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VILLANOVA UNIVERSITY
LANCASTER AVENUE
STUDENT RESIDENT HALLS

TRANSPORTATION IMPACT STUDY

Radnor Township

Delaware County, Pennsylvania

prepared for submission to:

RADNOR TOWNSHIP & PENNDOT DISTRICT 6-0

prepared by:

F. TAVANI AND ASSOCIATES, INC.

12 MARCH 2015

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FTA JOB NUMBER 211-027

PENNDOT TRAFFIC LOG #D13-008XR

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EXECUTIVE SUMMARY

The purpose of this Transportation Impact Study (TIS) is to examine the potential traffic impact of a proposed Villanova University project. The central feature of the project is a collection of undergraduate student residence hall buildings which is proposed to address presently-unmet on-campus housing demands of the existing student body. The project and the results of this study are summarized as follows:

- Key features of the project include 1,138 new beds for undergraduate students, a new performing arts center (PAC), a new 1,289-space garage (Pike Garage), and approximately 20,440 SF of Villanova-centric retail space on either side of Ithan Avenue south of Route 30, all of which is targeted to open in 2019.
- The residential component of the site will result in a reduction of peak hour traffic (since currently-commuting students will now reside on campus) but to be conservative peak hour traffic associated with 1,138 currently-commuting students was left in the road network and site driveways.
- The retail component of the site is estimated to generate 60 new vehicle trips during the weekday AM peak hour and 99 new vehicle trips during the PM peak hour.
- The project includes elimination of multiple driveways, consolidation of other small parking lots, and some expanded (existing) structured parking on main campus.
- The PAC, when funded, will replace currently-existing, outdated theater space found on the north side of campus and will not result in new weekday peak hour traffic.
- Access to the major components of the project will take place via new driveways along Route 30 and Ithan Avenue. Existing driveways along these roads will be removed, relocated, or altered in some fashion. The access modifications can be summarized as follows:
    - Between Route 320 and the Church Walk signalized intersection, eight (8) unsignalized and unrestricted driveways will be consolidated to become one (1) new unsignalized right-in/right-out (RIRO) driveway with EB right-turn lane near the proposed West Lancaster parking lot (WLA).
    - At the existing Church Walk signalized intersection along Route 30:
        - The existing location will be abandoned and a new signalized intersection will be installed approximately 175 feet to the west;
        - New auxiliary turn lanes (an EB right-turn lane and a WB left-turn lane) along Route 30 will be provided;
        - A second exit lane (NB configuration L + LR) will be provided; and
        - A grade-separated pedestrian bridge connecting Church Walk with the existing SEPTA Route 100 pedestrian staircases at the approximate location of the existing signalized intersection will be constructed.
    - At the existing, unsignalized, exit-only driveway along Route 30 just east of Ithan Avenue (PAC Driveway):
        - The driveway shall be modified to two-way operation (entry/exit);
        - A new EB right-turn lane and a new WB left-turn lane along Route 30 will be provided; and
        - Outbound left turns will be prohibited (all other movements allowed).

- At the four (4) existing, unsignalized driveways serving Main Lot and Pike Lot along Ithan Avenue just south of Route 30:
    - Existing parking lot driveways along Ithan Avenue will be removed;
    - One new two-way driveway serving the parking behind the residential housing (LAH) and one new two-way driveway serving the Pike Garage will be provided on each side of Ithan Avenue, opposite one another, just north of the existing SEPTA Route 100 overpass; and
    - One additional limited access (i.e., emergencies, deliveries, and special event recirculation) driveway on the east side of Ithan Avenue will be provided between the PAC and the Pike Garage.

- More details regarding roadway improvements are as follows:

Route 30 and Route 320/Kenilworth Street/Aldwyn Lane

- A contribution toward the cost an Adaptive Traffic Signal controller at this location shall be made by the University.

Route 30 and New RIRO Access (near WLA)

- Channelization islands to prohibit entering and exiting left turns shall be provided.
- A new EB right-turn only lane with 75 feet of taper, 125 feet of storage, and 14 feet width shall be provided.

Route 30 and Relocated Church Walk

- A contribution toward the cost an Adaptive Traffic Signal controller at this location shall be made by the University.
- A new EB right-turn only lane with 75 feet of taper, 125 feet of storage, and 14 feet width shall be provided.
- A new WB left-turn only lane with 75 feet of taper, 125 feet of storage, and 10 feet width shall be provided.
- 11 foot wide inside and 12 foot wide outside through lanes (10-foot travel lanes presently exist) shall be provided.

Route 30 and Ithan Avenue

- A contribution toward the cost an Adaptive Traffic Signal controller at this location shall be made by the University.
- The existing EB left-turn only lane shall be extended to provide a 75 feet of taper, 200 feet of storage, and 10 feet width.
- The existing NB left-turn only lane shall be extended to provide a 50 feet of taper, 190 feet of storage, and 11 feet width.
- The existing WB left-turn only lane shall be extended to provide a full-width (10 feet) section of approximately 250 feet (between Ithan Avenue and the PAC driveway) plus an additional full-width section beyond the PAC driveway (to the east) measuring an additional 75 feet with a 75-foot taper.
- 11-foot wide inside and 12-foot wide outside through lanes (10-foot travel lanes presently exist) shall be provided on each Route 30 approach to this intersection.

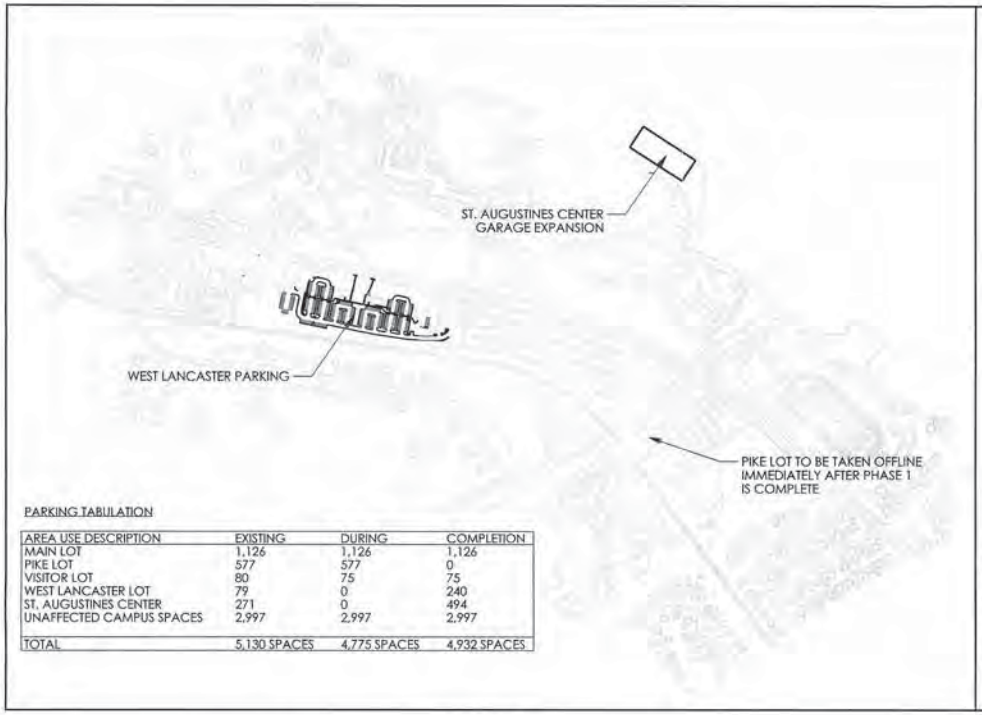
Additional Site Access Points

- At the currently-existing exit-only unsignalized driveway along Route 30 just east of Ithan Avenue (PAC Driveway):
  - The driveway shall be modified to provide entry/exit operation;
  - A new EB right-turn only lane with 50 feet of taper, 100 feet of storage, and 12 feet width shall be provided;
  - A new WB left-turn only lane with 75 feet of taper, 75 feet of storage, and 10 feet width (an extension of the existing WB left-turn lane at Ithan Avenue) shall be provided; and
  - Exiting left turns shall be prohibited (signage and channelization features).
- At the proposed new unsignalized intersection serving the LAH rear lot and Pike Garage along Ithan Avenue:
  - A new SB left-turn lane featuring 50 feet of storage and 50 feet of taper shall be provided;
  - A new pedestrian crosswalk (with post-mounted, pedestrian-actuated Rectangular Rapid Flash Beacons [RRFB] on each side) spanning the NB approach of Ithan Avenue connecting the garage and the resident halls shall be provided; and
  - Free-flow operation of Ithan Avenue traffic shall be maintained.

Other findings of this study include:

- The measured sight distances at the proposed site driveways will satisfy all PennDOT sight distance requirements.
- Traffic Adaptive signal improvements at additional off-site intersections may occur along Route 30. The University's cost component is subject to a monetary limit as stipulated during the conditional use hearings. The actual improvements will be designed and implemented by the Township.
- Not every offered roadway improvement (pedestrian bridge, Route 30 driveway consolidation west of Church Walk, etc.) is required to mitigate project impacts, but have been included in the project as requested by PennDOT and/or the Township.
- Level of service comparison tables demonstrate no significant impacts to any intersection in the study area, either in terms of overall delay increase or critical movement delay increase.
- Proposed new turn lanes accommodate projected queues.
- Accident investigations reveal no correctable patterns.
- Additional information relative to special event parking and traffic management is provided under separate cover by the University.
- A **Phasing Narrative** which summarizes the proposed phasing of both roadway improvements and building construction as well as level of service (LOS) and queue comparisons tables (**Tables I** and **II**) follow on the next several pages.

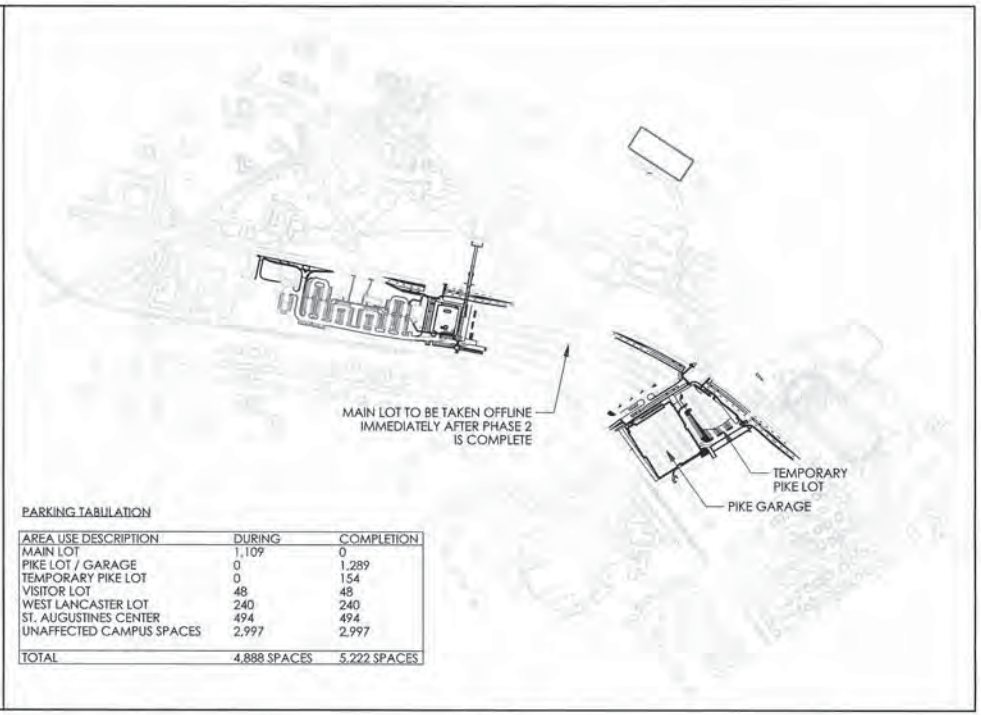
Local studies in the Delaware Valley have shown significant reduction in delays when Traffic Adaptive (TA) signal improvements are installed. TA benefits are not directly modeled in this TIS, making the results that much more conservative.



PARKING TABULATION

AREA USE DESCRIPTION	EXISTING	DURING	COMPLETION
MAIN LOT	1,126	1,126	1,126
PIKE LOT	577	577	0
VISITOR LOT	80	75	75
WEST LANCASTER LOT	79	0	240
ST. AUGUSTINES CENTER	271	0	494
UNAFFECTED CAMPUS SPACES	2,997	2,997	2,997
TOTAL	5,130 SPACES	4,775 SPACES	4,932 SPACES

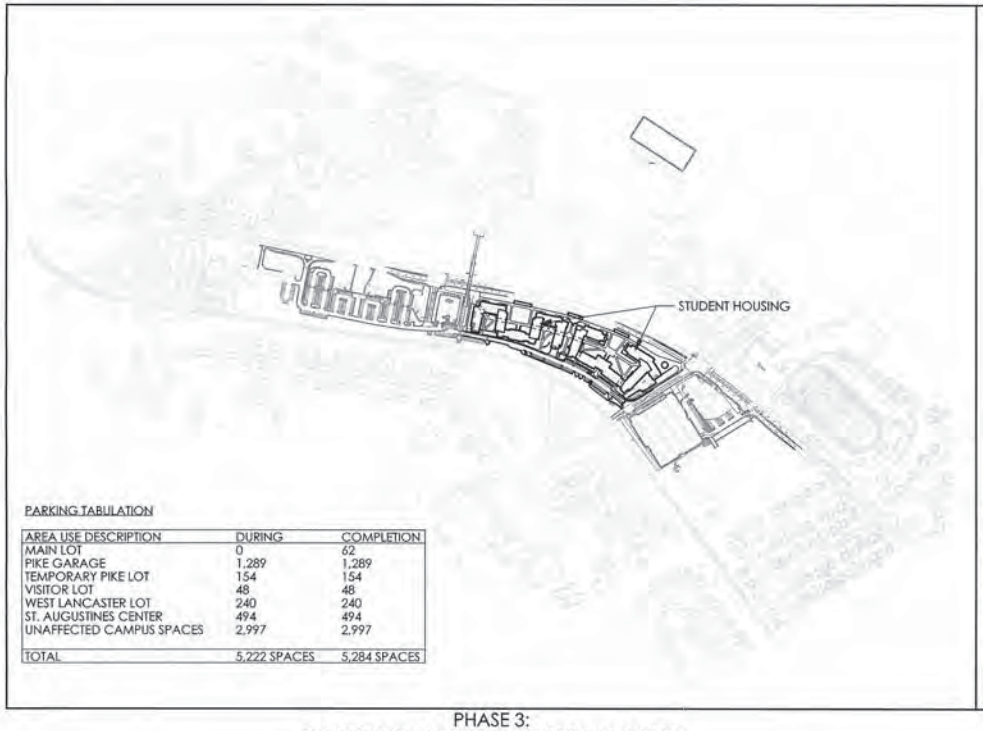
PHASE 1:
CONSTRUCT WEST LANCASTER AVENUE PARKING AND
ST. AUGUSTINE CENTER GARAGE EXPANSION



PARKING TABULATION

AREA USE DESCRIPTION	DURING	COMPLETION
MAIN LOT	1,109	0
PIKE LOT / GARAGE	0	1,289
TEMPORARY PIKE LOT	0	154
VISITOR LOT	48	48
WEST LANCASTER LOT	240	240
ST. AUGUSTINES CENTER	494	494
UNAFFECTED CAMPUS SPACES	2,997	2,997
TOTAL	4,888 SPACES	5,222 SPACES

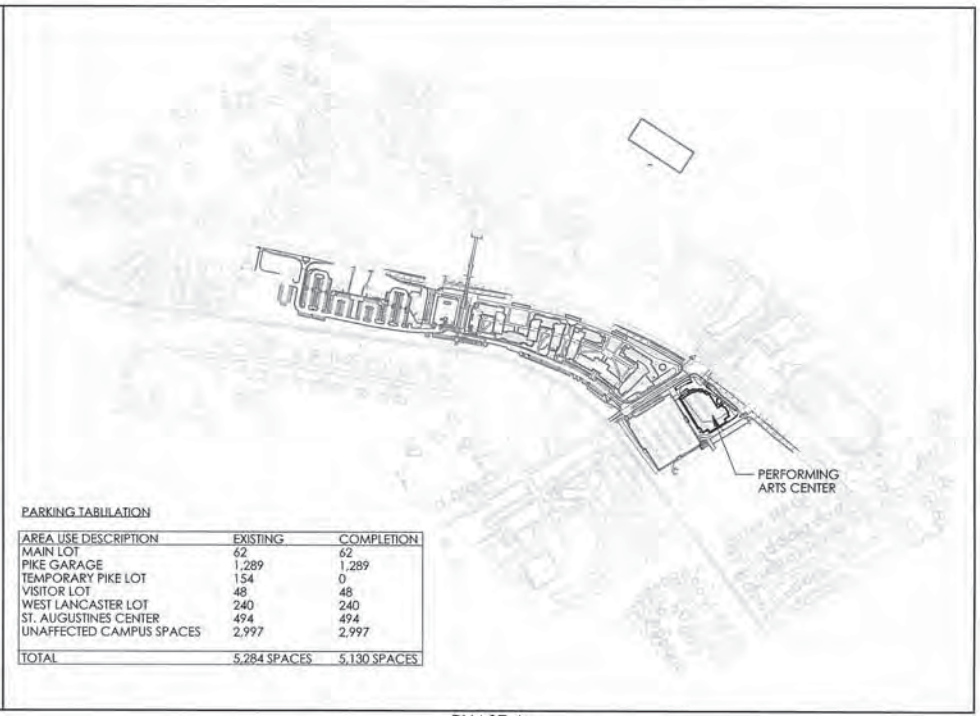
PHASE 2:
CONSTRUCT PIKE FIELD GARAGE, LANCASTER AVENUE / ITHAN AVENUE WORK
AND PEDESTRIAN BRIDGE OVER LANCASTER AVENUE



PARKING TABULATION

AREA USE DESCRIPTION	DURING	COMPLETION
MAIN LOT	0	62
PIKE GARAGE	1,289	1,289
TEMPORARY PIKE LOT	154	154
VISITOR LOT	48	48
WEST LANCASTER LOT	240	240
ST. AUGUSTINES CENTER	494	494
UNAFFECTED CAMPUS SPACES	2,997	2,997
TOTAL	5,222 SPACES	5,284 SPACES

PHASE 3:
CONSTRUCT LANCASTER AVENUE HOUSING



PARKING TABULATION

AREA USE DESCRIPTION	EXISTING	COMPLETION
MAIN LOT	62	62
PIKE GARAGE	1,289	1,289
TEMPORARY PIKE LOT	154	0
VISITOR LOT	48	48
WEST LANCASTER LOT	240	240
ST. AUGUSTINES CENTER	494	494
UNAFFECTED CAMPUS SPACES	2,997	2,997
TOTAL	5,284 SPACES	5,130 SPACES

PHASE 4:
CONSTRUCT PERFORMING ARTS CENTER

Table I
Level of Service Comparisons

1. Lancaster Avenue & Spring Mill Road/Kenilworth Road/Aldwyn Lane														
Direction	Movement	AM Peak Hour						PM Peak Hour						
Lancaster Avenue		2012 Existing	2020 Base	2020 Projected	2025 Base	2025 Projected	2025 w/ Alt Timing	2012 Existing	2020 Base	2020 Projected	2025 Base	2025 Projected	2025 w/ Alt Timing
Eastbound	L	**F 201**	**F 117**	**F 117**	**F 122**	**F122**	**None Required**	**F 283**	**F 138**	**F138**	**F 141**	**F 140**	**F 142**
	TT	**D**	**C**	**C**	**C 35**	**D 35**		**D**	**D**	**D 46**	**D 51**	**D 44**	**D 47**
	R	**A**	**A**	**A**	**A**	**A**		**B**	**B**	**A**	**B**	**A**	**A**
Westbound	L	**D**	**D**	**D**	**D**	**D**		**D**	**E 65**	**E 60**	**E 69**	**E 65**	**E 62**
	TTR	**F 93**	**E 76**	**F 80**	**F 85**	**F 89**		**D**	**F 81**	**E 73**	**F 85**	**E 65**	**E 75**
Spring Mill Road													
Northbound	L	**F 121**	**F 128**	**F 128**	**F 122**	**F 122**		**F 158**	**F 126**	**F 171**	**F 136**	**F 238**	**F 163**
	TR	**D**	**D**	**D**	**D**	**D**		**D**	**C**	**D**	**C 34**	**C 37**	**C 35**
Southbound	L	**D**	**E 55**	**E 55**	**E 55**	**E 55**		**D**	**D**	**D**	**D**	**D**	**D**
	TR	**F 146**	**F 116**	**F 117**	**F 111**	**F 111**		**F 352**	**F 112**	**F 121**	**F 115**	**F 136**	**F 136**
Aldwyn Lane													
Northbound	LTR	**E**	**F 170**	**F 170**	**F 174**	**F 174**		**E**	**F 189**	**F 236**	**F 192**	**F 241**	**F 241**
Kenilworth Road													
Southbound	LTR	**E**	**F 86**	**F 86**	**F 86**	**F 86**		**E**	**F 83**	**F 83**	**F 83**	**F 83**	**F 83**
OVERALL:		**E 79**	**E 68**	**E 69**	**E 70**	**E 72**		**F 99**	**E 76**	**E 77**	**E 79**	**E 80**	**E 80**

2. Lancaster Avenue & Church Walk														
Direction	Movement	AM Peak Hour						PM Peak Hour						
Lancaster Avenue		2012 Existing	2020 Base	2020 Projected	2025 Base	2025 Projected	2025 w/ Imp's	2012 Existing	2020 Base	2020 Projected	2025 Base	2025 Projected	2025 w/ Imp's
Eastbound	TTR	**A**	**A**	**A**	**A**	**A**	**None Required**	**A**	**A**	**A**	**A**	**A**	**None Required**
Westbound	LTT	**A**	**A**	**A**	**A**	**A**		**A**	**A**	**A**	**A**	**A**	
Church Walk													
Northbound	LR or L LR	**C**	**C**	**C**	**C**	**C**		**C**	**C**	**C**	**C**	**C**	
OVERALL:		**A 3**	**A 3**	**A 2**	**A 3**	**A 3**		**A 6**	**A 6**	**A 4**	**A 6**	**A 4**	

3. Lancaster Avenue & Ithan Avenues

Direction	Movement	AM Peak Hour						PM Peak Hour					
Lancaster Avenue		2012 Existing	2020 Base	2020 Projected	2025 Base	2025 Projected	2025 w/ Alt Timing	2012 Existing	2020 Base	2020 Projected	2025 Base	2025 Projected	2025 w/ Alt Timing
Eastbound	L	**C**	**C**	**C**	**C 29**	**D 35**	**D 41**	**C**	**C**	**C**	**C**	**C**	**C**
	TTR	**D**	**D**	**C**	**D 36**	**C 33**	**D 36**	**D**	**D**	**D**	**D**	**D**	**D**
Westbound	L	**C**	**C**	**B**	**D**	**B**	**B**	**D**	**D**	**C**	**D**	**C**	**C**
	TTR	**C**	**C**	**C**	**C 32**	**C 32**	**D 35**	**C**	**C**	**C**	**C**	**C**	**C**
Ithan Avenue													
Northbound	L	**F 93**	**F 121**	**F 81**	**F 125**	**F 83**	**E 66**	**F 94**	**F 126**	**F 154**	**F 145**	**F 216**	**F 98**
	TR	**E 68**	**E 75**	**F 84**	**E 75**	**F 86**	**E 71**	**D**	**E 56**	**D 53**	**E 57**	**D 49**	**D 43**
Southbound	L	**D**	**D 46**	**F 105**	**D 46**	**F 108**	**E 78**	**D**	**D 53**	**E 70**	**D 53**	**E 61**	**D 50**
	TR	**E 71**	**E 79**	**E 64**	**E 79**	**E 64**	**E 57**	**F 88**	**F 100**	**F 96**	**F 104**	**F 111**	**E 76**
OVERALL:		**D 43**	**D 45**	**D 44**	**D 46**	**D 44**	**D43**	**D 48**	**D 48**	**D 49**	**D 50**	**D 52**	**D 49**

4. Lancaster Avenue & Lowrys Lane

Direction	Movement	AM Peak Hour						PM Peak Hour					
Lancaster Avenue		2012 Existing	2020 Base	2020 Projected	2025 Base	2025 Projected	2025 w/ Imp's	2012 Existing	2020 Base	2020 Projected	2025 Base	2025 Projected	2025 w/ Imp's
Eastbound	LTTR	**A**	**A**	**A**	**A**	**A**	**None Required**	**A**	**A**	**B**	**A**	**B**	**None Required**
Westbound	LTTR	**A**	**A**	**A**	**A**	**A**		**A**	**A**	**A**	**A**	**A**	
Lowrys Lane													
Northbound	LTR	**C**	**C**	**C**	**C**	**C**		**C**	**C**	**C**	**C**	**C**	
Southbound	LTR	**C**	**C**	**C**	**C**	**C**		**C**	**C**	**C**	**C**	**C**	
OVERALL:		**A 7**	**A 7**	**A 10**	**A 7**	**B 10**		**A 8**	**A 7**	**B 11**	**A 7**	**B 11**	

5. Conestoga Road & Sproul Road

Direction	Movement	AM Peak Hour						PM Peak Hour					
Conestoga Road		2012 Existing	2020 Base	2020 Projected	2025 Base	2025 Projected	2025 w/ Imp's	2012 Existing	2020 Base	2020 Projected	2025 Base	2025 Projected	2025 w/ Imp's
Eastbound	L	**D**	**C**	**D**	**D 46**	**E 57**	**None Required**	**B**	**C**	**C**	**C**	**C**	**None Required**
	TR	**C**	**C**	**C**	**C**	**C**		**C**	**C**	**C**	**C**	**C**	
Westbound	L	**C**	**C**	**C**	**C**	**C**		**C**	**C**	**C**	**C**	**C**	
	TR	**F 72**	**F 65**	**E 56**	**F 68**	**E 59**		**D**	**D**	**D**	**D**	**D**	
Sproul Road													
Northbound	L	**C**	**D**	**D**	**D**	**D**		**B**	**B**	**B**	**B**	**B**	
	TR	**C**	**C**	**C**	**C**	**C**		**B**	**B**	**B**	**B**	**B**	
Southbound	LTR	**D**	**D**	**D**	**E 56**	**E 56**		**D**	**D**	**D**	**D**	**D**	
OVERALL:		**D 41**	**D 42**	**D 40**	**D 43**	**D 42**		**C 32**	**C 34**	**C 34**	**D 35**	**D 35**	

6. Conestoga Road & Ithan Avenue

Direction	Movement	AM Peak Hour						PM Peak Hour					
Conestoga Road		2012 Existing	2020 Base	2020 Projected	2025 Base	2025 Projected	2025 w/ Imp's	2012 Existing	2020 Base	2020 Projected	2025 Base	2025 Projected	2025 w/ Imp's
Eastbound	LTR	**D 51**	**D 51**	**E 58**	**E 60**	**E 65**	**None Required**	**B**	**B**	**B**	**B**	**B**	**None Required**
Westbound	LTR	**B**	**B**	**B**	**B**	**B**		**B**	**B**	**B**	**B**	**B**	
Ithan Avenue													
Northbound	LTR	**B**	**C**	**C**	**C**	**C**		**B**	**B**	**B**	**B**	**B**	
Southbound	LTR	**C**	**C**	**C**	**C**	**C**		**B**	**B**	**B**	**B**	**B**	
OVERALL:		**C 29**	**C 30**	**C 33**	**C 33**	**D 36**		**B 12**	**B 12**	**B 13**	**B 12**	**B 13**	

7. Conestoga Road & Garrett Avenue

Direction	Movement	AM Peak Hour						PM Peak Hour					
Conestoga Road		2012 Existing	2020 Base	2020 Projected	2025 Base	2025 Projected	2025 w/ Imp's	2012 Existing	2020 Base	2020 Projected	2025 Base	2025 Projected	2025 w/ Imp's
Eastbound	LTR	**A**	**A**	**A**	**A**	**A**	**None Required**	**A**	**A**	**A**	**A**	**A**	**None Required**
Westbound	LTR	**A**	**A**	**A**	**A**	**A**		**A**	**A**	**A**	**A**	**A**	
Garrett Avenue													
Northbound	LTR	**C**	**C**	**C**	**C**	**C**		**C**	**C**	**C**	**C**	**C**	
Southbound	LTR	**C**	**C**	**C**	**C**	**C**		**C**	**C**	**C**	**C**	**C**	
OVERALL:		**A 6**	**A 6**	**A 6**	**A 6**	**A 6**		**A 7**	**A 7**	**A 7**	**A 8**	**A 8**	

8. County Line & Spring Mill Roads

Direction	Movement	AM Peak Hour						PM Peak Hour					
County Line Road		2012 Existing	2020 Base	2020 Projected	2025 Base	2025 Projected	2025 w/ Imp's	2012 Existing	2020 Base	2020 Projected	2025 Base	2025 Projected	2025 w/ Imp's
Eastbound	LTR	**B**	**B**	**B**	**B**	**B**	**None Required**	**C**	**C**	**C**	**C**	**C**	**None Required**
Westbound	LTR	**B**	**B**	**B**	**B**	**B**		**B**	**B**	**B**	**B**	**B**	
Spring Mill Road													
Northbound	LTR	**C**	**C**	**C**	**C**	**B**		**B**	**C**	**C**	**C**	**C**	
Southbound	LTR	**C**	**C**	**C**	**C**	**B**		**C**	**C**	**C**	**C**	**C**	
OVERALL:		**B 16**	**B 17**	**B 17**	**B 18**	**B 18**		**B 19**	**C 22**	**C 22**	**C 23**	**C 23**	

9. Lancaster Avenue & Garrett Avenue

Direction	Movement	AM Peak Hour						PM Peak Hour					
Lancaster Avenue		2012 Existing	2020 Base	2020 Projected	2025 Base	2025 Projected	2025 w/ Imp's	2012 Existing	2020 Base	2020 Projected	2025 Base	2025 Projected	2025 w/ Imp's
Westbound	L	**B**	**B**	**C**	**C**	**C**	**None Required**	**B**	**B**	**B**	**B**	**C**	**None Required**
Northbound	R	**C**	**C**	**C**	**C**	**C**		**C**	**C**	**C**	**C**	**C**	
OVERALL:		**A 3**	**A 4**	**A 4**	**A 4**	**A 4**		**A 1**	**A 2**	**A 2**	**A 2**	**A 2**	

10. Conestoga Road & Spring Mill Road

Direction	Movement	AM Peak Hour						PM Peak Hour					
Conestoga Road		2012 Existing	2020 Base	2020 Projected	2025 Base	2025 Projected	2025 w/ Imp's	2012 Existing	2020 Base	2020 Projected	2025 Base	2025 Projected	2025 w/ Imp's
Eastbound	L	A	A	A	A	A	None Required	A	A	A	A	A	None Required
Spring Mill Road													
Southbound	LR	C	C	C	C	C		C	C	C	D	D	
OVERALL:		A 1	A 1	A 1	A 1	A 1		A 1	A 1	A 1	A 1	A 1	

11. Conestoga Road & Lowrys Lane

Direction	Movement	AM Peak Hour						PM Peak Hour					
Conestoga Road		2012 Existing	2020 Base	2020 Projected	2025 Base	2025 Projected	2025 w/ Imp's	2012 Existing	2020 Base	2020 Projected	2025 Base	2025 Projected	2025 w/ Imp's
Eastbound	L	A	A	A	A	A	None Required	A	A	A	A	A	None Required
Westbound	L	A	A	A	A	A		A	A	A	A	A	
Lowrys Lane													
Northbound	LTR	E 38	E 40	E 40	E 41	E 43		C	D	D	D	D	
Southbound	LTR	C	C	C	C	C		C	C	C	C	C	
OVERALL:		A 4	A 4	A 4	A 4	A 4		A 3	A 3	A 3	A 3	A 3	

12. County Line Road & Ithan Avenue North

Direction	Movement	AM Peak Hour						PM Peak Hour					
County Line Road		2012 Existing	2020 Base	2020 Projected	2025 Base	2025 Projected	2025 w/ Imp's	2012 Existing	2020 Base	2020 Projected	2025 Base	2025 Projected	2025 w/ Imp's
Eastbound	LR	D	D	D	D	D	None Required	D	D	D	D	D	None Required
Ithan Avenue													
Southbound	TR	D	D	D	D	D		D	D	D	D	D	
OVERALL:		D 30	D 31	D 31	D 31	D 31		D 30	D 31	D 31	D 31	D 32	

13. County Line Road & Ithan Avenue South

Direction	Movement	AM Peak Hour						PM Peak Hour					
County Line Road		2012 Existing	2020 Base	2020 Projected	2025 Base	2025 Projected	2025 w/ Imp's	2012 Existing	2020 Base	2020 Projected	2025 Base	2025 Projected	2025 w/ Imp's
Westbound	LR	C	C	C	C	C	None Required	C	C	C	C	C	None Required
Ithan Avenue													
Northbound	TR	C	C	C	C	C		C	C	C	C	C	
OVERALL:		C 20	C 21	C 21	C 21	C 21		C 20	C 21	D 25	C 21	D 25	

14. County Line Road & Lowrys Lane

Direction	Movement	AM Peak Hour						PM Peak Hour					
County Line Road		2012 Existing	2020 Base	2020 Projected	2025 Base	2025 Projected	2025 w/ Imp's	2012 Existing	2020 Base	2020 Projected	2025 Base	2025 Projected	2025 w/ Imp's
Westbound	L	A	A	A	A	A	None Required	A	A	A	A	A	None Required
Lowrys Lane													
Northbound	LR	B	B	B	B	B		B	B	B	B	B	
OVERALL:		A 4	A 4	A 4	A 4	A 4		A 2	A 2	A 2	A 2	A 2	

15. County Line Road & Airdale Road

Direction	Movement	AM Peak Hour						PM Peak Hour					
County Line Road		2012 Existing	2020 Base	2020 Projected	2025 Base	2025 Projected	2025 w/ Imp's	2012 Existing	2020 Base	2020 Projected	2025 Base	2025 Projected	2025 w/ Imp's
Eastbound	LR	A	A	A	A	A	None Required	A	A	A	A	A	None Required
Airdale Road													
Northbound	L	B	B	B	B	B		B	B	B	B	B	
OVERALL:		A 4	A 4	A 4	A 4	A 4		A 4	A 4	A 4	A 4	A 4	

16. County Line Road & Roberts Road

Direction	Movement	AM Peak Hour						PM Peak Hour					
County Line Road		2012 Existing	2020 Base	2020 Projected	2025 Base	2025 Projected	2025 w/ Imp's	2012 Existing	2020 Base	2020 Projected	2025 Base	2025 Projected	2025 w/ Imp's
Eastbound	L	A	A	A	A	A	None Required	A	A	A	A	A	None Required
Westbound	L	A	A	A	A	A		A	A	A	A	A	
Roberts Road													
Northbound	LTR	F 181	F 207	F 207	F 226	F 226		E	E	E	E	E	
Southbound	LTR	D	E 36	E 36	E 38	E		D	D	D	D	D	
OVERALL:		C 24	D 27	D 27	D 30	D 30		A 3	A 3	A 3	A 3	A 3	

17. Ithan Avenue & Aldwyn Lane

Direction	Movement	AM Peak Hour						PM Peak Hour					
Aldwyn Lane		2012 Existing	2020 Base	2020 Projected	2025 Base	2025 Projected	2025 w/ Imp's	2012 Existing	2020 Base	2020 Projected	2025 Base	2025 Projected	2025 w/ Imp's
Eastbound	LTR	B	B	B	B	B	None Required	B	B	B	B	B	None Required
Westbound	LTR	B	B	B	B	B		B	B	B	B	B	
Ithan Avenue													
Northbound	L	A	A	A	A	A		A	A	A	A	A	
Southbound	L	A	A	A	A	A		A	A	A	A	A	
OVERALL:		A 2	A 2	A 2	A 2	A 2		A 2	A 2	A 2	A 2	A 2	

18. Lancaster Avenue & WLA RIRO Drive

Direction	Movement	AM Peak Hour						PM Peak Hour					
WLA RIRO Drive		2012 Existing	2020 Base	2020 Projected	2025 Base	2025 Projected	2025 ALT	2012 Existing	2020 Base	2020 Projected	2025 Base	2025 Projected	2025 ALT
Northbound	R			**B**		**B**	**NA**			**B**		**B**	**NA**
OVERALL:				**A 1**		**A 1**				**A 1**		**A 1**	

19. Lancaster Avenue & PAC RILIRO Drive

Direction	Movement	AM Peak Hour						PM Peak Hour					
Lancaster Avenue		2012 Existing	2020 Base	2020 Projected	2025 Base	2025 Projected	2025 ALT	2012 Existing	2020 Base	2020 Projected	2025 Base	2025 Projected	2025 ALT
Westbound	L			**B**		**B**	**NA**			**B**		**B**	**NA**
PAC RILIRO Drive													
Northbound	R			**B**		**B**				**C**		**C**	
OVERALL:				**A 1**		**A 1**				**A 1**		**A 1**	

20. Ithan Avenue & LAH / Garage Drive

Direction	Movement	AM Peak Hour						PM Peak Hour					
LAH / Garage Drive		2012 Existing	2020 Base	2020 Projected	2025 Base	2025 Projected	2025 ALT	2012 Existing	2020 Base	2020 Projected	2025 Base	2025 Projected	2025 ALT
Eastbound	LTR			**C**		**C**	**NA**			**C**		**C**	**NA**
Westbound	LTR			**B**		**C**				**C**		**C**	
Ithan Avenue													
Northbound	L			**A**		**A**				**A**		**A**	
Southbound	L			**A**		**A**				**A**		**A**	
OVERALL:				**A 3**		**A 4**				**A 8**		**A 8**	

Base = No-Build Scenario
Projected = Build Scenario

Table II

QUEUE COMPARISON TABLE
SIGNALIZED INTERSECTIONS

1. Lancaster Avenue & Spring Mill Road/Kenilworth Road/Aldwyn Lane

Control Type:	Signalized								
Direction	Movement	AM Peak Hour				PM Peak Hour			
Lancaster Avenue		Available Storage	Proposed Storage (If Different)	2025 Base	2025 Projected	Available Storage	Proposed Storage (If Different)	2025 Base	2025 Projected
Eastbound	L	300 or 560*	---	428	428	300 or 560*	---	455	455 - 455
	TT	[500]	---	513	523	[500]	---	627	599 - 614
	R	350	---	71	73	350	---	125	112 - 119
Westbound	L	75	---	33	34	75	---	58	54 - 56
	TTR	[1600]	---	767	786	[1600]	---	581	571 - 593
Spring Mill Road									
Northbound	L	375	---	317	317	375	---	341	386 - 363
	TR	[1100]	---	338	338	[1100]	---	153	160 - 156
Southbound	L	75	---	57	59	75	---	77	79 - 79
	TR	[1000]	---	546	546	[1000]	---	683	704 - 704
Aldwyn Lane									
Northbound	LTR	[700]	---	178	178	[700]	---	197	205 - 205
Kenilworth Road									
Southbound	LTR	[900]	---	44	44	[900]	---	48	48 - 48

2. Lancaster Avenue & Church Walk

Control Type:	Signalized								
Direction	Movement	AM Peak Hour				PM Peak Hour			
Lancaster Avenue		Available Storage	Proposed Storage (If Different)	2025 Base	2025 Projected	Available Storage	Proposed Storage (If Different)	2025 Base	2025 Projected
Eastbound	TTR or TT	[1600]	1400	102	88	[1600]	1400	208	153
	R	none	125	--	<25	none	125	--	<25
Westbound	LTT or TT	[1300]	1500	330	317	[1300]	1500	109	12
	L	none	125	--	<25	none	125	--	<25
Church Walk									
Northbound	LR or L LR	200++	---	<25	<25	200++	---	67	36

3. Lancaster Avenue & Ithan Avenues

Control Type:	Signalized								
Lancaster Avenue		Available Storage	Proposed Storage (If Different)	2025 Base	2025 Projected	Available Storage	Proposed Storage (If Different)	2025 Base	2025 Projected
Eastbound	L	100	200	82	104 - 119	100	200	63	78 - 78
	TTR	[1300]	---	415	365 - 479	[1300]	---	627	673 - 729
Westbound	L	125	250	105	35 - 38	125	250	105	45 - 50
	TTR	[950]	---	501	508 - 563	[950]	---	244	241 - 321
Ithan Avenue									
Northbound	L	50	190	178	169 - 137	50	190	148	189 - 159
	TR	[1050]	---	347	381 - 330	[1050]	---	244	185 - 175
Southbound	L	75	---	48	160 - 135	75	---	99	171 - 150
	TR	[550]	---	372	292 - 253	[550]	---	458	464 - 412

Table II

QUEUE COMPARISON TABLE
SIGNALIZED INTERSECTIONS

4. Lancaster Avenue & Lowrys Lane									
Control Type:	**Signalized**								
Direction	Movement	**AM Peak Hour**				**PM Peak Hour**			
Lancaster Avenue		Available Storage	Proposed Storage (If Different)	2025 Base	2025 Projected	Available Storage	Proposed Storage (If Different)	2025 Base	2025 Projected
Eastbound	LTTR	[450]	---	207	170	[450]	---	212	277
Westbound	LTTR	[350]	---	216	224	[350]	---	173	176
Lowrys Lane									
Northbound	LTR	[850]	---	143	143	[850]	---	52	52
Southbound	LTR	[600]	---	81	81	[600]	---	190	190

5. Conestoga Road & Sproul Road									
Control Type:	**Signalized**								
Direction	Movement	**AM Peak Hour**				**PM Peak Hour**			
Conestoga Road		Available Storage	Proposed Storage (If Different)	2025 Base	2025 Projected	Available Storage	Proposed Storage (If Different)	2025 Base	2025 Projected
Eastbound	L	75	---	169	180	75	---	65	65
	TR	[450]	---	655	660	[450]	---	702	707
Westbound	L	75	---	48	48	75	---	43	43
	TR	[150]	---	705	692	[150]	---	569	563
Sproul Road									
Northbound	L	75	---	231	231	75	---	66	66
	TR	[1250]	---	224	224	[1250]	---	122	122
Southbound	LTR	[1200]	---	416	416	[1200]	---	446	447

6. Conestoga Road & Ithan Avenue									
Control Type:	**Signalized**								
Direction	Movement	**AM Peak Hour**				**PM Peak Hour**			
Conestoga Road		Available Storage	Proposed Storage (If Different)	2025 Base	2025 Projected	Available Storage	Proposed Storage (If Different)	2025 Base	2025 Projected
Eastbound	LTR	[750]	---	469	424	[750]	---	315	325
Westbound	LTR	[500]	---	269	260	[500]	---	231	236
Ithan Avenue									
Northbound	LTR	[+1500]	---	120	126	[+1500]	---	28	31
Southbound	LTR	[500]	---	157	177	[500]	---	182	204

Table II

QUEUE COMPARISON TABLE
SIGNALIZED INTERSECTIONS

7. Conestoga Road & Garrett Avenue									
Control Type:	**Signalized**								
Direction	Movement	**AM Peak Hour**				**PM Peak Hour**			
Conestoga Road		Available Storage	Proposed Storage (If Different)	2025 Base	2025 Projected	Available Storage	Proposed Storage (If Different)	2025 Base	2025 Projected
Eastbound	LTR	[200]	---	130	131	[200]	---	189	194
Westbound	LTR	[300]	---	114	116	[300]	---	189	193
Garrett Avenue									
Northbound	LTR	[500]	---	29	29	[500]	---	33	33
Southbound	LTR	[1400]	---	59	59	[1400]	---	84	84

8. County Line & Spring Mill Roads									
Control Type:	**Signalized**								
Direction	Movement	**AM Peak Hour**				**PM Peak Hour**			
County Line Road		Available Storage	Proposed Storage (If Different)	2025 Base	2025 Projected	Available Storage	Proposed Storage (If Different)	2025 Base	2025 Projected
Eastbound	LTR	[+1500]	---	276	270	[+1500]	---	408	393
Westbound	LTR	[900]	---	187	189	[900]	---	193	178
Spring Mill Road									
Northbound	LTR	[450]	---	196	204	[450]	---	373	386
Southbound	LTR	[+1500]	---	263	272	[+1500]	---	292	313

Base = No-Build Scenario

Projected = Build Scenario

All values shown in feet. If queue is is less than one car it is shown as <25

If timing alternatives were considered those associated queues are shown as 2nd entries

* indicates additional left-turn lane storage available in another left-turn lane at immediately adjacent upstream intersection.

Storage values with ++ mean minimum value shown, additional storage available within parking lot, parking garage, etc.

[ ] values in brackets are approximate distance to next significant upstream intersection.

If distance exceeds 1500 feet then +1500 is shown

Table II

QUEUE COMPARISON TABLE
UNSIGNALIZED INTERSECTIONS

9. Lancaster Avenue & Garrett Avenue									
Control Type:	**Unsignalized**								
Direction	Movement	**AM Peak Hour**				**PM Peak Hour**			
Lancaster Avenue		Available Storage	Proposed Storage (If Different)	2025 Base	2025 Projected	Available Storage	Proposed Storage (If Different)	2025 Base	2025 Projected
Westbound	L	[600]	---	<25	<25	[600]	---	<25	<25
Garrett Avenue									
Northbound	LR	[400]	---	<25	<25	[400]	---	<25	<25

10. Conestoga Road & Spring Mill Road									
Control Type:	**Unsignalized**								
Direction	Movement	**AM Peak Hour**				**PM Peak Hour**			
Conestoga Road		Available Storage	Proposed Storage (If Different)	2025 Base	2025 Projected	Available Storage	Proposed Storage (If Different)	2025 Base	2025 Projected
Eastbound	L	[150]	---	<25	<25	[150]	---	<25	<25
Spring Mill Road									
Southbound	LR	[1150]	---	<25	<25	[1150]	---	<25	<25

11. Conestoga Road & Lowrys Lane									
Control Type:	**Unsignalized**								
Direction	Movement	**AM Peak Hour**				**PM Peak Hour**			
Conestoga Road		Available Storage	Proposed Storage (If Different)	2025 Base	2025 Projected	Available Storage	Proposed Storage (If Different)	2025 Base	2025 Projected
Eastbound	L	[275]	---	<25	<25	[275]	---	<25	<25
Westbound	L	[750]	---	<25	<25	[750]	---	<25	<25
Lowrys Lane									
Northbound	LTR	[1000]	---	33	35	[1000]	---	<25	<25
Southbound	LTR	[300]	---	40	40	[300]	---	<25	<25

12. County Line Road & Ithan Avenue North									
Control Type:	**Unsignalized**								
Direction	Movement	**AM Peak Hour**				**PM Peak Hour**			
County Line Road		Available Storage	Proposed Storage (If Different)	2025 Base	2025 Projected	Available Storage	Proposed Storage (If Different)	2025 Base	2025 Projected
Eastbound	LR	[900]	---	n/a	n/a	[900]	---	n/a	n/a
Ithan Avenue									
Southbound	TR	[250]	---	n/a	n/a	[250]	---	n/a	n/a

Table II

QUEUE COMPARISON TABLE
UNSIGNALIZED INTERSECTIONS

13. County Line Road & Ithan Avenue South									
Control Type:	**Unsignalized**								
Direction	Movement	**AM Peak Hour**				**PM Peak Hour**			
County Line Road		Available Storage	Proposed Storage (If Different)	2025 Base	2025 Projected	Available Storage	Proposed Storage (If Different)	2025 Base	2025 Projected
Westbound	LR	[+1500]	---	n/a	n/a	[+1500]	---	n/a	n/a
Ithan Avenue									
Northbound	TR	[400]	---	n/a	n/a	[400]	---	n/a	n/a

14. County Line Road & Lowrys Lane									
Control Type:	**Unsignalized**								
Direction	Movement	**AM Peak Hour**				**PM Peak Hour**			
County Line Road		Available Storage	Proposed Storage (If Different)	2025 Base	2025 Projected	Available Storage	Proposed Storage (If Different)	2025 Base	2025 Projected
Westbound	L	[300]	---	<25	<25	[300]	---	<25	<25
Lowrys Lane									
Northbound	LR	[350]	---	28	28	[350]	---	<25	<25

15. County Line Road & Airdale Road									
Control Type:	**Unsignalized**								
Direction	Movement	**AM Peak Hour**				**PM Peak Hour**			
County Line Road		Available Storage	Proposed Storage (If Different)	2025 Base	2025 Projected	Available Storage	Proposed Storage (If Different)	2025 Base	2025 Projected
Eastbound	LR	[1000]	---	25	25	[1000]	---	<25	<25
Airdale Road									
Northbound	L	[100]	---	<25	<25	[100]	---	<25	<25

16. County Line Road & Roberts Road									
Control Type:	**Unsignalized**								
Direction	Movement	**AM Peak Hour**				**PM Peak Hour**			
County Line Road		Available Storage	Proposed Storage (If Different)	2025 Base	2025 Projected	Available Storage	Proposed Storage (If Different)	2025 Base	2025 Projected
Eastbound	L	[200]	---	<25	<25	[200]	---	<25	<25
Westbound	L	[400]	---	<25	<25	[400]	---	<25	<25
Roberts Road									
Northbound	LTR	[350]	---	300	300	[350]	---	50	50
Southbound	LTR	[300]	---	<25	<25	[300]	---	25	25

Table II

QUEUE COMPARISON TABLE
UNSIGNALIZED INTERSECTIONS

17. Ithan Avenue & Aldwyn Lane									
Control Type:	**Unsignalized**								
Direction	Movement	**AM Peak Hour**				**PM Peak Hour**			
Aldwyn Lane		Available Storage	Proposed Storage (If Different)	2025 Base	2025 Projected	Available Storage	Proposed Storage (If Different)	2025 Base	2025 Projected
Eastbound	LTR	[500]	---	<25	<25	[500]	---	<25	<25
Westbound	LTR	[200++]	---	<25	<25	[200++]	---	<25	<25
Ithan Avenue									
Northbound	L	[550]	---	<25	<25	[550]	---	<25	<25
Southbound	L	[950]	---	<25	<25	[950]	---	<25	<25

18. Lancaster Avenue & WLA RI/RO Drive									
Control Type:	**Unsignalized**								
Direction	Movement	**AM Peak Hour**				**PM Peak Hour**			
WLL RIRO Drive		Available Storage	Proposed Storage (If Different)	2025 Base	2025 Projected	Available Storage	Proposed Storage (If Different)	2025 Base	2025 Projected
Eastbound	R	none	125		<25	none	125		<25

19. Lancaster Avenue & PAC RI/LI/RO Drive									
Control Type:	**Unsignalized**								
Direction	Movement	**AM Peak Hour**				**PM Peak Hour**			
Lancaster Avenue		Available Storage	Proposed Storage (If Different)	2025 Base	2025 Projected	Available Storage	Proposed Storage (If Different)	2025 Base	2025 Projected
Eastbound	R	none	100		<25	none	100		<25
Westbound	L	none	75		<25	none	75		<25
PAC RILIRO Drive									
Northbound	R	none	290		<25	none	290		<25

20. Ithan Avenue & LAH / Garage Drive									
Control Type:	**Unsignalized**								
Direction	Movement	**AM Peak Hour**				**PM Peak Hour**			
LAH / Garage Drive		Available Storage	Proposed Storage (If Different)	2025 Base	2025 Projected	Available Storage	Proposed Storage (If Different)	2025 Base	2025 Projected
Eastbound	LTR	100++	---		25	100++	---		<25
Westbound	LTR	100++	---		<25	100++	---		<25
Ithan Avenue									
Northbound	L	none	---		<25	none	---		<25
Southbound	L	none	50		<25	none	50		<25

Base = No-Build Scenario

Projected = Build Scenario

All values shown in feet

Storage values with ++ mean minimum value shown, additional storage available within parking lot

[ ] values in brackets are approximate distance to next upstream intersection or driveway

INTRODUCTION

Villanova University ("Villanova") proposes construction of new undergraduate student residence halls on the site of an existing parking lot (known as "Main Lot") near the intersection of Lancaster Avenue and Ithan Avenue. Construction of the new halls will displace 1,126 existing surface parking spaces currently found on the Main Lot. The majority of replacement parking is provided in a new parking structure to be constructed east of Ithan Avenue in an area currently occupied by a surface parking lot having a capacity of 577 spaces ("Pike Lot"). The project also includes plans for a performing art center and approximately 20,440 SF of Villanova-centric retail space. This transportation impact study was prepared per the requirements of the zoning ordinance of Radnor Township as adopted in January 2014. The ordinance features a requirement for traffic investigations pursuant to PennDOT Strike Off Letter (SOL) 470-09-4.

Traffic investigations and related due diligence with the Township and PennDOT began well before ordinance adoption. Radnor Township provided input on scope of work in 2012 with most data collection taking place that fall. See **Appendix A** for more details and other project correspondence. Additional efforts unfolded as ordinance adoption efforts continued through 2013. With the ordinance adopted and a conditional use hearing completed in 2014, additional comments have been received from both PennDOT and the Township and are reflected herein.

The new student residence halls will provide a total of 1,138 new beds and are intended to address currently-unmet undergraduate student housing demand. This unmet demand results in students living off campus and commuting to classes. Construction of the new halls will result in reduced student commuting activity. Regardless of their location and the possibility of more-distanced students 'backfilling' nearby off-campus student housing, the number of peak hour commuting trips will be less after the project is constructed as 1,138 currently-commuting students – near or far – will become campus-residing (non-commuting) students. The study area and the project location are shown in **Figure 1**. An excerpt of the site plan is shown in **Figure 2**.

EXISTING ROAD NETWORK

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

TABLE 1
ROADWAY CHARACTERISTICS WITHIN STUDY AREA

Roadway Name	Route #	Smart Trans. Guidelines Roadway Class/Type	Directional Orientation	Posted Speed Limit	AADT per iTMS (09/2014)
Lancaster Avenue	SR 0030	Regional Arterial	E-W	25	17,264

TABLE 1 (continued)
ROADWAY CHARACTERISTICS WITHIN STUDY AREA

Roadway Name	Route #	Smart Trans. Guidelines Roadway Class/Type	Directional Orientation	Posted Speed Limit	AADT per iTMS (09/2014)
Conestoga Road	SR 1019	Regional Arterial	E-W	25-35	10,000
County Line Road	G 847	Community Collector	E-W	25	1,906
Spring Mill Road / Sproul Road	SR 0320	Regional Arterial	N-S	25-45	8,449
Ithan Avenue	G 309	Neighborhood Collector	N-S	25	1,814
remaining streets	none	Local	N-S and E-W	25 (typical)	not available

LAND USE CONTEXT

Land use context guidance is provided in Chapter 4 of the Smart Transportation Guidebook (March 2008). The immediate area surrounding Villanova University most closely resembles the Suburban Center definition.

ROADWAY CLASSIFICATION

Roadway type guidance is provided in Chapter 5 of the Smart Transportation Guidebook (March 2008). The roadways closest to the project are Lancaster Avenue and Ithan Avenue. As summarized in **Table 1**, these roadways are defined as Regional Arterials and Neighborhood Collectors.

Applicable excerpts from the Smart Transportation Guidebook are provided in **Appendix C**.

PEDESTRIAN, MASS TRANSIT, AND BICYCLE FACILITIES

Both the Villanova campus and the roadways closest to the project provide sidewalks, painted pedestrian crosswalks, bicycle facilities, and/or designated pedestrian-only paths. There are also several mass transit opportunities in the area:

- SEPTA Regional Rail Paoli/Thorndale (formerly R5) line, north side of Route 30;
- SEPTA Norristown High Speed Line (formerly RT 100) line, south side of Route 30; and
- SEPTA Bus Routes 105 & 106 along Route 30 (stops near Ithan Avenue & Church Walk).

Additional details are provided in **Appendix D**.

EXISTING TRAFFIC VOLUMES

The site will generate traffic at various times throughout the day, though typical weekday commuter peak periods (i.e., 7:00-9:00 AM and 4:00-6:00 PM) are when the demands of the site plus existing traffic at study area intersections will be at a combined maximum. Data collection for this study was scheduled reflective of this and was performed by FTA principally in the fall of 2012 following receipt of a scope of work by the Township in June 2012.

MANUAL TURNING MOVEMENT COUNTS

Manual traffic counts were conducted using 15-minute intervals during weekday commuter peak periods (7:00-9:00 AM and 4:00-6:00 PM) at the following locations:

1) Lancaster Avenue and Spring Mill Road / Kenilworth Road / Aldwyn Lane
2) Lancaster Avenue and Church Walk
3) Lancaster Avenue and Ithan Avenue
4) Lancaster Avenue and Lowrys Lane
5) Lancaster Avenue and Garrett Avenue
6) Conestoga Road and Sproul Road
7) Conestoga Road and Spring Mill Road
8) Conestoga Road and Ithan Avenue
9) Conestoga Road and Lowrys Lane
10) Conestoga Road and Garrett Avenue
11) County Line Road and Spring Mill Road
12) County Line Road and Ithan Avenue North
13) County Line Road and Ithan Avenue South
14) County Line Road and Lowrys Lane
15) County Line Road and Airedale Road
16) County Line Road and Roberts Road
17) Ithan Avenue and Aldwyn Lane

In addition, counts were also conducted at the unsignalized driveways serving Villanova's main parking lots (Main Lot and Pike Lot) which are located on either side of Ithan Avenue south of Lancaster Avenue. These driveways were counted twice – in 2011 and in 2013.

The analyzed peak hours were 7:30 to 8:30 AM and 5:00 to 6:00. Turning movement peak hour volumes are presented in **Figures 3** and **4**. Pedestrian crossing activity was also counted and is presented in separate figures. The counts were conducted during ordinary class days.

Additional information regarding existing traffic volumes – including count data – is provided in the **Appendix E**. Note that "Special event" data collection was also conducted namely during Homecoming (10-26-12) and a weekday evening during a basketball game (St. Joes 12-11-12) and is referenced in the appendix. In all cases, the data collection efforts were also selected during normal weather and when no area road construction or detours were underway.

BASE CONDITIONS

The opening date of the project is expected to be 2019 but 2020 was chosen to be conservative. This time frame reflects approximately eight (8) years from the date of the data collection of the site (Fall 2012). This timeframe includes engineering, land

development approvals, construction, fit out, and occupancy of the site. PennDOT regulations require adding five (5) additional years to the full build condition to arrive at a Design Year (2025). Thus this report includes two base conditions:

- 2.02% (0.25% per year for 8 years) for Full-Build (2020), and
- 3.30% (0.25% per year for 13 years) for Design Year (2025).

BACKGROUND GROWTH

In 2013 the Delaware Valley Regional Planning Commission (DVRPC) performed studies which resulted in a recommended growth rate for the study area. This TIS incorporates the recommended rate (0.25% per annum) and was approved by PennDOT. DVRPC growth rate documentation is provided in **Appendix A**.

NEARBY PROPOSED DEVELOPMENTS

At this time there are no other significant approved land development projects in the immediate vicinity of the project. The Base (No Build) scenario includes existing traffic volumes and either 8 or 13 years of compounded growth at 0.25% per year applied to all through movements (i.e., excluding driveways and dead-end streets). 2020 and 2025 Base Condition turning movement peak hour volumes are presented in **Figures 5** thru **8**.

PROJECT DESCRIPTION

One significant component of the project is the new residence halls which yield 1,138 new beds on campus. These beds will be used by existing commuting undergraduate students, many of whom currently use Main Lot. In the future, while many 'converted' campus-residing (former-commuting) students will continue to own automobiles, these cars will – in large part – not be moving during weekday commuter peak periods. This is but one of a few fundamental changes in traffic which will result from the project. Other changes include:

- added parking to an existing garage (SAC[1]) on the north side of campus,
- consolidation of several small parking lots plus added supply west of Church Walk,
- elimination of several unregulated driveways along Route 30 west of Church Walk,
- construction of a new grade-separated pedestrian bridge at Church Walk, and
- other capacity-adding and mobility-improving features.

See **Appendix F** for map figure which identifies names and locations of buildings and parking lots throughout the Villanova University campus.

Note that even though the automobiles owned by the new campus-residing students will typically not be active or moving during weekday peak periods, this TIS assumes *all* parking spaces continue to be active during peak hours, just as they are today (without the new residence halls). This adds a significant measure of conservativeness to the Projected Condition scenarios.

TRIP GENERATION

Trip generation activity for many land uses can be investigated utilizing the Institute of Transportation Engineers' (ITE) publication entitled Trip Generation Manual and land use

[1] Saint Augustine Center

code 550 (University/College) is available for review. However, the data is intended to reflect entirely new universities / new students. This project provides for the conversion of currently-commuting students to campus-residing students – not net-new students – so a different approach is needed.

The project will result in no change in total parking supply, but does include significant shifts both in the location of parking spaces as well as their function. For example, there currently exists 1,126 parking spaces in the Main Lot (west side of Ithan Avenue) and 577 spaces in Pike Lot (east side of Ithan Avenue). With the project constructed, there will be 62 parking spaces in the 'former' Main Lot and 1,289 spaces in a structure on the 'former' 577-space Pike Lot (many of which will be occupied by non-moving student-owned vehicles).

The main exercise of the study is to reassign turning movement traffic volumes to reflect parking supply location changes. As mentioned earlier, the project continues to assume parking space activity 'turns over' in the same manner as it does today (i.e., as it does with currently-commuting students). The trip generation for the project is thus conservatively based upon the trip generating characteristics of the existing parking spaces in Main and Pike Lots and is effectively a reallocation of current peak hour activity based on the location of new parking spaces throughout campus, including at the new Pike garage, at the expanded SAC garage, and at the 'new' West Lancaster surface lot (WLA). More details about trip generation rates for existing parking is provided in **Appendix G** and are summarized below.

TABLE 2
PARKING SPACE TRIP GENERATION

Trip Generation (Parking Spaces)	AM Peak Hour			PM Peak Hour		
	IN	**OUT**	**TOTAL**	**IN**	**OUT**	**TOTAL**
Rates	0.227	0.028	0.255	0.199	0.225	0.424

In addition to parking / traffic redistribution analysis, the Township traffic engineer requested (in letters provided in **Appendix A**) that the trip generation potential of the university-centric retail space be examined and discussed. Trip generation associated with similar contemporary retail space at St. Joe's University was observed and documented in 2014 and was compared with three scenarios which utilized ITE trip generation predictions for non-university-centric retail space (see **Appendix A**). A January 2015 review letter from the Township traffic engineer directed that ITE Scenario 1 (which resulted in more conservative trip generation estimates than the St. Joe's observations) be utilized in a revised TIS. **Table 3** summarizes the retail AM and PM peak hour new vehicular trip generation potential of the site as gathered from that scenario. As shown, the retail component of the site is estimated to generate 60 new vehicle trips during the weekday AM peak hour and 99 new vehicle trips during the weekday PM peak hour.

TABLE 3
RETAIL TRIP GENERATION (NEW VEHICULAR TRIPS)

Trip Component	AM Peak Hour			PM Peak Hour		
	IN	**OUT**	**TOTAL**	**IN**	**OUT**	**TOTAL**
Retail	31	29	60	51	48	99

TRIP DISTRIBUTION

The first distribution of site traffic is an extensive redistribution of existing traffic due to the reassignment of parking supply in different locations throughout the core campus area (SAC garage, WLA, Pike Garage, etc). In addition there are proposed changes to driveway locations and functionality, such as the Lancaster Avenue inbound access to the Pike Lot garage (which currently exists but is presently exit-only). As a result, several different models were created to track traffic assignments which result from parking changes in different locations which are affected by the project. The principal parking locations affected include:

- Pike Lot (Garage),
- LAH surface parking and the West Lancaster Lot, and
- the expanded SAC Garage.

More information regarding the derivation of trip distribution models is provided in **Appendix H**. Essentially, trips are added or subtracted throughout the network proportionate to existing driveway volumes and adjacent intersections. Retail traffic was added as described in the appendix. **Appendix H** includes the results of all individual peak hour worksheets in summary figures presented at the end of the Appendix. Proposed road improvements are described later but are summarized in **Figures 9** and **10**. The combination of site traffic with Base Condition volumes yield Projected Conditions peak hour volumes, **Figures 11** thru **14**.

CAPACITY ANALYSIS METHODOLOGY

Capacity analyses were conducted for the weekday AM and PM peak hours at the study area intersections. These analyses were conducted according to the methodologies contained in the 2010 *Highway Capacity Manual* (where applicable) and using *Synchro 8* software. The following conditions were analyzed:

- 2012 Existing Conditions,
- 2020 Base Conditions,
- 2020 Projected Conditions,
- 2025 Base Conditions, and
- 2025 Projected Conditions.

In addition, capacity analyses were conducted at the proposed site driveway intersections under the Projected Condition scenarios.

PennDOT's transportation impact study guidelines outlined in Strike Off Letter 470-09-4, dated February 2009 last updated December 2013 contain the following criteria regarding levels of service:

- Page 29 of the Guidelines describes that if evaluation of the Base Condition to the Projected Condition results in an overall level of service increase greater than 10 seconds then the Applicant will be required to mitigate the impact.
- Page 31 of the Guidelines states that new driveways shall be designed to operate at LOS C in rural areas and LOS D in urban areas.

Base Condition analysis signal timings were optimized. Overall PHFs were utilized.

LEVELS OF SERVICE IN THE STUDY AREA

Levels of service (LOS) at the study area intersections for the weekday AM and PM peak hours are summarized in **Tables I** as found in the **Executive Summary**. As revealed in the tables, all levels of service at the study area intersections comply with the requirements outlined in the PennDOT SOL (for both overall intersection impacts as well as critical movement impacts), meaning no improvements are required. Even so, a number of roadway improvements and pedestrian benefits are offered (see **Recommendations**).

More details regarding capacity analyses are explained in **Appendix I**. The signal plans utilized in the analyses are provided in **Appendix L**.

QUEUE LENGTH ANALYSIS

Projected 95th percentile queues were produced using *Synchro* and were presented in **Table II** in the **Executive Summary**. Predicted 2025 queue lengths are accommodated where new (or extended existing) turn lanes are proposed.

TURN LANE WARRANT ANALYSIS

The project includes providing new auxiliary left- and right-turn lanes as appropriate all proposed points of access. PennDOT's XLSX spreadsheet "Turn Lane Warrant and Length Analysis Workbook" were utilized in analysis of all WLA, Visitor Lot, LAH, and Pike Garage driveways. The details of the investigations are included in **Appendix J**. Note that in many cases, turn lanes are included in the plans even though they are not required per the warrants. Additionally, in many cases where turn lanes are warranted, the storage length shown on the plans exceeds the required storage length per the warrant analysis.

Note that at the Route 30 WLA driveway, no WB left-turn lane analysis is included since the movement is prohibited (i.e., the driveway is proposed as a right-in/right-out driveway.

CRASH DATA INVESTIGATIONS

Crash history investigations using PennDOT-supplied cluster list, homogenous report, crash resumes, and a crash summary for 01/2008 to 12/2012 data along the Lancaster Avenue corridor (from Spring Mill Road to County Line Road) were conducted.

The study area featured 112 reportable accidents. Highlights of the data include:

- 0 accidents involved fatalities
- 6 accidents involved pedestrians
- 8 accidents involved injuries classified as *moderate* or *major*
- 24 accidents involved injuries classified *minor*
- 13 accidents involved environmental conditions such as ice- or snow-covered roadways

The segment in question covers approximately 1.23 miles and is classified as an urban, NFAC (non full-access control) roadway. The calculated crash rate (C) of the study corridor is 2.40 crashes per million vehicle miles whereas the latest Department-provided homogenous report gives a rate of 2.25 crashes per million vehicle miles for similar

roadways which are undivided, are 41-99 feet wide, and which feature 10-99k ADT. The difference in crash rates (between the study area and similar roadways per the homogenous report) is not significant. It is also appropriate to eliminate certain crashes given the involvement of conditions unrelated to the design of the roadway including – but not limited to – environmental factors such as snow, ice, etc. Eliminating the 13 accidents (per the last bullet point above) which involve these conditions, for example, produces a redacted crash rate (C') of 2.12 crashes per million vehicle miles, which is lower than the homogenous report rate for similar roadways.

Whether using C or C', the crash history of the corridor is consistent with the crash history of other roadways having similar attributes. The absence of any crash involving a fatality and the relatively low number of accidents involving major injuries, moderate injuries, and pedestrians also supports this conclusion.

Note that the individual crash data for the 6 accidents involving pedestrians were reviewed and no correctable pattern or element was discovered.

Crash data is not provided in any appendix but will be kept on file should PennDOT or the Township traffic engineer wish to review it.

PARKING

Parking demands have been documented throughout the entire campus under both 'ordinary class' conditions and 'special event' conditions, including home basketball games. Copies of detailed campus-wide parking tabulations (including summaries of observed demand and available supply) on more than a dozen different days are provided in **Appendix K**. These spreadsheets show that there typically exist hundreds of unused parking spaces throughout campus no matter what time of day or circumstance.

West Campus has some similarities with the proposed student resident halls since it is principally occupied by undergraduate upperclassmen. The unconstrained parking demand rate at West Campus is ~55% (2013) and auto ownership at the proposed student resident halls may be comparable. The number of spaces in the garage which will not be moving during weekday commuter peak periods could potentially total about 500 to 600 spaces. Regardless and as previously explained, *all* parking in the garage is assumed to be "peak hour moving" to provide the most conservative results.

Questions regarding midday vehicular activity (turnover) by the proposed student hall residents have been raised. The likelihood that campus-residing students are any more (or less) likely to make midday trips is debatable, but regardless West Campus midday parking turnover was examined in an attempt to quantify midday trip making. Investigations occurred on Tuesday, 30 April 2013. Traffic counts were conducted at the only driveway which is used by student residents to gain access to / from West Campus student parking areas between 10 AM to 12 PM. In addition, during the counts, a random sample of approximately 5% of the available parking spaces (30 out of 596 spaces) were monitored for turnover. The investigations determined:

- The peak hour was 11:00 AM to 12:00 PM.
- During the peak hour, 30 entering vehicles and 23 exiting vehicles (53 total trips) were recorded at the driveway.

- During the same hour, there was turnover at 2 of the 30 parking spaces which were monitored and the turnover activity at these spaces amounted to 2 arriving (entering) vehicles and 2 departing (exiting) vehicles (4 total trips).

The results suggest that midday peak hour parking turnover – and thus trip generation – is on the order of about 1 out of every 10 parking spaces during class days. This activity is much lower than AM and PM peak hour trip generation. AM peak hour trip generation is approximately 1 trip for every 4 parking spaces and PM peak hour trip generation is approximately 1 trip for every 3 parking spaces.

More details on the study are provided in **Appendix K**.

SIGHT DISTANCE ANALYSIS

A sight distance analysis was prepared for the proposed site driveways. In general, recommended sight distances depend upon the posted speed limit and roadway grades. Existing sight distances were measured in accordance with PennDOT Publication 282 and compared to PennDOT's desirable (aka tabular) and SSSD (aka formulaic) sight distance as found in Title 67 Chapter 441 of the PA Code. Comparisons with available sight distances at the proposed unsignalized site accesses are presented below. Note that the posted speed limit along both Lancaster Avenue and Ithan Avenue is 25 mph. Note also that if the available sight distance is well beyond the required minimum then the full extent of available sight distance was not documented. Grades are field estimates.

TABLE 6
SIGHT DISTANCES

RT 30 WLA RIRO	DIRECTION	GRADE (APPROX)	SIGHT DISTANCE (FT)		
			DES	SSSD	EXIST
EXITING	Looking to the left	0%	300	265	**500+**
	Looking to the right	NOT APPLICABLE; LEFTS OUT PROHIBITED			
ENTERING	Approaching same direction	NOT APPLICABLE; LEFTS IN PROHIBITED			
	Approaching opposite direction				

RT 30 PAC RILIRO	DIRECTION	GRADE (APPROX)	SIGHT DISTANCE (FT)		
			DES	SSSD	EXIST(1)
EXITING	Looking to the left	0%	300	265	**470**
	Looking to the right	NOT APPLICABLE; LEFTS OUT PROHIBITED			
ENTERING	Approaching same direction	0%	N/A	265	**500+**
	Approaching opposite direction	0%	320	265	**500+**

LAH (W. SIDE OF ITHAN)	DIRECTION	GRADE (APPROX)	SIGHT DISTANCE (FT)		
			DES	SSSD	EXIST
EXITING	Looking to the left	-2%	440	274	**500+**
	Looking to the right	-2%	350	274	**500+**
ENTERING	Approaching same direction	-2%	N/A	274	**500+**
	Approaching opposite direction	-2%	300	274	**450**

GAR (E. SIDE OF ITHAN)	DIRECTION	GRADE (APPROX)	SIGHT DISTANCE (FT)		
			DES	SSSD	EXIST
EXITING	Looking to the left	-2%	440	274	**500+**
	Looking to the right	-2%	350	274	**450**
ENTERING	Approaching same direction	-2%	N/A	274	**500+**
	Approaching opposite direction	-2%	300	274	**500+**

EMR (E. SIDE OF ITHAN)	DIRECTION	GRADE (APPROX)	SIGHT DISTANCE (FT)		
			DES	SSSD	EXIST
EXITING	Looking to the left	NOT APPLICABLE; ENTRY-ONLY DRIVEWAY			
	Looking to the right				
ENTERING	Approaching same direction	0%	N/A	274	**500+**
	Approaching opposite direction	+2%	300	256	**500+**

DES based on posted speed limit + 10

SSSD based on posted speed limit + 10

(1) existing wrought iron fence assumed to be removed or set back ~ 3 feet from current location

The site plans may evolve throughout land development and these sight distances will be measured again by the site civil engineer and included with the HOP application which will later be made by the site civil engineer.

SPECIAL EVENT TRAFFIC AND PARKING MANAGEMENT

Radnor Police Department and Villanova Public Safety are present to direct traffic and chaperone motorists (and pedestrians) during events such as basketball games, homecoming, graduation events, etc. Since either Radnor Police, Villanova Public Safety, or both are present directing traffic / controlling intersection operation at most of these events, level of service analyses cannot be modeled or conducted. In addition, total intersection volumes during special events have been demonstrated to be comparable to or less than weekday peak hour traffic, and the Township traffic engineer has previously given an opinion that LOS analyses are not required, but that a special event management plan *is* necessary as requested in past review letters (see **Appendix A**). Villanova University will provide a Special Event Management Plan under separate cover.

RECOMMENDATIONS

A comprehensive suite of roadway improvements, new pedestrian facilities, existing driveway removal, and new driveway installation will mitigate the impact of the site. More details are as follows:

Most Intersections in the Study Area

While the project includes some new retail space, the majority of the traffic impact of the site is the redistribution of traffic patterns caused by significant changes to parking locations as well as many changes to parking lot / garage driveways.

The intersections closest to the Main Lot / Pike Lot will have the most noticeable changes. The more remote intersections have greatly reduced impact – whether because of the diluted impact of the redistribution of traffic or the diluted impacts of the new retail traffic. Most intersections – even including relatively nearby intersections such as Route 30 and Route 320/Kenilworth Street/Aldwyn Lane will not warrant any improvements, whether examined in terms of overall delay changes or critical movement delay changes. Despite this, a number of locations do feature proposed improvements.

Route 30 and Route 320/Kenilworth Street/Aldwyn Lane

- A contribution toward the cost an Adaptive Traffic Signal controller and related hardware at this location shall be made by the University.

Route 30 and New RIRO Access (near WLA)

- Channelization islands to prohibit entering and exiting left turns shall be provided.
- A new EB right-turn only lane with 75 feet of taper, 125 feet of storage, and 14 feet width shall be provided.

Route 30 and Relocated Church Walk

- A contribution toward the cost an Adaptive Traffic Signal controller and related hardware at this location shall be made by the University.
- A new EB right-turn only lane with 75 feet of taper, 125 feet of storage, and 14 feet width shall be provided.
- A new WB left-turn only lane with 75 feet of taper, 125 feet of storage, and 10 feet width shall be provided.

- 11 foot wide inside and 12 foot wide outside through lanes (10-foot travel lanes presently exist) shall be provided.

Route 30 and Ithan Avenue

- A contribution toward the cost an Adaptive Traffic Signal controller and related hardware at this location shall be made by the University.
- The existing EB left-turn only lane shall be extended to provide a 75 feet of taper, 200 feet of storage, and 10 feet width.
- The existing NB left-turn only lane shall be extended to provide a 50 feet of taper, 190 feet of storage, and 11 feet width.
- The existing WB left-turn only lane shall be extended to provide a full-width (10 feet) section of approximately 250 feet (between Ithan Avenue and the PAC driveway) plus an additional full-width section beyond the PAC driveway (to the east) measuring an additional 75 feet with a 75-foot taper.
- 11-foot wide inside and 12-foot wide outside through lanes (10-foot travel lanes presently exist) shall be provided on each Route 30 approach to this intersection.
- While there is either no change or a projected decrease in overall delay between Base and Projected conditions (both in both build years), 2025 Projected conditions include alternate signal timings which reduces some delays even further. Actual signal timing revisions may not be needed since Traffic Adaptive signal controller installation at this location will reduce delays as explained at the end of this section.

Additional Site Access Points

- At the currently-existing exit-only unsignalized driveway along Route 30 just east of Ithan Avenue (PAC Driveway):
  - The driveway shall be modified to provide entry/exit operation;
  - A new EB right-turn only lane with 50 feet of taper, 100 feet of storage, and 12 feet width shall be provided;
  - A new WB left-turn only lane with 75 feet of taper, 75 feet of storage, and 10 feet width (an extension of the existing WB left-turn lane at Ithan Avenue) shall be provided; and
  - Exiting left turns shall be prohibited (signage and channelization features).
- At the proposed new unsignalized intersection serving the LAH rear lot and Pike Garage along Ithan Avenue:
  - A new SB left-turn lane featuring 50 feet of storage and 50 feet of taper shall be provided;
  - A new pedestrian crosswalk (with post-mounted, pedestrian-actuated Rectangular Rapid Flash Beacons [RRFB] on each side) spanning the NB approach of Ithan Avenue and connecting the garage with the resident halls shall be provided; and
  - Free-flow operation of Ithan Avenue traffic shall be maintained.

A **Phasing Narrative Figure** found in the Executive Summary and **Figures 9** and **10** provide added details.

It should be noted that no specific adjustments were made for the installation of Traffic Adaptive signal controllers at any intersection as there is no current consensus at PennDOT regarding modeling such intersections. Local studies in the Delaware Valley have shown a reduction in delay between 27% and 38% in before-and-after studies[2]. Thus the year 2020 and 2025 Projected delays found in this report are likely overstated when compared with real world delays which may be found when Traffic Adaptive signal controllers are installed.

CONCLUSIONS

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

- The project is forecasted to generate a small amount of net new vehicular traffic. Even with conservative assumptions and retail trip generation estimates, fewer than 100 new vehicular trips during either the AM or PM weekday peak hour are expected.
- The project will result in a more equitable distribution of parking – and the traffic associated therewith – as compared with present day conditions. Some turning movements will feature a reduction in volume.
- The project includes access points which will adequately serve the projected weekday peak hour traffic volumes associated with the project.
- Available sight distances exceed requirements.
- Proposed new turn lanes accommodate projected queues.
- Crash history investigations reveal no correctable patterns.
- Not every offered roadway improvement (pedestrian bridge, Route 30 driveway consolidation west of Church Walk, etc.) is required to mitigate project impacts, but have been included in the project as requested by PennDOT and/or the Township.
- Traffic Adaptive signal controller installation will serve as an Alternative Transportation Plan improvement for all project-affected intersections along the Lancaster Avenue corridor.

[2] Pennoni Associates memorandum to Ashwin Patel, P.E. (PennDOT) dated 14 December 2010, gathered from: http://rhythmtraffic.com/insyncs-performance/deployments

Study Area / Project Location

Villanova University Lancaster Avenue Residence Halls
Radnor Township, Delaware County, Pennsylvania

March 2015*

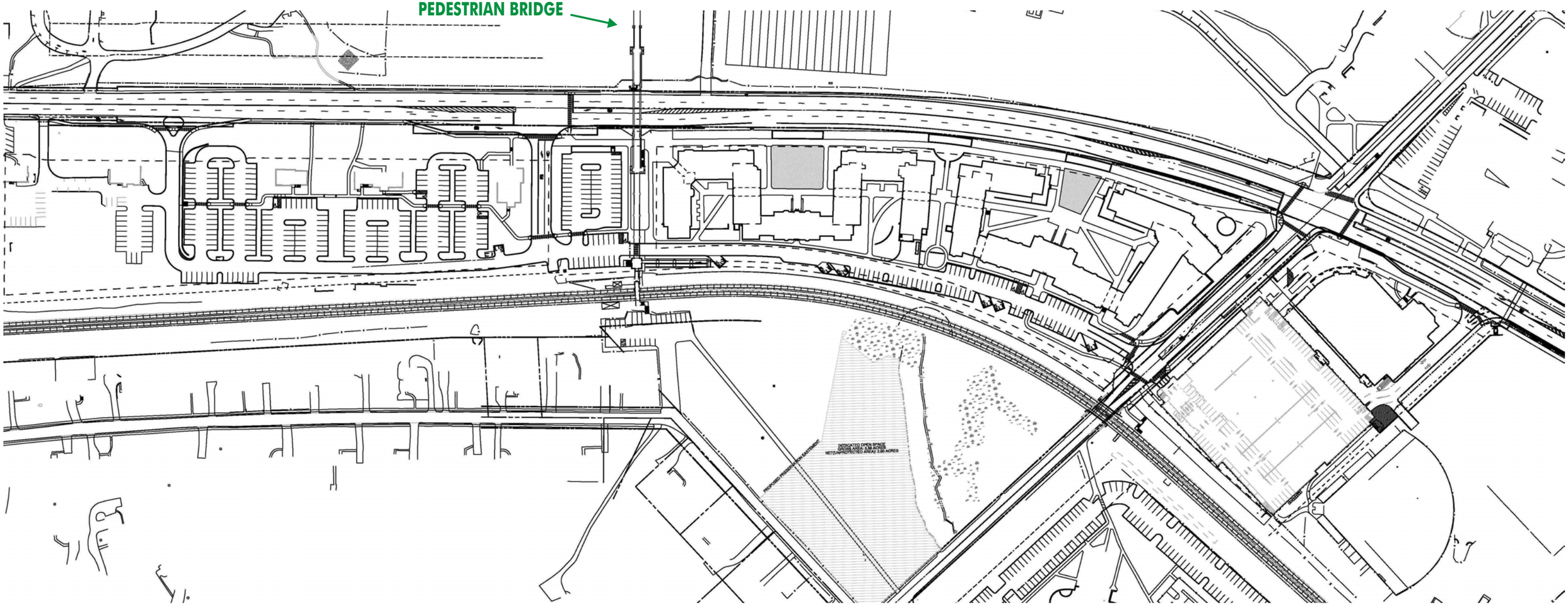
* figure preparation date

Figure 2

Site Plan Excerpt

Villanova University Lancaster Avenue Residence Halls
Radnor Township, Delaware County, Pennsylvania

March 2015*



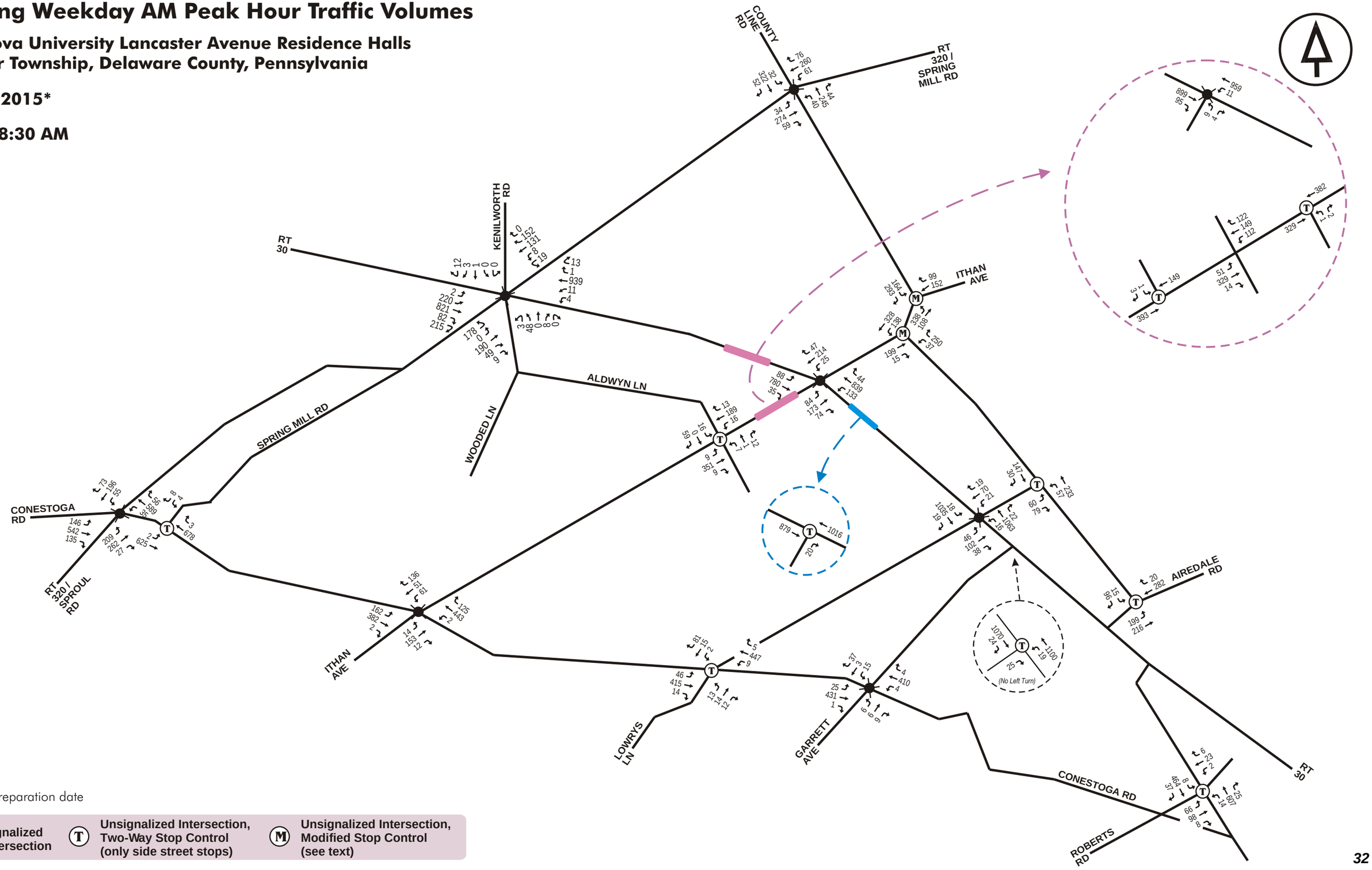
* figure preparation date

Existing Weekday AM Peak Hour Traffic Volumes

Villanova University Lancaster Avenue Residence Halls
Radnor Township, Delaware County, Pennsylvania

March 2015*

7:30 - 8:30 AM



* figure preparation date

Signalized Intersection

Unsignalized Intersection, Two-Way Stop Control (only side street stops)

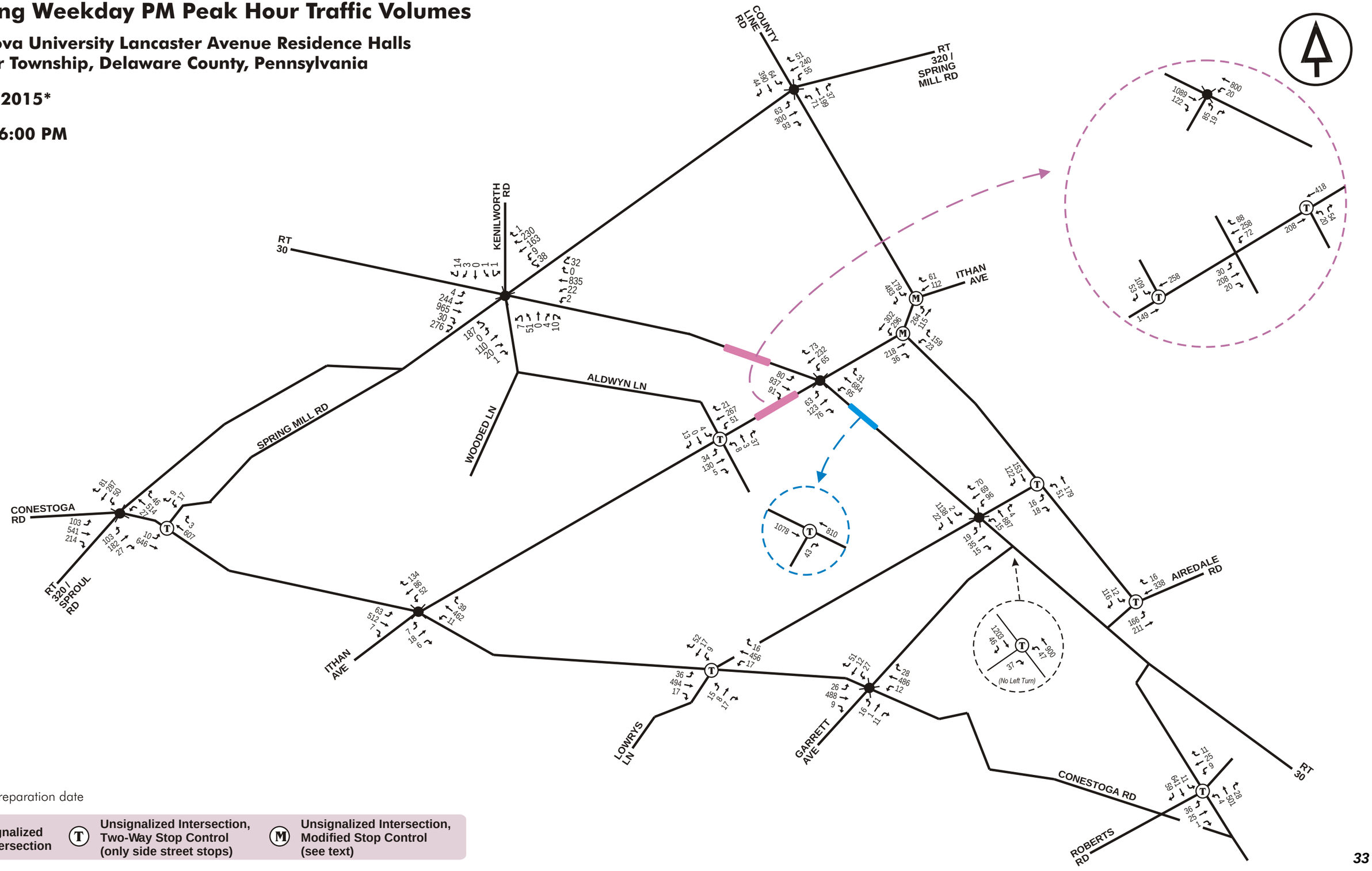
Unsignalized Intersection, Modified Stop Control (see text)

Existing Weekday PM Peak Hour Traffic Volumes

Villanova University Lancaster Avenue Residence Halls
Radnor Township, Delaware County, Pennsylvania

March 2015*

5:00 - 6:00 PM



* figure preparation date

Signalized Intersection

Unsignalized Intersection, Two-Way Stop Control (only side street stops)

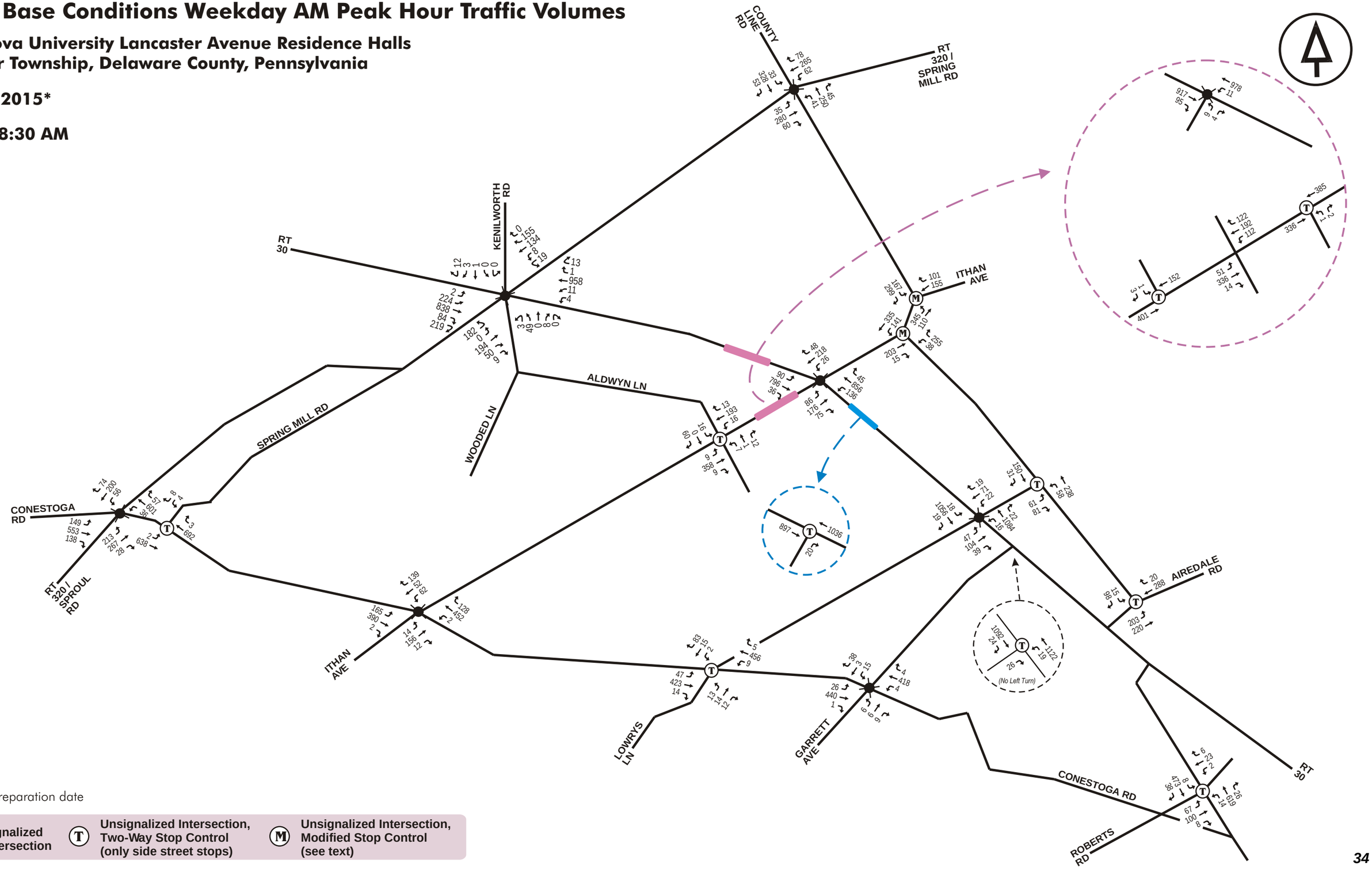
Unsignalized Intersection, Modified Stop Control (see text)

2020 Base Conditions Weekday AM Peak Hour Traffic Volumes

Villanova University Lancaster Avenue Residence Halls
Radnor Township, Delaware County, Pennsylvania

March 2015*

7:30 - 8:30 AM



* figure preparation date

Signalized Intersection

(T) Unsignalized Intersection, Two-Way Stop Control (only side street stops)

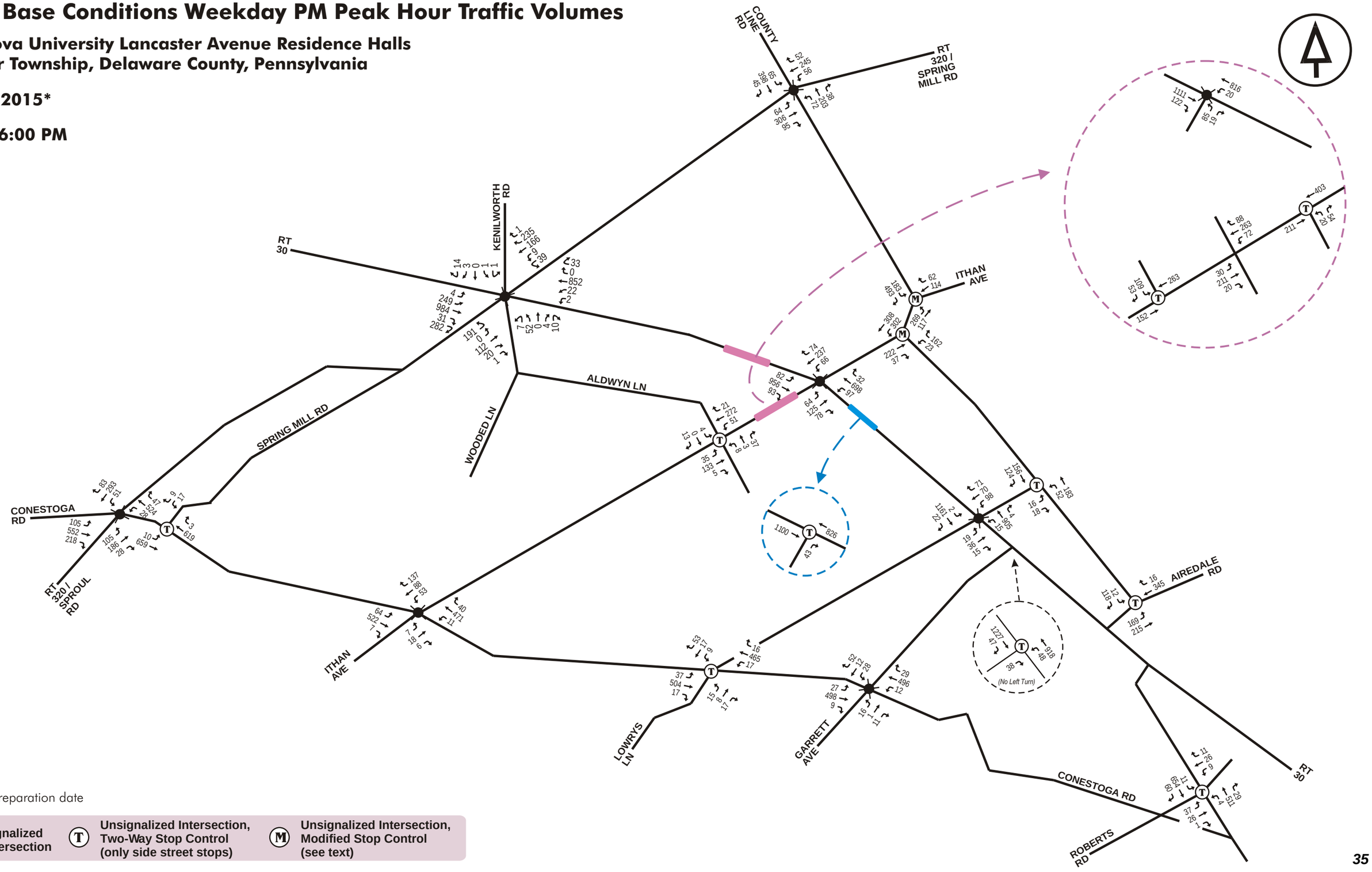
(M) Unsignalized Intersection, Modified Stop Control (see text)

2020 Base Conditions Weekday PM Peak Hour Traffic Volumes

Villanova University Lancaster Avenue Residence Halls
Radnor Township, Delaware County, Pennsylvania

March 2015*

5:00 - 6:00 PM



* figure preparation date

Signalized Intersection

Unsignalized Intersection, Two-Way Stop Control (only side street stops)

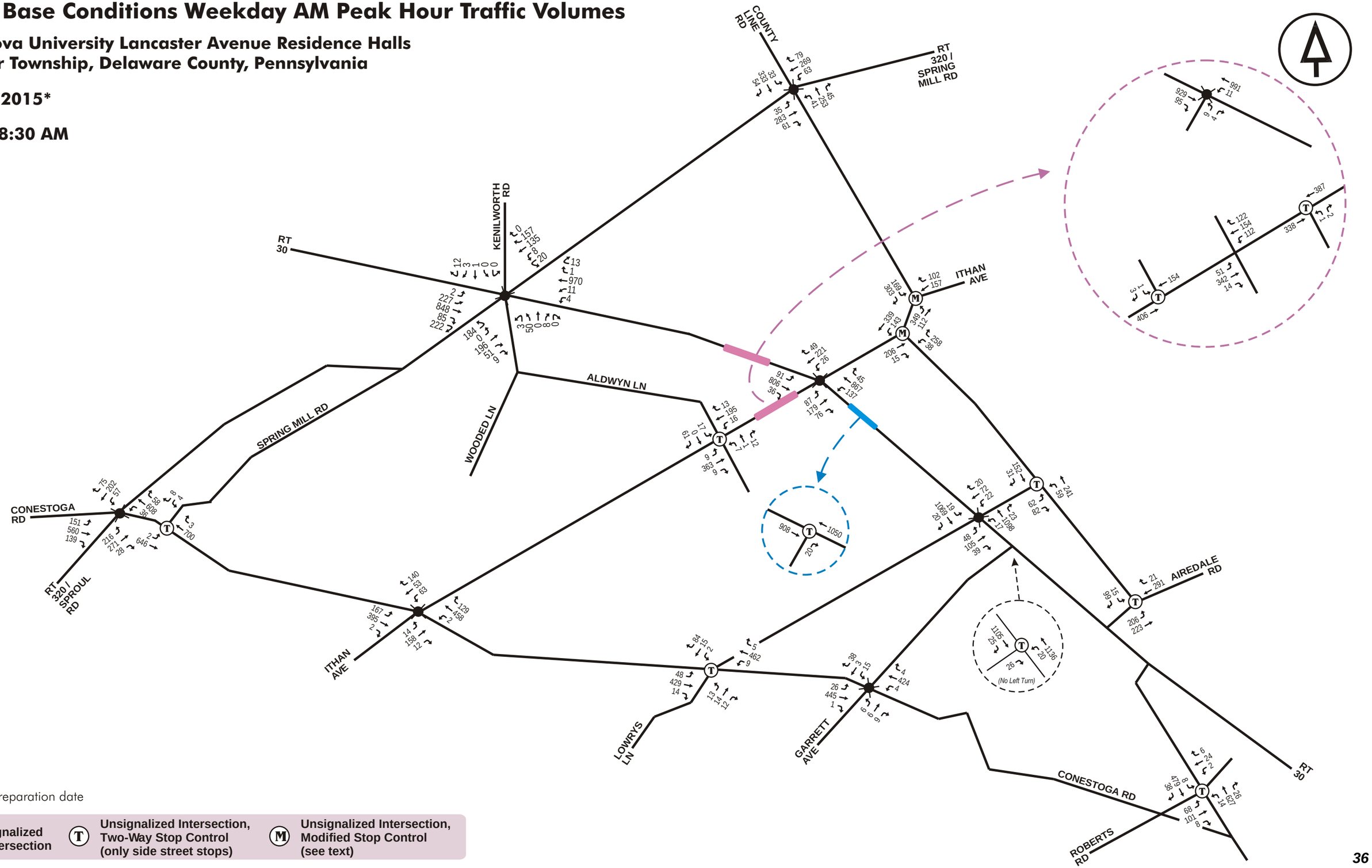
Unsignalized Intersection, Modified Stop Control (see text)

2025 Base Conditions Weekday AM Peak Hour Traffic Volumes

Villanova University Lancaster Avenue Residence Halls
Radnor Township, Delaware County, Pennsylvania

March 2015*

7:30 - 8:30 AM



* figure preparation date

Signalized Intersection

T Unsignalized Intersection, Two-Way Stop Control (only side street stops)

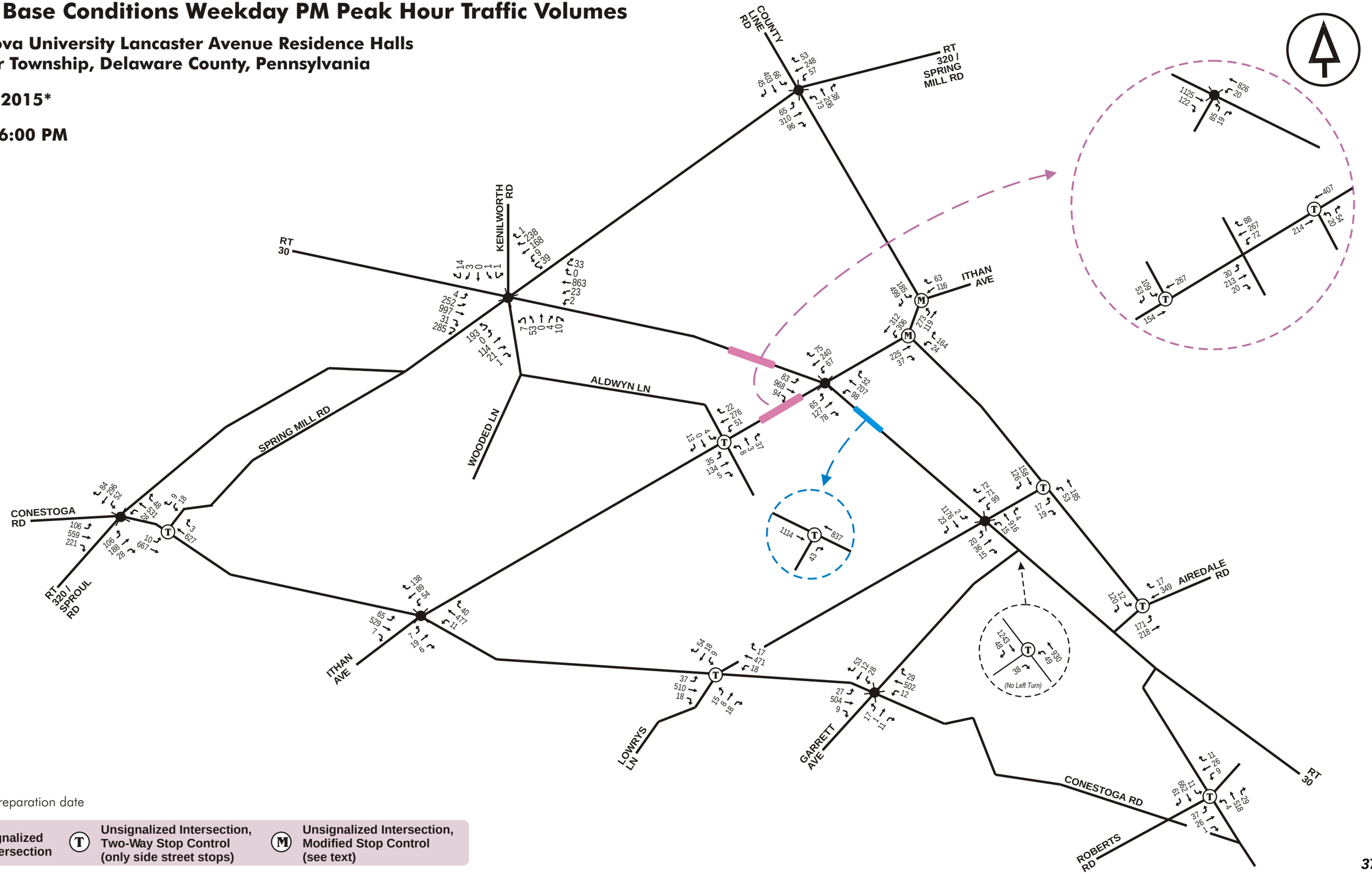
M Unsignalized Intersection, Modified Stop Control (see text)

2025 Base Conditions Weekday PM Peak Hour Traffic Volumes

Villanova University Lancaster Avenue Residence Halls
Radnor Township, Delaware County, Pennsylvania

March 2015*

5:00 - 6:00 PM



* figure preparation date

Signalized Intersection

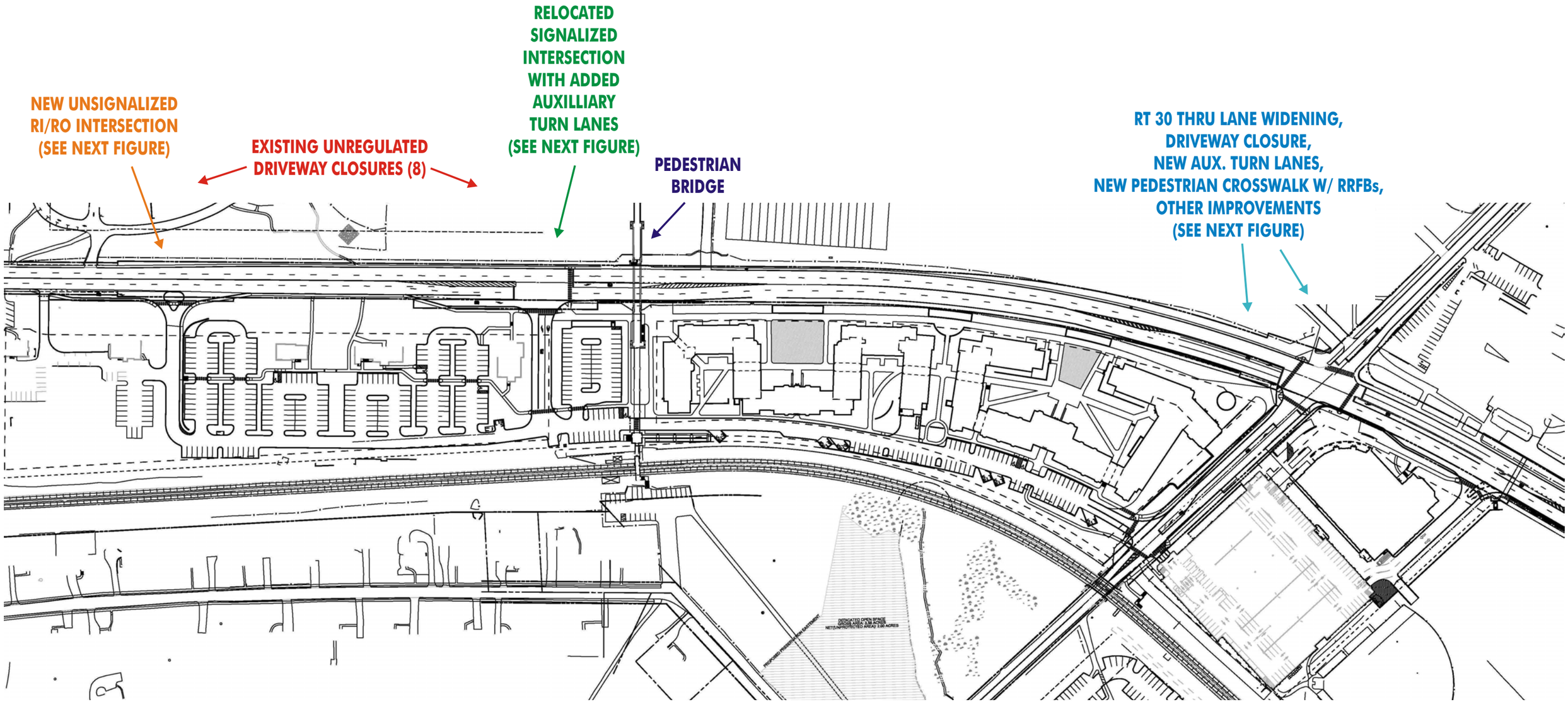
Unsignalized Intersection, Two-Way Stop Control (only side street stops)

Unsignalized Intersection, Modified Stop Control (see text)

Proposed Traffic Improvements, Overview

Villanova University Lancaster Avenue Residence Halls
Radnor Township, Delaware County, Pennsylvania

March 2015*

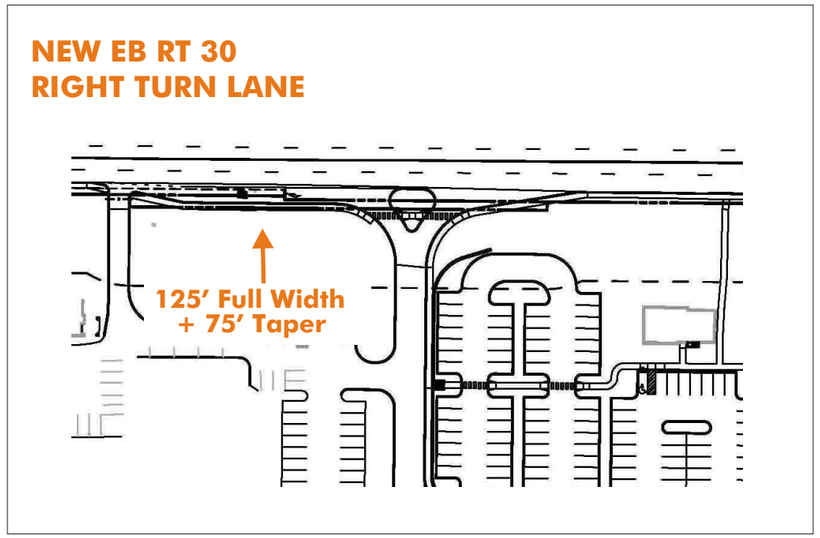


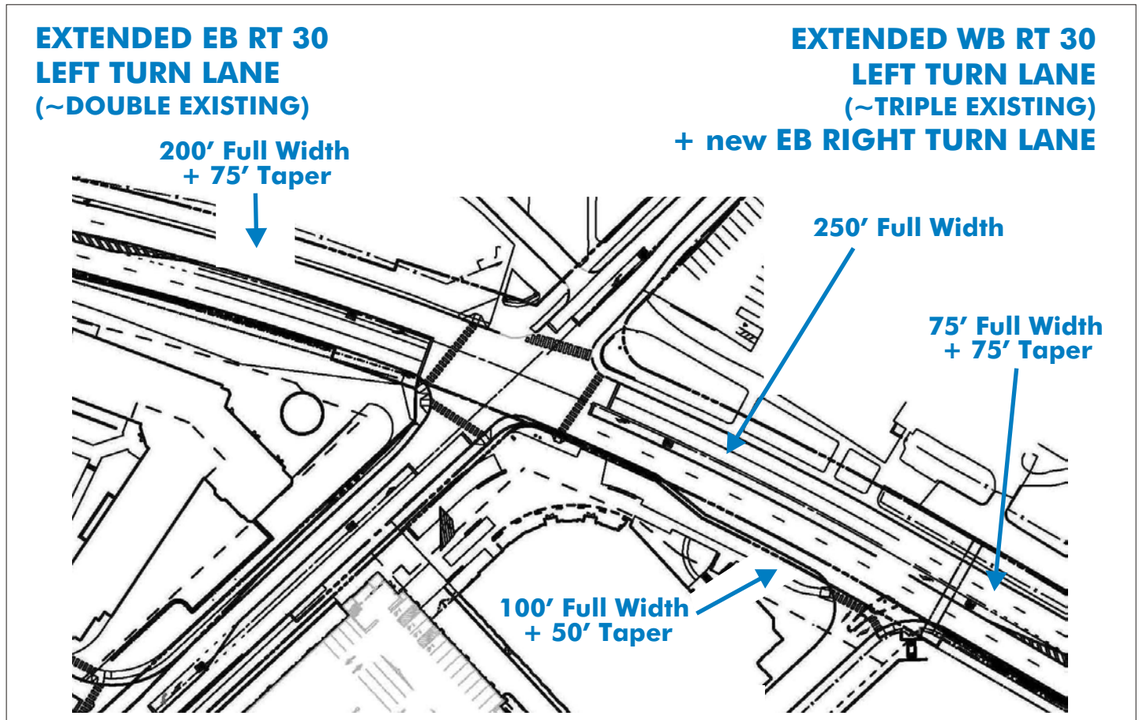
* figure preparation date

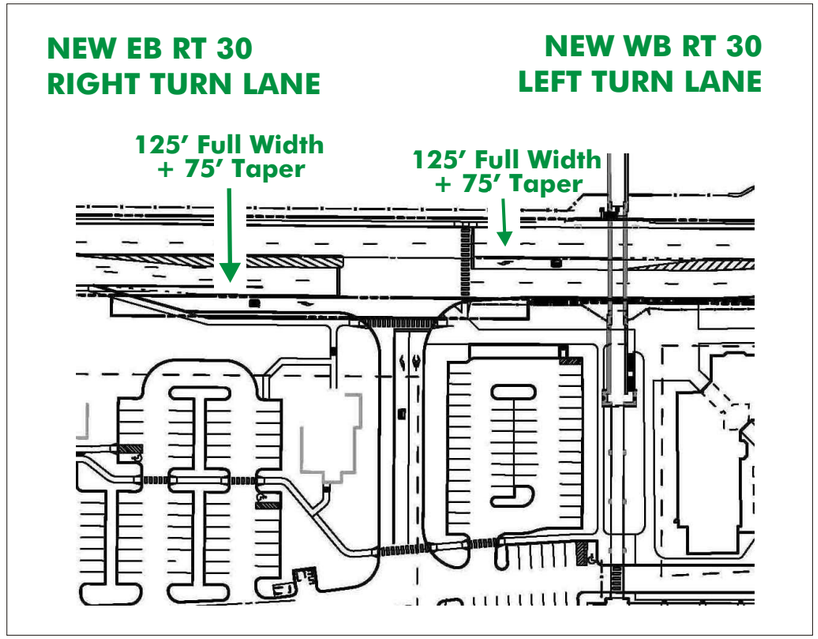
Proposed Traffic Improvements, Selected Details

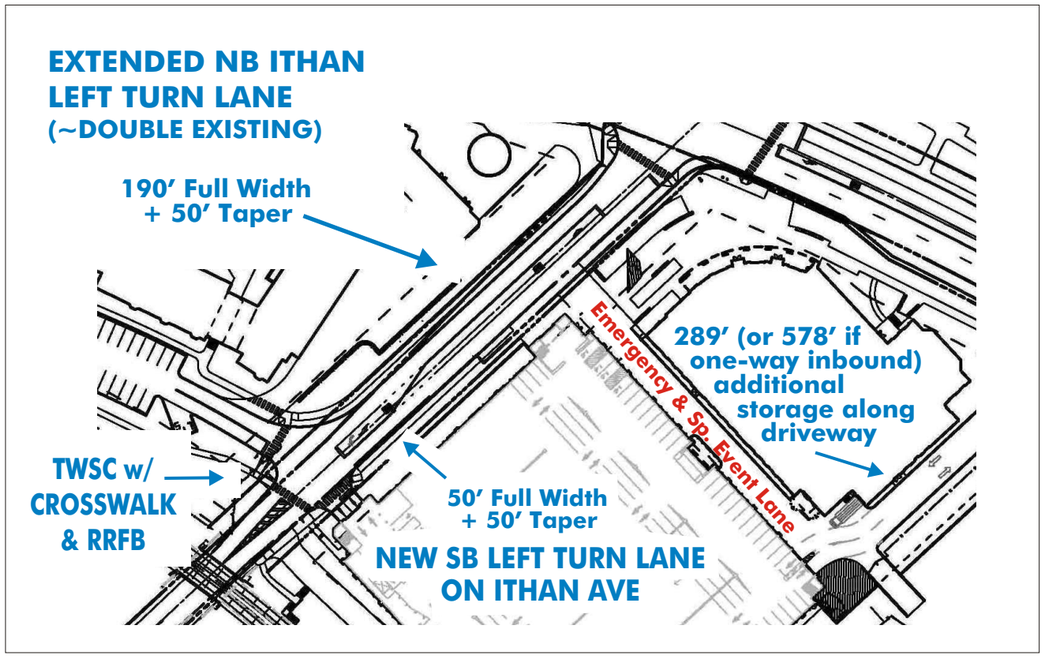
Villanova University Lancaster Avenue Residence Halls
Radnor Township, Delaware County, Pennsylvania

March 2015*









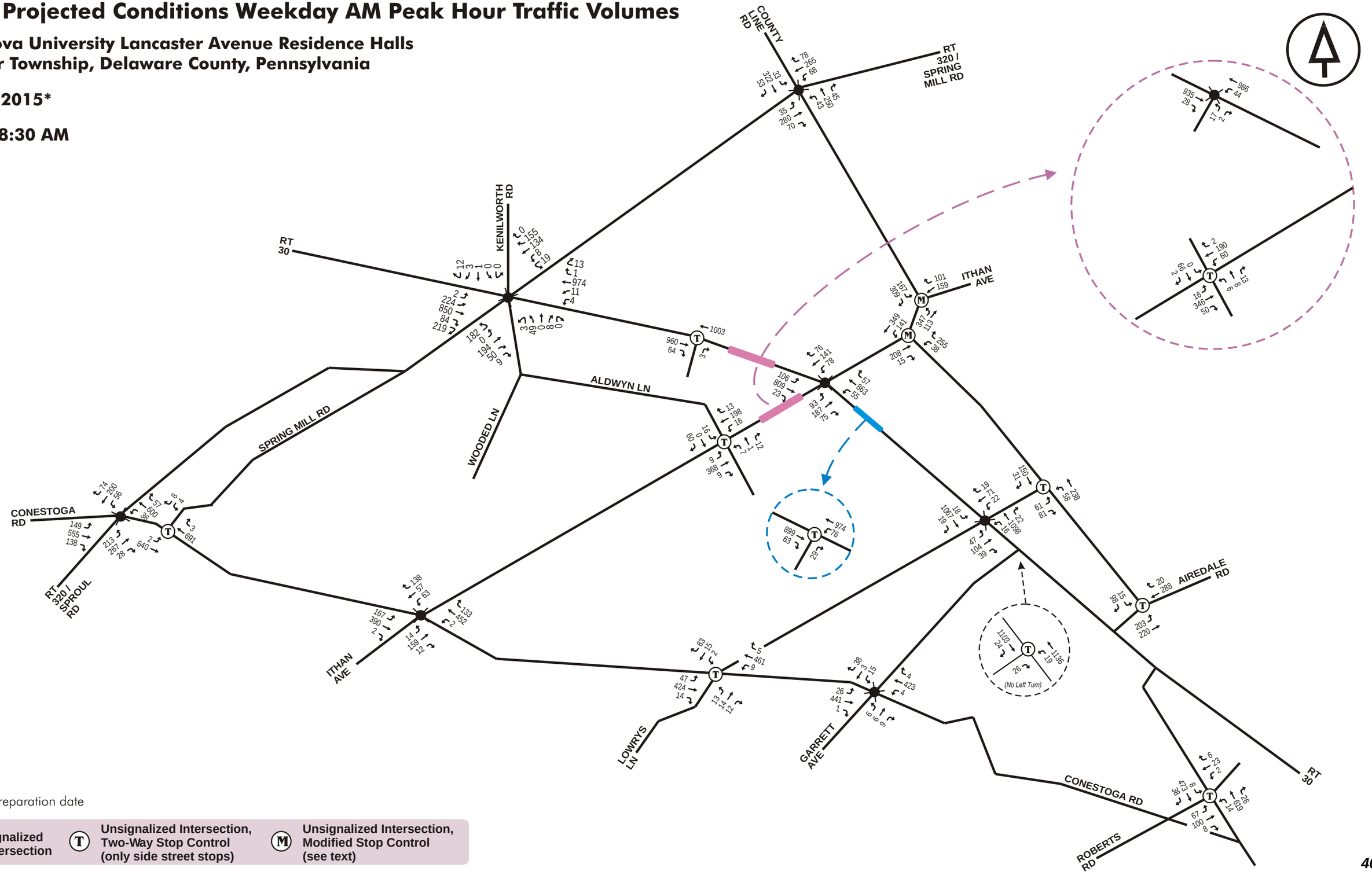
* figure preparation date

2020 Projected Conditions Weekday AM Peak Hour Traffic Volumes

Villanova University Lancaster Avenue Residence Halls
Radnor Township, Delaware County, Pennsylvania

March 2015*

7:30 - 8:30 AM



* figure preparation date

Signalized Intersection

Unsignalized Intersection, Two-Way Stop Control (only side street stops)

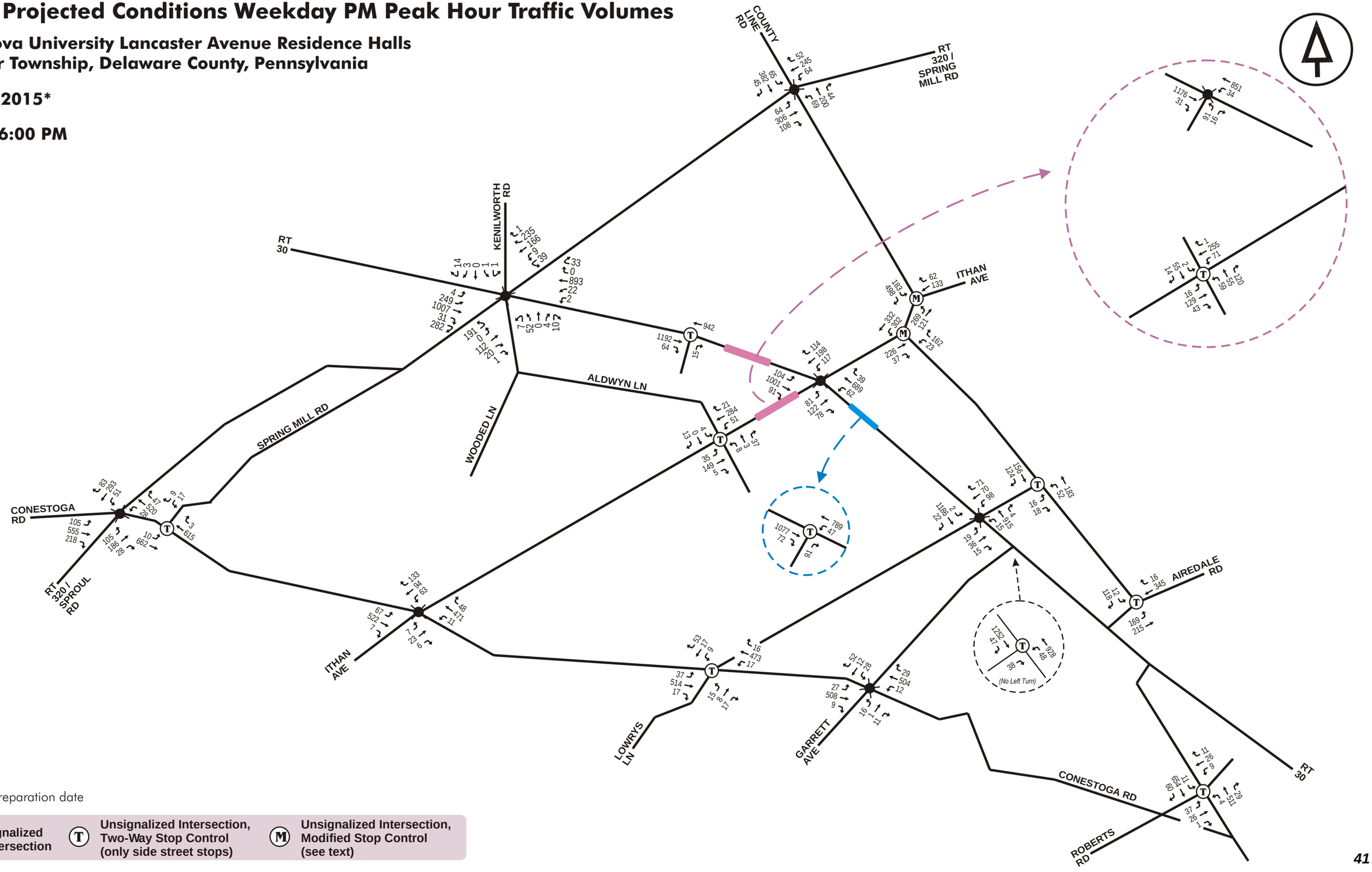
Unsignalized Intersection, Modified Stop Control (see text)

2020 Projected Conditions Weekday PM Peak Hour Traffic Volumes

Villanova University Lancaster Avenue Residence Halls
Radnor Township, Delaware County, Pennsylvania

March 2015*

5:00 - 6:00 PM



* figure preparation date

Signalized Intersection

Unsignalized Intersection, Two-Way Stop Control (only side street stops)

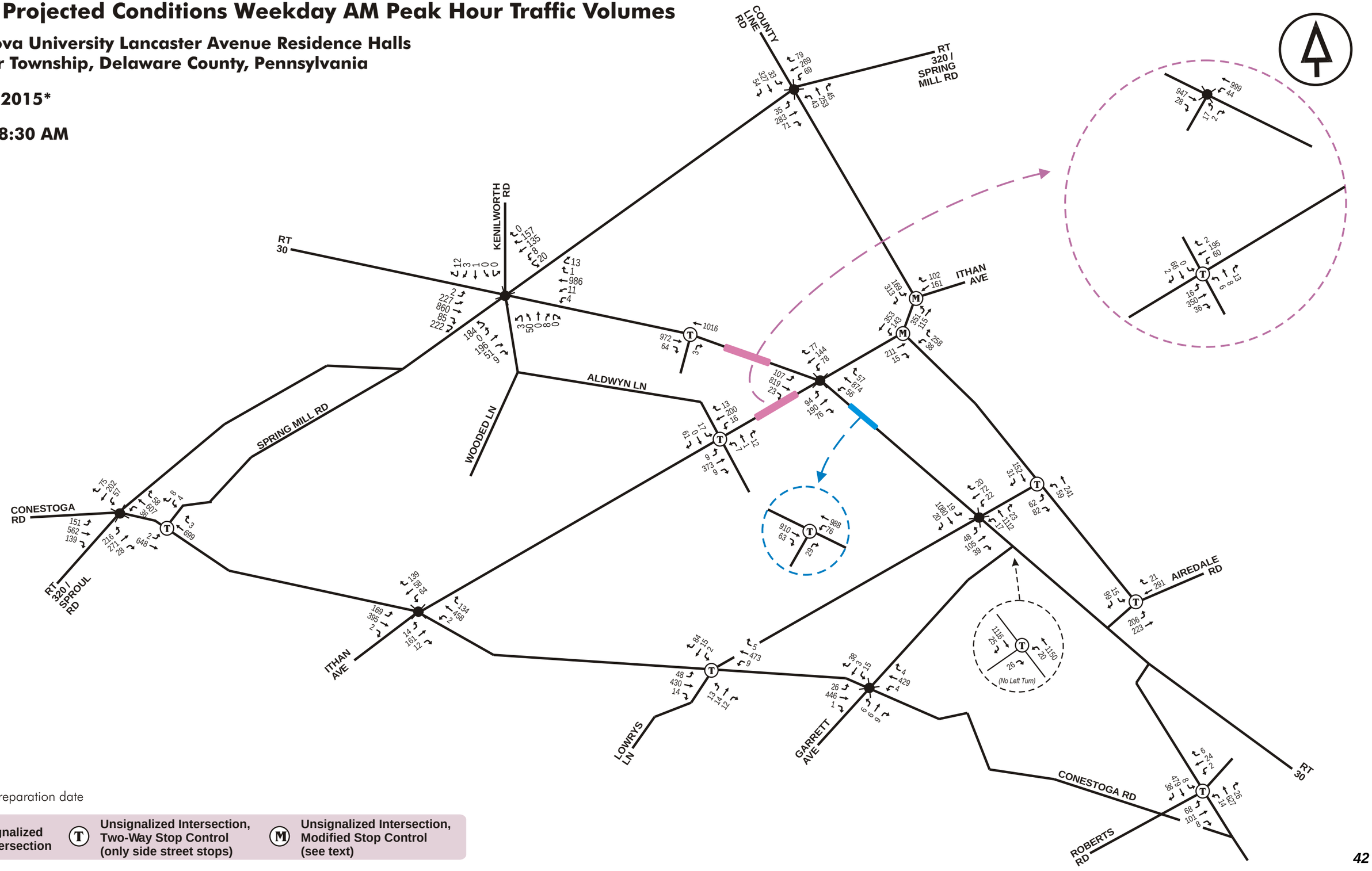
Unsignalized Intersection, Modified Stop Control (see text)

2025 Projected Conditions Weekday AM Peak Hour Traffic Volumes

Villanova University Lancaster Avenue Residence Halls
Radnor Township, Delaware County, Pennsylvania

March 2015*

7:30 - 8:30 AM



* figure preparation date

Signalized Intersection

(T) Unsignalized Intersection, Two-Way Stop Control (only side street stops)

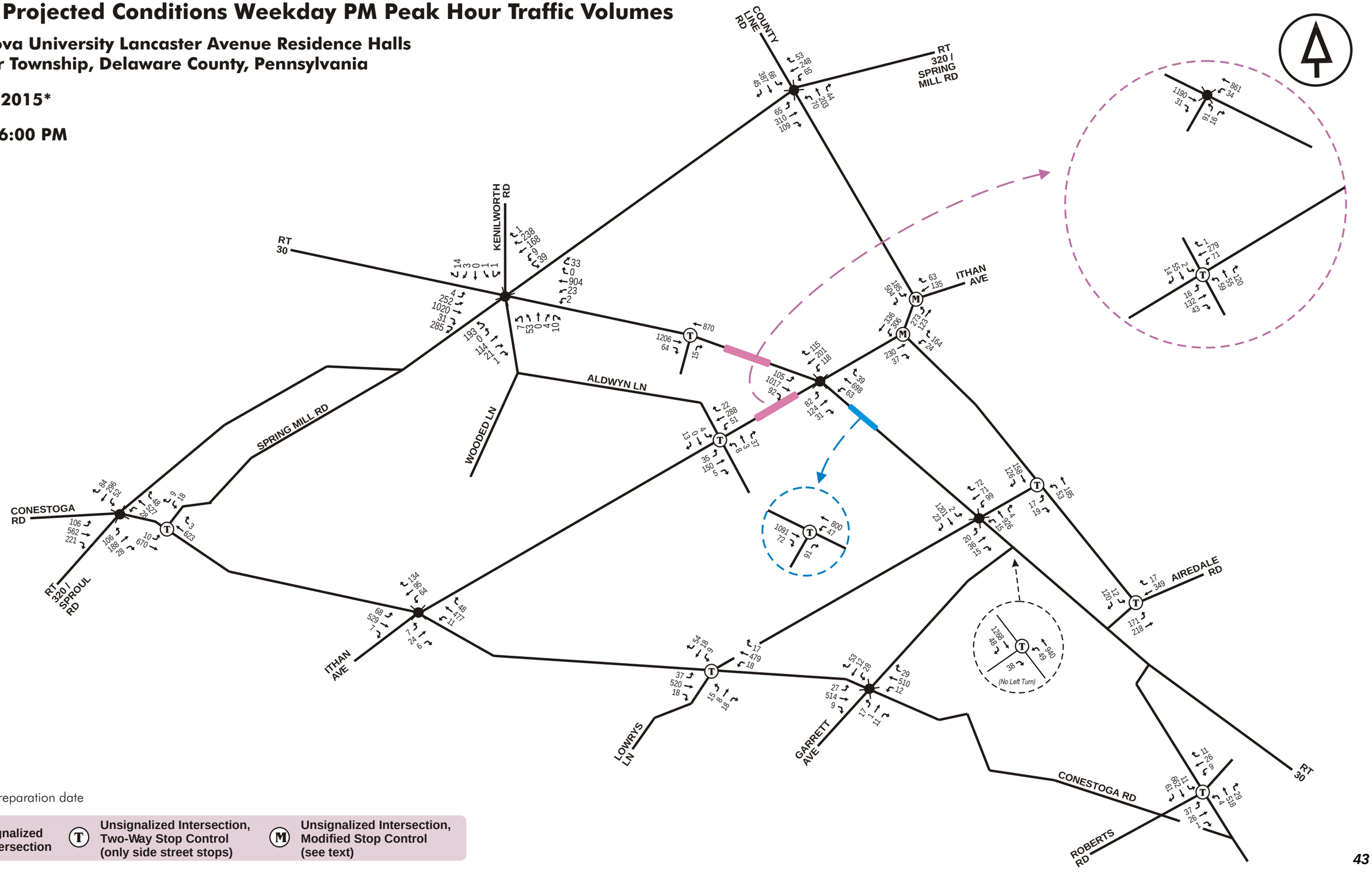
(M) Unsignalized Intersection, Modified Stop Control (see text)

2025 Projected Conditions Weekday PM Peak Hour Traffic Volumes

Villanova University Lancaster Avenue Residence Halls
Radnor Township, Delaware County, Pennsylvania

March 2015*

5:00 - 6:00 PM



* figure preparation date

Signalized Intersection

(T) Unsignalized Intersection, Two-Way Stop Control (only side street stops)

(M) Unsignalized Intersection, Modified Stop Control (see text)

APPENDIX A

Project Correspondence

Project Correspondence Notes

Project history is extensive and spans a considerable period of time.

The most recent project-related correspondence is shown on the next page, with the remaining pages being in reverse chronological order.

F. Tavani and Associates, Inc.
Traffic Engineering and Planning

105 Kenilworth Street • Philadelphia • PA • 19147 • (215) 625-3821 Phone • (484) 792-9495 Fax
www.FTAVANIASSOCIATES.com

12 March 2015

Steve Norcini, P.E.
Radnor Township
301 Iven Avenue
Wayne, PA 19087-5297

VIA TIS SUBMITTAL

RE: Villanova University
Lancaster Avenue Redevelopment
Land Development TIS Review #1
Gilmore Review Letter dated 01/28/15
FTA Job # 211-027

Dear Mr. Norcini:

On or about 28 January 2015 Gilmore & Associates, Inc. issued a review memorandum to you regarding the transportation impact study (TIS) prepared by F. Tavani and Associates, Inc. (FTA) for the above-referenced project. The TIS has since been updated to reflect the comments of that memorandum. In addition, this letter has been prepared to further address and respond to each item contained in that memorandum. Note that a copy of the memorandum is attached. The comments begin under heading III on page 2 of the memorandum.

1. This comment contains three subcomments:

    i. More details regard phasing – including a graphic – are provided in the Executive Summary of the TIS.

    ii. Garage access and circulation was discussed with PennDOT and the township in person and electronically throughout February – subsequent to the issuance of the January memorandum. The outcome was agreement that incoming EB special event traffic circulation would probably be best served if it utilized the proposed garage access along Route 30. The plans now reflect a new eastbound right-turn decel lane having a taper length of 50 feet and a full width section of 100 feet at this access. No other improvements to the EB approach of Route 30 at Ithan Avenue are required and further widening will result in negative pedestrian impacts, as agreed by PennDOT. The southbound left-turn movement into the garage provides a benefit to non-special-event traffic circulation, and remains part of the site plan. Queue projections show that SB left-turning traffic at the garage access will be contained within the proposed SB left-turn lane storage area. Additional modeling of special event conditions using SimTraffic – a traffic micro-simulation program – are also underway.

iii. The requested change has been incorporated into the plans.

2. The requested formatting revisions were made in the revised TIS.

3. The requested changes have been incorporated into the revised TIS. See also response 11.

4. The requested 95th percentile queue lengths (full build 2023 projected conditions) for all intersections in the study area are provided in the revised TIS.

5. The file has been updated to reflect the correct proposed NB lane configuration (L+LR). *Synchro* version 8.0 build 806, revision 60 is in use and is the latest available update from *Trafficware*. HCM2010 does not support the proposed NB lane configuration. Error output is included in **Appendix I**. Note this intersection performs well relative to the rest of the corridor since it "half cycles". Percentile Delay methodology results reflect existing conditions (delays) accurately. PennDOT is expected to accept the use of this methodology for this location.

6. The requested additional retail trip generation was incorporated into the revised TIS.

7. The trip distribution has been revised and more details about the methodology of the distribution of site traffic are included in the revised TIS.

8. The requested expanded trip distribution worksheets are provided in the revised TIS.

9. The requested expanded trip distribution worksheets are provided in the revised TIS.

10. The trip distribution has been revised and more details about the distribution of traffic are included in the revised TIS and related appendices. Several appendicies now feature introductory text which better explains content, including revisions which have been made since the last submittal, if any.

11. PennDOT will not support installation of a new exclusive right-turn lane on the eastbound approach of Lancaster Avenue at Ithan Avenue. This determination was made by PennDOT (F. Hanney) in an email shared with the township subsequent to the date of Gilmore's memorandum.

12. The requested additional detail was incorporated into the revised TIS.

13. The requested additional retail was incorporated into the revised TIS.

14. The referenced all-way stop has been removed from the site plans as well as the revised TIS.

15. The missing sheets are provided in the revised TIS.

16. Page numbers and a table of contents are provided in the revised TIS.

17. The requested formatting revisions were made in the revised TIS.

18. The University will provide a special event report under separate cover. Additional modeling of special event conditions using SimTraffic – a traffic micro-simulation program – are also underway.

Please call or email me if I can answer any other questions. Thank you.

Very truly yours,
F. TAVANI AND ASSOCIATES, INC.

FRANK TAVANI, P.E., PTOE
Principal

attachments (PennDOT Meeting Minutes and Gilmore memorandum)

F. Tavani and Associates, Inc.
Traffic Engineering and Planning

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VILLANOVA UNIVERSITY'S PROPOSED LANCASTER AVE HOUSING PROJECT

JOINT MEETING WITH APPLICANT, TOWNSHIP, & PENNDOT

MEETING MINUTES

Meeting Date: 28 January 2015, Start ~11:00 AM, End ~1:00 PM

Location: 4th Floor Conference Room
PennDOT Engineering District 6-0
King of Prussia, Pennsylvania

Attendees:	John Cluver	Voith MacTavish Architects
	Al Federico	McCormick Taylor
	Fran Hanney	PennDOT 6-0 Traffic Services
	Steve Hildebrand	Villanova University
	Lou Hufnagle	Delaware County Planning Commission
	Amy Kaminski	Gilmore & Associates, Inc.
	Chris Kovolski	Villanova University
	Susan LaPenta	PennDOT 6-0 Traffic Services
	Paul Lutz	PennDOT 6-0 Signals
	Steve Norcini	Radnor Township
	Alex Tweedie	Nave Newell
	Frank Tavani	F. Tavani and Associates, Inc.
Copied but: not present at meeting	Marilou Smith	Villanova University

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Purpose and Background:

To review and discuss the recent conditional use approval of Villanova's proposed Lancaster Ave Housing project and associated other road improvements including the following specifics:

- HOP applications and phasing
- PennDOT's August 2014 preliminary review letter
- The next revised TIS
- Specific geometric issues, including the potential for a new EB right turn lane at Ithan Avenue

Discussion:

Meeting began with an introduction to the project including some brief explanation of building locations, parking to be removed, parking to be added (and where), parking spaces which are expected to remain inactive during peak periods, and offered road improvements.

Alex presented a phasing plan for building and road improvement staging and discussed the plan to break up over four phases.

Phase 1
- Expansion of SAC Garage
- Construction of West Lancaster Parking Lot (WLA)
- Elimination of individual driveways west of Church Walk within the project area of WLA. (note that WLA will be serviced by the existing Church Walk signal until Phase 2B)

Phase 2A
- Closure of Pike Parking lot and construction of Pike Parking Garage.
- Ithan Avenue widening.
- All Route 30 turn lane improvements and lane widening at Ithan Avenue.

Phase 2B
- Construction of Pedestrian Bridge and relocation of Church Walk driveway.
- Installation of new Route 30 EB right-turn lane and new WB left-turn lane into Church Walk.
- Construction of a new right-in/right-out driveway to serve the WLA.

Phase 3
- Construction of Student Housing within the Main Parking Lot.

Phase 4
- Construction of the Performing Arts Center (donor funding dependent phase)

The Commonwealth has awarded $7.5 million in grants toward the project ($4.5 TIIF money, $3.5 multimodal grant) which have been targeted primarily for the pedestrian bridge. A PennDOT project manager will be assigned to the project. Current contact is Tim Stevenson (610-205-6820).

Fran emphasized the benefit of having one contractor perform the work associated with the pedestrian bridge (to be bid through PennDOT process) as well as the other road improvements closer to Ithan Avenue (to be bid through Villanova). The University acknowledged this might be possible as it should provide economies of scale as well as greatly simplify the coordination of the efforts, and likely save time as well. Fran noted that a HOP will still be required from the Highway Division for the Church Walk driveway, but it will be applied for as part of the Bridge application.

Steve Norcini explained that the conditional use approval required a $175k contribution from the University to fund an adaptive signal system. Even though the money was specifically derived as a contribution to 3 locations/intersections, the Township will explore using the money to include every signalized intersection along Route 30 starting possibly near I-476 and continuing out to Airedale Road. The timing of this project is not determined, as the Township is looking to receive a grant for their portion of the work. Fran indicated that if this work should not occur simultaneously with the road improvements, then an interim signal plan will be required. Some discussion took place

regarding existing fiber optic connection capabilities. Paul Lutz believes area has fiber and is majority aerial. Fran questioned whether the TIS was based on adaptive signals or not. PennDOT's review of the Impact Study will comment whether or not adaptive signals are warranted to address project impacts. If adaptive signals are needed to address impacts but installation is delayed due to funding, PennDOT would need interim timing plan and condition statement to insure installation.

Frank recognized that there hasn't been a response to PennDOT's August 2014 review letter. The explanation is because the University was awaiting conditional use approval and wanted to get land development started / feedback from the Township regarding said submittal (made in early December) before resubmitting to PennDOT.

Some discussion ensued about possible long-term improvements to the intersection of Route 30 and Route 320, but since the project is mainly a redistribution of existing traffic (to reflect new parking 'centers' [at the proposed Pike Garage, the proposed 'West Lancaster Avenue' {WLA} parking lot, and two additional parking decks on the existing SAC garage on campus]), efforts to date show only minimal impacts at off site locations (such as Route 30 and Route 320). Though it is unlikely this will change, it will be explored further in the next study. Fran also note that an Alternative Traffic Project (ATP) may be required if unmitigated impacts are found as a result of the study. If so, Fran would like this ATP to focus on Rtes. 30/320 intersection. Fran noted that the adaptive signals could assist in the ATP. He also noted that his preference is that the Township work to eliminate Aldwyn Lane from the 30/320 signal. Steve Norcini noted that this has been discussed with the residents and the Residents don't have consensus on design approach.

Discussion returned to road improvement / general project construction phasing, and in particular the possibility of relocating the existing Church Walk signal slightly further west was mentioned. This would simplify construction of the pedestrian bridge and would allow cars parked at the WLA lot (which is the first phase of construction) to still be able to utilize the signal at Church Walk (so left turning movements can be better accommodated). This possibility needs to be explored further, including whether or not the potential relocation is temporary or permanent. The relocation of Church Walk would occur as part of the Bridge project. Al also noted that, in its current position, he is concerned about the proximity of the Bridge abutment to Lancaster Avenue. He recently sent his bridge review comments to Tim Stevenson.

Al commented that the complexity of the phasing of the improvements will need to be documented in the Highway Occupancy Permits. Al offered to provide an example of this. Al noted that to meet Villanova phasing goals, the HOP for the right-in right-out drive to the WLA lot would be the first application, and would be a stand-alone application. A summary of phasing would be part of that application, and PennDOT's approval would include condition statements requiring the future completion of the later phases as well as the preservation of left turns at Church Walk for the WLA vehicles. Those later phases can then be submitted to PennDOT as supplements to the original permit.

Susan requested a "one-sheet" summary of the proposed roadway improvements, including how they are proposed to be constructed/the time line involved. Susan said this summary must be made part of the TIS and will also be included in the condition statement.

Pedestrian crossings at Church Walk were also discussed and PennDOT would find one crosswalk on the east side of the intersection acceptable. Fran and Al questioned whether the pedestrian crossing

time was shorter than the required left turn phase. Design should confirm the pedestrian crosswalk in this location does not affect efficiency of the intersection.

Fran noted that the access gate at the Farrell Hall driveway should be located further from R/W to permit queue at the gate. Since this driveway will be exit only, the team will review if this is necessary.

The possibility of a new EB right-turn lane to be added at the intersection of Route 30 and Ithan Avenue was the last discussion item. Frank gave an overview of how the existing Main Lot and Pike Lot parking locations – and specifically how they are currently used during present-day special event conditions. The site plan includes many changes to various parking locations, and as such a better solution exists, namely the more direct garage access which is afforded by the new unsignalized, right-turn entering access found on Route 30 just east of Ithan Avenue. Additionally, if the garage is full, traffic can then be directed out to Ithan Avenue, either to turn right and head back to Route 30 to recirculate to other parking opportunities on main campus, or proceed straight through to Church Walk to recirculate to parking opportunities at the WLA lot. Concerns about the added pedestrian clearance time a new right turn lane (at Ithan) would require were also expressed by PennDOT and the University.

There was consensus that the circulation pattern utilizing the direct garage access off of Lancaster Avenue is the more efficient and logical means of accommodating special event traffic, but a new concern arose in whether or not a right turn taper or lane may be required. Alex will prepare charettes/sketches which illustrate what can be provided, along with stacking information, assuming such treatments are even required. A preliminary investigation of the 'routine' traffic during typical weekday peak hours suggest one IS NOT required, though the greater volumes during special events would clearly benefit from such a lane. No other site access changes were discussed. Specifically there was no discussion regarding the elimination of the SB left-turn movement at the proposed garage entrance, except for in the context of during special events (at which time the direct access to the garage along Route 30 will be the mandated and police-chaperoned traffic pattern). PennDOT also expressed interest in an ITS system. During other non-special event conditions, site traffic can access the Pike Garage either via the Route 30 access or the Ithan Avenue access at the discretion of the motorist, with the only turning movement restriction being left-turns out on Route 30 (from the garage access). The restriction of this turning movement has always been part of the site plan.

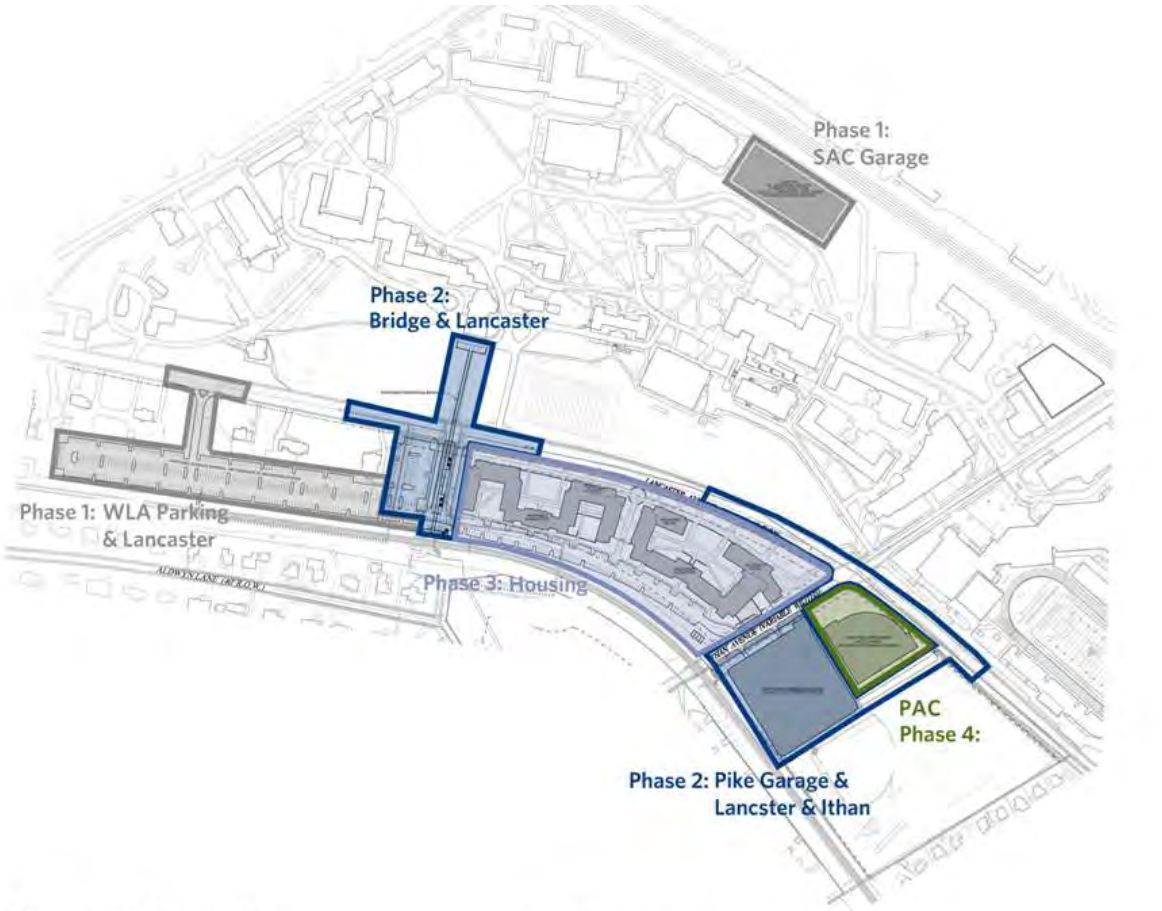
……

These meeting minutes are believed to reflect an accurate representation of key issues discussed. Should you have any comments or would like to request changes, please notify F. Tavani and Associates, Inc. within the next five calendar days (of receipt of these minutes), after such time these minutes will become an official record of events with follow up actions taken as described herein.

Very truly yours,
F. TAVANI AND ASSOCIATES, INC.

FRANK TAVANI, P.E., PTOE
Principal

attachment: Project Phasing Plan



Villanova University

Project Phasing Plan
February 2, 2015

GILMORE & ASSOCIATES, INC.
ENGINEERING & CONSULTING SERVICES

MEMORANDUM

Date: January 28, 2015

To: Steve Norcini, P.E.
Radnor Township Public Works Director

From: Amy Kaminski, P.E., PTOE
Department Manager of Transportation

cc: Kevin Kochanski, ASLA, R.L.A., Director of Community Development
Roger Phillips, P.E., Senior Project Manager, Gannett Fleming, Inc.
Steve Gabriel, PP, RETTEW
Damon Drummond, P.E., PTOE, Gilmore & Associates, Inc.

Reference: Villanova University – Lancaster Avenue Redevelopment
Preliminary Land Development Transportation Impact Study Review #1
Radnor Township, Delaware County, PA

G&A 12-04054

Gilmore & Associates, Inc. (G&A) has completed the preliminary land development transportation review of the Traffic Impact Assessment dated September 16, 2014 and last revised December 4, 2014. The revisions included added correspondence since the initial date of the report and supplemental information included in Appendix M. G&A reviewed the submitted materials and offers the following comments for Radnor Township consideration:

I. BACKGROUND

The applicant, Villanova University, intends to develop/redevelop several parcels located along Lancaster Avenue, southeast and southwest of the Ithan Avenue intersection, in Radnor Township, Delaware County. The project includes construction of student housing (1,135 bed apartment-style residence halls), retail shops (University Bookstore, bistro and small convenience store, size to be determined) along with 147 surface parking spaces to be located on the southwest corner of Lancaster Avenue and Ithan Avenue. In addition, the project includes construction of a Performing Arts Center (with 500 – 650 total seats in two theaters) and a multilevel parking structure (1,293 spaces) to be located on the southeast corner of Lancaster Avenue and Ithan Avenue. Villanova University intends to eliminate many of the existing driveway accesses located on the south side of Lancaster Avenue, west of Ithan Avenue and construct a shared surface parking facility to the rear of the existing university buildings on Lancaster Avenue with limited access to Lancaster Avenue at the signalized intersection of Church Walk and a new right in driveway, west of Church Walk.

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Phone: 215-345-4330 | Fax: 215-345-8606

www.gilmore-assoc.com

II. DOCUMENTS REVIEWED

The following documents were submitted to Gilmore & Associates for review:

1. Transportation Impact Study for Villanova University Lancaster Avenue Student Resident Halls, prepared by F. Tavani and Associates, Inc., dated September 16, 2014, revised December 4, 2014.

2. Response letter dated December 4, 2014 prepared by F. Tavani and Associates, Inc.

III. TRANSPORTATION IMPACT STUDY COMMENTS

1. As discussed at a coordination meeting on January 28, 2015 with PennDOT, Radnor Township, and Villanova University staff, revise the transportation impact study to investigate the following alternatives/information:

    i. Include phased improvements in the report and any graphics to clarify what improvements are associated with each phase.

    ii. Eliminate the southbound Ithan Avenue left turns into the Pike Lot Garage and include a deceleration lane on the eastbound departure of Lancaster Avenue at Ithan Avenue. This may reduce the need for a right turn lane on eastbound Lancaster Avenue at Ithan Avenue, provide more queuing space for the northbound left turn lane on Ithan Avenue at Lancaster Avenue, provide better circulation during special events and reduce the impact to pedestrians crossing Ithan Avenue near both parking accesses.

    iii. Relocate the Church Walk traffic signal on Lancaster Avenue west of the current location. This will separate vehicular and pedestrian movements, encourage more pedestrians to utilize the pedestrian bridge, provide more parking near the pedestrian bridge, allow for vehicle and pedestrian movements during construction efforts and provide a less complicated construction staging for the pedestrian bridge.

2. The applicant will be required to provide a comprehensive Transportation Impact Study once all comments are resolved. The final documents accepted for the land development process should not include updates and modifications in the form of an Appendix. We understand while the study is under review it makes sense to allow individual submissions but once the TIS is considered acceptable a final document must be provided to the Township as a permanent, stand-alone complete document.

3. The applicant is required to provide a turn-lane length analysis for all auxiliary lanes including the eastbound right turn lane at the intersection of Ithan Avenue and Lancaster Avenue in accordance with the methodology included in PennDOT Publication 46 *Traffic Engineering Manual*. The applicant should utilize the

PennDOT turn lane analysis worksheet from the PennDOT Traffic Signal Portal website and include the analysis in the next submission.

Although the response letter accompanying the TIS submission indicated the preliminary PennDOT letter and the CU Decision and Order did not include this as a requirement, we remind the applicant that the PennDOT letter was a preliminary review letter (pre-HOP application) based on the limited information provided and the applicant is working through the land development process. Furthermore, it is our understanding that the conditional use decision does not limit township staff from requesting additional information or providing recommendations during the land development and highway occupancy permitting process.

4. Provide a table indicating the 95th percentile queues for all intersections using HCM2010 methodology. A queue analysis was only provided for five intersections. Minimally, the applicant should provide the information for the following intersections:
    i. Conestoga Road and Sproul Road
    ii. Conestoga Road and Ithan Avenue
    iii. Conestoga Road and Lowrys Lane (northbound approach)
    iv. County Line Road & Ithan Avenue North
    v. County Line Road & Roberts Road (both north and southbound)

    Although the submission letter indicated PennDOT requested a limited intersection scope, the township will be evaluating the scope of all intersections in the study area as discussed previously and the applicant is requested to provide the information for review.

5. Use the Synchro HCM2010 methodology for the analysis of the Church Walk and Lancaster Avenue intersection. Verify the Synchro software version is up to date as the latest update includes a shared lane algorithm to support an analysis of this type of intersection; this should resolve any error message associated with analyzing the intersection with HCM2010. In addition, verify the Church Lane approach is modeled in Synchro accurately and reflects the latest site plans (dated December 5, 2014).

6. The new trips for the retail portion of the development should be based on the Scenario 1 information provide in your response letter December 4, 2014, which includes 31 trips entering and 29 exiting trips during the AM peak hour and 51 entering and 48 trips during the PM peak hour. The analysis must be based on the most conservative traffic impact of the three alternatives since the exact use is unknown. Revise the report accordingly.

7. Verify the trip distribution for the retail portion of the development to and from the east. The current projections show all the retail site traffic to and from the east using the PAC Lot. The eastbound Lancaster Avenue traffic to the proposed retail portion of the development is more likely to turn left at Ithan Avenue from WB Lancaster Avenue and continue southbound on Ithan Avenue and then turn right in the surface parking lot, near the residential dormitories and retail area. In addition, the exiting

movement would likely turn left on northbound Ithan Road and turn right on Lancaster Avenue to continue east.

8. Redistribution Worksheet A1 and A7, the site trip traffic must be distributed through the entire network and not just at the seven intersections shown on the worksheet. Provide a Figure that shows the site generated trip throughout the entire study area.

9. The revised Redistribution Worksheet 6 and 12 indicate redistribution traffic occurs outside the seven intersections shown on the worksheets. For example, Redistribution Worksheet 12 indicates 43 trips were redistributed to the area prior to north of the HRB access shown on Ithan Avenue Provide worksheets that show the anticipated redistributed traffic within the entire study.

10. Comparing the base condition traffic volumes to the future projected traffic volumes, it appears that some trips may have been removed and were not redistributed throughout the study area for the projected conditions. For example, at the intersection of Ithan Avenue and County Line Road, Figure 5: *2018 Base Conditions*, shows the southbound though movement decreases from 154 vehicles to 134 vehicles in Figure 11 *2018 Projected Conditions*. On the same two figures, the southbound movement on Ithan Avenue at Lancaster Avenue decreases from 217 to 118 vehicles for the 2018 *Base Conditions* and 2018 *Projected Conditions*, respectively. Additional information must be provided to explain the reduction. In addition, the applicant should verify the provided data for the future 2018 and 2023 analyses for both AM and PM conditions for similar discrepancies at the following intersections:

    i. Ithan Avenue & Route 30
    ii. Both County Line Road & Ithan Avenue intersections
    iii. County Line Road & Spring Mill Road

11. As previously requested in our September 30, 2014 review letter under comment L, provide a right turn warrant analysis for the eastbound approach on Lancaster Avenue at Ithan Avenue in accordance with PennDOT Publication 46 Chapter 11 regardless of the level of service operation and pedestrian accommodations.

12. Revise Table 1 to include the delay in seconds where there are critical movements with LOS degradation particularly for intersections 1, 3, 4, and 9.

13. We understand PennDOT has requested a more limited scope to be submitted for review but to address the township concerns, critical movements must also be evaluated. Address the LOS drops for the critical movements and provide discussion of improvements which would be needed for mitigation of the critical movements. For example, there is an increase of over 100 seconds in delay for the intersection of Lancaster Avenue/Spring Mill Road/Kenilworth Road/Aldwyn Lane for the critical movement on the southbound through/right-turn movement during the PM 2018 and 2023 analyses from base conditions to projected conditions.

14. The applicant has previously proposed an all-way stop at the intersection Ithan Road and the Pike Parking Garage access. The applicant has provided an additional two-way stop analysis in Appendix M of the revised report. It is unclear which type of stop control is to be installed. The recommendations in the report must be updated to be clear on which type of stop control is to be installed. Based on the analysis a two way stop appears to operate at acceptable LOS. The traffic volumes do not appear to warrant an all-way stop in accordance with the MUTCD. Traffic calming measures or other pedestrian improvements should be considered in lieu of an all-way stop.

15. Provide the missing Synchro analysis for the No-Build analysis for the AM peak hour conditions for 2018 and 2023 in Appendix I.

16. Future submissions should include page numbers at the bottom of each page for consistency with the Table of Contents and to allow more efficient review and comment.

17. Incorporate all comments and supplemental items provided in Appendix M and submit a comprehensive TIS. Supplemental Appendices are not acceptable for the final TIS submission.

18. The applicant is required to submit a separate report for special events. Final approval of the TIS cannot be recommended until all comments regarding the special event report and the TIS are satisfied.

F. Tavani and Associates, Inc.
Traffic Engineering and Planning

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4 December 2014

Amy Kaminski, P.E., PTOE
Gilmore & Associates, Inc.
65 E. Butler Avenue, SU 100
New Britian, PA 18901

VIA EMAIL ONLY

RE: Villanova University
Gilmore Letter dated 30 September 2014
Radnor Township, Delaware County

FTA Job # 211-027

Dear Ms. Kaminski:

Earlier this year F. Tavani and Associates, Inc. (FTA) received a copy of your letter addressed to Bill Bolla dated 30 September 2014 (attached) regarding Villanova University's proposed undergraduate residential halls near Ithan Avenue.

Your review letter was prepared during the conditional use hearing process, which has since ended with the application being approved, subject to conditions. Prior to the approval, a response to your review letter was issued in October 2014. Some of the responses in that letter were: "to be investigated and revised / resubmitted if needed" (or the like). It is the intention of this letter to address those outstanding issues.

For purposes of record, all other responses which were included in October 2014 are repeated below in standard print. New information is shown in red, following the original response. Note that in some cases previously-issued responses benefit from added explanation (now that a decision has been rendered on 24 November 2014). In those cases, once again, the original response is provided, followed by new information in red print.

What follows next is a repeat of FTA's response letter to Mr. Bolla (plus the additions just mentioned).

At the outset it should be mentioned that the CICD ordinance provides that a traffic study must be conducted in accordance with PennDOT's Strike Off Letter 470-09-4 (hereinafter, the SOL) and thus PennDOT's opinion about what is required to comply with the SOL is significant. PennDOT provided guidance in its letter dated 1 August 2014 (hereinafter, the PennDOT letter). This letter was included in Appendix A of A-18 and is referenced on occasion in the responses that follow.

A.

1. A turn lane length analysis is provided in Appendix K. This is supplemented by a queue length analysis provided on page 7. Neither a turn length nor queue length analysis is provided for a separate EB right turn lane at Lancaster Avenue and Ithan Avenue as A-18 concludes that the benefit is limited and the lane is not necessary. Additionally, the PennDOT letter requested an investigation of the lane, which has been provided. PennDOT also stated in the same letter that the lane is "…*not a requirement from the Department*." The PennDOT letter also provided guidance regarding turn lane warrant analysis scope and that requirement was met in A-18.

   The conditional use decision of 24 November 2014 did not include a requirement for the cited eastbound right-turn lane.

2. The queue analysis was provided in compliance with the PennDOT letter. The PennDOT letter limited the scope of the study to certain intersections. The queue analysis provided complies with the SOL and the PennDOT letter.

F. To be investigated and revised / resubmitted if needed.

The requested methodology resuts in an error message in Synchro, the output of which has been printed. Rather than alter the affected previously-issued appendix items (i.e., Appendix I, Capacity Analysis), a new appendix (Appendix M, December 2014 Supplemental Items) has been created and included with the revised TIS, which is attached. The details of this error message can be found in that appendix of the attached revised TIS which is dated 4 December 2014.

G. Trip generation for the retail subordinate uses should have been explained in greater detail in Appendix G of A-18.

First, it should be mentioned that the exact users of the retail subordinate space is not confirmed. More consideration will be given to this subject during land development. However, the uses will be among those provided in or fitting the definitions of the Retail Subordinate Uses section of the CICD ordinance.

The Gilmore letter correctly cites that the plans show 20,440 SF for the retail uses. However, some of the space is currently being considered as a computer support facility which would be limited to Villanova students and faculty (and thus have no external trip generation).

Recognizing this was not adequately explained in Appendix G of A-18, an alternative trip generation analysis has been prepared. It assumes a combination of uses as permitted under the ordinance. Three such combinations were prepared using ITE trip generation rates as requested. More than one combination was prepared because the exact users are not yet known and also because evidence of the impact of different permitted uses may benefit the township in its decision making process.

SCENARIO 1: Convenience Mart (ITE LUC 852), Bistro (932), and Bookstore (868)

KSF	ITE LUC	AM PEAK HOUR		PM PEAK HOUR	
		IN	OUT	IN	OUT
5.29	Conv Mart	82	82	90	93
5.40	Bistro	36	29	35	24
9.75	Bookstore	6	6	80	74
	TOTAL	124	117	205	191
	25% NEW	31	29	51	48
	FROM A-18	11	11	34	30
	DIFFERENCE	+20	+18	+17	+18

SCENARIO 2: Clothing / Apparel Store (ITE LUC 876), Bistro (932), and Bookstore (868)

KSF	ITE LUC	AM PEAK HOUR		PM PEAK HOUR	
		IN	OUT	IN	OUT
5.29	Apparel	4	1	10	10
5.40	Bistro	36	29	35	24
9.75	Bookstore	6	6	80	74
	TOTAL	46	36	125	108
	25% NEW	12	9	31	27
	FROM A-18	11	11	34	30
	DIFFERENCE	+1	-2	-3	-3

SCENARIO 3: Copy, Print, Ship Store (ITE LUC 920), Bistro (932), and Bookstore (868)

KSF	ITE LUC	AM PEAK HOUR		PM PEAK HOUR	
		IN	OUT	IN	OUT
5.29	Copy/Print	11	5	17	22
5.40	Bistro	36	29	35	24
9.75	Bookstore	6	6	80	74
	TOTAL	53	40	132	120
	25% NEW	13	10	33	30
	FROM A-18	11	11	34	30
	DIFFERENCE	+2	-1	-1	0

AVERAGE NEW TRIPS

		AM PEAK HOUR		PM PEAK HOUR	
		IN	**OUT**	**IN**	**OUT**
SCENARIO 1		31	29	51	48
SCENARIO 2		12	9	31	27
SCENARIO 3		13	10	33	30
	AVERAGE	19	16	38	35
	FROM A-18	11	11	34	30
	DIFFERENCE	+8	+5	+4	+5

Whether using individual scenarios or the average of all 3 hypothetical scenarios, it is plain to see that the difference in trip generation as compared with what was used in A-18 is trivial.

Remember that the numbers shown in the tables above are total trips, and when trip distribution models are applied, the effect on individual intersections / turning movements will be further diminished – in most cases amounting to fractions of one trip.

Based on this new information provided – as well as the notion that the exact users and square footages apportioned to each user are currently indeterminate – FTA maintains that the trip generation used in A-18 is an appropriate estimate for traffic engineering planning purposes. Further, none of the land uses codes mentioned above were based on data collected in university settings and much of the data is 20 years old (or older). The data collected at a local university (St. Joe's) in 2014 is a more appropriate barometer of potential of what may happen at Villanova, even considering small potential differences in opening and closing times (the details of which cannot be determined until much later in land development).

H. The minor differences in variables mentioned will have no meaningful affect on traffic projections and do not warrant any changes to A-18. **Further A-18 is based on 100% peak hour moving parking spaces which alone is a highly conservative assumption having no basis in reality.** Any concerns about the minor plan differences mentioned in this comment should be tempered by the extraordinarily conservative emphasis on peak hour traffic which A-18 already incorporates by design.

The applicant confirms the number of beds is 1,135.

I. See two prior responses. As determined/mentioned, the matters have been investigated and no further revisions are necessary.

The conditional use decision of 24 November 2014 did not include a requirement for the cited eastbound right-turn lane.

J. To be investigated and revised / resubmitted if needed.

The noted inconsistencies were found and addressed. See also response to "F".

K. To be investigated and revised / resubmitted if needed.

The noted inconsistencies were found and addressed. See also response to "F".

L. No additional turn lane warrant investigation is necessary or required to be code compliant – the burden of the SOL and the PennDOT letter have been met. In fact the PennDOT letter clearly states the right turn lane is "…*not a requirement from the Department*."

Even though it is not required, level of service investigations were performed and those investigations confirm that an eastbound right turn lane at the intersection of Lancaster Avenue and Ithan Avenue has limited value. Analysis was provided to support this conclusion. Levels of service were summarized in the LOS comparison tables. *Synchro* outputs were included in Appendix I, for example the last few pages of that appendix feature a footer which reads "B 23 pm w/EB RT at Ithan 9/16/2014 Baseline". Special event (volume) predictions/analysis were not included as previously directed by Gilmore (see Appendix A).

Additionally, alternative travel patterns for inbound special event traffic (to include the WLL driveway and/or the PAC driveway, not to mention other parking locations such as HSB, SAC, et al) do not utilize the mentioned right turn lane. This has been identified and discussed in A-18 as well as the Chance Management report. FTA disagrees with regard to the cited defacto operation. No further explanation or analysis is needed regarding the applicant's position or the benefit – or lack thereof – of the requested lane. The applicant confirms that the suggested lane is not offered as an improvement.

The conditional use decision of 24 November 2014 did not include a requirement for the cited eastbound right-turn lane.

M. The requested information is not required to be code compliant and is not a requirement of the SOL or the PennDOT letter. Further previous direction by Gilmore (included in Appendix A) clearly stated that further special event analysis was not necessary.

N. The cited SOL requirement is incorrect. The level of service investigations required under the SOL apply to overall intersection values, and this requirement is what dictated the format of the LOS tables found in A-18. Page 29 of the SOL states "The Department **may** request the applicant to mitigate critical movements or approaches and perform additional analysis." (emphasis added). The PennDOT letter included no such requests. In fact, the only direction included in the PennDOT letter was a request to provide delay in seconds for LOS F movements, which was provided. If the A-18 reader is determined to uncover one or more of the nearly 1,000 of individual turning movement delay estimates, this information is readily available in Appendix I as well as the individual *Synchro* files which were shared with Gilmore last week. A-18 is compliant with the ordinance and with the SOL.

O. Intersection traffic control "warrants" are guidelines and almost always include statements that traffic engineering judgment should be applied in individual cases. The difference in delay between TWSC and AWSC is minimal. AWSC control affords added protections to pedestrians crossing Ithan Avenue between the garage and the new residence halls. This design element is important. AWSC is the recommended traffic control device.

The conditional use decision of 24 November 2014 did include a requirement for the cited intersection to be changed from AWSC (as shown in the TIS) to TWSC operation. See response to "F".

P. To be investigated further.

The requested site plan change has been made.

Q. The request has no substantiation. Gilmore should provide added detail about what is required under the ordinance or the SOL to maintain the crossings mentioned. Note also that this is ultimately a PennDOT decision and does not enter into the conditional use hearings or decision making process of said proceeding.

Signal plan revisions are pending and will be prepared and submitted later in the land development process but the applicant has agreed to maintain the crossing mentioned, subject to PennDOT approval.

R. To be investigated further.

The applicant agrees to these requests.

Please call or email me if I can answer any other questions. Thank you.

Very truly yours,
F. TAVANI AND ASSOCIATES, INC.

FRANK TAVANI, P.E., PTOE
Principal

attachments as follows:

- Gilmore 30 September 2014 review letter
- revised TIS, including new Appendix A items (letters, including this letter) and a new Appendix M

cc: Gilmore & Associates, Inc. (Amy Kaminski, P.E., PTOE)
Radnor Township (c/o Steve Norcini, P.E.)
Villanova University (c/o Marilou Smith)

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F. Tavani and Associates, Inc.
Traffic Engineering and Planning

105 Kenilworth Street • Philadelphia • PA • 19147 • (215) 625-3821 Phone • (484) 792-9495 Fax
www.FTAVANIASSOCIATES.com

30 September 2014

Bill Bolla, Esq.
McNamara, Bolla, & Panzer
116 East Court Street
Doylestown, PA 18901

RE: Villanova University – Gilmore Letter
Radnor Township, Delaware County
FTA Job # 211-027

Dear Mr. Bolla:

Earlier this week F. Tavani and Associates, Inc. (FTA) received a copy of a review letter addressed to you from Gilmore & Associates, Inc. dated 30 September 2014 (attached) regarding Villanova University's proposed undergraduate residential halls near Ithan Avenue. Responses to items under the heading "Comments" beginning at the bottom of page 2 are provided below.

At the outset it should be mentioned that the CICD ordinance provides that a traffic study must be conducted in accordance with PennDOT's Strike Off Letter 470-09-4 (hereinafter, the SOL) and thus PennDOT's opinion about what is required to comply with the SOL is significant. PennDOT provided guidance in its letter dated 1 August 2014 (hereinafter, the PennDOT letter). This letter was included in Appendix A of A-18 and is referenced on occasion in the responses that follow.

A.

1. A turn lane length analysis is provided in Appendix K. This is supplemented by a queue length analysis provided on page 7. Neither a turn length nor queue length analysis is provided for a separate EB right turn lane at Lancaster Avenue and Ithan Avenue as A-18 concludes that the benefit is limited and the lane is not necessary. Additionally, the PennDOT letter requested an investigation of the lane, which has been provided. PennDOT also stated in the same letter that the lane is "…*not a requirement from the Department*." The PennDOT letter also provided guidance regarding turn lane warrant analysis scope and that requirement was met in A-18.
2. The queue analysis was provided in compliance with the PennDOT letter. The PennDOT letter limited the scope of the study to certain intersections. The queue analysis provided complies with the SOL and the PennDOT letter.

F. To be investigated and revised / resubmitted if needed.

G. Trip generation for the retail subordinate uses should have been explained in greater detail in Appendix G of A-18.

First, it should be mentioned that the exact users of the retail subordinate space is not confirmed. More consideration will be given to this subject during land development. However, the uses will be among those provided in or fitting the definitions of the Retail Subordinate Uses section of the CICD ordinance.

The Gilmore letter correctly cites that the plans show 20,440 SF for the retail uses. However, some of the space is currently being considered as a computer support facility which would be limited to Villanova students and faculty (and thus have no external trip generation).

Recognizing this was not adequately explained in Appendix G of A-18, an alternative trip generation analysis has been prepared. It assumes a combination of uses as permitted under the ordinance. Three such combinations were prepared using ITE trip generation rates as requested. More than one combination was prepared because the exact users are not yet known and also because evidence of the impact of different permitted uses may benefit the township in its decision making process.

SCENARIO 1: Convenience Mart (ITE LUC 852), Bistro (932), and Bookstore (868)

KSF	ITE LUC	AM PEAK HOUR		PM PEAK HOUR	
		IN	OUT	IN	OUT
5.29	Conv Mart	82	82	90	93
5.40	Bistro	36	29	35	24
9.75	Bookstore	6	6	80	74
	TOTAL	124	117	205	191
	25% NEW	31	29	51	48
	FROM A-18	11	11	34	30
	DIFFERENCE	+20	+18	+17	+18

SCENARIO 2: Clothing / Apparel Store (ITE LUC 876), Bistro (932), and Bookstore (868)

KSF	ITE LUC	AM PEAK HOUR		PM PEAK HOUR	
		IN	OUT	IN	OUT
5.29	Apparel	4	1	10	10
5.40	Bistro	36	29	35	24
9.75	Bookstore	6	6	80	74
	TOTAL	46	36	125	108
	25% NEW	12	9	31	27
	FROM A-18	11	11	34	30
	DIFFERENCE	+1	-2	-3	-3

SCENARIO 3: Copy, Print, Ship Store (ITE LUC 920), Bistro (932), and Bookstore (868)

KSF	ITE LUC	AM PEAK HOUR		PM PEAK HOUR	
		IN	OUT	IN	OUT
5.29	Copy/Print	11	5	17	22
5.40	Bistro	36	29	35	24
9.75	Bookstore	6	6	80	74
	TOTAL	53	40	132	120
	25% NEW	13	10	33	30
	FROM A-18	11	11	34	30
	DIFFERENCE	+2	-1	-1	0

AVERAGE NEW TRIPS

		AM PEAK HOUR		PM PEAK HOUR	
		IN	OUT	IN	OUT
SCENARIO 1		31	29	51	48
SCENARIO 2		12	9	31	27
SCENARIO 3		13	10	33	30
	AVERAGE	19	16	38	35
	FROM A-18	11	11	34	30
	DIFFERENCE	+8	+5	+4	+5

Whether using individual scenarios or the average of all 3 hypothetical scenarios, it is plain to see that the difference in trip generation as compared with what was used in A-18 is trivial.

Remember that the numbers shown in the tables above are total trips, and when trip distribution models are applied, the effect on individual intersections / turning movements will be further diminished – in most cases amounting to fractions of one trip.

Based on this new information provided – as well as the notion that the exact users and square footages apportioned to each user are currently indeterminate – FTA maintains that the trip generation used in A-18 is an appropriate estimate for traffic engineering planning purposes. Further, none of the land uses codes mentioned above were based on data collected in university settings and much of the data is 20 years old (or older). The data collected at a local university (St. Joe's) in 2014 is a more appropriate barometer of potential of what may happen at Villanova, even considering small potential differences in opening and closing times (the details of which cannot be determined until much later in land development).

H. The minor differences in variables mentioned will have no meaningful affect on traffic projections and do not warrant any changes to A-18. **Further A-18 is based on 100% peak hour moving parking spaces which alone is a highly conservative assumption having no basis in reality.** Any concerns about the minor plan differences mentioned in this comment should be tempered by the extraordinarily conservative emphasis on peak hour traffic which A-18 already incorporates by design.

I. See two prior responses. As determined/mentioned, the matters have been investigated and no further revisions are necessary.

J. To be investigated and revised / resubmitted if needed.

K. To be investigated and revised / resubmitted if needed.

L. No additional turn lane warrant investigation is necessary or required to be code compliant – the burden of the SOL and the PennDOT letter have been met. In fact the PennDOT letter clearly states the right turn lane is "…*not a requirement from the Department*."

Even though it is not required, level of service investigations were performed and those investigations confirm that an eastbound right turn lane at the intersection of Lancaster Avenue and Ithan Avenue has limited value. Analysis was provided to support this conclusion. Levels of service were summarized in the LOS comparison tables. *Synchro* outputs were included in Appendix I, for example the last few pages of that appendix feature a footer which reads "B 23 pm w/EB RT at Ithan 9/16/2014 Baseline". Special event (volume) predictions/analysis were not included as previously directed by Gilmore (see Appendix A).

Additionally, alternative travel patterns for inbound special event traffic (to include the WLL driveway and/or the PAC driveway, not to mention other parking locations such as HSB, SAC, et al) do not utilize the mentioned right turn lane. This has been identified and discussed in A-18 as well as the Chance Management report. FTA disagrees with regard to the cited defacto operation. No further explanation or analysis is needed regarding the applicant's position or the benefit – or lack thereof – of the requested lane. The applicant confirms that the suggested lane is not offered as an improvement.

M. The requested information is not required to be code compliant and is not a requirement of the SOL or the PennDOT letter. Further previous direction by Gilmore (included in Appendix A) clearly stated that further special event analysis was not necessary.

N. The cited SOL requirement is incorrect. The level of service investigations required under the SOL apply to overall intersection values, and this requirement is what dictated the format of the LOS tables found in A-18. Page 29 of the SOL states "The Department **may** request the applicant to mitigate critical movements or approaches and perform additional analysis." (emphasis added). The PennDOT letter included no such requests. In fact, the only direction included in the PennDOT letter was a request to provide delay in seconds for LOS F movements, which was provided. If the A-18 reader is determined to uncover one or more of the nearly 1,000 of individual turning movement delay estimates, this information is readily available in Appendix I as well as the individual *Synchro* files which were shared with Gilmore last week. A-18 is compliant with the ordinance and with the SOL.

O. Intersection traffic control "warrants" are guidelines and almost always include statements that traffic engineering judgment should be applied in individual cases. The difference in delay between TWSC and AWSC is minimal. AWSC control affords added protections to

pedestrians crossing Ithan Avenue between the garage and the new residence halls. This design element is important. AWSC is the recommended traffic control device.

P. To be investigated further.

Q. The request has no substantiation. Gilmore should provide added detail about what is required under the ordinance or the SOL to maintain the crossings mentioned. Note also that this is ultimately a PennDOT decision and does not enter into the conditional use hearings or decision making process of said proceeding.

R. To be investigated further.

Please call or email me if I can answer any other questions. Thank you.

Very truly yours,
F. TAVANI AND ASSOCIATES, INC.

FRANK TAVANI, P.E., PTOE
Principal

attachment

cc: Gilmore & Associates, Inc. (Amy Kaminski, P.E., PTOE)
Radnor Township (c/o Steve Norcini, P.E.)
Villanova University (c/o Marilou Smith)

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GILMORE & ASSOCIATES, INC.
ENGINEERING & CONSULTING SERVICES

September 30, 2014

File No. 12-04054

Mr. William Bolla, Esq.
McNamara, Bolla & Panzer
116 East Court Street
Doylestown, PA 18901

Reference: Villanova University – Lancaster Avenue Redevelopment
CICD Conditional Use Transportation Review
Radnor Township, Delaware County, PA

Dear Mr. Bolla:

Gilmore & Associates, Inc. has completed the conditional use Transportation review of the submitted materials and offers the following comments for Radnor Township consideration:

I. BACKGROUND

The applicant, Villanova University, intends to develop/redevelop several parcels located along Lancaster Avenue, southeast and southwest of Ithan Avenue intersection, in Radnor Township, Delaware County. The project includes construction of student housing (1,135 bed apartment-style residence halls), retail shops (University Bookstore, bistro and small convenience store). In addition, the project includes construction of a Performing Arts Center (with 500 – 650 total seats in two theaters) and multilevel parking structure (1,293 spaces) to be located on the southeast corner of Lancaster Avenue and Ithan Avenue. Villanova University intends to eliminate many of the existing driveway accesses located on the south side of Lancaster Avenue, west of Ithan Avenue and construct a shared surface parking facility to the rear of the existing university buildings with limited access to Lancaster Avenue at the signalized intersection of Chapel Walk.

II. REVIEWED DOCUMENTS

Transportation Impact Assessment for Villanova University Lancaster Avenue Student Resident Halls, prepared by F. Tavani and Associates, Inc. dated September 16, 2014.

III. IMPROVEMENTS

According to the submitted Transportation Impact Study, Villanova University proposes the following improvements/accesses:

A. Lancaster Avenue at Church Walk-Signalized Intersection

65 E. Butler Avenue | Suite 100 | New Britain, PA 18901
Phone: 215-345-4330 | Fax: 215-345-8606

www.gilmore-assoc.com

1. Left and right turn lane exit from Chapel Walk to Lancaster Avenue.
2. Right in/right out on the eastbound approach of Lancaster Avenue, west of Church Walk
3. A westbound dedicated left-turn lane on Lancaster Avenue entering Church Walk
4. An eastbound dedicated right-turn lane on Lancaster Avenue entering Church Walk
5. A new pedestrian bridge spanning Lancaster Avenue at Church Walk.
6. Eliminate existing pedestrian crosswalks crossing Route 30 at Church Walk.
7. Optimize signal timings at the intersection during the studied peak hours.

B. Pike Lot Parking Garage Accesses (Southeast corner of Lancaster Avenue and Ithan Avenue)
   1. New left-turn movement directly from westbound Lancaster Avenue to Pike Garage, east of Ithan Avenue along with a right in/right out; however, northbound left turn movements out of the Pike Garage will be prohibited.
   2. Full access on Ithan Avenue at Pike Lot Parking Garage & Lancaster Avenue Housing (LAH) intersection
   3. Right out, north of the full access to Ithan Avenue, just south of Lancaster Avenue.

C. Lancaster Avenue and Ithan Avenue-Signalized Intersection:
   1. Lancaster Avenue eastbound to include a dedicated left turn lane, one through lane and one shared through/right turn lane.
   2. Lancaster Avenue westbound to include an extended dedicated left turn lane, one through lane and one shared through/right turn lane.
   3. Ithan Avenue northbound to include an extended dedicated left turn lane; one shared through/right turn lane.
   4. Ithan Avenue southbound to include a dedicated left turn lane; one shared through/right turn lane.

D. Lancaster Avenue and Route 320/Kenilworth Street/Aldwyn Lane:
   Optimize signal timings at the intersection during the studied peak hours in order to improve operations and reduce queuing.

E. Lancaster Avenue and Driveway access:
   1. Eight (8) unsignalized and unrestricted driveways will be consolidated to one (1) unsignalized right-in/right-out (RIRO) driveway Between Route 320 and the Church Walk signalized intersection, .
   2. A right-turn deceleration lane will be constructed along Lancaster Avenue at the right-in/right-out driveway, west of Church Walk.

IV. COMMENTS

A. As required in PennDOT Publication 46 *Traffic Engineering Manual*

   1. Provide a turn-lane length analysis for the new proposed turn lanes and for the eastbound right turn at the intersection of Ithan Avenue and Lancaster Avenue.

2. Provide a table indicating the 95th percentile queues for all intersections using HCM2010 methodology. A queue analysis was only provided for five intersections.

F. Use HCM2010 methodology in Synchro for the intersection of Church Walk and Lancaster Avenue.

G. In general, when a new development is proposed, the vehicular trips associated with the new land development are calculated based on the type of land use and the size of the proposed land use. The applicant based the Trip Generation for University Student Bookstore, Bistro and the small convenience store on a similar site at St. Joseph University (SJU). The SJU includes approximately 15,000 square feet of retail space including a coffee shop, bookstore and restaurant/bistro.

   Although in general, we agree with utilizing the trip generation of a similar local site there are some assumptions in the Villanova trip generation we disagree with as follows:

   1. In accordance with Conditional Use (CU) Exhibit A.6.A, the Villanova retail space is approximately 20,440 square feet and the SJU retail is only 15,000 square feet. No factor was applied to account for the approximate 33% increase in square footage.

   2. The SJU restaurant/bistro opens at 11:00 AM while the bookstore opens at 9AM. The SJU restaurant/bistro and bookstore were not opened during the studied AM peak hour (7:30 - 8:30 AM); however, Villanova University Student Bookstore currently opens at 8:00 AM.

   3. The report should clarify if Villanova University intends to operate the Bistro and Bookstore during the AM Peak Hour and modify the trip generation data accordingly. Based on the above differences and to account for the Trip Generation of the Villanova retail component, it is recommended the study utilize the ITE Trip Generation 9th Edition for the three retail uses of convenience store, bookstore and restaurant/bistro. According to the SJU survey study, a 75% capture rate could be applied to the calculated ITE Trip Generation.

H. The Transportation Impact Study identifies 1,135 new beds for undergraduate students and 1,293 parking spaces for the proposed Pike garage. However, the CU application dated May 4, 2014 identifies 1,159 new beds and 1,265 new garage spaces. All conditional use documents must be consistent.

I. CU Exhibit A.6.A and A.18 identifies site plans that are not consistent as follows:

   1. The pedestrian bridge entry point locations are inconsistent

   2. Exhibit A.6.A indicates over 20,000 square feet of retail space while Exihibit.A.18 indicates 15,000 square feet of retail space.

3. Verify and revise as necessary so both are consistent.

J. Verify the 2023 PM Peak Hour traffic volumes for the eastbound right turn lane at the intersection of Lancaster Avenue and Ithan Avenue and revise as needed. It appears the PM Peak Hour 2023 traffic volumes are less than the existing conditions and the 2018 conditions; verify and revise as necessary.

K. There are some inconsistencies between the 2014 figure volumes and the analysis. These inconsistencies should be corrected.

L. The applicant indicates an eastbound right-turn lane at the intersection of Lancaster Avenue and Ithan Avenue would have limited value during ordinary traffic conditions and would be insignificant during special events. No analysis was provided for this conclusion. The report must include a right turn lane warrant analysis based on PennDOT Publication 46 Traffic Engineering Handbook. During special events, a right turn lane will provide relief for the congested eastbound through movement and if a right turn is not provided, it is anticipated the two eastbound lanes will operate as one though lane and a de facto right turn lane thus reducing the capacity of Lancaster Avenue. To improve the operation of the intersection and to better accommodate special event traffic, an eastbound right-turn should be provided.

M. Add traffic volumes figures depicting the 2023 projected traffic for special events such as men's basketball game and homecoming.

N. PennDOT Strike-Off-Letter (SOL) 470-09-4 identifies mitigation for deficient critical movements or approaches (page 29). Revise Table 1 to include the delay in seconds where there are critical movements with LOS degradation.

O. The applicant has proposed an all way stop at the intersection Ithan Road and the Pike parking garage access. Based on the analysis a two way stop seems to operate at acceptable LOS. The traffic volumes do not appear to warrant an all-way stop in accordance with the MUTCD. Traffic calming measures or other pedestrian improvements should be considered in lieu of an all-way stop.

P. We recommend eliminating the second right turn out only from the Pike Garage to northbound Ithan Avenue. Superfluous

Q. The street level pedestrian crossing on Lancaster Avenue at Church Walk must be maintained between the public sidewalk south of Lancaster Avenue and the public sidewalk north of Lancaster Avenue.

R. The applicant should consider the following improvements associated with the pedestrian overpass:

1. Provide an elevator for the physically challenged for access from the LAH surface parking lot to the pedestrian overpass.

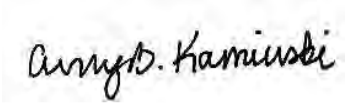
2. Install fencing between the north-side Lancaster Avenue sidewalk and the Villanova University property frontage along Lancaster Avenue to

discourage pedestrians from taking access to Villanova University from the northern public sidewalk.

3. Discuss alternative SEPTA bus stop locations with SEPTA officials

Please let me know if you require additional information or further clarification related to this subject.

Sincerely,



Amy B. Kaminski, P.E., PTOE
Department Manager of Transportation
Gilmore & Associates, Inc.

RETTEW

We answer to you.

3020 Columbia Avenue, Lancaster, PA 17603 ● Phone: (717) 394-3721
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Engineers
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August 19, 2014

Mr. William J. Bolla, Esquire
McNamara, Bolla, and Panzer
116 East Court Street
Doylestown, PA 18901-4321

RE: Villanova CICD Conditional Use Development Impact Statement
Review No. 1
RETTEW Project No. 101442003

Dear Bill:

At your request, we have completed our review of the above referenced document as prepared by Voith & Mactavish Architects LLP. Our review was of the following information received on July 15, 2014:

1. Thirteen (13) plan sheets dated May 2, 2014;
2. Development Impact Statement dated May 2, 2014;
3. Traffic Impact Statement dated May 2, 2014; and,
4. Miscellaneous Township ordinances and related documents.

Project Overview:

Applicant:	Villanova University
Requested Action/Use:	CICD Conditional Use – Development Impact Statement Review
Zoning District:	PI – Planned Institutional; CO – Commercial Office
Location and Size:	CICD Conditional Use Property is located between Lancaster Avenue and the SEPTA R-100 tracks, and between Pike Field and Moriarty Hall on the Villanova campus, a gross site area of approximately 13.81 acres.
Existing Use:	Surface parking lots
Proposed Use:	Student dormitories, Performing Arts Center, Parking Structure, and student-centered retail.

We have performed a general review of the Development Impact Statement supported by conditional use plans and related documents, and have included comments on the Impact Statement at this point. We may have additional comments as the Conditional Use application moves through the review process and will when more detailed land development plans are submitted.

Our comments below are in the same order as the contents for a Development Impact Statement are listed in the CICD Use in the Planned Institutional zoning district.

COMPREHENSIVE PLAN CONSISTENCY REVIEW – ENVIRONMENTAL & NATURAL RESOURCES

1. Objectives 1 – 3: No comments.

2. Objective 4: In addition to the University's response, the proposed 13-acre development provides for 2 acres of preserved land in the Aldwyn Triangle, which has been designated, at least partially, as a "core reserve wooded area." The Comprehensive Plan strongly recommends that the Township protects and preserves these existing natural areas to the maximum extent *(2-40)*. Preservation by the University of the remainder of the Aldwyn Triangle would help to protect the environmental integrity of the sensitive natural features in the dedicated 2-acre portion and be an indication of the University's intent for the Triangle property to remain a quiet part of the neighborhood.

3. Objectives 5 – 7: No comments.

COMPREHENSIVE PLAN CONSISTENCY REVIEW – HOUSING, DEMOGRAPHICS, AND SOCIOECONOMICS

4. Objectives 1 – 4: No comments.

5. Objective 5: In addition to the University's response, the new on-campus housing provided for over 1,100 off-campus resident students may consequently increase the availability of housing in Radnor Township, especially of rental units. Current demand for housing in Radnor is high, and the Township Comprehensive Plan indicates that another downside of this "more demand than supply" market condition above and beyond rapid increases in price is that households wanting to move into Radnor in the future… will not be able to move in and will be forced to seek alternative locations. This factor may be more significant for certain types of households, certain age groups, or ethnic and racial groups which are more income-constrained, all of which can have implications for future Radnor community building *(3-14)*.

6. Objectives 6 – 10: No comments.

COMPREHENSIVE PLAN CONSISTENCY REVIEW – BUSINESS AND ECONOMIC DEVELOPMENT

7. Objectives 1 – 6: No comments.

8. Objective 7: The University indicates that it pays applicable taxes on unrelated business generating activities. It does not, however, pay business privilege taxes on those business activities it conducts which it considers part of its core mission. The University also does not pay property taxes.

COMPREHENSIVE PLAN CONSISTENCY REVIEW – TRANSPORTATION AND CIRCULATION PLAN

9. One of the goals of Section 5 – Transportation and Circulation Plan of the Comprehensive Plan is to develop traffic calming strategies for implementation, as appropriate, to help preserve neighborhoods. The Development Impact Statement on page 11, however, indicates that no traffic calming is proposed as a method to "reduce the likelihood of cut-through traffic." Instead, proposed traffic improvements to Lancaster Avenue are cited as improving the performance of that key arterial roadway and in doing so will reduce cut-through traffic. Until the University submits its Special Events Management Plan for the post-development condition, and it reworks its Traffic Impact Study to comply with all PennDOT requirements for such studies (see comment under Transportation Impact below), the ability of Lancaster Avenue improvements to reduce cut-through traffic cannot be confirmed. The University has indicated a willingness to install a raised crosswalk and Rapid Reaction Flashing Beacon at Aldwyn and at the two-way access/egress to the Parking Garage on Ithan for pedestrian safety, both of which will help calm traffic speeds. Similar consideration will be needed for traffic calming on Aldwyn Lane, particularly for special event traffic.

10. Section 5 – Transportation and Circulation Plan of the Comprehensive Plan outlines an Access Management Program that "should apply to all roads in the Township, as practical. Reducing the amount of unnecessary curb cuts and access points can also help to reduce delays in traffic flow, accident levels, and pedestrian conflicts" *(5-29).* The University's plan includes the elimination of eight (8) existing 'unrestricted' driveways along Lancaster Avenue between State Route 320 and Church Walk at the West Lancaster Parking area properties.

11. Section 5 – Transportation and Circulation Plan of the Comprehensive Plan also states that the Township should encourage access management methods along U.S. Route 30 and provide access easements through adjoining parcels *(5-32)*. The proposed development contains offered/suggested traffic improvements that include side accesses, deceleration lanes and a reverse frontage road.

COMPREHENSIVE PLAN CONSISTENCY REVIEW – OPEN SPACE AND RECREATION

12. Objective 1: No comments.

13. Objective 2: The proposed development includes the open space dedication of 87,120 square feet (2 acres) in the Aldwyn Triangle in order to meet the CICD ordinance requirement for exceeding 30% building coverage, consistent with the Comprehensive Plan's strong recommendation that such an existing natural area be preserved to the maximum extent *(2-40)*.Preservation by the University of the remainder of the Aldwyn Triangle would help to protect the environmental integrity of the sensitive natural features in the dedicated 2-acre portion and be an indication of the University's intent for the Triangle property to remain a quiet part of the neighborhood.

14. Objectives 3 – 9: No comments.

COMPREHENSIVE PLAN CONSISTENCY REVIEW – HISTORICAL AND ARCHAEOLOGICAL RESOURCES

15. The goal in this plan is not applicable to this development.

COMPREHENSIVE PLAN CONSISTENCY REVIEW – INSTITUTIONAL USE

(Institutional Use is not explicitly listed in CICD Ordinance as a required subject for review but is certainly applicable and comes under the heading of "including, but not limited to" in the text of the CICD Ordinance Development Impact Statement requirement.)

16. The Development Impact Statement does not include any analysis of consistency with Section 8 – Institutional Use of the Comprehensive Plan. As noted above, the project needs to be consistent with the goals and objectives stated in Section 8. Our comments on Section 8 consistency are provided below.

17. The Comprehensive Plan lays out some general principles to be kept in mind when dealing with Institutional land use. For example, the expansion of institutions is to be limited to the areas within the present boundaries of the campus zoned for Institutional use. The University's CICD plan does not expand the current limits of the campus, although the proposed development activity does extend beyond the PI – Planned Institutional zoning district in the form of the 'West Lancaster Parking' area proposed for University property in the CO – Commercial Office zoning district.

18. Further, the Comprehensive Plan asks that existing institutions be harmonized with adjacent land uses by promoting physical buffering. Villanova's plans include the installation of deciduous trees, evergreens, shrubs, and ground cover along most of the CICD district boundaries. To properly buffer adjoining properties (along both the R-100 line and those on Barley Cone Lane), existing buffer vegetation needs to be retained to the fullest applicable extent along with the addition of new vegetation and landscaping. Strategic placement of berms along University property boundaries are needed to help with visual and noise impacts. Section and elevation views of proposed buffering need to be provided to demonstrate the sufficiency of the proposed buffering plan that the University presently suggests will include safety fence and could include modest, sound-dampening masonry walls as appropriate.

19. Section 8 – Institutional Use of the Comprehensive Plan, which was last updated in 2003, states that Villanova University has prioritized a number of plans and projects moving forward. The Comprehensive Plan acknowledges the University's intention of implementing several major building projects, most of which will be in the form of student housing, while maintaining the status quo enrollment figures. Reducing the need for off-campus housing, improving the quality of student life, and minimizing community issues occurring due to a large number of students living off campus are presented as key reasons for the need to build additional residential facilities.

20. Section 8 – Institutional Use of the Comprehensive Plan specifically recognizes that an important issue to the community relates to Villanova's long range plans for its land holdings south of Lancaster Avenue that contain the Main and Pike surface parking lots. The Plan notes that the University has considered the development of a major convocation center there, including a

bookstore plus structured parking with related facilities, very similar to that proposed under the CICD Conditional Use. Features of such a development were to include possible application of traffic calming, gateway enhancements, and other appearance improvements *(8-6)*.

COMPREHENSIVE PLAN CONSISTENCY REVIEW – COMMUNITY SERVICES AND FACILITIES

21. No comments.

COMPREHENSIVE PLAN CONSISTENCY REVIEW – EXISTING LAND USE & LAND USE PLAN

22. Objectives 1 – 4: No comments.

23. Objective 5: The proposed development includes the open space dedication of 87,120 square feet (2 acres) in the Aldwyn Triangle in order to meet the CICD ordinance requirement for exceeding 30% building coverage. Consistent with the Comprehensive Plan's strong recommendation that such existing natural features be preserved to the maximum extent *(2-40),* preservation by the University of the remainder of the Aldwyn Triangle would help to protect the environmental integrity of the sensitive natural features in the dedicated 2-acre portion and be an indication of the University's intent for the Triangle property to remain a quiet part of the neighborhood.

24. Objective 6: In addition to the University's response, to properly buffer adjoining properties (along both the R-100 line and those on Barley Cone Lane), existing buffer vegetation needs to be retained to the fullest applicable extent along with the addition of new vegetation and landscaping. Strategic placement of berms along University property boundaries are needed to help with visual and noise impacts. Section and elevation views of proposed buffering need to be provided to demonstrate the sufficiency of the proposed buffering plan that the University presently suggests will include safety fence and could include modest, sound-dampening masonry walls as appropriate.

REVIEW OF IMPACT ON SENSITIVE NATURAL FEATURES

25. In addition to the University's response, the proposed 13-acre development provides for 2 acres of preserved land in the adjacent Aldwyn Triangle, which has been designated, at least partially, as a "core reserve wooded area" *(2-41)*. Preservation by the University of the remainder of the Aldwyn Triangle would help to protect the environmental integrity of the sensitive natural features in the dedicated 2-acre portion and be an indication of the University's intent for the Triangle property to remain a quiet part of the neighborhood.

26. On page 2, the Development Impact Statement states it is anticipated that redevelopment of the parking lots will increase potential habitat for local wildlife. However, the statement fails to describe the ramifications of increasing wildlife habitat, such as wildlife interactions with humans, motorized vehicles, etc.

27. Page 4 of the report states the proposed development will locate more students within easy walking distance of university related activities, thereby reducing the need to drive to campus and improve air quality in the area. The report further addresses the carbon footprint of moving 1,160

students from off-campus housing to new LEED certified residence halls on campus. This would equate to a reduction of 2,100 car trips per day and would equate to a reduction of 1,162,000 pounds of CO-2 emission every year; however, the reports further states the vacated rental units would be filled with commuter students thereby eliminating all the indicated carbon footprint gains.

REVIEW OF IMPACT ON THE TOWNSHIP AND REGIONAL TRANSPORTATION SYSTEM AND THE ABILITY OF ADJACENT STREETS AND INTERSECTIONS TO EFFICIENTLY AND SAFELY HANDLE THE TRAFFIC GENERATED BY THE PROPOSED DEVELOPMENT

The University's Development Impact Statement indicates that compliance with this section is by virtue of the Traffic Impact Study (TIS) submitted for the development proposal. Therefore, our review of transportation impact focuses on a review of the TIS.

28. As indicated in the Gilmore Review as well as the recent PennDOT review, the TIS must be prepared in accordance with Section 280-135G(1)(c) which indicates it must follow PennDOT's guidelines as contained in PennDOT SOL 470-09-4. Therefore the TIS should be revised to include queue analyses, turn lane needs analyses, and the HCM 2010 methodology. In addition, all SYNCHRO analyses should be revised to incorporate the PennDOT approved default factors and to also include the actual pedestrian calls per hour at the signalized intersections. The level of service tables should be expanded to include the seconds of delay for any unsatisfactory levels of service. A 95th percentile queue table should also be provided. Any recommended turn lane length should be the maximum length as determined from the turn lane needs analysis and/or the queue analysis. These significant revisions to the TIS need to be prepared and reviewed by the Township before any conditional use decision-making occurs in order that the Township can know that the general set of transportation improvements laid out in the plan will efficiently and safely handle the traffic generated by the proposed development.

29. Trip generation for the commercial uses fronting on Lancaster Avenue should be developed from the ITE Trip Generation manual unless specific justification can be provided that would indicate no new trips would be generated from these uses.

30. The analysis in the TIS assumes 4-way STOP control at the intersection of the garage and parking lot along Ithan Avenue. Always stopping traffic flow on South Ithan is not desirable. The analysis of this intersection should assume two-way STOP control of the side streets approaches only. Consideration by the University of a raised crosswalk and Rapid Reaction Flashing Beacon (RRFB) with the 'intersection' designed to accommodate a 4-way stop if determined appropriate in the future is a welcome approach.

31. There is discussion in the TIS that a detailed Special Events Plan for the future development condition is to be prepared by a different consultant. A copy of this plan should be provided for review and comment prior to any decision-making on the conditional use.

32. Capacity and Queue analyses should be provided for the "special event" conditions, particularly along Ithan Avenue and at its intersection with Lancaster Avenue. The TIS 'projects' 176

Eastbound right turns and 220 Westbound left turns onto Ithan Avenue for the peak hour of a special event.

33. The addition of a dedicated Eastbound Lancaster Avenue right-turn lane at Ithan Avenue needs to be investigated for both day-to-day operation as well as special events. Trying to send event traffic further to the east past Ithan to the proposed Lancaster Avenue entrance to the parking garage will still have event traffic out on the mainline of Lancaster Avenue, waiting to make entrance into the garage through a narrow, single lane driveway, while blocking through traffic.

34. There has been discussion by the University of sending special event visitors to the new parking garage via a new entrance into the West Lancaster Parking area, through the West Lancaster Parking area, across Church Walk, and through the parking lot behind the new dorms to Ithan Avenue. No analysis or plan has been submitted to illustrate how this would function.

35. Pedestrian crossings at the intersection of Lancaster Avenue and Ithan Avenue should be reviewed and revised such that they are more perpendicular to the sidewalks. This will provide a shorter distance and less WALK time at the intersection.

36. The TIS indicates the driveway to the east of the Performing Arts Center (PAC) would prohibit left turns out of the driveway, however the submitted plans indicate full egress movement. The plans should be revised to indicate a left turn-out restriction. In addition, information should be provided relating to truck access in and around the PAC.

37. Aldwyn Lane Access: Restricting the traffic flow to a permanent one-way flow would alleviate "cut-through" traffic. This or some other traffic management approach on Aldwyn would require agreement from the residents along this street.

REVIEW OF IMPACT ON RADNOR SCHOOL DISTRICT

38. On Page 20, the report states the addition of student housing will not materially affect the rental housing market in the Township because vacated off-campus student rental housing will be filled by another student living farther away. This statement is contrary to how the report addresses Housing Objectives on Page 5, which states many houses previously rented to Villanova students could be brought back onto the open rental market or potentially sold for re-conversion back to single family residences.

39. There are 125 licensed off-campus student rental units in Radnor Township all within several miles of three colleges and two universities. The report concludes that the quality of these dwelling units is such that they are unlikely to appeal to families, especially families with school age children, and that should any of these units become available they will likely be occupied by another student and not by a family with children. Based on this conclusion, it is estimated that only three new school age students will be generated as a result of this development.

    There is a trend in the housing market away from home ownership. The report should explore this trend and the impact of these rental units not being filled by other students. The age and quality of these units may generate rental prices on the open market that make them affordable

for young families and single-parent households, which will impact student enrollment in the school district.

REVIEW OF IMPACT ON COMMERCIAL FACILITIES WITHIN THE TOWNSHIP AND OTHER MUNICIPALITIES

40. The Development Impact Statement indicates on page 26 that the project includes between 20,000 and 25,000 square feet of retail and restaurant space. However, the development plans submitted with the Impact Statement show a total of 17,000 square feet of bookstore, bistro, and convenience store space. The amount of square feet of the retail/personal service spaces needs to be clarified.

41. Overall, it appears that the proposed development will have a marginal effect on commercial businesses within the Township and other municipalities. More students on campus might increase patronage for Garrett Hill and Wayne businesses. However, the presence of the bistro and convenience store on campus might make it less likely for students to go off campus for those needs. Students already have favorite retail and restaurant establishments and established patronage patterns as a result. It is not likely that there will be significant changes in those patterns.

REVIEW OF IMPACT ON PUBLIC UTILITIES

42. The University's Conceptual Stormwater Management Narrative highlights the 2-year volume difference in runoff as the key objective for the project. However, the University must provide infiltration for one (1) inch of runoff from all proposed impervious surfaces of the project, regardless of the 2-year volume difference. This is a requirement of the Darby/Cobbs Creeks Act 167 Plan and the Township Stormwater Management Ordinance. The infiltration of one (1) inch of runoff was generated as a standard by PADEP and is also a requirement of the City of Philadelphia. Some jurisdictions in other areas require infiltration of 1.5 inches.

43. Section 245.18.B of the Township Stormwater Management Ordinance states that applicants are required to find practicable alternatives to surface discharge of stormwater runoff. Such alternatives would include reuse, ponds, and underground storage. As a minimum to address downstream residents' identified issues the University needs to provide no surface discharge for up to a 10-year storm, but the most environmentally conscious thing they could do would be providing no surface discharge for up to a 100-year storm. This would assist in offsetting flood-causing runoff from the remainder of the Villanova facilities in the drainage area and would be consistent with Villanova's nationwide reputation for stormwater management research and for having been labeled by the Princeton Review as one of the 322 most environmentally responsible universities in the nation.

44. It does not appear that the infiltration/detention facilities under the western end of the West Lancaster Parking area will be feasible due to the substantial slope of the land and existing trees present. The University has indicated that infiltration/detention facilities are no longer being proposed for the land west of Farrell Hall, the Public Safety Building.

REVIEW OF IMPACT ON POLICE AND FIRE PROTECTION

(Reviewed under Fiscal Impact Analysis Overview)

REVIEW OF IMPACT ON OPEN SPACE AND RECREATION FACILITIES

45. The Development Impact Statement does not provide an analysis of the number of students currently using the Township's recreation facilities, nor what facilities they use, and it concludes that all students will utilize on-campus open space and recreation facilities.

    To accurately determine the impact this project has on the Township's open space and recreation facilities, the Impact Statement needs to identify Township open space and recreation facilities that are reasonably accessible, estimate the number of students currently utilizing the Township's open space and recreation facilities, and determine the impact moving more students on campus will have on student usage of Township open space and recreation facilities.

    In addition, Section 255-43.1.B(2) of the Township Code requires non-residential developments to dedicate open space/recreational lands or pay a fee in lieu of.

REVIEW OF IMPACT ON CHARACTER OF SURROUNDING NEIGHBORHOOD

46. The West Lancaster Avenue Parking area, while located outside of the CICD and the Planning Institutional zoning district, is a key element of the proposed development. It is the first project component to be constructed since replacement parking must be provided before spaces in the Pike Lot are lost during parking garage construction and spaces are lost in the Mail Lot during dormitory construction. The West Lancaster Avenue Parking area is separated from nearby residences only by the R-100 Trolley line. Evidence of sufficient noise and light buffering along the proposed parking area in the form of section and elevation drawings need to be provided showing the anticipated results of buffer plantings, gap filling, and retention of existing trees and shrubs. Similarly, buffering elevations for the property behind the parking garage and Performing Arts Center need to be provided.

47. The Development Impact Statement states on page 28 that "the new buildings will create a new audio and visual buffer between Lancaster Avenue and the residential neighborhoods at the South side of the development." However, the presence of approximately 1160 students in the new dorms, plus other proposed traffic generators (parking garage, Performing Arts Center, retail businesses, surface parking), will create new audio and light sources for the neighborhood. In addition, the construction of the new buildings will close off the view of the Chapel and fronting lawn and introduce a new visual – the parking garage and dorms. Thus, buffering section and elevations drawings including combinations of new trees and shrubs, berming, safety fence, modest masonry walls as appropriate to different locations need to be provided.

FISCAL IMPACT ANALYSIS OVERVIEW

48. On page 29, the report indicates that "many of the students who will be living in the proposed development will be moving in from outside of the Township" and "these new residents will now

be more likely to patronize Township establishments more often," leading to more sales and increased gross receipts tax revenues (Business Privilege Tax) for the Township. However, in item #6 on page 6, the report states that "the retail incorporated into the development will also provide ready access to many of the needs of daily student life," suggesting that students will have less need to go off campus as a result of the development. Further, some of the students moving into the new dorms will be those currently occupying West Campus dorms and are already on campus. Students, whether currently living on or off campus have favorite places inside and outside of the Township and their patronage patterns are not likely to change much. It is unclear which direction gross receipts tax revenues (Business Privilege Tax) will head.

49. The report notes that the University is not subject to property taxes nor is it expected that the retail uses that are part of the project and the University's core mission will pay any business taxes. The report goes on to say that roughly $5.6 million dollars in one-time permit fees and gross receipts taxes will be paid by the University and its contractors as a result of the construction of the proposed development. These one-time fees are not a windfall for the Township. They are fees to cover the costs of Township services provided during the development process including construction code plans review and inspections. Further, most all development in the Township must pay building permit fees and their contractors pay gross receipts taxes. The key distinction is that the University pays no property taxes. Private sector development at a value similar to the $269 million cited for the proposed development would generate approximately $1,009,000 annually in property taxes to the Township (at the 2014 property tax rate), plus roughly $750,000 in Business Privilege taxes could be generated on gross receipts each year.

50. On page 30, the report indicates that "the project will not cause any additional burden on Township administration" or the Community Development budget. The administration, coordination, and execution of review of the project and enabling zoning ordinance amendment has actually caused quite a burden on Township administration and Community Development.

51. The report on page 32 states that the potential increase in police calls (estimated to be 55) attributable to the project is small compared to the total number of calls handled by the Police Department. The report needs to state the total number of calls, calculate what percent of total calls is represented by the 55 additional calls, and apply that percentage to the Police Department's budget of roughly $8 million to calculate the approximate cost of those 55 additional calls and to determine the need for additional resources by the Police.

52. On Page 33 under Public Works, the report states that it is possible that the Township will see a decline in roadway maintenance expenditures due to fewer students driving. This contradicts the statement earlier in the Development Impact Statement that it is anticipated that the vacated off-campus student housing is expected to be filled with students, requiring them to drive, or rented on the open market. Those occupants will have similar driving patterns as those who currently live in those units such that there would be an overall increase in driving activity and wear and tear on area streets.

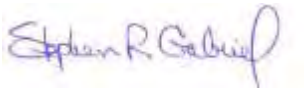
53. The report also notes on page 33 that "the University will maintain the sidewalks along Lancaster Avenue, further decreasing possible Township expenses." Section 250-9 of the Township Code requires property owners to maintain the sidewalk along their property such that this

maintenance of the sidewalks by the University is a current duty and does not represent a shift in responsibility and a decrease in possible Township expenses.

54. On page 34, the report notes that the proposed development's township-compliant stormwater management system will help reduce stormwater runoff from the site, potentially lowering costs borne by Township Public Works. It should also be noted that there has been a burden on the Township for many years of stormwater runoff discharge from the surface parking lots where there has been little or no stormwater management in place.

Should you have any questions or require any additional information, please do not hesitate to contact us at any time.

Sincerely,



Stephen R. Gabriel, PP
Township Planning Consultant

copy: Robert Zienkowski, Township Manager
Steve Norcini, Public Works Director
Roger Phillips, Township Engineer
Amy Kaminski, Township Traffic Engineer
Nicholas Caniglia, Esq.
File

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August 1, 2014

DELAWARE COUNTY, RADNOR TOWNSHIP
S.R. 0030 (LANCASTER AVENUE)
HIGHWAY OCCUPANCY PERMIT APPLICATION NO. pre913
VILLANOVA UNIVERSITY
TRAFFIC LOG NO.: D13-008XR
PRELIMINARY REVIEW

Frank Tavani, P.E., PTOE
F. Tavani and Associates, Inc.
105 Kenilworth Street
Philadelphia, PA 19147

Dear Mr. Tavani:

The Department has reviewed the preliminary submission of the Traffic Impact Assessment dated August 27, 2013 for compliance with applicable Department Regulations. This review has identified deficiencies that must be addressed in order for your application submission to be processed as efficiently as possible.

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

Our comments on your preliminary submission are as follows:

PRELIMINARY COMMENTS

1. Future submissions should include a letter that describes how each comment, from this or previous reviews, has been addressed and where each can be found in the associated studies or plans. Based on the manner in which this project has taken place the inclusion of formal review letters and/or comments provided via email may be appropriate.
2. Transportation Impact Study
   a. The PennDOT project number, D13-008XR, for this preliminary review must be referenced when the formal HOP application is submitted.
   b. In consideration of the previously submitted information and coordination to date, future submissions to the Department may be limited to:
      i) Site accesses to State Routes

ii) S.R. 0030, from S.R. 0320 to Garrett Avenue

iii) S.R. 0320 and County Line Road

c. Based on the magnitude of the anticipated modifications associated with the proposed development, including roadway modifications and traffic re-distribution, the submitted document is considered a Transportation Impact **Study** and should conform to the Department guidelines as such. As previously noted, this includes:

i) Land Use Context

ii) Roadway Classification (reference the Smart Transportation Guidelines)

iii) Pedestrian and Bicycle Facilities

iv) Photographs of study intersections and accesses

v) Sight distances at access

vi) Turn lane warrant analysis for site accesses and intersections serving the site (e.g. Ithan Avenue)

d. The study should consider an alternative that includes providing an eastbound right turn lane on S.R. 0030 approaching Ithan Avenue. The right turn lane is a recommended improvement and not a requirement from the Department.

e. As previously noted, tables and figures should be organized so that there is a clear flow from trip generation to trip distribution and the resulting Levels-of-Service.

f. The crash history noted six accidents involving pedestrians. Additional information should be provided to determine if there is a correctable pattern or other elements that should be considered as part of this project.

g. As previously noted, additional information is also needed for the Performing Arts Center accesses, addressing proximity to the signal, flow and restrictions, etc. Specific issues include the manner in which previous submissions appeared to direct traffic away from Ithan Avenue and the operation of the full-movement access to S.R. 0030, including evaluation of the access pre and post event.

h. Please note that the various materials submitted in relation to this project include minor discrepancies in the campus-wide parking supply figures. These are generally minimal and are not expected to change the results of the analyses; however they should be addressed as part of future submissions.

i. As previously noted, Level-of-Service data tables should include the delay in seconds for each lane group operating at LOS F.

j. Verify that the figures clearly illustrate proposed volumes at all accesses to state roads, including but not limited to the proposed right in and right out access to the modified commuter lot along S.R. 0030.

k. The Synchro analyses should address the following:

i) Ensure that Future Build volumes are consistent with the submitted figures.

ii) Per the current Highway Capacity Manual the overall intersection peak hour factor should be used.

iii) Ensure that all turn lanes are coded appropriately.

iv) As previously noted, ensure that the pedestrian phase clearance intervals are coded appropriately. In particular, for S.R. 0030 and Ithan Avenue:

(1) Ensure that pedestrian times meet or exceed the minimums for existing (26 seconds per the current Traffic Signal Permit) and future conditions.

(2) Enter an appropriate number of pedestrian calls. If the number of calls is assumed to be reduced under future conditions due to proposed improvements, include documentation of the methodology used to develop the assumed number of calls.

v) Ensure the appropriate coordination and recall settings are utilized.

l. The submitted Conditional Use Plan shows two lanes exiting Chapel Drive to S.R. 0030; verify that this is addressed in the analyses.

3. Conditional Use Plans

a. Note that all improvements will be required to comply with current ADA standards.

b. To the maximum extent feasible existing accesses to S.R. 0030 within the project limits should be removed where new access is provided as part of the proposed development (e.g. the two story buildings adjacent to the West Lancaster Parking).

c. Future submissions should include calculations supporting the proposed transition taper lengths.

d. The westbound stop bar for S.R. 0030 approaching Church Walk appears too far west; adjusting this will impact the proposed eastbound transition taper.

e. The eastbound stop bar for the S.R. 0030 left turn lane approaching Ithan Avenue may need to be adjusted to account for the shifting of the northbound left turn lane.

f. Consideration of re-aligning the crosswalks at S.R. 0030 and Ithan Avenue may be warranted as a means to reduce pedestrian crossing distances.

g. Ensure that appropriate visibility is maintained for the pedestrian crossing of the Performance Arts Center access; the magnitude of the setback may warrant reconsideration.

The Department has performed this preliminary review based only on the limited information provided. We reserve the right to make future, additional, detailed comments based on the formal submission and application for a Highway Occupancy Permit. If you have any questions pertaining to the technical aspects of this review, please contact Albert Federico, P.E., PTOE of McCormick Taylor, Inc. at 215.592.4200 or apfederico@mtmail.biz.

Respectfully,

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

cc: M. Miele
L.R. Belmonte
Traffic Services File
Radnor Township
Delaware County Planning Commission

GILMORE & ASSOCIATES, INC.
ENGINEERING & CONSULTING SERVICES

July 23, 2014

File No. 12-04054T

Mr. William Bolla, Esq.
McNamara, Bolla & Panzer
116 East Court Street
Doylestown, PA 18901

Reference: Villanova University – Lancaster Avenue Redevelopment
CICD Conditional Use Transportation Review #1-*Revised*
Radnor Township, Delaware County, PA

Dear Mr. Bolla:

Gilmore & Associates, Inc. has completed the conditional use Transportation review of the submitted materials and offers the following comments for Radnor Township consideration:

I. BACKGROUND

The applicant, Villanova University, intends to develop/redevelop several parcels located along Lancaster Avenue, southeast and southwest of Ithan Avenue intersection, in Radnor Township, Delaware County. The project includes construction of student housing (1,159 bed apartment-style residence halls), retail shops (University Bookstore, bistro and small convenience store) along with 147 surface parking spaces to be located on the southwest corner of Lancaster Avenue and Ithan Avenue. In addition, the project includes construction of a Performing Arts Center (with 500 – 650 total seats in two theaters) and multilevel parking structure (1,265 spaces) to be located on the southeast corner of Lancaster Avenue and Ithan Avenue. Villanova University intends to eliminate many of the existing driveway accesses located on the south side of Lancaster Avenue, west of Ithan Avenue and construct a shared surface parking facility to the rear of the existing university buildings with limited access to Lancaster Avenue at the signalized intersection of Chapel Walk.

II. DOCUMENTS SUBMITTED

The following documents were submitted to Gilmore & Associates for review:

A. Conditional use plan set (11 sheets) for Villanova University prepared by Voith & Mactavish Architects, LLP and Robert A.M. Stern Architects, LLP, dated May 2, 2014.

65 E. Butler Avenue | Suite 100 | New Britain, PA 18901
Phone: 215-345-4330 | Fax: 215-345-8606

www.gilmore-assoc.com

B. Landscape plans (3 sheets) for Villanova University prepared by Voith & Mactavish Architects, LLP and Robert A.M. Stern Architects, LLP, dated May 2, 2014.

C. Transportation Impact Assessment for Villanova University Lancaster Avenue Student Resident Halls, prepared by F. Tavani and Associates, Inc. dated May 4, 2014.

D. Development Impact Statement for the Villanova University CICD Development dated May 2, 2014.

III. IMPROVEMENTS

According to the submitted Transportation Impact Assessment, Villanova University proposes the following improvements/accesses:

A. Lancaster Avenue at Church Walk-Signalized Intersection

1. Left and right turn lane exit from Chapel Walk to Lancaster Avenue.
2. Improvements on Lancaster Avenue at Church Walk include:
    a. Right in/right out on the eastbound approach of Lancaster Avenue, east of Church Walk
    b. A westbound dedicated left-turn lane entering Church Walk
    c. An Eastbound dedicated right-turn lane entering Church Walk
3. Full access on Ithan Avenue at Pike Lot Parking Garage
4. New pedestrian bridge spanning Lancaster Avenue at Church Walk.
5. Elimination of eight (8) existing full access driveways along Lancaster Avenue
6. Consolidation of existing parking lots with access to existing signalized intersection at Lancaster Avenue and Church Walk.

B. Pike Lot Parking Garage Accesses (Southeast corner of Lancaster Avenue and Ithan Avenue)

1. Left/right in and right out access on Lancaster Avenue, east of Ithan Avenue.
2. Full access to Ithan Avenue with northbound and southbound left-turn lanes on Ithan Avenue.
3. Right out, north of the full access to Ithan Avenue

C. Lancaster Avenue and Ithan Avenue-Signalized Intersection:

1. Lancaster Avenue eastbound dedicated left lane, one through lane and one shared through/right turn lane.
2. Lancaster Avenue westbound: extended dedicated left turn lane, one through lane and one shared through/right turn lane.
3. Ithan Avenue northbound: extended dedicated left turn lane; one shared through/right turn lane.
4. Ithan Avenue southbound: dedicated left turn lane; one shared through/right turn lane.

5. New entering left-turn movement directly from westbound Lancaster Avenue to Pike Garage including eastbound Lancaster Avenue right in/right out (prohibit left turn movement out of Pike Garage onto Lancaster Avenue.

IV. COMMENTS

A. Conditional Use Plans

1. §280-135F(1); Truck turning templates should be provided to ensure access is adequate for the "Mechanical/Loading Pit" located just west of Lancaster Avenue & Ithan Avenue. In addition, a mechanical gate is needed for this location during non-use to discourage illegal parking.

2. The conditional use plans and the TIA should provide consistent lane configurations. The TIA indicates one shared northbound lane for the Church Walk Access approach driveway while the plans indicate a left-turn lane and a shared left/right turn lane. At the intersection of Ithan Avenue and Lancaster Avenue, the TIA indicates a dedicated right turn lane is proposed for the eastbound approach Lancaster Avenue at Ithan Avenue (Synchro Report in TIA, page 296) ; however, the plans indicate a shared right/though lane.

3. As discussed during coordination meetings with Villanova and Township staff, revise the plans to include a dedicated eastbound right turn lane on Lancaster Avenue to provide Radnor Township Police Department the ability to close the travel lane during special events without impeding non-event traffic.

4. Previous coordination meetings included the construction of a pedestrian activated rectangular rapid flashing beacon (RRFB) crosswalk at the unsignalized crossing on Ithan Avenue near South Campus dormitories and Aldwyn Park

5. The unsignalized access to Lancaster Avenue, east of Ithan Avenue, is shown on the conditional use plans as a full access (all turning movements allowed) while the Transportation Impact Assessment (TIA) describes this access as a right-in, right-out with a westbound left-in from Lancaster Avenue. The access should prohibit left turns out of the Pike Garage with channelization to restrict the left movement out of the access as indicated in the TIA.

6. The pedestrian bridge indicates that pedestrians will access the street level on the south side of Lancaster Avenue (adjacent to the proposed dormitories within the driveway median. This is not acceptable and the design should be revised as follows:

    a. The steps should place Villanova foot traffic outside the driveway limits to discourage pedestrians from crossing the Church Walk driveway.

    b. Dormitory students should have direct access from the dormitories to the Pedestrian Bridge without the need to move to the street level. We recommend constructing a raised direct access between the dormitories

and the pedestrian bridge with a possible key card entry for dormitory students to encourage the use of the Pedestrian Bridge over the at-grade pedestrian crossing. Students at street level are less inclined to walk up the steps to gain access to the Pedestrian Bridge if a street level crossing is readily available.

c. Construct a fence along the north side of Lancaster Avenue to prohibit Villanova foot traffic from utilizing the traffic signal at street level to gain access to the parking lot or campus. The fence should be installed along the north site frontage the fullest extent possible to deter Villanova pedestrian traffic from utilizing the traffic signal at Church Walk to cross Lancaster Avenue.

d. Provide an elevator, ramp or other acceptable method to allow handicap users access to the pedestrian bridge where direct access to the pedestrian bridge is not provided.

7. Traffic Calming: The strategy discussed in the Development Impact Study (DIS) includes moving traffic along Lancaster Avenue in an effort to reduce the cut-through traffic experienced in neighborhoods; however, the improvements along Lancaster Avenue are not likely to move traffic along any more quickly than is currently experienced. We recommend discussing traffic calming with nearby affected neighborhoods, particularly Aldwyn Lane residents and considering installing a traffic adaptive system beginning at Lancaster Avenue and Sproul Road/Spring Mill Road & Aldwyn Lane & Kenilworth Road and continuing to County Line Road for a total of six (6) intersections. Furthermore, the traffic calming and traffic adaptive system should be constructed during phase 1.

8. Provide a special event plan with permanent dynamic message signage prior to conditional use approval.

9. Provide a mechanical gate for the Ithan Avenue accesses to both the surface lot and the Pike Garage; the gates will offer Radnor Township Police Department the ability to close or open the accesses during special events.

10. Develop permanent reverse signage and internal vehicular flow for the Pike Garage to allow reverse flow for all accesses during special events.

11. Develop a parking lot identification system with signage and assigned parking for campus users.

B. Development Impact Statement/Transportation Impact Assessment

1. §280-135G(1)(c) indicates the Transportation Impact Assessment (TIA) must follow PennDOT SOL 470-09-4 Transportation Impact Study Guidelines, dated February 12, 2009, as amended, regarding *Policies and Procedures For Transportation Impact Studies*, the TIS should be revised to include the following:

a. Executive Summary
b. List of intersections for study area.
c. Provides dates for when counts were conducted.
d. Intersection Level of Service (LOS) Table with LOS and delay for each approach and critical movement.
e. Provide a description of the existing roadways and intersections within the study area.

2. As required in PennDOT Publication 46 *Traffic Engineering Handbook*

a. Provide a turn-lane length analysis.
b. Provide a table indicating the 95th percentile queues for all intersections.
c. Provide the available and proposed storage length for all movements. The applicant should design the proposed turn-lanes lengths to be the greater of the storage length based on the turn lane analysis and the 95% queue analysis.
d. The capacity analysis should use PennDOT defaults as required in Exhibits 10-9 through 10-11.

2. Revise the TIS to follow HCM2010 methodology in Synchro. We note other approved methodologies may be used at intersections where HCM 2010 methodology cannot be applied; however, most studied intersections can and should follow HCM2010 methodology in Synchro.

3. All signal timings should be optimized for No-Build conditions in accordance with PennDOT SOL 470-09-4.

4. Traffic volumes and Level of Service analysis should be provided for the figures for the proposed right-in/right-out driveway.

5. The actual AM and PM peak hour period may vary from intersection to intersection; however, the analysis should provide the traffic volumes for the peak hour of each individual intersection despite different peak hours in the study area. It appears a consistent uniform peak hour was selected for all studied intersections and the provided analysis does not adequately analyze the worst case scenario.

6. As discussed at previous coordination meetings, the applicant must include a discussion regarding Special Event Transportation Plan. This plan should consider signal timing revisions (including a possible split phase at Ithan and Lancaster), alternative vehicular lane use strategies, social media alerts, and the use of changeable electronic message boards. The strategies should also consider the post event release of vehicles from the Pike Garage and Church Walk surface lot.

7. In general, when a new development is proposed, the vehicular trips associated with the new land development are calculated based on the type of land use and the size of the proposed land use. The applicant indicates there will be no net increase in traffic for the proposed University Student Bookstore, Bistro and the

small convenience store. While we agree that it is very likely the University Student Bookstore will generate fewer trips than predicted by the industry standard, *ITE Trip Generation*, it is unclear how many new trips will be generated. As a comparison and for information purposes, the analysis should include a discussion regarding the total potential trip generation based on the square footage of the proposed Bookstore, Bistro, and convenience store in an effort to determine what the maximum number of vehicle trips generated for the development would be if the development if all trips associated with the improvements were considered "new" trips.

Please let me know if you require additional information or further clarification related to this subject.

Sincerely,

Amy B. Kaminski

Amy B. Kaminski, P.E., PTOE
Department Manager of Transportation
Gilmore & Associates, Inc.

DELAWARE VALLEY
dvrpc
REGIONAL
PLANNING COMMISSION

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April 26, 2013

Mr. Francis Hanney
PennDOT, District 6.0
7000 Geerdes Bvld
King of Prussia, PA 19406

RE: US 30 Radnor Township Corridor Study.

Dear Mr. Hanney:

DVRPC was asked to provide an annual background traffic growth factor to support the evaluation of alternatives to improve congestion along US 30 in the vicinity of Villanova University during peak periods. We suggest that you use an average annual factor of 0.25 percent per year between the 2012 base year and the 2035 horizon year.

This factor is based on an examination of current and forecast traffic volumes, as well as historical trends in traffic volumes and DVRPC's Board-adopted population and employment forecasts in the study area. DVRPC's new traffic demand model (TIM2.0), which was just recently validated against base year conditions, was used to support this analysis. If you have any questions or need additional information, please contact me at (215) 238-2911 or mgates@dvrpc.org.

Sincerely,

Matthew T. Gates
Manager, Office of Modeling and Analysis

Cc: Ashwin Patel, PennDOT District 6.0
David Anderson, DVRPC
Jerry Coyne, DVRPC
Keith Hartington, DVRPC

GILMORE & ASSOCIATES, INC.
ENGINEERING & CONSULTING SERVICES

April 24, 2013

File No. 11-04054T

Mr. Steve Norcini, P.E.
Public Works Director
Radnor Township
301 Iven Avenue
Wayne, PA 19087

Reference: Villanova University – Lancaster Avenue Redevelopment Traffic Study
Review of Deliverable #2:
Parking Supply & Demand, Trip Generation, Trip Distribution, Trip Redistribution
Radnor Township, Delaware County, PA

Dear Mr. Norcini:

Gilmore & Associates, Inc. has completed the review of the referenced materials (*Villanova Traffic Study Deliverable #2*), dated: February 21, 2013, prepared for Villanova University; prepared by F. Tavani and Associates, Inc. and offers the following comments for your consideration:

BACKGROUND

The applicant, Villanova University, intends to develop/redevelop several parcels located along Lancaster Avenue, southeast and southwest of Ithan Avenue intersection, in Radnor Township, Delaware County. The project includes construction of student housing (1,159 bed apartment-style residence halls), retail shops (University Bookstore, bistro and small convenience store) to be located on the southwest corner of Lancaster Avenue and Ithan Avenue. In addition, the project includes construction of a Performing Arts Center (with 500 – 650 total seats in two theaters) and multilevel parking structure to be located on the southeast corner of Lancaster Avenue and Ithan Avenue. Villanova University intends to eliminate many of the existing driveway accesses located on the south side of Lancaster Avenue, west of Ithan Avenue and construct a shared surface parking facility to the rear of the existing university buildings with limited access to Lancaster Avenue at the signalized intersection of Chapel Walk. Villanova University is required to provide a traffic impact study to both Pennsylvania Department of Transportation (PennDOT) and Radnor Township for the existing, proposed, and future conditions of the roadway infrastructure. In order to expedite the review process, the applicant has agreed to provide Radnor Township and PennDOT with the traffic impact study in a segmented approach to eliminate future extensive reviews and revisions. This submission represents the second deliverable provided to both PennDOT and Radnor Township and examines the following information:

1. Parking Supply and Demand
2. Trip Generation
3. Trip Distribution (new traffic)
4. Trip Re-Distribution (existing traffic)

All of the below comments do not require a response or resubmission of *Deliverable #2*; however, comments should be addressed in subsequent submissions and in the final Traffic Impact Study analysis:

COMMENTS:

DELIVERABLE #1

1. *Deliverable #1:* While reviewing *Deliverable #2,* the Synchro® files from *Deliverable #1* were submitted for review and revealed the AM and PM networks include many bends in the roadway coding. Bends are typically used for lane adds or drops in a roadway network. Synchro cautions users to use curved links instead of bends where possible. We recommend eliminating the short link bends entirely for bends number 39 and 63, and revise other bends to curved links.

PARKING DISCUSSION:

1. Given the length of *Deliverable #2*, many of the following discussion points are intended to provide a summary and discussion of *Deliverable #2* to clarify the content.

2. **Parking Demand at On-Campus Residence Halls:** *Deliverable #2* information concludes that Villanova on-campus residential hall students tend to remain parked during the school day; however, provided data does not analyze parking turnover information that might provide insight as to the movement of vehicles. The table provided on page 20 of *Deliverable #2*, indicates West and South Campus parking facilities have minimal difference in the number of available parking spaces during the 10:00 AM and 12:00 PM data collection periods but does not include the parking turnover rate.

   Comment: We recommend a parking turnover analysis during the school day for West Campus to support the applicant's conclusion that parking turnover is minimal at the West Campus residential halls. The scope of work should be cleared with township staff prior to conducting the turnover analysis.

3. **Class Day Demand v. Special Event Demand:** *Deliverable #2* included information regarding a campus wide parking inventory obtained on typical class days and during several Special Events (basketball games). The information provided indicates that the typical class day parking demand is more intense than the basketball events; therefore, the focus of the parking analysis should be for a typical class day.

Comment: Based on the provided information, we agree with this conclusion and support eliminating the "Special Event" parking analysis. However, we remind the applicant that a Special Event Traffic Plan is required in the final submission, as discussed during recent scoping meetings and as a comment provided on *Deliverable #1*.

4. **Performing Arts Center:** *Deliverable #2* includes a discussion regarding parking supply and demand for the proposed Performing Arts Center. Presently, a performance stage/theater facility currently operates on campus at Vasey Hall. The existing theatre includes 167 seats and offers twelve performances per year. The new facility will include 350 – 450 seats in the main auditorium with an additional 150 - 200 seats in the "black box" theater. Discussions in *Deliverable #2* centered on the scheduling of performances to avoid conflicts with other campus Special Events like basketball games.

   Comment: The applicant concludes the events associated with the Performing Arts Center would occur in the evening, during non-peak traffic conditions when parking supply was readily available. We agree with this information and conclusion.

5. **Institute of Transportation Engineers (ITE) Parking Generation, 4th Edition:** Based on the industry standard for determining parking demand by land use type in a Suburban environment, along with the existing school population independent variable (students, faculty and staff), the Weekday Peak Period parking demand for Villanova University is calculated at 4,126 parking spaces. Data collected by Villanova indicates the peak parking demand is 4,382 parking spaces, which indicates 256 additional parking spaces are required (demand) for Villanova's campus as compared to other University Campuses of similar size and environment. The actual number of on-campus parking spaces supplied is 5,130, which exceeds the existing demand based on the school population at Villanova. Note: ITE provides parking rates based on both Urban and Suburban environments; however, the more conservative analysis used in the deliverable focused on the more intensely parked Suburban environments.

   Comment: We agree with this methodology.

6. **West Campus Housing Discussion:**
   a. The existing West Campus apartment-type residence halls have 1,244 beds and provide housing for undergraduate upperclassmen, which is similar to what is being proposed at the Lancaster Avenue Housing (LAH). A statement is included in *Deliverable # 2* indicating that it is unlikely vehicles will be moving during the peak periods on class days. The table provided on page 20 *Villanova Parking Lot Inventory* indicates minimal change in parking occupancy during the data collection periods (10AM and 12PM); however, it is unclear if the 10AM occupied/unoccupied spaces were consistent with the 12PM data or if a turnover occurred between 10AM and 12PM. Villanova has consistently maintained the construction of the LAH will reduce vehicular traffic, as off-campus students will now reside on-campus and vehicles will not be utilized during the typical class day.

Comment: We recommend a parking turnover analysis during the school day for West Campus to support the applicant's conclusion that parking turnover is minimal at the West Campus residential halls. The scope of work should be cleared with township staff prior to conducting the turnover analysis.

b. Details of the West Campus residential occupation indicate that only 1,097 of the total 1,244 beds are occupied by undergraduate juniors. Villanova has indicated that housing demand exceeds housing supply; however, the provided information indicates 147 beds are presently unused.

Comment: More detail should be provided to clarify the unoccupied beds.

c. *Deliverable #2* includes an analysis that equates the forecasted parking demand for the Proposed LAH based on the parking demand at the existing West Campus residence hall.

Comment: The analysis follows a valid methodology for projecting the number of student parking demand for the proposed LAH; we agree with this validation methodology and subsequent analysis

i. Based on the provided information that assumes the retail portion of the LAH is restricted to only Villanova University "traffic", the projected parking demand would be 550 parking spaces to be utilized by staff, visitor's and vehicular student commuters. As a comparison, the existing Pike Surface Lot provides 577 parking spaces for staff and students.

Comment: We concur that the identified 550 Pike Garage parking spaces would satisfy the existing parking demand currently provided by the Pike Surface Lot.

ii. Figure 7 indicates the net increase/decrease of parking spaces by quadrant for the proposed Lancaster Expansion. The net results indicate an increase of 653 parking spaces at the proposed Pike Garage, to be located on the southeast corner of Lancaster Avenue and Ithan Avenue. *Deliverable # 2* identifies 930 spaces will be utilized by vehicles that are not likely to be driven during the AM and PM peak hours and 300 of the remaining spaces will be utilized by Villanova staff, visitors and others.

Comment: The pedestrian traffic from the 300 parking spaces may require the signalized intersection at Lancaster Avenue and Ithan Avenue continue to operate with a protected pedestrian phase (pedestrian scramble phase) and will continue to create delays to Lancaster Avenue through motorists.

TRIP GENERATION

1. In general, when a new development is proposed, the vehicular trips associated with the new land development are calculated based on the type of land use and the size of the proposed land use. The applicant indicates there will be no net increase in traffic for the proposed University Student Bookstore, Bistro and the small convenience store. While we agree that it is very likely the University Student Bookstore will generate fewer trips than predicted by the industry standard, *ITE Trip Generation*, it is unclear how many new trips will be generated.

   Comment: As a comparison and for information purposes, the final report should include the total potential trip generation based on the square footage of the proposed Bookstore, Bistro, and convenience store in an effort to determine what the maximum number of vehicle trips generated for the development would be if the development were constructed elsewhere in the Township.

2. *Deliverable #2* indicates the Trip Generation portion of the study will take a conservative approach, analyzing the roadways and intersections to include the existing Villanova commuters that will no longer commute to campus because the students will utilize the new on-campus housing. In other words, the report acknowledges that off-campus housing vacated by Villanova students moving to on-campus housing will likely be rented by new tenants who may or may not be Villanova commuters. As such, the existing trips associated with the off-campus rental units will be included in the "background" traffic volumes and no attempt will be made to eliminate the Villanova commuters from the traffic counts obtained by the applicant.

   Comment: The conservative approach taken by the applicant dismisses taking a "credit" for traffic volumes associated with students that no longer commute to Villanova and provides a future analysis that is in all probability more intense than the existing conditions. We acknowledge and agree with this conservative approach.

TRIP DISTRIBUTION

3. *Deliverable #2* assumes the following operations and intersection traffic control:

   a. Western Lancaster Avenue Housing (LAH) Lot Driveway: Right-in, right-out, left-in turning movements permitted (left turning movement out of the driveway will be prohibited) and stop control for motorists exiting the driveway to access Lancaster Avenue.

      COMMENT: Previous discussions with the applicant indicated this driveway would include a right-in, right-out operation and no left turns would be permitted at the driveway intersection. If the applicant intends to include lefts into the site, a dedicated left turn lane would be necessary to reduce delay for motorists traveling westbound on Lancaster Avenue.

   b. Ithan Avenue & Pike Garage North Driveway: This driveway would operate as an exit only; left and right turns with stop control for the driveway.

COMMENT: We recommend altering this exit driveway to a channelized right turn and eliminating the left turn movement at the north driveway for the following reasons:

i. Left turning vehicles continuing south on Ithan Avenue would increase the delay to vehicles on the southbound approach of Ithan Avenue at the proposed all-way stop control at the Pike Garage South Driveway.
ii. Vehicles queued on northbound Ithan Avenue at Lancaster Avenue may extend beyond the Pike Garage North Driveway which increases the potential for crash incidents with southbound Ithan Avenue vehicular traffic.
iii. Eliminating left turns from the north driveway may eliminate the need for police control at the north driveway during Special Events.

c. Ithan Avenue & Lancaster Avenue Lot/Pike Garage South Driveway: Full access (all turning movements provided for all approaches) and an all-way stop control.

COMMENT: The final TIS should include detailed information regarding queue and delay for this all-way stop control; in addition, a signal warrant analysis should be included in future studies. We recognize the intersection location is a less than desirable distance from the signal at Ithan Avenue and Lancaster Avenue; however, a warrant analysis would determine if a signal might be considered at this intersection.

d. Lancaster Avenue and Pike Garage Eastern Driveway: This driveway would include left and right turns into Pike Garage, and right turns out of the driveway to continue eastbound on Lancaster Avenue.

COMMENT: Township staff has expressed concern for pedestrians using the existing de facto mid-block pedestrian crossing on Lancaster Avenue near the Villanova Stadium. Although the proposed Pike Garage Eastern driveway access provides an efficient operation for vehicular traffic, the Township may want to consider eliminating the driveway from the proposed plan or require design measures that permanently deter pedestrians crossing Lancaster Avenue east of Ithan Avenue.

4. **Pike Parking Garage Location** Although perhaps premature as this is a land development comment, we recommend the Township consider having the applicant investigate altering the location of the Pike Garage to a more campus neutral site near the proposed pedestrian bridge. Moving the parking structure to a central campus location, adjacent to the pedestrian bridge would:

a. encourage much of the pedestrian traffic to utilize the pedestrian bridge, which would reduce the number of pedestrians crossing at Lancaster Avenue and Ithan Avenue. This could provide an opportunity to eliminate the pedestrian scramble; however, adequate signage would be necessary to alert pedestrians to the new pedestrian phasing.

b. reduce the number of driveway curb cuts on Ithan Avenue and Lancaster Avenue as most vehicle traffic would take direct access to Lancaster Avenue via the traffic signal near Church Walk

c. provide a more concentrated Police detail/effort during Villanova Special Events on Lancaster Avenue near Church Walk and could potentially reduce or eliminate the need for police detail along Ithan Avenue at Lancaster Avenue near the stadium

d. concentrate vehicle turning movements at the signalized intersection on Lancaster Avenue/Church Walk without conflicting with street level pedestrian traffic.

As indicated previously, none of the above comments elicits a response or a resubmission of *Deliverable #2*; however, we recommend the applicant resolve identified omissions/corrections in subsequent submissions and in the final Report. We hope you find the above discussion useful; please do not hesitate to contact this office if the Township has any questions.

Sincerely,

Amy B. Kaminski

Amy B. Kaminski, P.E., PTOE
Senior Transportation Engineer
Gilmore & Associates, Inc.

Cc (via email):
Kevin W. Kochanski, R.L.A, C.Z.O, Director of Community Development
Roger A. Phillips, Senior Project Manager, Gannett Fleming, Inc.

GILMORE & ASSOCIATES, INC.
ENGINEERING & CONSULTING SERVICES

February 1, 2013

File No. 11-04054T

Mr. Steve Norcini, P.E.
Public Works Director
Radnor Township
301 Iven Avenue
Wayne, PA 19087

Reference: Villanova University – Lancaster Avenue Redevelopment Traffic Study
Review of Deliverable #1:
Data Collection, Existing Traffic Volumes, and Initial LOS Analysis
Radnor Township, Delaware County, PA

Dear Mr. Norcini:

Gilmore & Associates, Inc. has completed the review of the referenced materials (*Villanova Traffic Study Deliverable #1*), dated: January 15, 2013, prepared for Villanova University; prepared by F. Tavani and Associates, Inc. and offers the following comments for your consideration:

BACKGROUND

The applicant, Villanova University, intends to develop/redevelop several parcels located along Lancaster Avenue, southeast and southwest of Ithan Avenue, in Radnor Township, Delaware County. The project will include the construction of student housing, retail shops, a performing arts center along with a multilevel parking structure. In addition, Villanova University intends to eliminate many of the existing driveway accesses to Villanova buildings, located south of Lancaster Avenue, and construct a shared surface parking facility to the rear of the existing university buildings with a combined shared access at "Church Walk". As such, the University is required to provide a traffic impact study for the existing, proposed, and future conditions of the roadway infrastructure. In order to expedite the review process, the applicant has agreed to provide Radnor Township and Pennsylvania Department of Transportation (PennDOT) the traffic impact study in a segmented approach to eliminate future tedious revisions.

All the below comments do not require a response or a resubmission of *Deliverable #1*; however, omissions should be addressed in subsequent submissions and in the final Report:

SUMMARY

TRAFFIC COUNT LOCATIONS:

Vehicle turning movement counts were obtained at the below requested intersections:

1. Lancaster Avenue and Spring Mill Road / Kenilworth Road / Aldwyn Lane
2. Lancaster Avenue and Church Walk
3. Lancaster Avenue and Ithan Avenue
4. Lancaster Avenue and Lowrys Lane
5. Lancaster Avenue and Garrett Avenue
6. Conestoga Road and Sproul Road
7. Conestoga Road and Spring Mill Road
8. Conestoga Road and Ithan Avenue
9. Conestoga Road and Lowrys Lane
10. Conestoga Road and Garrett Avenue
11. County Line Road and Spring Mill Road
12. County Line Road and Ithan Avenue North
13. County Line Road and Ithan Avenue South
14. County Line Road and Lowrys Lane
15. County Line Road and Airedale Road
16. County Line Road and Roberts Road
17. Ithan Avenue and Aldwyn Lane

In addition to the above intersections, turning movement counts were conducted at the five unsignalized driveways serving Villanova's main parking lots along Ithan Avenue and Lancaster Avenue, for a total of twenty-two (22) count locations.

COUNT PERIODS:

1. Morning Peak Hour (AM) 7:00 AM – 9:00 AM
2. Afternoon/Evening Peak Hour (PM) 4:00 PM – 6:00 PM
3. Requested Special Event No. 1: Homecoming Traffic (October 27, 2012) Noon-3:00 PM
4. Requested Special Event No. 2: Basketball Traffic (December 11, 2012) 6:00 PM-8:00 PM

COMMENTS:

1. **Special Event Analyses**: Included in the *Deliverable #1* submission was a discussion regarding the comparison of the AM and PM peak hour data with the "Special Event" peak hour data. The discussion concluded there is no real value in developing a level of service analysis for the "Special Events" because the total intersection volumes during "Special Events" were less than both the AM and PM Peak hours studied. While we do agree with this conclusion and support eliminating the unnecessary level of service analysis for the two "Special Events", we remind the applicant that a Special Event Traffic Plan is required in the final submission, as discussed during recent scoping meetings.

2. **Adjustments: Traffic Demand versus Traffic Served:** It appears that no volumetric adjustments were made to any of the studied intersections concerning the observation of unmet demand. Evidently, the only approach exhibiting excessive queues from unserved vehicles occurred on the southbound approach of E. County Line Road at Airdale Road. Information provided in *Deliverable #1* indicates that an excess of five (5) vehicles were observed during both the AM and PM peak 15 minutes analyzed.

Although the explanation provided regarding the unserved demand volumes indicated the queues were directly related to the metering effect from the adjacent signalized intersection, no adjustment to the analysis data was included. An adjustment should be made to the traffic volumes, or further discussion regarding the excessive queue on the southbound approach of E. County Line Road at Airdale Road should be included in the final report. The discussion should include a more detailed explanation of causal factors rather than an general discussion.

3. We remind the applicant of the following information as indicated in Strike-off Letter (SOL) 470-09-04, *Policies and Procedures Transportation Impact Guidelines,* Dated: February 12, 2009

    a. Page 8: PennDOT requires a five (5) year projection beyond the anticipated full build-out of the proposed site.
    b. Page 13: Crash records shall be provided along with a crash pattern discussion.
    c. Page 15: A detailed level-of-service and delay table by approach and movement for the various studied scenarios shall be provided.

GENERAL:

4. For verification, the Synchro Reports should include the detector layouts in the report. It appears the detector option was not selected when generating the report. Please include in future submissions.

5. Unsignalized intersection capacity analysis must be provided through Report selection for HCM Unsignalized Intersection Capacity Analysis. The provided Report did not identify LOS or Delay for the unsignalized intersections.

6. PennDOT File No. 0779 *Lancaster Avenue & Villanova Parking Lot* was not included in this submission; please include the Signal Permit Plan in subsequent submissions.

INTERSECTION:

7. Pages 3 and 62 of 208: AM & PM Synchro data for Intersection 3: *County Line Road & Spring Mill Road*:
    a. Verify posted speed limit on both approaches of Spring Mill Road; it appears the speed limit is 25 MPH.
    b. Per the Signal Permit Plan, revise the OFFSET to “0” for both AM and PM timings
    c. AM timing should reflect a total of 20 seconds for phase 2+6 (Spring Mill Road) and 40 seconds for phase 4+8 (County Line Road) for a total Cycle Length of 60 seconds.
    d. PM timing should reflect a total of 22 seconds for phase 2+6 (Spring Mill Road) and 38 seconds for phase 4+8 (County Line Road) for a total Cycle Length of 60 seconds.

8. Page 31 and 67 of 208: AM and PM Synchro data for Intersection 7: *Sproul Rd/Spring Mill Rd & Aldwyn Ln/Kenilworth Rd & Lancaster Ave* and PennDOT System Plan I-0156: revise the control type to FREE operation.

9. Pages 37 and 73 of 208: AM & PM Synchro data for Intersection 16: *Conestoga Road & Sproul Road* and PennDOT File No. 0886.
    a. Verify this intersection is the MASTER intersection and Offset = 0; the permit plan does not identify the offset or typical coordination notes regarding the system limits.
    b. Verify the Minimum Initial for Phases 4+8 and 2+6; it appears the values may have been transposed.

10. Pages 42 and 78 of 208: AM and PM Synchro data for Synchro Intersection 27: *Lancaster Avenue & Ithan Avenue* and PennDOT File 0780:
    a. Minimum Initial for Phase 2+6 should be verified; the signal permit plan indicates a value of 34.0 seconds for the minimum initial.

11. Page 47 and 83 of 208: AM & PM Synchro data for Intersection 33 *Williams Rd/Garrett Ave & Conestoga Rd*; verify the posted speed limit and lane widths on all approaches to this intersection. It appears Williams Road/Garrett Avenue is posted at 15 MPH and Conestoga Road is posted at 25 MPH; and the lane width default value of 12 feet was utilized.

12. Pages 52 of 208: AM Synchro data for Intersection 51: *Lowrys Lane & Lancaster Avenue* and System Plan I-0156: Revise the offset to 25 as indicated on the System Plan

13. Page 82 of 208: PM Synchro data for Intersection 29: *Strathmore Dr/Lowrys Ln & Conestoga Rd*; verify the turning movement counts for the northbound approach; both the count data and figures indicate 15, 8, 17 for the left, through and right movements.

As indicated previously, none of the above comments require a response or a resubmission of *Deliverable #1*; however, we recommend the applicant resolve identified omissions/corrections in subsequent submissions and in the final Report. We hope you find the above discussion useful and, please do not hesitate to contact this office if the Township has any questions.

Sincerely,

Amy B. Kaminski

Amy B. Kaminski, P.E., PTOE
Senior Transportation Engineer
Gilmore & Associates, Inc.

Cc (via email):
Kevin W. Kochanski, R.L.A, C.Z.O, Director of Community Development
John Sartor, P.E. Vice President, Gilmore & Associates, Inc.
David Leh, P.E., Senior Project Manager, Gilmore & Associates, Inc.
Roger A. Phillips, Senior Project Manager, Gannett Fleming, Inc.

F. Tavani and Associates, Inc.
Traffic Engineering and Planning

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Villanova University Lancaster Avenue Housing Initiative **14 November 2012**
Traffic meeting with Radnor Township **revised 27 November 2012**

Meeting Minutes

Attendees

Name	Affiliation		
Lt. Chris Flanagan	Radnor Township	Bob Morro	Villanova University
Steve Hildebrand	Villanova University	Steve Norcini	Radnor Township
Amy Kaminski	Radnor Township / Gilmore	Marilou Smith	Villanova University
Chris Kovoloski	Villanova University	Frank Tavani	FTA, Inc.
Officer Ray Matus	Radnor Township		

Discussion Points

SPECIAL EVENT COUNTS

Since our last meeting, "special event" counts took place as previously discussed and agreed. They were conducted during homecoming weekend and during the counts there was no precipitation and attendance was normal. Some discussion ensued about the possibility of doing additional counts during a home basketball game, namely one scheduled for December 5th but this issue was left unresolved (see next page, last paragraph). Also discussed was how the point of the special event exercise was mainly to determine if traffic could be better managed through improved logistics and wayfinding. Villanova is already investigating ways to do this, including assigned parking to season ticket holders (which will rotate on an annual basis to treat all holders fairly), charging a fee for the parking in the proposed structure for non-season ticket holders, and other strategies, all of which will be documented later in the traffic report. Traffic count data has not yet been plotted but will be presented to the township – along with the 'ordinary' traffic data – later in December.

OTHER CAMPUS CHANGES

Bob M. talked about changes to parking permits and locations are being considered not only for special events but also for faculty and staff during the regular school year, including the possibility of changing the roadways leading to the SAC Parking Garage from one-way to two-way.

CHURCH WALK SIGNAL

Steve N. asked about the signal at Church Walk and how signal heads visibility would be affected by the proposed pedestrian bridge. Frank explained that the bridge will be essentially centered over the existing driveway, which is currently aligned with the Church Walk, so there will be no visibility issues as the signal heads will simply be mounted on mast arms on either side of the structure.

Some lengthy discussion took place regarding a WB left-turn lane and why it may not be needed at Church Walk, but that this will be investigated during the TIS production. There was discussion that in the EB direction an exclusive right turn lane at Church Walk is not needed due to proposed right-in/right-out driveway which will be located east of Church Walk, about midway between Church Walk and Route 320. Improved

access management will be provided through the elimination of 6 driveways and the reallocation of parking which will have access to the Church Walk signal (for left turns in and out).

Some discussion ensured about pedestrian crossings at grade at this location and how to prevent that. Some peds may attempt to cross, especially others in the community who Villanova can't control (joggers, SEPTA bus riders, etc.) This will be investigated further but initial thoughts include still providing sidewalks along Route 30 at Church Walk, installing post-mounted signs that prohibit ped crossings, elimination of painted crosswalks in Route 30, possibly fencing and other controls, moving SEPTA bus stops, etc.

ALDWYN LANE

Amy K. asked about any discussion which took place with the neighbors regarding Aldwyn Lane changes. At the meeting there were many neighbors not in favor of a cul-de-sac anywhere along Aldwyn Lane. Wooded Lane residents were also concerned. Frank T. mentioned a possibility may be to make Aldwyn Lane one-way for a short segment, such as between Route 320 and Wooded Lane, and further that such one-way orientation should be away from Route 30, meaning the signal heads for Aldwyn Lane could be eliminated, thereby possibly improving levels of service.

ITHAN AVENUE

Officer Matus mentioned an EB exclusive right-turn lane at Ithan might be useful as well adding a second NB left-turn lane. He also mentioned how the SB side sidewalk on Ithan is seldom used and does not extend under the Route 100 overpass. The upcoming TIS will investigate all these possibilities, including possibly extending the existing WB exclusive left-turn lane (at Ithan). Officer Matus expressed concern about directing / controlling ped flow on the east side of Ithan (i.e., from the stadium to the existing surface lot) and how controlling that should be considered in upcoming design work for the PAC and the parking structure.

Steve N. requested Villanova perform some investigations of what would need to be done to make the Ithan Avenue underpass traversable by trash trucks and emergency vehicles. Bob M. agreed to have Nave Newell investigate this and report back later. Villanova is not committing to this improvement but will provide some preliminary engineering investigations to the township.

Frank T. and others talked about traffic control devices along Ithan south of Route 30 and how the intersection of the parking structure driveway and the apartment surface parking lot area (i.e., the driveways along Ithan Avenue nearest to the Route 100 overpass) may be all-way stop-controlled. A gate may also be installed on the driveway serving the apartment surface parking lot area. Said gate would normally be open and would be provided just in the event that cut through traffic from the structure to Route 30 (at Church Walk) needs to be regulated or discouraged during certain events.

Some discussion took place regarding Dougherty Drive, which is the small road just north of Route 30 on the west side of Ithan Avenue. This unsignalized intersection permits all turning movements since some truck deliveries have to be made from Route 30 (they can't fit under the Regional Rail bridge to the north). Part of Villanova's master plan calls for a new gate and turn around area along Dougherty Drive and this will help regulate traffic flow there. This improvement is unrelated to the apartments and is moving forward presently and should be installed early next year.

If any part of these minutes is believed to be inaccurate or if there are significant omissions, please contact FTA by 30 November 2012 after which time the contents of these minutes will be binding. *Note that subsequent to the meeting, Villanova authorized FTA to move forward with additional data collection on a date TBD.*

F. Tavani and Associates, Inc.
Traffic Engineering and Planning

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www.FTAVANIASSOCIATES.com

Villanova University Lancaster Avenue Housing Initiative **15 October 2012**
Transportation Impact Investigations joint meeting with Radnor Township & PennDOT
Meeting Minutes revised 8 November 2012

Attendees

Name	Affiliation
Fran Hanney	PennDOT
Steve Hildebrand	Villanova University
Amy Kaminski	Radnor Township / Gilmore
Susan LaPenta	PennDOT
Officer Ray Matus	Radnor Township
Bob Morro	Villanova University
Steve Norcini	Radnor Township
Marilou Smith	Villanova University
Frank Tavani	FTA, Inc.

Discussion Points

BACKGROUND

Bob Morro started off by bringing PennDOT up to speed on the project and explained how it includes new dormitory buildings with up to approximately 1,150 beds for juniors and seniors and a new parking structure – both located on the sites of the current parking lots flanking Ithan Avenue near Lancaster Avenue. The new dorms are aimed at bringing more of the existing undergraduate population on campus, not growing the school population. Even with the new beds, some undergrads will continue to live off campus, but the new dorms will significantly reduce this number and, in turn, significantly reduce student commuting trips.

Bob explained how proposed new parking will be found in not only the new parking structure but also in a new surface lot (west of the proposed dormitory buildings), and in new levels to be built atop existing parking structures on the main campus. As the project unfolds and through its parking permit program, the University plans to implement revised parking policies which will dictate where faculty, staff, resident students, commuter students, and visitors will park.

Bob next went over the proposed new ped bridge, the rationale behind the location of same (including the SEPTA Rt. 100 station platforms, grades, and the locations of classrooms).

Finally, it should be noted that while a new performing arts center (PAC) is shown on the plans as a placeholder, it will not be part of upcoming plan submittals. The plans will focus on the new resident halls, the new parking structure and other campus parking changes, and a new pedestrian bridge.

DATA COLLECTION

Frank T. then began discussion of the meeting agenda and first commented that Villanova will include the 14 intersections mentioned in the June 2012 scope of work email as requested by the twp. Given the large

scope, Frank indicated that data collection may be spread over 2 or 3 days, to accommodate limitations of personnel and count boards. FTA may also elect not to count through volumes at certain locations to minimize personnel requirements and avoid redundancy. Collected data will reflect traffic demand as well as traffic served. Locations which are immediately adjacent to each other and do not feature significant or meaningful driveways in between are likely candidates. Gilmore (Amy K.) indicated acceptance of this approach, as long as it was properly documented and defendable.

PED SCRAMBLE PHASE

Some discussion then took place regarding the 26-second all-red ped-scramble phase at Ithan. The township indicated it thinks most residents want the ped phase duration reduced, to improve traffic flow. With the proposed pedestrian bridge, it may be possible to pursue reducing the duration of the ped phase. One possible remedy includes agreement to a post-development monitoring condition wherein ped activity (and traffic counts) will be monitored following the opening of the new pedestrian bridge, with subsequent retiming and tweaking of the signal controller performed at a later date. Villanova will be required to post escrow for the post-development analysis and possible retiming efforts (permit plan modifications and controller retiming).

SPECIAL EVENTS

Much discussion took place regarding the township-requested special event traffic counts (4 intersections). It was agreed that Homecoming (Saturday, 10/27/12) would be the targeted special event and in the event of moderate to heavy rain an alternate (a home basketball game) may be chosen instead. The counts will be conducted from 12 noon to 3:00 PM. The township has concerns regarding not only traffic but thinks an analysis and/or discussion of the logistics – including buying parking tickets in advance ($10 vs $40, to facilitate planning), better wayfinding, etc. – should be included in the traffic study.

TRIP GENERATION

Much discussion also took place regarding the trip generation approach for the project. Frank mentioned that the project will not result in an increase in peak hour traffic and in fact will capture/reduce the traffic impact of 1,150 currently-commuting students since those students will now live on campus. In addition, other proposed features/uses proposed within the new buildings – such as a bookstore, a bistro, etc. – will be targeted at serving the campus population of student, faculty, staff, and visitors and will not result in any meaningful external trip generation. In addition, any space which is vacated on the main campus (i.e., relocating the bookstore) will be 'backfilled' with offices of current faculty/staff who are currently working in basements or other undesirable locations on campus which, again, will not result in new external trip generation. Frank noted that the proposed trip generation methodology/approach will be to 'grow' traffic in the study area using trip generation rates of the existing parking lots (i.e., a trip rate per 'parking space') and applying that to the net increase in proposed new parking which will result from the project. In addition, Frank mentioned that the commuting student traffic which is currently found in the existing off-site traffic counts today cannot be removed or extracted from the road network, so it will be left. Thus, the combination of leaving those trips in the road network AND adding new traffic based on current parking trip generation activity will result in a very conservative trip generation methodology in the traffic study. This was discussed at length and consensus was reached that the approach was appropriate but should still be adequately documented in the study.

DRIVEWAYS, ACCESS, & CIRCULATION

Much discussion took place regarding a number of circulation and access issues, including neighbors' request to cul-de-sac Aldwyn Lane; the possibility of a reverse frontage road parallel to Lancaster Avenue behind existing Villanova-owned properties between the site and Route 320, conversion of Aldwyn Lane to

one-way away from the intersection of Route 320 and Route 30; a long-term study of the intersection to include possible conversion to a roundabout; conversion of existing unsignalized driveways to right-in/right-out; investigation into converting Kenilworth Road to one-way away from the intersection of Route 320 and Route 30; discussion regarding an investigation into providing additional clearance for sanitation trucks, school busses and emergency services at the rail overpass on Ithan Avenue (currently 10 ft clearance); and elimination/consolidation of certain driveways. In the end, some decisions/agreements include: that a roundabout may or may not be feasible but analysis of same will not be part of Villanova's project; that consolidation of driveways will be investigated further, that a reverse frontage road is likely not feasible due to grade challenges and SEPTA equipment, and that certain other improvements such as conversion of Aldwyn to one-way may be feasible. These issues will be investigated further by Villanova and further discussion of this topic (including a decision about which scenario will be included in the upcoming TIS' Future Build section) will be part of the staged submittals as suggested by Amy K. as mentioned below.

'CHURCH WALK' INTERSECTION

The proposed ped bridge and its relationship to the existing signalized T intersection at what is called the "Church Walk" was discussed at length. Discussion points included: the possible shifting of the driveway; permanent or temporary closure(s) of the driveway(s) serving the main lot on Ithan Avenue (and the effect of driving – or reducing – traffic at Church Walk; signal warrants; signal head visibility; providing two outbound left-turn lanes; stacking length; auxiliary lane analysis (WB left and EB right) along Route 30; and ped compliance. Regarding the last issue, the township and PennDOT expressed a desire to see implementation of whatever measures may be useful to compel peds to use the proposed ped bridge (and not cross Lancaster Avenue at grade). No definitive agreement on any of the items was reached other than a general agreement that all of the issues raised (warrants, circulation, etc.) will be carefully considered as the traffic study unfolds. More definitive steps will likely evolve as part of the staged submittal process referenced earlier and explained below.

ACCIDENT STUDY

Some discussion took place regarding the requested traffic investigations. Amy indicated the township was not interested in anything more than a standard investigation of crash data of the last 5 years and that such investigation should include reportable and non-reportable accidents. No accident diagrams need be drawn.

PARKING STUDY

Township will accept, review, and consider recent parking data collection efforts already conducted by Villanova's Public Safety officers. Frank will incorporate and explain the approach taken by the officers and include the many detailed spreadsheets in the upcoming traffic study.

OTHER DEVELOPMENTS

No other developments in the Township are close enough to – or large enough – to mandate consideration /inclusion in the study. The township accepts that Villanova's trip generation is all that needs to be included.

Finally, note that some other agreements were already reached regarding the traffic study in previous emails with the township. Specifically, in an email dated 10 October 2012, the township upheld its request for 14-intersection study area; agreed to a 4-interection special event study area; and agreed that it will accept PennDOT's methodology for level of service degradations as noted in SOL 470-09-4 in its review of the upcoming traffic study. Also, Amy K. previously suggested that Villanova consider submitting the traffic study in parts (i.e., existing conditions first, no build second, trip generation/distribution third, etc.) to

facilitate a smoother review. Steve N. stated that Frank should continue to coordinate traffic efforts with Amy and used words to the effect that "if Amy and Gilmore are satisfied with how you suggest or approach a traffic issue, then the township is satisfied".

If any part of these minutes is believed to be inaccurate or if there are significant omissions, please contact FTA by 12 November 2012 after which time the contents of these minutes will be binding. Thank you.

YAHOO! SMALL BUSINESS

RE: Villanova Lancaster Avenue Expansion Wednesday, October 10, 2012 4:16 PM

From: "Amy Kaminski" <akaminski@gilmore-assoc.com>

To: "Frank Tavani" <frank@ftavaniassociates.com>

Cc: "Zienkowski Robert" <rzienkowski@radnor.org>, "Norcini, Steve" <snorcini@radnor.org>, Kkochanski@radnor.org, "John Sartor" <JSARTOR@gilmore-assoc.com>, "Dave Leh" <DLEH@gilmore-assoc.com>, "Michael Shinton" <mshinton@gilmore-assoc.com>, "April Bauer" <abauer@gilmore-assoc.com>

Good afternoon Frank—

The Township has considered your request regarding a scope reduction and offers the following responses and direction:

As a reminder, Section 255-20.B(5)(d) indicates, "*The transportation impact study shall contain, **but not be limited to**, the following information*" (emphasis added). The term "but not be limited to" indicates that additional information may be required in addition to the scope identified in this section of the SALDO.

Discussion 1: Count Locations
Response: The number of intersections studied will remain including the previously identified 14 intersections. In addition to requiring a detailed parking analysis, the reportable and non-reportable crash records are to be included in the study for the identified intersections along with an analysis of the information.

Discussion 2: Trip Generation: The SALDO Trip Generation Rates table (255 Attachment 4) does not include all of the proposed land uses, specifically, the Performing Arts Center, Parking Garage, Student Book Store, Fitness Center, Convenience Store, Bistro, and dormitory rooms. Furthermore, many of the identified sources for 255 Attachment 4 are outdated.

As indicated in SALDO 255.20.B(5)(d)[4] "*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.*" Given the proposed mixed uses for the site, it will be up to the applicant to provide a discussion regarding no increase in traffic. The traffic impact study should also include a discussion regarding the anticipated redistribution of any traffic movements in and around the site and campus. At a minimum, moving the Book Store from the current location, north of Lancaster Avenue , to the proposed location south of Lancaster Avenue may alter pedestrian and vehicular traffic patterns.

In addition, the TIS should include discussions regarding the planned reuse of the vacated north campus space with information regarding the square footage and the anticipated type of use. Villanova offers public use of meeting facilities and the planned reuse of the

proposed vacated spaces will need discussed more fully in the required traffic study.

Discussion 3: LOS 'C' Requirement: The Township agrees with utilizing the methodology outlined in PennDOT Strike Off Letter (SOL 470-09-4) regarding mitigation requirements for a 10 second degradation to delay.

Discussion 4: Special Events Scope: The Township agrees with reducing the scope of study for the Special Events as follows:

1. Ithan Ave & Conestoga Road
2. Conestoga Road, Sproul Road , & Spring Mill Road
3. Sproul Road/Spring Mill Road & Lancaster Avenue
4. Ithan Ave & Lancaster Avenue

Please let me know if you require clarification of the information--

Sincerely,

Amy

Amy B. Kaminski, P.E., PTOE | **Gilmore & Associates**
Senior Transportation Engineer
65 E. Butler Avenue, Suite 100 | New Britain , PA 18901
Direct: 267-337-6979 | Company: 215 - 345 - 4330 Ext. 346 | Fax: 215 - 345 - 8606
Email: akaminski@gilmore-assoc.com
* **Please consider the environment before printing.**

From: Frank Tavani [mailto:frank@ftavaniassociates.com]
Sent: Wednesday, September 26, 2012 4:16 PM
To: Amy Kaminski
Cc: SteveNorcini; Kkochanski@radnor.org; Dave Leh ; Michael Shinton; Marilou Smith; Steven Hildebrand; John Sartor
Subject: Re: Villanova Lancaster Avenue Expansion

Amy, I know that you have been asked to look for a date to meet with Villanova to discuss traffic. In anticipation of that meeting, I have revisited your June email (below) as well as the SALDO and have a few comments and questions:

1) Count Locations. The SALDO language (255.20.B.5.d.3) states that "all major intersections" in a study area should be counted. Several of the 14 intersections in the June email are not major intersections. I believe the ordinance requires the following to be studied:

1. Congestoga Road, Sproul Road , & Spring Mill Road
2. Ithan Ave & Lancaster Avenue
3. Sproul Road/Spring Mill Road & Lancaster Avenue
4. Spring Mill Road & County Line Road
5. Ithan Ave & County Line
6. Ithan Ave and Aldwyn Lane

2) Trip Generation. The SALDO language (255.20.B.5.d.4) requires use of trip generation tables which are provided at the end of chapter 255. Those trip generation rates support a trip generation estimate of 0 peak hour trips for the project (since no increase in student body or instructional space is proposed). As you know, I believe the project will result in a *reduction* in peak hour traffic in the study area. Nonetheless, we have in the past and still currently suggest using non-zero trip generation based on the net increase in parking spaces which are part of the project, specifically using rates which are derived from the existing parking spaces today. We also propose "leaving" the existing traffic in the road network which is due to the currently-commuting students. I believe the combination of these two types of trips results in a very conservative estimate of site impact.

3) LOS 'C' Requirement. The SALDO language (255.20.B.5.d.6.a) requires a list of recommended improvements to achieve LOS C operation at the study area intersections. The ordinance does not clarify if this is by overall LOS, or by turning movement, or what the township will do to address underlying (existing) conditions which do not meet the ordinance. Realizing several intersections will have existing conditions which do not meet the ordinance, I suggest using PennDOT's methodology for LOS impact assessment.

There are other matters I'd like to discuss with you as well, such as how the ordinance does not appear to require accident analyses or parking studies, but these 3 issues are more urgent and need to be resolved before data collection can begin. Can you provide responses on these topics in the next week or two? Thanks.

Frank

_____
Frank Tavani, P.E., PTOE
Principal

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--- On **Thu, 6/14/12, Amy Kaminski <*akaminski@gilmore-assoc.com*>** wrote:

From: Amy Kaminski <akaminski@gilmore-assoc.com>
Subject: Villanova Lancaster Avenue Expansion
To: "Frank Tavani" <frank@ftavaniassociates.com>
Cc: "Norcini, Steve" <snorcini@radnor.org>, Kkochanski@radnor.org, " Dave Leh " <DLEH@gilmore-assoc.com>, "Michael Shinton" <mshinton@gilmore-assoc.com>
Date: Thursday, June 14, 2012, 8:26 AM

Good morning Frank—
Radnor Township has indicated the Villanova transportation impact study should include the

following information:
The Transportation Impact Study shall follow SALDO §255.20.B.5 with the following scope extent of study area, identified intersections and studied time periods:
Extent of Study Area:

1. North – Spring Mill Road from Conestoga to County Line Road
2. East – County Line Road from N. Spring Mill Road to Roberts Road
3. South – Roberts Road from County Line Road to S. Ithan Ave
4. West – S. Ithan Ave from Roberts Road to Mill Road; Mill Road from S. Ithan Ave to Conestoga Road; Conestoga Road from Mill Road to Sproul Road

2. Intersections:

1. Lowrey's Lane & Conestoga Road
2. Garrett Ave & Conestoga Road
3. Congestoga Road, Sproul Road , & Spring Mill Road
4. Ithan Ave & Conestoga Road
5. Lowrys Lane & Lancaster Avenue
6. Ithan Ave & Lancaster Avenue
7. Garrett Ave & Lancaster Avenue
8. Roberts Road & Lancaster Avenue
9. Sproul Road/Spring Mill Road & Lancaster Avenue
10. Spring Mill Road & County Line Road
11. Ithan Ave & County Line
12. Lowrey's Lane & County Line
13. Ithan Ave and Aldwyn Lane
14. County Line Road and Airdale Road

3. Study Periods:

1. Weekday AM Peak Hour
2. Weekday PM Peak Hour
3. Major Campus event: Basketball, Graduation, Football game or other acceptable event approved by Township.

Crash Records:

1. Reportable and non-reportable crash records; 5 year history (from both PennDOT and Radnor Township Police Department
2. Locations:
   i. All approaches at Lancaster Avenue and Ithan Avenue intersection;
   ii. Lancaster Avenue from Spring Mill Road to Black Friar Road

5. Pedestrian Traffic

6. Parking Utilization:

1. Parking turnover
2. Parking duration
3. Parking occupancy

Please note Steve's comment below regarding seasonal adjustments and his suggestion that counts should be obtained in September, after school is in full session. As discussed in our meeting on April 24, 2012, the Township is interested in obtaining as much information as possible and we will assist the board in making an informed decision through our professional review services. Although the identified 14 studied intersections may appear excessive, it is important to the township that an extensive transportation analysis is inclusive of all intersections within close proximity to Villanova.
Thanks so much---
Amy

Amy B. Kaminski, P.E., PTOE| Gilmore & Associates
Senior Transportation Engineer
65 E. Butler Avenue , Suite 100 | New Britain , PA 18901
Direct: 267-337-6979|Company: 215 - 345 - 4330 Ext. 346 | Fax: 215 - 345 - 8606
Email: akaminski@gilmore-assoc.com
* **Please consider the environment before printing.**

From: Norcini, Steve [mailto:snorcini@radnor.org]
Sent: Wednesday, April 25, 2012 6:50 AM
To: 'Frank Tavani'
Cc: 'Kevin Kochanski'; Amy Kaminski; Dave Leh ; ' Marilou Smith '; ' Steven Hildebrand '; Zienkowski Robert
Subject: RE: Villanova traffic information

Good morning Frank,

The Township has received your transmission and will provide direction regarding the study area. As far as the data collection is concerned, you may have to wait until September to obtain meaningful counts. Seasonal adjustment factors would not be appropriate in this case.

Thank you

Stephen F. Norcini P.E.
Director of Public Works
Radnor Township
610.688.5600 x156
snorcini@radnor.org

From: Frank Tavani [mailto:frank@ftavaniassociates.com]
Sent: Tuesday, April 24, 2012 5:49 PM
To: Steve Norcini
Cc: Kevin Kochanski; Amy Kaminski; David Leh; Marilou Smith ; Steven Hildebrand
Subject: villanova traffic information

Steve,

This email is addressed to you as requested but is merely the transmission of some additional traffic information intended for Amy. One PDF file is attached. It is 30 pages. It contains the figures I handed out earlier today followed by raw count data.

As we mentioned toward the close of the meeting, we would like some direction from the township regarding our trip generation methodology as well as our study area. I should re-iterate that -- as Marilou mentioned -- the school year is in its final week this week and next weeks are final examinations, so there is very limited opportunity, if any, for additional data collection.

Finally -- and I'm embarassed to only be mentioning this now -- but one of the things that occured to me AFTER our meeting today impacts what Mr. Kochanski was discussing regarding the 1159 beds which are going to be vacated off campus if and when LAH is built. Specifically we discussed how those bedrooms/houses may be filled with other tenants who may (or may not) drive in our study area and how it would be helpful if the township could say (to residents or anyone else) that we were asked to include the impacts of *that* traffic in our study. I just realized that that in fact is exactly what we did. Specifically, we did NOT reduce the traffic along Route 30, Ithan, Aldwyn, etc. at all to reflect the 1159 students now being "on site", we **simply added more** traffic based on the parking space trip generation methodology which I explained.

We will wait to hear back from you and of course if you have any questions call or email anytime. Thx.

-Frank

_____
Frank Tavani, P.E., PTOE
Principal

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APPENDIX B

Study Area Photographs

Description: Eastbound on Route 30 (approaching intersection)

Description: Westbound on Route 30 (approaching intersection)

Description: Northbound on Spring Mill Road (approaching intersection)

Description: Southbound on Spring Mill Road (approaching intersection)

Description: Northbound on Aldwyn Lane (approaching intersection)

Description: Southbound on Kenilworth Road (approaching intersection)

Description: Eastbound on Route 30 (approaching intersection)

Description: Westbound on Route 30 (approaching intersection)

Description: Northbound on Church Walk (approaching intersection)

Description: Eastbound on Route 30 (approaching intersection)

Description: Westbound on Route 30 (approaching intersection)

Description: Northbound on Ithan Avenue (approaching intersection)

Description: Southbound on Ithan Avenue (approaching intersection)

Description: Northbound on Ithan Avenue (approaching Route 30)

Description: Southbound on Ithan Avenue (looking from Route 30)

Description: Eastbound on Route 30 (approaching intersection)

Description: Westbound on Route 30 (approaching intersection)

Description: Northbound on Lowrys Lane (approaching intersection)

Description: Southbound on Lowrys Lane (approaching intersection)

Description: Eastbound on Route 30 (approaching intersection)

Description: Westbound on Route 30 (approaching intersection)

Description: Northbound on Garrett Avenue (approaching intersection)

Description: Eastbound on Conestoga Road (approaching intersection)

Description: Westbound on Conestoga Road (approaching intersection)

Description: Northbound on Sproul Road (approaching intersection)

Description: Southbound on Sproul Road (approaching intersection)

Description: Eastbound on Conestoga Road (approaching intersection)

Description: Westbound on Conestoga Road (approaching intersection)

Description: Northbound on Spring Mill Road (approaching intersection)

Description: Description: Eastbound on Conestoga Road (approaching intersection)

Description: Westbound on Conestoga Road (approaching intersection)

Description: Northbound on Ithan Avenue (approaching intersection)

Description: Southbound on Ithan Avenue (approaching intersection)

Description: Eastbound on Conestoga Road (approaching intersection)

Description: Westbound on Conestoga Road (approaching intersection)

Description: Northbound on Strathmore Drive (approaching intersection)

Description: Southbound on Lowrys Lane (approaching intersection)

Description: Eastbound on Conestoga Road (approaching intersection)

Description: Westbound on Conestoga Road (approaching intersection)

Description: Northbound on Williams Road (approaching intersection)

Description: Southbound on Garrett Avenue (approaching intersection)

Description: Eastbound on County Line Road (approaching intersection)

Description: Westbound on County Line Road (approaching intersection)

Description: Northbound on Spring Mill Road (approaching intersection)

Description: Southbound on Spring Mill Road (approaching intersection)

Description: Eastbound on County Line Road (approaching intersection)

Description: Northbound on Ithan Avenue North (approaching intersection)

Description: Southbound on Ithan Avenue North (approaching intersection)

Description: Westbound on County Line Road (approaching intersection)

Description: Northbound on Ithan Avenue South (approaching intersection)

Description: Southbound on Ithan Avenue South (approaching intersection)

Description: Eastbound on County Line Road (approaching intersection)

Description: Westbound on County Line Road (approaching intersection)

Description: Northbound on Lowrys Lane (approaching intersection)

Description: Eastbound on County Line Road (approaching intersection)

Description: Northbound on Airedale Road (approaching intersection)

Description: Southbound on Airedale Road (approaching intersection)

Description: Eastbound on County Line Road (approaching intersection)

Description: Westbound on County Line Road (approaching intersection)

Description: Northbound on Roberts Road (approaching intersection)

Description: Southbound on Roberts Road (approaching intersection)

APPENDIX C

Smart Transportation Guidelines

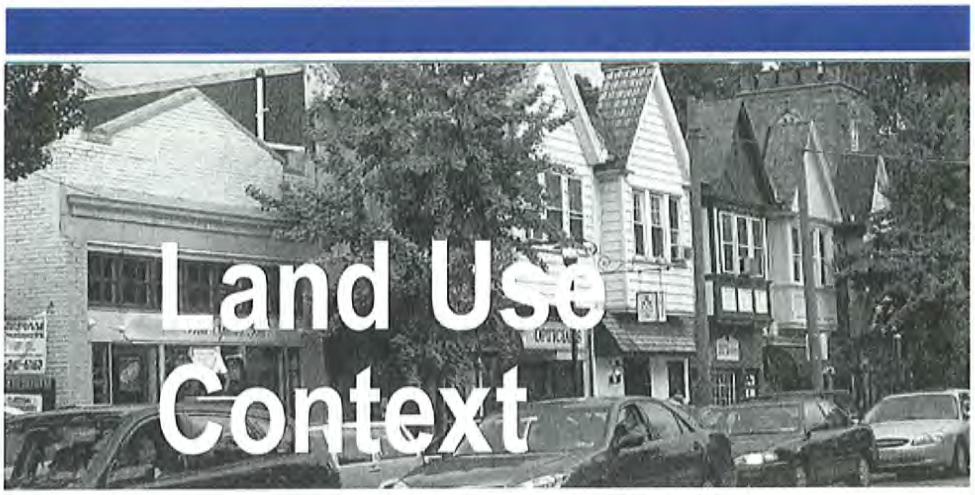
SMART TRANSPORTATION GUIDEBOOK

Planning and Designing Highways and Streets that Support Sustainable and Livable Communities

New Jersey Department of Transportation

Pennsylvania Department of Transportation

MARCH 2008



4.0 Land Use Context

Land use context and roadway type comprise the organizing framework for the selection of appropriate roadway design values. A context area is a land area comprising a unique combination of different land uses, architectural types, urban form, building density, roadways, and topography and other natural features. The existing and planned land use context should be defined on every project. The roadway design should be compatible with the existing land use context, or a planned land use context that reflects the community vision.

4.1 WHY CONTEXT MATTERS

Understanding the land use context provides guidance on who will need to use the road and how. This understanding influences the geometric design of the roadway and the types of amenities required in the right-of-way.

For this document, the design elements are organized into three general categories:

Desired Operating Speed: This is the speed at which it is intended that vehicles travel. The roadway context should play a large role in determining the desired operating speed. For example, pedestrian travel and the presence of civic uses and retail close to the street all suggest the need to use the lower range of the desired operating speed.

Roadway: The design team should select roadway elements and geometry with a clear understanding of surrounding land uses. For example, in urban areas the design team should always seek to provide parking lanes. Travel lanes are often narrower than in suburban areas, particularly if this enables the installation of bike lanes.

Roadside: The roadside primarily serves the pedestrian and the transit rider and provides a transition between public and private space. The design of the roadside elements should support the land use context. Civic uses such as schools and parks, and high density neighborhoods which generate higher pedestrian activity may require wider sidewalks.

A Tale of Two Contexts

Route 30, classified as a principal arterial, has a cross-section of four 10 ft. travel lanes in both Ardmore, PA, and Wayne, PA, as shown below. The speed limit on both roads is 25 mph. In a workshop for this guidebook, DVRPC stakeholders agreed that the Wayne town center is friendlier for pedestrians, identifying Route 30 in Wayne as "an example of an arterial roadway that has evolved to a village feeling." The difference? In Wayne, the presence of on-street parking and the traditional town center context (with zero building setbacks) results in more watchful motorists and creates a defined space for pedestrians. With sporadic on-street parking and with the greater prominence of parking lots, Ardmore is an example of a suburban center.

4.2 DEFINING LAND USE CONTEXT

Seven context areas are described in the following section, from the least to the most developed: Rural, Suburban Neighborhood, Suburban Corridor, Suburban Center, Town/Village Neighborhood, Town Center, and Urban Core.

The context areas are illustrated in Figure 4.2. This drawing does not arrange the areas in order of intensity, but is an illustrative example of how these areas might fall across the land.

"Quantifiable characteristics," summarized in figure 4.3, are provided for each context. They are similar to what community planners refer to as "bulk standards," normally used to prescribe the desired appearance of land uses within a zoning district. Each land use context should be identified based upon this information.

In practice, land uses do not always fit neatly into the defined context areas, or the boundaries between context areas may be fluid. The planner or designer should use their best judgment in selecting the context that most closely matches the existing and proposed land uses.

It is recommended that contexts be broadly defined, avoiding segments less than 600 ft. in length. This is largely an issue of practicality. There is a limit on the number of different roadway cross-sections that can be implemented to respond to land use context within a small area.

1. Rural

This context area consists of a few houses and structures dotting a farm or forest landscape. The areas are predominantly natural wetlands, woodlands, meadow or cultivated land. Small markets, gas stations, diners, farm supplies, convenience grocers, etc. are often seen at the intersections of arterial or collector roads. Areas with a few commercial or civic uses and a number of homes close to the roadway can be placed into the sub-context type of "rural hamlet." Once the population of the settled area exceeds 250, it should be classified into the town/village context.

Examples include areas of Burlington and Gloucester Counties to the east, and Tioga and Jefferson Counties to the west.

2. Suburban Neighborhood

Predominantly low-density residential communities, many built since WWII. House lots are typically arranged along a curvilinear internal system of streets with limited connections to regional road network or surrounding streets. Lot sizes are usually two acres to one-quarter acre, but in older suburbs, it is common to find one-eighth acre lots. Garden apartments are also included in this type. Neighborhoods can include community facilities such as schools, churches, recreational facilities, and some stores and offices. When suburban houses line an arterial roadway but have their primary access to frontage roads or rear access roads, it is possible to classify this area as a "suburban corridor."

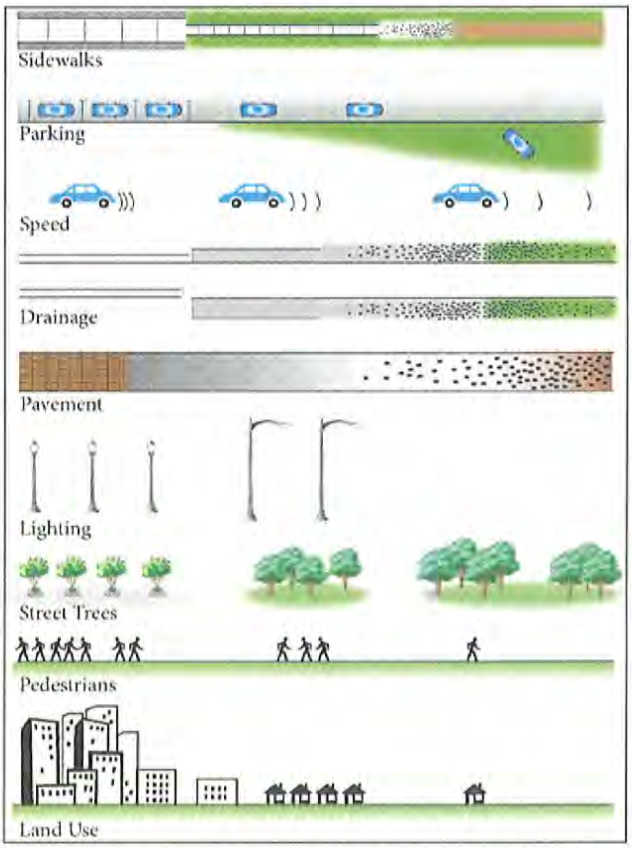


Figure 4.1 From Urban to Rural. As intensity and mix of uses along a roadway increase, there is a greater need to accommodate and prioritize other modes of travel, including bicyclists, pedestrians, and transit riders.

Figure 4.2 The Seven Land Use Contexts

3. Suburban Corridor

This area is characterized by big box stores, commercial strip centers, restaurants, auto dealerships, office parks, and gas stations. These uses are sometimes interspersed with natural areas and occasional clusters of homes. Buildings are usually set back from the roadway behind surface parking. Office buildings are usually set back a bit more than adjacent retail frontage to establish garden separation from ground windows.

These areas are found along many arterial roadways, such as Route 38 in Cherry Hill and Route 611 north of Philadelphia.

4. Suburban Center

Often a mixed-use, cohesive collection of land uses that may include residential, office, retail, and restaurant uses where commercial uses serve surrounding neighborhoods. These areas are typically designed to be accessible by car, and may include large parking areas and garages.

They are less accommodating to pedestrians than town centers, and opportunities to cross the primary roadway can be limited. On-street parking may or may not be provided.

Examples include Lancaster Avenue in Ardmore, PA, and Montgomery Avenue in Bryn Mawr, PA.

5. Town/Village Neighborhood

Predominantly residential neighborhoods, sometimes mixed with retail, restaurants and offices. In urban places, residential buildings tend to be close to the street. Rowhouses fronting the sidewalk, and houses back 30 feet behind a front lawn are both common types. Small retail establisments sometimes occupy principal corners. Block sizes are regular and often small in comparison to suburban neighborhood blocks. Even where streets are narrow, on-street parking is common and typically well used. The large majority of neighborhoods have sidewalks.

Existing examples include Fairview in Camden and Society Hill in Philadelphia.

Figure 4.3 Defining Contexts

	RURAL	SUBURBAN			URBAN		
	 Rural	 Suburban Neighborhood	 Suburban Corridor	 Suburban Center	 Town/Village Neighborhood	 Town Center	 Urban Core
Density Units	1 DU/20 ac	1 DU/ac - 8DU/ac	2 - 30 DU/ac	3 - 20 DU/ac	4 - 30 DU/ac	8 - 50 DU/ac	16 - 75 DU/ac
Building Coverage	NA	< 20%	20% - 35%	35% - 45%	35% - 50%	50% - 70%	70% - 100%
Lot Size/Area	20 acres	5,000 - 80,000 sf	20,000 - 200,000 sf	25,000 - 100,000 sf	2,000 - 12,000 sf	2,000 - 20,000 sf	25,000 - 100,000 sf
Lot Frontage	NA	50 to 200 feet	100 to 500 feet	100 to 300 feet	18 to 50 feet	25 to 200 feet	100 to 300 feet
Block Dimensions	NA	400 wide x varies	200 wide x varies	300 wide by varies	200 by 400 ft	200 by 400 ft	200 by 400 ft
Max. Height	1 to 3 stories	1.5 to 3 stories	retail -1 story; office 3-5 stories	2 to 5 stories	2 to 5 stories	1 to 3 stories	3 to 60 stories
Min./Max. Setback	Varies	20 to 80 feet	20 to 80 ft	20 to 80 ft	10 to 20 ft	0 to 20 ft	0 to 20 ft

6. Town/Village Center

A mixed use, high density area with buildings adjacent to the sidewalk, typically two to four stories tall with commercial operations on the ground floor and offices or residences above. Parallel parking usually occupies both sides of the street with parking lots behind the buildings. Important public buildings, such as the town hall or library, are provided special prominence.

Places like Haddon Avenue in Collingswood and State and Main Streets in Doylestown are classic "Main street" town centers.

7. Urban Core

Downtown areas consisting of blocks of higher density, mixed use buildings. Buildings vary in height from 3 to 60+ stories with most buildings dating from an era when elevators were new technology - so five to twelve stories were the standard.

Examples are Trenton's Downtown and Center City Philadelphia.

4.3 PLANNING FUTURE CONTEXT AREAS

The planned land use context along the corridor is assessed by consulting the following plans and documents:

- Municipal comprehensive plan (referred to as master plan in New Jersey)
- Multi-municipal or regional comprehensive plan (applicable in Pennsylvania)
- Zoning ordinance
- Redevelopment plan (if applicable)
- State Plan designation (applicable in New Jersey)

As part of the collaboration between state and community, the study team consults with local stakeholders on the vision for their community. If no vision exists, a workshop or charrette can be held to help crystallize the community vision.

5.0 Transportation Context

Routes 1 and 27 in Central New Jersey (below) are both classified as principal arterials in traditional functional classification, but they have very different roles within the roadway network. This chapter proposes a new roadway typology to better capture the role of roadways in a community.

The transportation context consists of the role that the roadway plays, or is anticipated to play within the local community and the larger region. It also refers to the supporting street network, and the interaction of the roadway with that network.

5.1 ROADWAY TYPE

A new roadway typology is proposed for the Guidebook in order to design roadways that better reflect their role in the community and the larger transportation network.

Currently, every roadway owned by NJDOT or PennDOT, or by county governments in New Jersey, is assigned a functional classification consistent with the AASHTO Green Book:

- Principal Arterial
- Minor Arterial
- Collector (subdivided into major collector and minor collector within rural areas)
- Local

A problem with the existing functional classification system is that an entire highway is sometimes placed into a certain class based on select characteristics – such as the overall highway length, or traffic volumes – although its level of access and mobility are not consistent with other roadways in that class. For example, many state highways are classified as principal arterials even if they are far more vital to community access than to regional mobility. This creates a dilemma for highway designers: the application of design standards for that class may encourage higher operating speeds than are appropriate for segments serving community access.

To address this issue, a roadway typology is proposed which better captures the role of the roadway within the community. It focuses more narrowly on the characteristics of access, mobility and speed. If a segment of an arterial roadway has a relatively low speed, is important to community access, and has a lower average trip length, it should not be designed like a high order arterial. Further, under this approach, roadways


Route 1


Route 27

are segmented to a greater degree than traditional functional classification. If one segment of a roadway has low average trip lengths and has consistently lower speeds, its design should be different than another section which carries long trips.

The roadway typology is presented in Table 5.1 and illustrated in Figure 5.1. It should be emphasized that this should be used only as a planning and design "overlay" for individual projects, and does not replace the traditional functional classification system used in both states. The roadway classes shown in Table 5.1 correspond to the classifications of arterial, collector and local as described in the 2001 AASHTO Green Book. Their design values should likewise correspond to the design guidelines provided in the Green Book.

Different state highways have different community roles, and the Guidebook recommends that this should be reflected in the design. Some state highways, such as NJ Route 1, will be considered as a Regional Arterial because of their importance to regional mobility. On the other hand, Route 27, which is classified as a principal arterial by NJDOT, actually operates more like a community arterial or a community collector. Parallel to Route 1 and the New Jersey Turnpike, this highway has a low average trip length. Maintaining regional mobility becomes a smaller concern on Route 27 and similar state roadways.

Whatever the road classification, traffic mobility and safety are important goals on state highways, and must be considered on all roadway projects. These goals will continue to receive significant attention on roads with acute safety or congestion problems. Mobility and safety goals are balanced with local development goals on projects.

PennDOT owns many roads in Pennsylvania, from arterials down through local roads. NJDOT controls a much smaller share of the road network, and virtually all of its roadways are arterials. Because of the relatively high volumes found on many NJDOT roadways, the maintenance of mobility on regional arterials remains a strong emphasis.

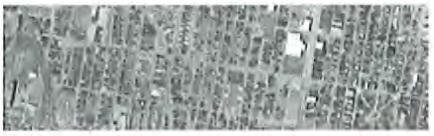
5.1.1 Main Street

Although not one of the Smart Transportation roadway categories, the concept of Main Street has an important place in Smart Transportation. Anchoring the center of a town, village or city, the Main Street is characterized by:

- Wide sidewalks and regular pedestrian activity;
- Mostly commercial and civic uses, with residential uses primarily found on the upper level of buildings;
- High building density;
- Buildings oriented to the street, with little or no building setbacks;
- Street furniture and public art;
- Heavy use of on-street parking;
- Speeds of 30 mph or less;
- Preferably no more than two travel lanes, although three to four lanes are seen on occasion.

Table 5.1 Roadway Categories

Roadway Class	Roadway Type	Desired Operating Speed (mph)	Average Trip Length (mi)	Volume	Intersection Spacing (ft)	Comments
Arterial	Regional	30-55	15-35	10,000-40,000	660-1,320	Roadways in this category would be considered "Principal Arterial" in traditional functional classification.
Arterial	Community	25-55	7-25	5,000-25,000	300-1,320	Often classified as "Minor Arterial" in traditional classification but may include road segments classified as "Principal Arterial."
Collector	Community	25-55	5-10	5,000-15,000	300-660	Often similar in appearance to a community arterial. Typically classified as "Major Collector."
Collector	Neighborhood	25-35	<7	<6,000	300-660	Similar in appearance to local roadways. Typically classified as "Minor Collector."
Local	Local	20-30	<5	<3,000	200-660	



Route 27, Kingston

Route 27, Princeton

The Main Street would typically belong to the Community Arterial road type, or to the Collector road type. This is the case on Route 27 in New Jersey; this roadway hosts two Main Street segments between New Brunswick and Trenton, in the towns of Princeton and Kingston. As defined here, a municipality can have more than one Main Street.

Main Streets are desirable in Smart Transportation because they support more sustainable communities, and because of their potential to increase walking, biking and transit use, as well as vehicular trip chaining.

For information on planning Main Streets, see Section 6.2.1.

5.2 ROADWAY NETWORK

Network design establishes critical parameters for roadway design—type of roadway, its general purpose (i.e., what type of traffic it is to handle) and number of lanes necessary to achieve the purpose. By increasing the options of motorists to travel from one point to another, a well-connected regional network permits greater flexibility in designing individual roadways. Improving roadway connectivity can serve regional mobility equally well as widening major roadways, and a well-connected network always serves the needs of pedestrians and bicyclists better than simply widening arterial roadways.

Because network connectivity is so important in Smart Transportation Solutions, it appears as a recurring theme in this guidebook. Network types, basic principles, and evaluating and creating a network are discussed in this section and in Chapter 3, "A Local Commitment."

5.2.1 Network types

The traditional urban grid has short blocks, straight streets, and a crosshatched pattern (Figure 5.2). The typical contemporary suburban street network has large blocks, curving streets, and a branching pattern (Figure 5.3). The two networks differ in three respects: (1) block size, (2) degree of curvature, and (3) degree of interconnectivity.

Both network designs have advantages and disadvantages. Traditional grids disperse traffic rather than concentrating it at a handful of intersections. They offer more direct routes and hence generate fewer vehicle miles of travel (VMT) than do contemporary networks. By offering many different routes to a destination, they better meet the needs of local motorists. They encourage walking and biking with their direct routing and their options for travel. Grids are also more transit-friendly; transit ridership is greatest between tracts that have relatively direct transit connections.[3]

Contemporary networks do have some advantages, such as the ability to lessen traffic on local residential streets. With their curves and dead ends, contemporary networks can go around or stop short of valuable natural areas.

Traditional grids best fulfill Smart Transportation goals, and are recommended for application in most areas.

5.2.2 Evaluation of the network

All roadway networks should be evaluated using the measures on internal connectivity, external connectivity, and route directness.

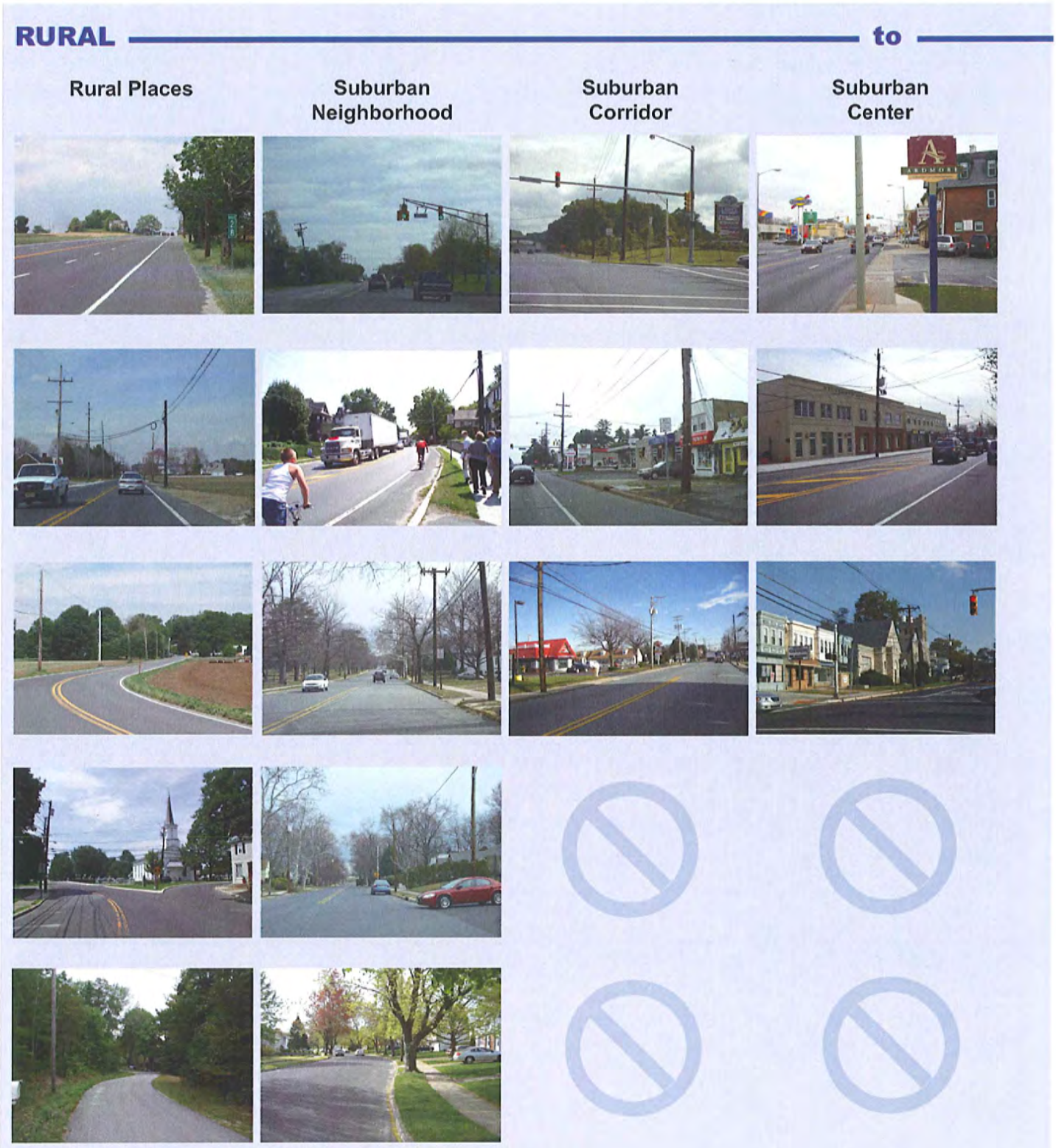
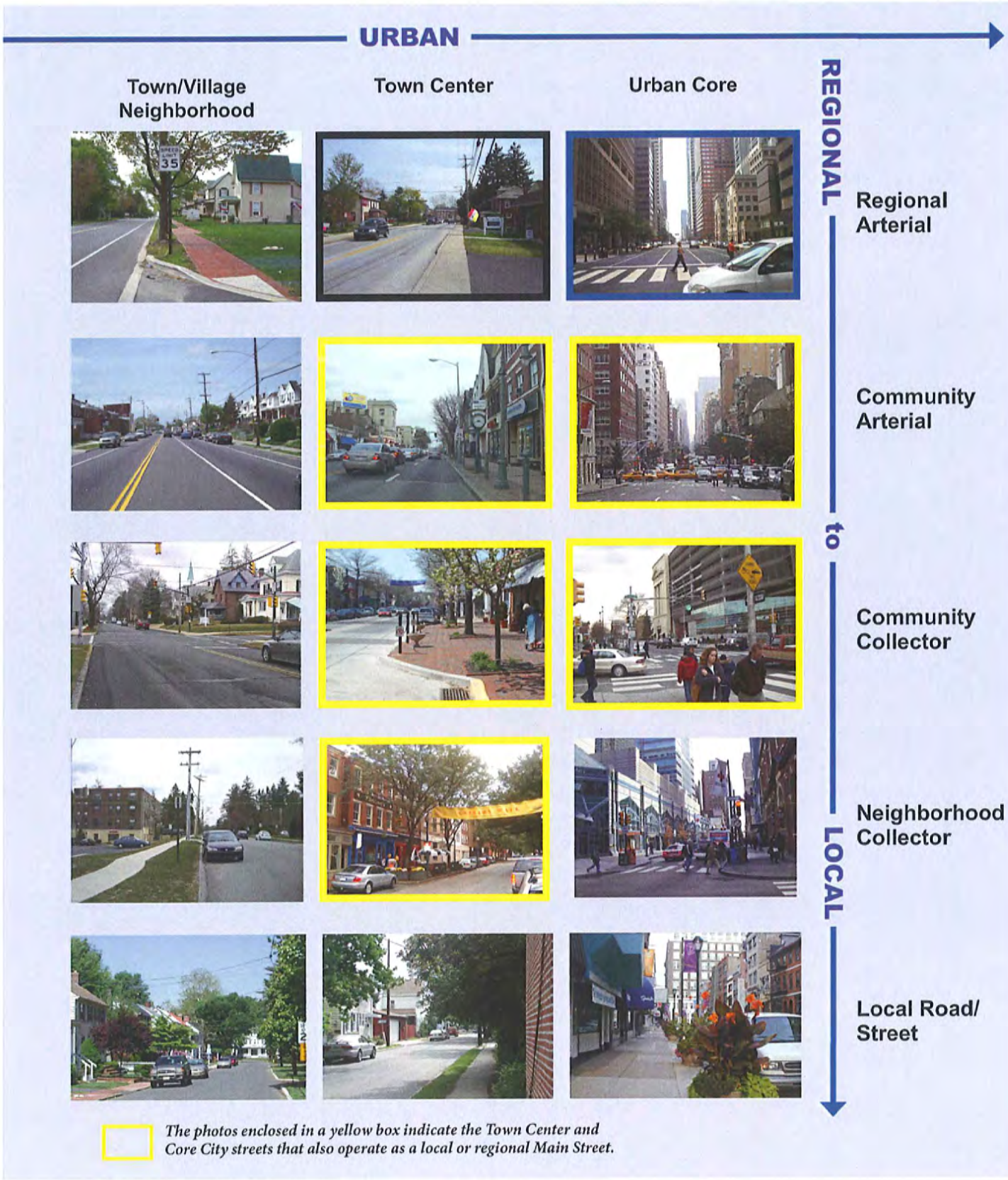


Figure 5.1 Roads in Context


URBAN
Town/Village Neighborhood
Town Center
Urban Core
REGIONAL
to
LOCAL
Regional Arterial
Community Arterial
Community Collector
Neighborhood Collector
Local Road/ Street
The photos enclosed in a yellow box indicate the Town Center and Core City streets that also operate as a local or regional Main Street.

Internal Connectivity. *Use either of the following two measures:*

- **Beta Index** — This is equal to the number of street links divided by the number of nodes or link ends. A higher ratio indicates higher street connectivity. When applied to the developments shown in Figures 5.2 and 5.3, Apalachicola is rated 1.69, and Haile Plantation is rated 1.19. Traditional developments generally rate above 1.4. [4]
- **Intersections per square mile** — Strict grid systems have about 25 intersections per square mile, while conventional branching systems have about one-third to one-half that many. [5]

External Connectivity

- All neighborhoods in the community should be connected to the larger street system at least every ¼ mile.

Route Directness

- This measures the distance a pedestrian would walk between two points compared to the straight line (or radial) distance between the same two points. The closer the ratio is to 1.0, the more direct the route; route directness values of 1.2-1.5 describe reasonably connected walkable networks. [6]

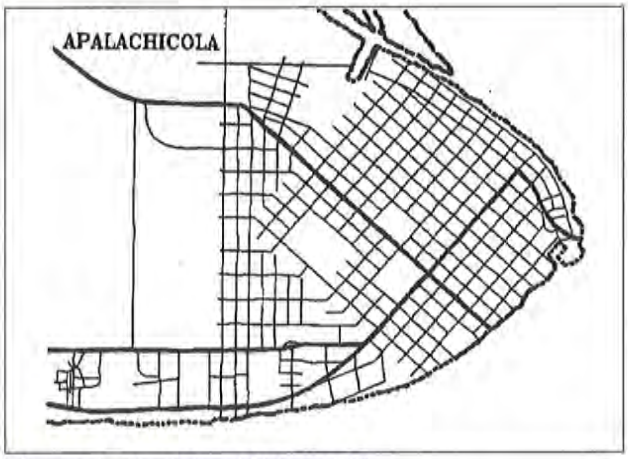


Figure 5.2. Traditional Urban Grid

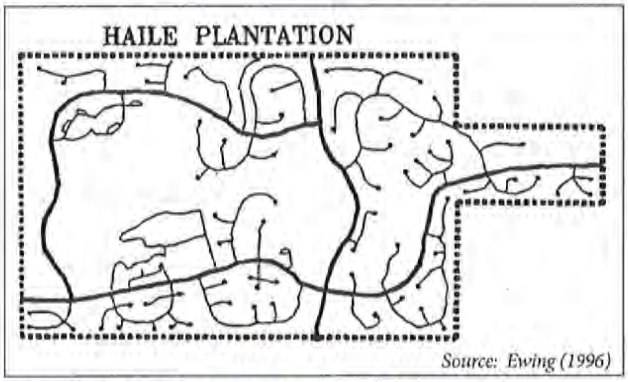


Figure 5.3. Contemporary Branching Network

5.3 CREATING EFFICIENT NETWORKS

In Smart Transportation, network evaluation becomes a critical task anytime existing or projected traffic congestion is identified as a potential issue on projects. The role of the network differs somewhat for projects in built-out areas versus newly developing areas.

5.3.1 Existing and Built-out Areas

In a built-out area, can the network be improved such that local traffic can use local streets to a greater degree? It should be determined how much traffic can be removed from regional roadways if the local and collector system is made to work more effectively. The network should be evaluated using measures of internal connectivity, external connectivity, and pedestrian route directness, described in Section 5.2.2.

If improving the network will not address the problem or is not an option, the two primary choices are to widen the roadway or to build a parallel roadway.

Roadway widening

The planner should first determine if segment improvements, access management, or intersection changes will address the problem, and then consider mainline widening. Widening should be done only if the resulting roadway is compatible with the land use context. Planners should identify the existing roadway role, its consistency with the community vision, and whether an alternative roadway type would better support the community.

Parallel roadway

If a parallel roadway is necessary, the planner should consider development of a regional or community arterial. It should be consistent with an area network plan, and be tied in where possible to the existing road system. This would improve the effectiveness of this road link.

5.3.2 Creating a Road Framework for New Development

A newly developing area offers the opportunity to implement a highly connected street system with less reliance on multi-lane arterials. Following are guidelines to be used in laying out a context sensitive roadway network capable of providing safe, multimodal choices for all trips. Initial planning should identify higher order roads needed for ultimate build-out; local roads and neighborhood collectors should then be included, depending upon specific developments proposed.

Network Configuration – Areawide

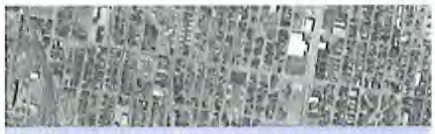
- Arterial roadways should be continuous and networked in generally rectilinear form with spacing of ½ to 1 mile in suburban contexts and ¼ to ½ mile in urban contexts. Closer spacing may be needed depending on activity levels and through movements.
- Collectors may be spaced at 1/8 mile intervals, if needed.
- Urban cores and town centers should be connected by community arterials and community collectors. These roadways should have the area's highest level transit service.
- Collectors should link neighborhood centers with adjacent neighborhood centers and town centers. All such connectors should be able to accommodate transit service.
- Major roadways that are to serve as major truck routes or primary through traffic routes should avoid the centers of urban areas or neighborhoods wherever possible. Community arterials and community collectors may be designated local truck routes to reach clusters of commercial uses in centers or cores.
- Sketch planning demand estimation or travel forecasting models should be used to estimate the density/spacing and capacity needs for major roadways beyond the minimum spacing described above.

Spacing

- Irrespective of thoroughfare spacing, pedestrian facilities should be well networked. In suburban contexts, block sizes of no more than 600 feet on a side with a maximum area of 7 acres will provide a reasonable level of connectivity.[7] In urban contexts, block sizes of 300 to 400 feet with a maximum area of 3-4 acres are ideal.
- Where streets cannot be connected, provide bike and pedestrian connections at cul-de-sac heads or midblock locations as a second-best solution to accessibility needs. Recommended maximum spacing is 330 ft.
- Bicycle-compatible roadways should comprise a bicycle network of parallel routes with effective spacing of ½ mile.

5.3.3 Network principles

All new networks should be evaluated using the measures on connectivity in Section 5.2.



Route 63, a principal arterial highway, runs through Harleysville, PA (top) and Lansdale, PA (bottom). Harleysville lies six miles northwest of Lansdale, with I-476 passing between the two municipalities. Motorists on Route 63 in Harleysville have an average trip length of 30 miles, much longer than the 10 mile average trip length of motorists found on Route 63 in Lansdale. Motorists commuting from the north prefer to take I-476 into Philadelphia, and avoid driving through Lansdale. Further, Route 63 in Lansdale serves as that borough's main street. The highway thus serves a different role in these two municipalities.

5.4 SIGNAL SPACING

Recommended signal spacing corresponds to the optimal spacing of arterial, collector and local streets (Table 5.2), although signals should be installed only where warranted.

Signal spacing of 300 ft. on arterials and collectors can be an important strategy in complementing traditional grid networks where low traffic speeds and high pedestrian activity are desired. On roadways in traditional urban contexts where regular cross traffic flows can be accommodated by stop-controlled intersections, signal spacing of 500 to 660 ft. on arterials and collectors may be sought.

On lower order suburban roadways, spacing of 660 ft. (1/8 mile) permits safe pedestrian crossings at the upper boundary of desirable block lengths. Signal spacing of 1320 ft. (1/4 mile) begins to permit the speed progression sought by NJDOT or PennDOT on those corridors where traffic flow is a priority.

The spacing of traffic signals has a major influence on roadway operating speeds and capacity. Studies have found that a four lane divided arterial roadway with signal spacing of 2640 ft. carries the same amount of traffic as a six lane arterial with signals spaced at 1320 ft.[8] Neither situation is optimal for pedestrians. On the one hand, narrower roadways are more amenable to pedestrian crossings. On the other hand, wider signal spacing reduces the opportunities for pedestrians to cross roadways at controlled locations. Further, motorists who desire to turn left onto an undivided major roadway may be tempted to access it at a Stop-controlled crossing, rather than traveling farther out of their way to access the roadway at a signal. On higher-order roadways where major pedestrian generators straddle the corridor, the best choice is sometimes smaller signal spacing and acceptance of a lower progression speed.

Table 5.2. Recommended Signal Spacing

	Urban Contexts	Suburban Contexts	Rural Contexts
Regional Arterial	660 to 1320 ft.	1320 to 1540 ft.	1980 ft.
Community Arterial	300 ft. to 1100 ft.	1320 ft.	1540 ft.
Community Collector	300 to 660 ft.	660 to 1320 ft.	1540 ft.

APPENDIX D

Ped/Bike/Transit Figure


County Line Road
West Campus Entrance
Pedestrian Tunnel
SEPTA Trains Parking Only
Villanova Station
SEPTA Regional Rail - Paoli/Thorndale Line
Main Campus Spring Mill Road Entrance
Spring Mill Road/PA 320
To US 1–476
Lancaster Avenue/US 30
Ithan Avenue
Main Lot Parking
Stadium Station
Main Campus Ithan Avenue Entrance
Office of Conference Services
Summer Conference Service Desk
Pedestrian Bridge
Villanova Station
South Campus Entrance
SEPTA Norristown High Speed Line
Parking
1. Alumni Hall
2. Austin Hall
3. Bartley Hall
4. Burns Hall
5. Butler Annex
6. Caughlin Hall
7. CEER: Center for Engineering Education and Research
8. Chemical Engineering Building
9. Connelly Center
10. Corr Hall
11. Davis Center for Athletics and Fitness
12. Delurey Hall
13. Donahue Hall
14. Dougherty Hall
15. Driscoll Hall
16. Facilities Management Building
17. Falvey Memorial Library
18. Farley Hall
19. Farrell Hall
20. Fedigan Hall
21. Galberry Hall
22. Gallen Hall
23. Garey Hall
24. Geraghty Hall
25. Good Counsel Hall
26. Griffin Hall
27. Health Services Building
28. Health Services Building Parking Garage
29. Jackson Hall
30. Jake Nevin Field House
31. John Barry Hall
32. Katharine Hall
33. Kennedy Hall
34. Klekotka Hall
35. McGuire Hall
36. Mendel Science Center
37. Middleton Hall
38. Military Sciences Building
39. Moriarty Hall
40. Moulden Hall
41. O'Dwyer Hall
42. Pavilion
43. Picotte Hall At Dundale
44. Rudolph Hall
45. St. Augustine Center for the Liberal Arts
46. St. Augustine Center for the Liberal Arts Parking Garage
47. St. Clare Hall
48. St. Mary's Hall
49. St. Monica Hall
50. St. Rita's Hall
51. St. Thomas of Villanova Church
52. St. Thomas of Villanova Monastery
53. School of Law
54. Sheehan Hall
55. Simpson Hall
56. Spring Mill Parking Garage
57. Stanford Hall
58. Steam Plant
59. Stone Hall
60. Structural Engineering Teaching and Research Laboratory
61. Sullivan Hall
62. Technology Services Building
63. Tolentine Hall
64. Vasey Hall
65. Villanova University Conference Center (601 County Line Road, not shown)
66. Villanova Stadium
67. Welsh Hall
68. White Hall
Bike Rack
Crosswalk
Pedestrian Only Roads
SEPTA Bus Stop (105 & 106 lines)
VILLANOVA UNIVERSITY

APPENDIX E

Data Collection

Data Collection Notes

Project data collection efforts are extensive and span a considerable period of time.

Details of weekday and special event count period (and subsequent peak hour) determination are provided on the next three pages.

Note that the remainder of this text is based on a submittal entitled **Deliverable #1** which was shared with the township and PennDOT in 2013.

FTA conducted turning movement traffic counts at the following 17 intersections in the fall of 2012:

1) Lancaster Avenue and Spring Mill Road / Kenilworth Road / Aldwyn Lane
2) Lancaster Avenue and Church Walk
3) Lancaster Avenue and Ithan Avenue
4) Lancaster Avenue and Lowrys Lane
5) Lancaster Avenue and Garrett Avenue
6) Conestoga Road and Sproul Road
7) Conestoga Road and Spring Mill Road
8) Conestoga Road and Ithan Avenue
9) Conestoga Road and Lowrys Lane
10) Conestoga Road and Garrett Avenue
11) County Line Road and Spring Mill Road
12) County Line Road and Ithan Avenue North
13) County Line Road and Ithan Avenue South
14) County Line Road and Lowrys Lane
15) County Line Road and Airedale Road
16) County Line Road and Roberts Road
17) Ithan Avenue and Aldwyn Lane

COUNT PERIODS

The count periods selected for analysis were weekday commuter AM and PM peak periods. These count periods were chosen for multiple reasons. First, Automatic Traffic Recorder (ATR) or 'tube' counts were available and recently conducted along Route 30 by the Delaware Valley Regional Planning Commission (DVRPC). The results of these counts identify that the sum of all traffic volumes in the study area -- which includes both Villanova traffic and non-Villanova traffic (commuter traffic, regional through traffic, other institutional traffic, etc.) -- combine to reach a peak typically between 7 and 9 AM in the morning and 4 and 6 PM in the afternoon. Discussions with Villanova staff also support these hours as featuring peak activity levels on campus. FTA's experience with the campus also supports this claim, and in fact traffic counts conducted for other Villanova projects since 2004 were also conducted during commuter peak periods. Finally, in an email dated 06-14-12, the Township's traffic engineer specifically requested that the AM and PM peak hours be the hours examined (see **Appendix A**).

The basis of this effort are 'ordinary condition' traffic counts, and these counts were conducted over a period of several days beginning the week of 11-05-12 during which time Villanova was in regular session. In addition to these counts, the Township requested the University conduct additional traffic counts during 2 other 'special event' traffic conditions. These events included Homecoming (10-26-12) and a weekday evening during a basketball game (vs St. Joe's, 12-11-12).

COUNT ADJUSTMENTS

Traffic data collection efforts typically focus on traffic which is processed or 'served' at an intersection. In some cases, however, the traffic 'demand' might be more than what is actually processed at an intersection. When this occurs, it is typically found only at signalized intersections and only in cases where traffic demand is *significantly* greater than intersection capacity. In addition a separate, related phenomenon is called 'initial unmet demand'. This is when a persistent queue of traffic is present at the *beginning* of an analysis period (i.e., the beginning of a peak hour) and also when said queue is not processed adequately at a signalized intersection. Traffic analysis methods and software account for either of these phenomenona to some extent, but if either is excessive, additional measures can be taken to adjust count data.

After the peak hours were determined, FTA revisited the study area in the first week of December 2012 to document additional details regarding the traffic demand vs traffic served issue as well as the initial unmet demands. Summary tables were developed to summarize the following: subject intersection, intersection type, approach, initial unmet demand observations, excessive unmet demand observations, and findings. These tables are included with this appendix. More details behind the purpose and methodology of the investigation are explained under the 'Purpose' heading found on page two of each table (one for each peak hour).

ANALYSIS RESULTS -- 'ORDINARY TRAFFIC'

AM and PM commuter 'system peak' hours were determined using a spreadsheet and the identified peak hours were found to be 7:30 to 8:30 AM and 5:00 to 6:00 PM. Spreadsheets were prepared both for the study area and for the Lancaster Avenue corridor and are attached to the end of this report in the appendix. The spreadsheets are based on vehicular volumes – pedestrian volumes were excluded. The highlighting used in the spreadsheets identifies individual intersection peak hours (in red). Only a handful of non-critical locations had individual peak hours different from the system peak (and typically only shifted by 15 minutes as shown in the tables).

ANALYSIS RESULTS -- 'HOMECOMING TRAFFIC'

In 2012, Homecoming occurred on Saturday, 10-27-12 and – per discussions with the Township – traffic counts were conducted at a reduced study area from 12:00 Noon to 3:00 PM. Spreadsheets were prepared both for the entire study area and for the Lancaster Avenue corridor and are attached to the end of this report in the appendix. The identified peak hours was found to be: 12:00 to 1:00 PM.

Interestingly, the traffic volumes for virtually every traffic *turning movement* in the study area during the peak hour of Homecoming are either comparable to or significantly less than the data that was collected during the weekday AM or weekday PM peak hour. In many cases, *total intersection* volume – such as at Lancaster Avenue and Spring Mill Road / Kenilworth Road / Aldwyn Lane – were also significantly lower than the 'ordinary traffic' counterpart. Realizing all this, there is no value in performing additional LOS calculations, since the LOS outputs of weekday commuter conditions represent a comparable – or worse – peak hour operational conditions. Additionally, level of service calculations are not even possible at intersections which are under manual police control,

which was the case at certain key locations in the study area during Homecoming. The township traffic engineer agreed with this conclusion in a letter dated 1 February 2013 though the need for a "Special Event Management Plan" was mentioned (see **Appendix A**).

ANALYSIS RESULTS -- 'BASKETBALL TRAFFIC'

After Homecoming was over, the Township requested Villanova perform additional data collection during a Basketball home game. This traffic is somewhat different from Homecoming since Homecoming occurs on Saturday while a home basketball game occurs during a week night during which time some lingering remaining 'day' student, faculty, and staff may be *leaving* campus while at the same time some 'night' student, faculty, and staff are *arriving* at campus. Per discussions with the Township – traffic counts were conducted using the same study area as Homecoming and from 6:00 to 8:00 PM since the game starts at approximately 7:00 PM. Once again, a 'system peak' hour was determined using a spreadsheet. The identified peak hours was found to be: 6:00 to 7:00 PM.

Coincidentally, as with Homecoming, the traffic volumes for virtually every traffic *turning movement* in the study area during the peak hour of the Basketball game data collection effort are either comparable to or significantly less than the data that was collected during the weekday AM or weekday PM peak hour. In many cases, *total intersection* volume – such as at Lancaster Avenue and Spring Mill Road / Kenilworth Road / Aldwyn Lane – was also significantly lower than the 'ordinary traffic' counterpart. Realizing all this, there is once again no value in performing additional LOS calculations, and once again levels of service calculations at certain key locations are not even possible due to manual police control. The township traffic engineer agreed with this conclusion in a letter dated 1 February 2013 though the need for a "Special Event Management Plan" was mentioned (see **Appendix A**).

ADDITIONAL ATTACHMENTS:

- DVRPC ATR data spreadsheet,
- count data system peak spreadsheets (for Ordinary, Homecoming, and Basketball conditions),
- raw manual turning movement traffic count data and unmet demand summary tables
- ped volume figures
- special event volume figures

DVRPC ATR TRAFFIC COUNT DATA -- PEAK HOUR DETERMINATION MATRIX

DVRPC ATR Data for Rt 30*

hour beginning	Tuesday 9/11/12			Wednesday 9/12/12			Thursday 9/13/12		
	30 West	30 East	Total	30 West	30 East	Total	30 West	30 East	Total
6:00 AM	n/a			325	413	738	312	413	725
7:00 AM	n/a			662	684	1346	683	715	1398
8:00 AM	n/a			710	752	1462	688	825	1513
9:00 AM	n/a			565	787	1352	580	803	1383
10:00 AM				570	778	1348	332	389	721
11:00 AM				591	695	1286			
12:00 PM				541	781	1322			
1:00 PM	584	658	1242	544	783	1327			
2:00 PM	632	747	1379	573	769	1342			
3:00 PM	437	797	1234	641	807	1448	n/a		
4:00 PM	510	777	1287	660	836	1496	n/a		
5:00 PM	712	855	1567	632	625	1257	n/a		
6:00 PM	558	684	1242	484	604	1088	n/a		
7:00 PM	517	439	956	632	625	1257	n/a		
8:00 PM	438	415	853	484	604	1088	n/a		

peak hour indicated in red

volume dbl checked, ~200 lower than day before

*Machines placed between Spring Mill Road and Barleycone Lane

Conclusions:

AM peak hour falls between 7 and 9 AM on both days.

PM peak hour falls between 4 and 6 PM on both days.

"ORDINARY CONDITIONS" TRAFFIC COUNT DATA -- SYSTEM PEAK HOUR DETERMINATION MATRIX

Total Intersection Volume

time beginging	30 & Sproul	30 & Ithan	30 & Lowry	Sproul & Conestoga	Conestoga & Spring Mill	Conestoga & Ithan	Spring Mill & County Line	County Line & Roberts	Conestoga & Garret	Conestoga & Lowrys	Ithan & Aldwyn	Ithan & County Line (North)	Ithan & County Line (South)	County Line & Lowrys	County Line & Aldwyn	total	
7:00	523	234	296	351	192	179	187	220	140	160	46	105	99	55	134	2921	
7:15	677	465	419	486	291	280	252	234	215	219	111	139	127	75	152	4142	
7:30	741	514	533	586	347	377	360	305	225	244	158	258	218	116	191	5173	
7:45	811	555	663	639	385	479	354	337	270	334	206	316	256	166	233	6004	18240
8:00	760	588	658	576	314	375	391	331	231	251	155	277	235	175	202	5519	20838
8:15	807	594	618	524	274	311	394	385	225	244	151	303	258	149	204	5441	22137
8:30	689	493	477	491	281	274	321	310	199	224	104	240	196	126	212	4637	21601
8:45	757	464	487	546	285	290	308	346	230	232	84	222	179	120	196	4746	20343
16:00	732	556	563	437	297	343	316	341	256	279	145	272	174	128	193	5032	
16:15	727	433	491	497	277	323	337	326	269	258	117	234	204	111	199	4803	
16:30	699	509	497	473	282	343	339	309	283	288	125	247	206	136	228	4964	
16:45	727	435	491	583	299	329	298	322	251	258	125	260	227	101	200	4906	19705
17:00	801	542	629	534	299	397	409	308	316	298	139	302	274	139	208	5595	20268
17:15	807	572	625	575	337	332	425	357	291	283	158	322	272	148	220	5724	21189
17:30	841	552	517	537	331	325	387	354	260	273	146	284	236	138	220	5401	21626
17:45	811	514	541	529	325	343	386	332	300	300	130	306	252	132	211	5412	22132

"ORDINARY CONDITIONS" TRAFFIC COUNT DATA -- SYSTEM PEAK HOUR DETERMINATION MATRIX (LANCASTER AVENUE CORRIDOR, ONLY)

time beginging	Total Intersection Volume				
	30 & Sproul	30 & Ithan	30 & Lowry	total	
7:00	523	234	296	1053	
7:15	677	465	419	1561	
7:30	741	514	533	1788	
7:45	811	555	663	2029	6431
8:00	760	588	658	2006	7384
8:15	807	594	618	2019	7842
8:30	689	493	477	1659	7713
8:45	757	464	487	1708	7392
16:00	732	556	563	1851	
16:15	727	433	491	1651	
16:30	699	509	497	1705	
16:45	727	435	491	1653	6860
17:00	801	542	629	1972	6981
17:15	807	572	625	2004	7334
17:30	841	552	517	1910	7539
17:45	811	514	541	1866	7752

"HOMECOMING CONDITIONS" TRAFFIC COUNT DATA -- SYSTEM PEAK HOUR DETERMINATION MATRIX

time beginging	Total Intersection Volume						
	30 & Sproul	30 & Ithan	Sproul & Conestoga	Conestoga & Spring Mill	Conestoga & Ithan	total	
12:00	721	433	351	196	204	1905	
12:15	717	523	393	217	207	2057	
12:30	663	569	384	211	214	2041	
12:45	684	621	398	224	205	2132	8135
13:00	635	485	362	201	203	1886	8116
13:15	633	619	379	211	206	2048	8107
13:30	661	549	361	219	221	2011	8077
13:45	629	562	402	219	215	2027	7972
14:00	629	523	358	194	194	1898	7984
14:15	569	535	384	211	204	1903	7839
14:30	620	523	339	186	190	1858	7686
14:45	586	566	378	212	193	1935	7594

"HOMECOMING CONDITIONS" TRAFFIC COUNT DATA -- SYSTEM PEAK HOUR DETERMINATION MATRIX (LANCASTER AVENUE CORRIDOR, ONLY)

time beginging	Total Intersection Volume			
	30 & Sproul	30 & Ithan	total	
12:00	721	433	1154	
12:15	717	523	1240	
12:30	663	569	1232	
12:45	684	621	1305	4931
13:00	635	485	1120	4897
13:15	633	619	1252	4909
13:30	661	549	1210	4887
13:45	629	562	1191	4773
14:00	629	523	1152	4805
14:15	569	535	1104	4657
14:30	620	523	1143	4590
14:45	586	566	1152	4551

"BASKETBALL GAME CONDITIONS" TRAFFIC COUNT DATA -- SYSTEM PEAK HOUR DETERMINATION MATRIX

time beginging	Total Intersection Volume						
	30 & Sproul	30 & Ithan	Sproul & Conestoga	Conestoga & Spring Mill	Conestoga & Ithan	total	
18:00	788	609	504	296	293	2490	
18:15	861	589	500	310	331	2591	
18:30	785	599	477	277	322	2460	
18:45	752	596	371	197	229	2145	9686
19:00	574	497	340	200	203	1814	9010
19:15	542	486	304	171	177	1680	8099
19:30	502	406	236	126	129	1399	7038
19:45	491	362	232	132	113	1330	6223

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105 Kenilworth Street
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Lancaster Avenue & Spring Mill/Sproul Rd
& Kenilworth Rd/Aldwyn Ln

File Name : 01-30SproulAM
Site Code : 00000000
Start Date : 11/8/2012
Page No : 1

Groups Printed- cars - HV

Start Time	North Spring Mill Road Southbound							Lancaster Avenue Westbound							Aldwyn Lane Northwestbound							Sproul Road Northbound							Lancaster Avenue Eastbound							Kenilworth Road Southeastbound							
	Lt o Lanc	Lt o Ald					App. Total	Lt o Ald	Lt o Spr					App. Total	Lt o Spr	Lt o Lanc					App. Total	Lt o Lanc	Lt o Ken					App. Total	Lt o Ken	Lt o S Mill					App. Total	Lt o S Mill	Lt o Lanc					App. Total	Int. Total
07:00 AM	6	0	12	25	0	0	43	0	0	121	1	0	0	122	0	11	0	1	0	0	12	71	0	26	2	1	0	100	1	43	153	11	38	0	246	0	0	0	0	0	0	0	523
07:15 AM	5	5	27	40	0	0	77	0	1	188	0	2	0	191	1	22	0	0	0	0	23	69	1	36	7	3	0	116	0	48	154	16	47	0	265	0	0	0	1	4	0	5	677
07:30 AM	8	2	36	32	0	1	79	0	4	192	0	2	0	198	0	16	0	2	0	0	18	36	0	40	7	1	0	84	0	62	224	17	59	1	363	0	0	0	0	1	0	1	743
07:45 AM	4	3	28	28	0	2	65	1	1	221	0	2	0	225	2	7	0	2	0	0	11	50	0	51	17	2	0	120	0	54	231	39	62	0	386	0	0	1	1	4	0	6	813
Total	23	10	103	125	0	3	264	1	6	722	1	6	0	736	3	56	0	5	0	0	64	226	1	153	33	7	0	420	1	207	762	83	206	1	1260	0	0	1	2	9	0	12	2756
08:00 AM	5	3	38	48	0	4	98	1	2	233	0	3	1	240	1	11	0	2	0	0	14	45	0	37	9	4	0	95	2	63	193	13	42	0	313	0	0	0	0	5	0	5	765
08:15 AM	2	0	29	44	0	1	76	2	4	293	1	6	1	307	0	14	0	2	0	0	16	47	0	62	16	2	0	127	0	41	173	13	52	0	279	0	0	0	2	2	0	4	809
08:30 AM	11	1	31	40	0	2	85	0	5	205	0	8	0	218	0	9	0	2	1	0	12	40	0	44	7	1	0	92	0	72	167	7	34	0	280	0	1	0	0	3	0	4	691
08:45 AM	5	2	16	31	0	1	55	0	3	255	0	3	2	263	2	6	0	0	0	0	8	46	1	44	8	1	0	100	0	59	217	14	42	0	332	0	0	0	1	1	0	2	760
Total	23	6	114	163	0	8	314	3	14	986	1	20	4	1028	3	40	0	6	1	0	50	178	1	187	40	8	0	414	2	235	750	47	170	0	1204	0	1	0	3	11	0	15	3025
Grand Total	46	16	217	288	0	11	578	4	20	1708	2	26	4	1764	6	96	0	11	1	0	114	404	2	340	73	15	0	834	3	442	1512	130	376	1	2464	0	1	1	5	20	0	27	5781
Apprch %	8	2.8	37.5	49.8	0	1.9		0.2	1.1	96.8	0.1	1.5	0.2		5.3	84.2	0	9.6	0.9	0		48.4	0.2	40.8	8.8	1.8	0		0.1	17.9	61.4	5.3	15.3	0		0	3.7	3.7	18.5	74.1	0		
Total %	0.8	0.3	3.8	5	0	0.2	10	0.1	0.3	29.5	0	0.4	0.1	30.5	0.1	1.7	0	0.2	0	0	2	7	0	5.9	1.3	0.3	0	14.4	0.1	7.6	26.2	2.2	6.5	0	42.6	0	0	0	0.1	0.3	0	0.5	
cars	38	16	186	272	0	11	523	4	19	1660	2	22	4	1711	6	90	0	0	0	0	96	377	2	324	71	15	0	789	3	414	1462	130	339	1	2349	0	1	1	4	20	0	26	5494
% cars	82.6	100	85.7	94.4	0	100	90.5	100	95	97.2	100	84.6	100	97	100	93.8	0	0	0	0	84.2	93.3	100	95.3	97.3	100	0	94.6	100	93.7	96.7	100	90.2	100	95.3	0	100	100	80	100	0	96.3	95
HV	8	0	31	16	0	0	55	0	1	48	0	4	0	53	0	6	0	11	1	0	18	27	0	16	2	0	0	45	0	28	50	0	37	0	115	0	0	0	1	0	0	1	287
% HV	17.4	0	14.3	5.6	0	0	9.5	0	5	2.8	0	15.4	0	3	0	6.2	0	100	100	0	15.8	6.7	0	4.7	2.7	0	0	5.4	0	6.3	3.3	0	9.8	0	4.7	0	0	0	20	0	0	3.7	5

Start Time	North Spring Mill Road Southbound						Lancaster Avenue Westbound						Aldwyn Lane Northwestbound						Sproul Road Northbound						Lancaster Avenue Eastbound						Kenilworth Road Southeastbound						
	L to Lanc	L to Ald	T to Spr	R to Lanc	R to Ken	App. Total	L to Ald	L to Spr	T to Lanc	R to Ken	R to S Mill	App. Total	L to Spr	L to Lanc	T to Ken	R to S Mill	R to Lanc	App. Total	L to Lanc	L to Ken	T to S Mill	R to Lanc	R to Ald	App. Total	L to Ken	L to S Mill	T to Lanc	R to Ald	R to Spr	App. Total	L to S Mill	L to Lanc	T to Ald	R to Spr	R to Lanc	App. Total	Int. Total
Peak Hour Analysis From 07:30 AM to 08:15 AM - Peak 1 of 1																																					
Peak Hour for Entire Intersection Begins at 07:30 AM																																					
07:30 AM	**8**	2	36	32	0	78	0	**4**	192	0	2	198	0	**16**	**0**	**2**	0	**18**	36	0	40	7	1	84	0	62	224	17	59	362	0	0	0	0	1	1	741
07:45 AM	4	**3**	28	28	0	63	1	1	221	0	2	225	**2**	7	0	2	0	11	**50**	**0**	51	**17**	**2**	120	0	54	**231**	**39**	**62**	**386**	0	0	**1**	1	4	**6**	**811**
08:00 AM	5	3	**38**	**48**	**0**	**94**	1	2	233	0	3	239	1	11	0	2	0	14	45	0	37	9	**4**	95	**2**	**63**	193	13	42	313	0	0	0	0	**5**	5	760
08:15 AM	2	0	29	44	0	75	**2**	4	**293**	**1**	**6**	**306**	0	14	0	2	0	16	47	0	**62**	16	2	**127**	0	41	173	13	52	279	0	0	0	**2**	2	4	807
Total Volume	19	8	131	152	0	310	4	11	939	1	13	968	3	48	0	8	0	59	178	0	190	49	9	426	2	220	821	82	215	1340	0	0	1	3	12	16	3119
% App. Total	6.1	2.6	42.3	49	0		0.4	1.1	97	0.1	1.3		5.1	81.4	0	13.6	0		41.8	0	44.6	11.5	2.1		0.1	16.4	61.3	6.1	16		0	0	6.2	18.8	75		
PHF	.594	.667	.862	.792	.000	.824	.500	.688	.801	.250	.542	.791	.375	.750	.000	1.00	.000	.819	.890	.000	.766	.721	.563	.839	.250	.873	.889	.526	.867	.868	.000	.000	.250	.375	.600	.667	.961
cars	16	8	111	144	0	279	4	10	914	1	11	940	3	44	0	0	0	47	166	0	181	48	9	404	2	204	802	82	196	1286	0	0	1	2	12	15	2971
% cars	84.2	100	84.7	94.7	0	90.0	100	90.9	97.3	100	84.6	97.1	100	91.7	0	0	0	79.7	93.3	0	95.3	98.0	100	94.8	100	92.7	97.7	100	91.2	96.0	0	0	100	66.7	100	93.8	95.3
HV	3	0	20	8	0	31	0	1	25	0	2	28	0	4	0	8	0	12	12	0	9	1	0	22	0	16	19	0	19	54	0	0	0	1	0	1	148
% HV	15.8	0	15.3	5.3	0	10.0	0	9.1	2.7	0	15.4	2.9	0	8.3	0	100	0	20.3	6.7	0	4.7	2.0	0	5.2	0	7.3	2.3	0	8.8	4.0	0	0	0	33.3	0	6.3	4.7

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Lancaster Avenue & Spring Mill/Sproul Rd
& Kenilworth Rd/Aldwyn Ln

File Name : 01-30SproulAM
Site Code : 00000000
Start Date : 11/8/2012
Page No : 1

Groups Printed- HV

	North Spring Mill Road Southbound							Lancaster Avenue Westbound							Aldwyn Lane Northwestbound							Sproul Road Northbound							Lancaster Avenue Eastbound							Kenilworth Road Southeastbound							
Start Time	L to Lanc	L to Ald					App. Total	L to Ald	L to Spr					App. Total	L to Spr	L to Lanc					App. Total	L to Lanc	L to Ken					App. Total	L to Ken	L to S Mill					App. Total	L to S Mill	L to Lanc					App. Total	Int. Total
07:00 AM	0	0	1	1	0	0	2	0	0	1	0	0	0	1	0	1	0	1	0	0	2	9	0	1	0	0	0	10	0	3	3	0	7	0	13	0	0	0	0	0	0	0	28
07:15 AM	0	0	5	3	0	0	8	0	0	3	0	0	0	3	0	0	0	0	0	0	0	2	0	0	1	0	0	3	0	5	9	0	7	0	21	0	0	0	0	0	0	0	35
07:30 AM	2	0	1	1	0	0	4	0	1	5	0	0	0	6	0	2	0	2	0	0	4	2	0	4	0	0	0	6	0	2	3	0	4	0	9	0	0	0	0	0	0	0	29
07:45 AM	0	0	9	1	0	0	10	0	0	4	0	0	0	4	0	0	0	2	0	0	2	3	0	4	0	0	0	7	0	4	7	0	4	0	15	0	0	0	0	0	0	0	38
Total	2	0	16	6	0	0	24	0	1	13	0	0	0	14	0	3	0	5	0	0	8	16	0	9	1	0	0	26	0	14	22	0	22	0	58	0	0	0	0	0	0	0	130
08:00 AM	1	0	8	2	0	0	11	0	0	12	0	1	0	13	0	0	0	2	0	0	2	4	0	1	0	0	0	5	0	6	5	0	5	0	16	0	0	0	0	0	0	0	47
08:15 AM	0	0	2	4	0	0	6	0	0	4	0	1	0	5	0	2	0	2	0	0	4	3	0	0	1	0	0	4	0	4	4	0	6	0	14	0	0	0	1	0	0	1	34
08:30 AM	2	0	3	3	0	0	8	0	0	9	0	1	0	10	0	1	0	2	1	0	4	0	0	5	0	0	0	5	0	1	9	0	2	0	12	0	0	0	0	0	0	0	39
08:45 AM	3	0	2	1	0	0	6	0	0	10	0	1	0	11	0	0	0	0	0	0	0	4	0	1	0	0	0	5	0	3	10	0	2	0	15	0	0	0	0	0	0	0	37
Total	6	0	15	10	0	0	31	0	0	35	0	4	0	39	0	3	0	6	1	0	10	11	0	7	1	0	0	19	0	14	28	0	15	0	57	0	0	0	1	0	0	1	157
Grand Total	8	0	31	16	0	0	55	0	1	48	0	4	0	53	0	6	0	11	1	0	18	27	0	16	2	0	0	45	0	28	50	0	37	0	115	0	0	0	1	0	0	1	287
Apprch %	14.5	0	56.4	29.1	0	0		0	1.9	90.6	0	7.5	0		0	33.3	0	61.1	5.6	0		60	0	35.6	4.4	0	0		0	24.3	43.5	0	32.2	0		0	0	0	100	0	0		
Total %	2.8	0	10.8	5.6	0	0	19.2	0	0.3	16.7	0	1.4	0	18.5	0	2.1	0	3.8	0.3	0	6.3	9.4	0	5.6	0.7	0	0	15.7	0	9.8	17.4	0	12.9	0	40.1	0	0	0	0.3	0	0	0.3	

	North Spring Mill Road Southbound						Lancaster Avenue Westbound						Aldwyn Lane Northwestbound						Sproul Road Northbound						Lancaster Avenue Eastbound						Kenilworth Road Southeastbound						
Start Time	L to Lanc	L to Ald	T to Spr	R to Lanc	R to Ken	App. Total	L to Ald	L to Spr	T to Lanc	R to Ken	R to S Mill	App. Total	L to Spr	L to Lanc	T to Ken	R to S Mill	R to Lanc	App. Total	L to Lanc	L to Ken	T to S Mill	R to Lanc	R to Ald	App. Total	L to Ken	L to S Mill	T to Lanc	R to Ald	R to Spr	App. Total	L to S Mill	L to Lanc	T to Ald	R to Spr	R to Lanc	App. Total	Int. Total
Peak Hour Analysis From 07:30 AM to 08:15 AM - Peak 1 of 1																																					
Peak Hour for Entire Intersection Begins at 07:30 AM																																					
07:30 AM	**2**	0	1	1	0	4	0	**1**	5	0	0	6	0	**2**	0	**2**	0	**4**	2	0	**4**	0	0	6	0	2	3	0	4	9	0	0	0	0	0	0	29
07:45 AM	0	0	**9**	1	0	10	0	0	4	0	0	4	0	0	0	2	0	2	3	0	4	0	0	**7**	0	4	**7**	0	4	15	0	0	0	0	0	0	38
08:00 AM	1	0	8	2	0	**11**	0	0	**12**	**0**	**1**	**13**	0	0	0	2	0	2	**4**	0	1	0	0	5	0	**6**	5	0	5	**16**	0	0	0	0	0	0	**47**
08:15 AM	0	0	2	**4**	0	6	0	0	4	0	1	5	0	2	0	2	0	4	3	0	0	**1**	0	4	0	4	4	0	**6**	14	0	0	0	**1**	0	**1**	34
Total Volume	3	0	20	8	0	31	0	1	25	0	2	28	0	4	0	8	0	12	12	0	9	1	0	22	0	16	19	0	19	54	0	0	0	1	0	1	148
% App. Total	9.7	0	64.5	25.8	0		0	3.6	89.3	0	7.1		0	33.3	0	66.7	0		54.5	0	40.9	4.5	0		0	29.6	35.2	0	35.2		0	0	0	100	0		
PHF	.375	.000	.556	.500	.000	.705	.000	.250	.521	.000	.500	.538	.000	.500	.000	1.00	.000	.750	.750	.000	.563	.250	.000	.786	.000	.667	.679	.000	.792	.844	.000	.000	.000	.250	.000	.250	.787

F. Tavani and Associates, Inc.
105 Kenilworth Street
Philadelphia, PA 19147

Lancaster & Ithan Avenues

EB Peds = diag peds NE-SW
WB Peds = diag peds NW-SE

File Name : 02-30IthanAM
Site Code : 00000000
Start Date : 11/15/2012
Page No : 1

Groups Printed- cars - HV

	Ithan Avenue Southbound					Lancaster Avenue Westbound						Ithan Avenue Northbound					Lancaster Avenue Eastbound						
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	NW-SE Peds	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	NE-SW Peds	Peds	App. Total	Int. Total
07:00 AM	3	19	2	7	31	6	106	2	5	13	132	10	8	1	0	19	5	86	4	0	5	100	282
07:15 AM	2	29	14	4	49	19	196	3	12	3	233	12	17	5	0	34	14	193	6	0	5	218	534
07:30 AM	5	48	12	2	67	9	196	6	6	8	225	20	38	18	0	76	22	191	13	1	4	231	599
07:45 AM	9	62	9	6	86	23	196	13	23	7	262	23	55	21	1	100	20	196	8	0	15	239	687
Total	19	158	37	19	233	57	694	24	46	31	852	65	118	45	1	229	61	666	31	1	29	788	2102
08:00 AM	8	38	12	3	61	44	212	15	69	3	343	23	42	23	0	88	20	202	7	0	33	262	754
08:15 AM	3	66	14	3	86	57	235	10	193	10	505	18	38	12	0	68	26	191	7	0	56	280	939
08:30 AM	9	37	11	3	60	16	206	15	57	10	304	13	41	8	0	62	22	166	6	0	26	220	646
08:45 AM	5	19	9	1	34	15	189	6	25	8	243	6	33	9	0	48	33	166	7	0	11	217	542
Total	25	160	46	10	241	132	842	46	344	31	1395	60	154	52	0	266	101	725	27	0	126	979	2881
Grand Total	44	318	83	29	474	189	1536	70	390	62	2247	125	272	97	1	495	162	1391	58	1	155	1767	4983
Apprch %	9.3	67.1	17.5	6.1		8.4	68.4	3.1	17.4	2.8		25.3	54.9	19.6	0.2		9.2	78.7	3.3	0.1	8.8		
Total %	0.9	6.4	1.7	0.6	9.5	3.8	30.8	1.4	7.8	1.2	45.1	2.5	5.5	1.9	0	9.9	3.3	27.9	1.2	0	3.1	35.5	
cars	42	307	76	29	454	189	1475	67	390	61	2182	120	266	94	1	481	157	1298	53	1	155	1664	4781
% cars	95.5	96.5	91.6	100	95.8	100	96	95.7	100	98.4	97.1	96	97.8	96.9	100	97.2	96.9	93.3	91.4	100	100	94.2	95.9
HV	2	11	7	0	20	0	61	3	0	1	65	5	6	3	0	14	5	93	5	0	0	103	202
% HV	4.5	3.5	8.4	0	4.2	0	4	4.3	0	1.6	2.9	4	2.2	3.1	0	2.8	3.1	6.7	8.6	0	0	5.8	4.1

	Ithan Avenue Southbound				Lancaster Avenue Westbound				Ithan Avenue Northbound				Lancaster Avenue Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:30 AM to 08:15 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:30 AM																	
07:30 AM	5	48	12	65	9	196	6	211	20	38	18	76	22	191	**13**	226	578
07:45 AM	**9**	62	9	80	23	196	13	232	**23**	**55**	21	**99**	20	196	8	224	635
08:00 AM	8	38	12	58	44	212	**15**	271	23	42	**23**	88	20	**202**	7	**229**	646
08:15 AM	3	**66**	**14**	**83**	**57**	**235**	10	**302**	18	38	12	68	**26**	191	7	224	**677**
Total Volume	25	214	47	286	133	839	44	1016	84	173	74	331	88	780	35	903	2536
% App. Total	8.7	74.8	16.4		13.1	82.6	4.3		25.4	52.3	22.4		9.7	86.4	3.9		
PHF	.694	.811	.839	.861	.583	.893	.733	.841	.913	.786	.804	.836	.846	.965	.673	.986	.936
cars	23	205	45	273	133	805	43	981	79	169	71	319	85	729	32	846	2419
% cars	92.0	95.8	95.7	95.5	100	95.9	97.7	96.6	94.0	97.7	95.9	96.4	96.6	93.5	91.4	93.7	95.4
HV	2	9	2	13	0	34	1	35	5	4	3	12	3	51	3	57	117
% HV	8.0	4.2	4.3	4.5	0	4.1	2.3	3.4	6.0	2.3	4.1	3.6	3.4	6.5	8.6	6.3	4.6

F. Tavani and Associates, Inc.
105 Kenilworth Street
Philadelphia, PA 19147

Lancaster & Ithan Avenues

EB Peds = diag peds NE-SW
WB Peds = diag peds NW-SE

File Name : 02-30IthanAM
Site Code : 00000000
Start Date : 11/15/2012
Page No : 1

Groups Printed- HV

	Ithan Avenue Southbound					Lancaster Avenue Westbound						Ithan Avenue Northbound					Lancaster Avenue Eastbound						
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	NW-SE Peds	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	NE-SW Peds	Peds	App. Total	Int. Total
07:00 AM	0	0	1	0	1	0	3	0	0	0	3	0	0	0	0	0	0	5	1	0	0	6	10
07:15 AM	0	1	1	0	2	0	3	0	0	0	3	0	0	0	0	0	0	12	0	0	0	12	17
07:30 AM	0	6	1	0	7	0	5	1	0	0	6	3	1	1	0	5	1	14	3	0	0	18	36
07:45 AM	1	0	0	0	1	0	10	0	0	0	10	0	1	1	0	2	1	15	0	0	0	16	29
Total	1	7	3	0	11	0	21	1	0	0	22	3	2	2	0	7	2	46	4	0	0	52	92
08:00 AM	0	1	0	0	1	0	7	0	0	0	7	2	1	0	0	3	1	12	0	0	0	13	24
08:15 AM	1	2	1	0	4	0	12	0	0	0	12	0	1	1	0	2	0	10	0	0	0	10	28
08:30 AM	0	1	2	0	3	0	15	2	0	0	17	0	1	0	0	1	0	11	0	0	0	11	32
08:45 AM	0	0	1	0	1	0	6	0	0	1	7	0	1	0	0	1	2	14	1	0	0	17	26
Total	1	4	4	0	9	0	40	2	0	1	43	2	4	1	0	7	3	47	1	0	0	51	110
Grand Total	2	11	7	0	20	0	61	3	0	1	65	5	6	3	0	14	5	93	5	0	0	103	202
Apprch %	10	55	35	0		0	93.8	4.6	0	1.5		35.7	42.9	21.4	0		4.9	90.3	4.9	0	0		
Total %	1	5.4	3.5	0	9.9	0	30.2	1.5	0	0.5	32.2	2.5	3	1.5	0	6.9	2.5	46	2.5	0	0	51	

	Ithan Avenue Southbound				Lancaster Avenue Westbound				Ithan Avenue Northbound				Lancaster Avenue Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:30 AM to 08:15 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:30 AM																	
07:30 AM	0	**6**	**1**	**7**	0	5	**1**	6	**3**	**1**	**1**	**5**	**1**	14	**3**	**18**	**36**
07:45 AM	**1**	0	0	1	0	10	0	10	0	1	1	2	1	**15**	0	16	29
08:00 AM	0	1	0	1	0	7	0	7	2	1	0	3	1	12	0	13	24
08:15 AM	1	2	1	4	0	**12**	0	**12**	0	1	1	2	0	10	0	10	28
Total Volume	2	9	2	13	0	34	1	35	5	4	3	12	3	51	3	57	117
% App. Total	15.4	69.2	15.4		0	97.1	2.9		41.7	33.3	25		5.3	89.5	5.3		
PHF	.500	.375	.500	.464	.000	.708	.250	.729	.417	1.00	.750	.600	.750	.850	.250	.792	.813

F. Tavani and Associates, Inc.
105 Kenilworth Street
Philadelphia, PA 19147

Lancaster Avenue & Lowrys Lane

File Name : 03-30LowrAM
Site Code : 00000000
Start Date : 11/7/2012
Page No : 1

Groups Printed- cars - HV

	Lowrys Lane Southbound					Lancaster Avenue Westbound					Lowrys Lane Northbound					Lancaster Avenue Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
07:00 AM	0	2	1	1	4	2	122	1	2	127	15	15	6	3	39	1	130	1	1	133	303
07:15 AM	4	4	3	0	11	3	193	3	0	199	22	14	3	0	39	0	162	5	0	167	416
07:30 AM	7	17	4	9	37	6	199	1	1	207	9	25	6	4	44	2	250	4	1	257	545
07:45 AM	4	21	7	3	35	6	271	8	0	285	8	34	17	3	62	7	276	4	0	287	669
Total	15	44	15	13	87	17	785	13	3	818	54	88	32	10	184	10	818	14	2	844	1933
08:00 AM	2	18	4	1	25	3	292	4	0	299	17	28	8	2	55	3	271	8	0	282	661
08:15 AM	8	14	4	0	26	1	301	9	0	311	12	15	7	6	40	6	238	3	0	247	624
08:30 AM	4	8	5	1	18	3	230	10	0	243	3	23	8	6	40	3	177	3	0	183	484
08:45 AM	11	6	2	1	20	2	235	8	1	246	4	11	9	3	27	2	194	3	0	199	492
Total	25	46	15	3	89	9	1058	31	1	1099	36	77	32	17	162	14	880	17	0	911	2261
Grand Total	40	90	30	16	176	26	1843	44	4	1917	90	165	64	27	346	24	1698	31	2	1755	4194
Apprch %	22.7	51.1	17	9.1		1.4	96.1	2.3	0.2		26	47.7	18.5	7.8		1.4	96.8	1.8	0.1		
Total %	1	2.1	0.7	0.4	4.2	0.6	43.9	1	0.1	45.7	2.1	3.9	1.5	0.6	8.2	0.6	40.5	0.7	0	41.8	
cars	39	88	30	16	173	26	1797	44	4	1871	86	164	63	27	340	24	1639	27	2	1692	4076
% cars	97.5	97.8	100	100	98.3	100	97.5	100	100	97.6	95.6	99.4	98.4	100	98.3	100	96.5	87.1	100	96.4	97.2
HV	1	2	0	0	3	0	46	0	0	46	4	1	1	0	6	0	59	4	0	63	118
% HV	2.5	2.2	0	0	1.7	0	2.5	0	0	2.4	4.4	0.6	1.6	0	1.7	0	3.5	12.9	0	3.6	2.8

	Lowrys Lane Southbound				Lancaster Avenue Westbound				Lowrys Lane Northbound				Lancaster Avenue Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:30 AM to 08:15 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:30 AM																	
07:30 AM	7	17	4	28	**6**	199	1	206	9	25	6	40	2	250	4	256	530
07:45 AM	4	**21**	**7**	**32**	6	271	8	285	8	**34**	**17**	**59**	**7**	**276**	4	**287**	**663**
08:00 AM	2	18	4	24	3	292	4	299	**17**	28	8	53	3	271	**8**	282	658
08:15 AM	**8**	14	4	26	1	**301**	**9**	**311**	12	15	7	34	6	238	3	247	618
Total Volume	21	70	19	110	16	1063	22	1101	46	102	38	186	18	1035	19	1072	2469
% App. Total	19.1	63.6	17.3		1.5	96.5	2		24.7	54.8	20.4		1.7	96.5	1.8		
PHF	.656	.833	.679	.859	.667	.883	.611	.885	.676	.750	.559	.788	.643	.938	.594	.934	.931
cars	20	68	19	107	16	1038	22	1076	42	102	37	181	18	1009	16	1043	2407
% cars	95.2	97.1	100	97.3	100	97.6	100	97.7	91.3	100	97.4	97.3	100	97.5	84.2	97.3	97.5
HV	1	2	0	3	0	25	0	25	4	0	1	5	0	26	3	29	62
% HV	4.8	2.9	0	2.7	0	2.4	0	2.3	8.7	0	2.6	2.7	0	2.5	15.8	2.7	2.5

F. Tavani and Associates, Inc.
105 Kenilworth Street
Philadelphia, PA 19147

Lancaster Avenue & Lowrys Lane

File Name : 03-30LowrAM
Site Code : 00000000
Start Date : 11/7/2012
Page No : 1

Groups Printed- HV

	Lowrys Lane Southbound					Lancaster Avenue Westbound					Lowrys Lane Northbound					Lancaster Avenue Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
07:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	0	0	7	7
07:15 AM	0	0	0	0	0	0	5	0	0	5	0	0	0	0	0	0	5	1	0	6	11
07:30 AM	1	1	0	0	2	0	4	0	0	4	0	0	0	0	0	0	2	0	0	2	8
07:45 AM	0	0	0	0	0	0	6	0	0	6	0	0	0	0	0	0	13	2	0	15	21
Total	1	1	0	0	2	0	15	0	0	15	0	0	0	0	0	0	27	3	0	30	47
08:00 AM	0	0	0	0	0	0	5	0	0	5	0	0	0	0	0	0	4	0	0	4	9
08:15 AM	0	1	0	0	1	0	10	0	0	10	4	0	1	0	5	0	7	1	0	8	24
08:30 AM	0	0	0	0	0	0	7	0	0	7	0	1	0	0	1	0	12	0	0	12	20
08:45 AM	0	0	0	0	0	0	9	0	0	9	0	0	0	0	0	0	9	0	0	9	18
Total	0	1	0	0	1	0	31	0	0	31	4	1	1	0	6	0	32	1	0	33	71
Grand Total	1	2	0	0	3	0	46	0	0	46	4	1	1	0	6	0	59	4	0	63	118
Apprch %	33.3	66.7	0	0		0	100	0	0		66.7	16.7	16.7	0		0	93.7	6.3	0		
Total %	0.8	1.7	0	0	2.5	0	39	0	0	39	3.4	0.8	0.8	0	5.1	0	50	3.4	0	53.4	

	Lowrys Lane Southbound				Lancaster Avenue Westbound				Lowrys Lane Northbound				Lancaster Avenue Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:30 AM to 08:15 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:30 AM																	
07:30 AM	**1**	**1**	0	**2**	0	4	0	4	0	0	0	0	0	2	0	2	8
07:45 AM	0	0	0	0	0	6	0	6	0	0	0	0	0	**13**	**2**	**15**	21
08:00 AM	0	0	0	0	0	5	0	5	0	0	0	0	0	4	0	4	9
08:15 AM	0	1	0	1	0	**10**	0	**10**	**4**	0	**1**	**5**	0	7	1	8	**24**
Total Volume	1	2	0	3	0	25	0	25	4	0	1	5	0	26	3	29	62
% App. Total	33.3	66.7	0		0	100	0		80	0	20		0	89.7	10.3		
PHF	.250	.500	.000	.375	.000	.625	.000	.625	.250	.000	.250	.250	.000	.500	.375	.483	.646

F. Tavani and Associates, Inc.
105 Kenilworth Street
Philadelphia, PA 19147

Lancaster & Garrett Avenues

File Name : 04-30GarAM
Site Code : 21102771
Start Date : 11/7/2012
Page No : 1

Groups Printed- cars - HV

	Lancaster Avenue Westbound				Garrett Avenue Northbound				Lancaster Avenue Eastbound				
Start Time	Left	Thru	Peds	App. Total	Left	Right	Peds	App. Total	Thru	Right	Peds	App. Total	Int. Total
07:00 AM	3	0	0	3	0	5	1	6	0	4	0	4	13
07:15 AM	0	0	0	0	0	3	0	3	0	5	0	5	8
07:30 AM	3	0	0	3	0	3	4	7	0	9	0	9	19
07:45 AM	8	0	1	9	0	7	6	13	0	4	0	4	26
Total	14	0	1	15	0	18	11	29	0	22	0	22	66
08:00 AM	4	0	0	4	1	10	4	15	0	4	0	4	23
08:15 AM	4	0	0	4	0	5	6	11	0	7	0	7	22
08:30 AM	2	0	0	2	1	6	4	11	0	3	0	3	16
08:45 AM	4	0	0	4	2	12	2	16	0	12	0	12	32
Total	14	0	0	14	4	33	16	53	0	26	0	26	93
Grand Total	28	0	1	29	4	51	27	82	0	48	0	48	159
Apprch %	96.6	0	3.4		4.9	62.2	32.9		0	100	0		
Total %	17.6	0	0.6	18.2	2.5	32.1	17	51.6	0	30.2	0	30.2	
cars	28	0	1	29	4	51	27	82	0	48	0	48	159
% cars	100	0	100	100	100	100	100	100	0	100	0	100	100
HV	0	0	0	0	0	0	0	0	0	0	0	0	0
% HV	0	0	0	0	0	0	0	0	0	0	0	0	0

	Lancaster Avenue Westbound			Garrett Avenue Northbound			Lancaster Avenue Eastbound			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:30 AM to 08:15 AM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 07:30 AM										
07:30 AM	3	0	3	0	3	3	0	**9**	**9**	15
07:45 AM	**8**	0	**8**	0	7	7	0	4	4	**19**
08:00 AM	4	0	4	**1**	**10**	**11**	0	4	4	19
08:15 AM	4	0	4	0	5	5	0	7	7	16
Total Volume	19	0	19	1	25	26	0	24	24	69
% App. Total	100	0		3.8	96.2		0	100		
PHF	.594	.000	.594	.250	.625	.591	.000	.667	.667	.908
cars	19	0	19	1	25	26	0	24	24	69
% cars	100	0	100	100	100	100	0	100	100	100
HV	0	0	0	0	0	0	0	0	0	0
% HV	0	0	0	0	0	0	0	0	0	0

F. Tavani and Associates, Inc.
105 Kenilworth Street
Philadelphia, PA 19147

Lancaster & Garrett Avenues

File Name : 04-30GarAM
Site Code : 21102771
Start Date : 11/7/2012
Page No : 1

Groups Printed- HV

	Lancaster Avenue Westbound				Garrett Avenue Northbound				Lancaster Avenue Eastbound				
Start Time	Left	Thru	Peds	App. Total	Left	Right	Peds	App. Total	Thru	Right	Peds	App. Total	Int. Total
07:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
07:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
07:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
07:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0
08:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
08:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
08:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
08:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	0	0	0	0	0	0	0	0	0	0	0	0	0
Apprch %	0	0	0		0	0	0		0	0	0		
Total %													

	Lancaster Avenue Westbound			Garrett Avenue Northbound			Lancaster Avenue Eastbound			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:30 AM to 08:15 AM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 07:30 AM										
07:30 AM	0	0	0	0	0	0	0	0	0	0
07:45 AM	0	0	0	0	0	0	0	0	0	0
08:00 AM	0	0	0	0	0	0	0	0	0	0
08:15 AM	0	0	0	0	0	0	0	0	0	0
Total Volume	0	0	0	0	0	0	0	0	0	0
% App. Total	0	0		0	0		0	0		
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000

F. Tavani and Associates, Inc.
105 Kenilworth Street
Philadelphia, PA 19147

Sproul & Conestoga Roads

File Name : 05-SprConAM
Site Code : 00000000
Start Date : 11/14/2012
Page No : 1

Groups Printed- cars - HV

	Sproul Road Southbound					Conestoga Road Westbound					Sproul Road Northbound					Conestoga Road Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
07:00 AM	10	30	7	0	47	0	98	17	0	115	36	51	4	0	91	25	65	8	0	98	351
07:15 AM	15	26	22	0	63	6	127	20	0	153	61	57	4	0	122	21	110	17	1	149	487
07:30 AM	19	45	17	0	81	17	137	11	0	165	64	60	7	0	131	30	150	29	0	209	586
07:45 AM	12	62	20	0	94	7	158	11	0	176	48	71	11	0	130	37	161	41	0	239	639
Total	56	163	66	0	285	30	520	59	0	609	209	239	26	0	474	113	486	95	1	695	2063
08:00 AM	12	48	14	0	74	4	157	14	0	175	48	65	2	0	115	45	127	40	0	212	576
08:15 AM	12	41	22	0	75	7	137	20	0	164	49	66	7	0	122	34	104	25	0	163	524
08:30 AM	6	42	22	0	70	3	143	15	0	161	49	58	7	0	114	28	94	24	0	146	491
08:45 AM	12	37	25	0	74	8	134	10	0	152	64	72	11	0	147	39	107	27	0	173	546
Total	42	168	83	0	293	22	571	59	0	652	210	261	27	0	498	146	432	116	0	694	2137
Grand Total	98	331	149	0	578	52	1091	118	0	1261	419	500	53	0	972	259	918	211	1	1389	4200
Apprch %	17	57.3	25.8	0		4.1	86.5	9.4	0		43.1	51.4	5.5	0		18.6	66.1	15.2	0.1		
Total %	2.3	7.9	3.5	0	13.8	1.2	26	2.8	0	30	10	11.9	1.3	0	23.1	6.2	21.9	5	0	33.1	
cars	77	307	134	0	518	46	1067	108	0	1221	408	464	48	0	920	246	900	199	1	1346	4005
% cars	78.6	92.7	89.9	0	89.6	88.5	97.8	91.5	0	96.8	97.4	92.8	90.6	0	94.7	95	98	94.3	100	96.9	95.4
HV	21	24	15	0	60	6	24	10	0	40	11	36	5	0	52	13	18	12	0	43	195
% HV	21.4	7.3	10.1	0	10.4	11.5	2.2	8.5	0	3.2	2.6	7.2	9.4	0	5.3	5	2	5.7	0	3.1	4.6

	Sproul Road Southbound				Conestoga Road Westbound				Sproul Road Northbound				Conestoga Road Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:30 AM to 08:15 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:30 AM																	
07:30 AM	**19**	45	17	81	**17**	137	11	165	**64**	60	7	**131**	30	150	29	209	586
07:45 AM	12	**62**	20	**94**	7	**158**	11	**176**	48	**71**	**11**	130	37	**161**	**41**	**239**	**639**
08:00 AM	12	48	14	74	4	157	14	175	48	65	2	115	**45**	127	40	212	576
08:15 AM	12	41	**22**	75	7	137	**20**	164	49	66	7	122	34	104	25	163	524
Total Volume	55	196	73	324	35	589	56	680	209	262	27	498	146	542	135	823	2325
% App. Total	17	60.5	22.5		5.1	86.6	8.2		42	52.6	5.4		17.7	65.9	16.4		
PHF	.724	.790	.830	.862	.515	.932	.700	.966	.816	.923	.614	.950	.811	.842	.823	.861	.910
cars	44	180	70	294	31	574	54	659	201	245	24	470	139	527	125	791	2214
% cars	80.0	91.8	95.9	90.7	88.6	97.5	96.4	96.9	96.2	93.5	88.9	94.4	95.2	97.2	92.6	96.1	95.2
HV	11	16	3	30	4	15	2	21	8	17	3	28	7	15	10	32	111
% HV	20.0	8.2	4.1	9.3	11.4	2.5	3.6	3.1	3.8	6.5	11.1	5.6	4.8	2.8	7.4	3.9	4.8

F. Tavani and Associates, Inc.
105 Kenilworth Street
Philadelphia, PA 19147

Sproul & Conestoga Roads

File Name : 05-SprConAM
Site Code : 00000000
Start Date : 11/14/2012
Page No : 1

Groups Printed- HV

	Sproul Road Southbound					Conestoga Road Westbound					Sproul Road Northbound					Conestoga Road Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
07:00 AM	3	1	3	0	7	0	4	4	0	8	0	4	1	0	5	3	0	0	0	3	23
07:15 AM	4	3	7	0	14	1	0	2	0	3	2	1	0	0	3	0	1	1	0	2	22
07:30 AM	2	3	1	0	6	1	7	0	0	8	2	3	1	0	6	4	10	3	0	17	37
07:45 AM	2	6	1	0	9	2	3	1	0	6	1	4	1	0	6	2	2	3	0	7	28
Total	11	13	12	0	36	4	14	7	0	25	5	12	3	0	20	9	13	7	0	29	110
08:00 AM	2	4	1	0	7	1	3	1	0	5	1	4	0	0	5	0	2	3	0	5	22
08:15 AM	5	3	0	0	8	0	2	0	0	2	4	6	1	0	11	1	1	1	0	3	24
08:30 AM	2	2	1	0	5	0	5	1	0	6	1	5	0	0	6	1	2	1	0	4	21
08:45 AM	1	2	1	0	4	1	0	1	0	2	0	9	1	0	10	2	0	0	0	2	18
Total	10	11	3	0	24	2	10	3	0	15	6	24	2	0	32	4	5	5	0	14	85
Grand Total	21	24	15	0	60	6	24	10	0	40	11	36	5	0	52	13	18	12	0	43	195
Apprch %	35	40	25	0		15	60	25	0		21.2	69.2	9.6	0		30.2	41.9	27.9	0		
Total %	10.8	12.3	7.7	0	30.8	3.1	12.3	5.1	0	20.5	5.6	18.5	2.6	0	26.7	6.7	9.2	6.2	0	22.1	

	Sproul Road Southbound				Conestoga Road Westbound				Sproul Road Northbound				Conestoga Road Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:30 AM to 08:15 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:30 AM																	
07:30 AM	2	3	**1**	6	1	**7**	0	**8**	2	3	**1**	6	**4**	**10**	**3**	**17**	**37**
07:45 AM	2	**6**	1	**9**	**2**	3	**1**	6	1	4	1	6	2	2	3	7	28
08:00 AM	2	4	1	7	1	3	1	5	1	4	0	5	0	2	3	5	22
08:15 AM	**5**	3	0	8	0	2	0	2	**4**	**6**	1	**11**	1	1	1	3	24
Total Volume	11	16	3	30	4	15	2	21	8	17	3	28	7	15	10	32	111
% App. Total	36.7	53.3	10		19	71.4	9.5		28.6	60.7	10.7		21.9	46.9	31.2		
PHF	.550	.667	.750	.833	.500	.536	.500	.656	.500	.708	.750	.636	.438	.375	.833	.471	.750

F. Tavani and Associates, Inc.
105 Kenilworth Street
Philadelphia, PA 19147

Conestoga & Spring Mill Roads

File Name : 06-ConSpMAM
Site Code : 00000000
Start Date : 11/14/2012
Page No : 1

Groups Printed- cars - HV

	Spring Mill Road Southbound				Conestoga Road Westbound				Conestoga Road Eastbound				
Start Time	Left	Right	Peds	App. Total	Thru	Right	Peds	App. Total	Left	Thru	Peds	App. Total	Int. Total
07:00 AM	0	2	0	2	114	0	0	114	0	76	0	76	192
07:15 AM	2	5	0	7	146	1	0	147	1	136	0	137	291
07:30 AM	1	3	0	4	167	0	0	167	0	176	0	176	347
07:45 AM	1	1	0	2	183	1	0	184	1	198	0	199	385
Total	4	11	0	15	610	2	0	612	2	586	0	588	1215
08:00 AM	0	3	0	3	172	2	0	174	1	136	0	137	314
08:15 AM	2	1	0	3	156	0	0	156	0	115	0	115	274
08:30 AM	1	2	0	3	166	1	0	167	0	111	0	111	281
08:45 AM	1	3	0	4	147	1	0	148	1	132	0	133	285
Total	4	9	0	13	641	4	0	645	2	494	0	496	1154
Grand Total	8	20	0	28	1251	6	0	1257	4	1080	0	1084	2369
Apprch %	28.6	71.4	0		99.5	0.5	0		0.4	99.6	0		
Total %	0.3	0.8	0	1.2	52.8	0.3	0	53.1	0.2	45.6	0	45.8	
cars	8	18	0	26	1213	6	0	1219	4	1041	0	1045	2290
% cars	100	90	0	92.9	97	100	0	97	100	96.4	0	96.4	96.7
HV	0	2	0	2	38	0	0	38	0	39	0	39	79
% HV	0	10	0	7.1	3	0	0	3	0	3.6	0	3.6	3.3

	Spring Mill Road Southbound			Conestoga Road Westbound			Conestoga Road Eastbound			
Start Time	Left	Right	App. Total	Thru	Right	App. Total	Left	Thru	App. Total	Int. Total
Peak Hour Analysis From 07:30 AM to 08:15 AM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 07:30 AM										
07:30 AM	1	**3**	**4**	167	0	167	0	176	176	347
07:45 AM	1	1	2	**183**	1	**184**	**1**	**198**	**199**	**385**
08:00 AM	0	3	3	172	**2**	174	1	136	137	314
08:15 AM	**2**	1	3	156	0	156	0	115	115	274
Total Volume	4	8	12	678	3	681	2	625	627	1320
% App. Total	33.3	66.7		99.6	0.4		0.3	99.7		
PHF	.500	.667	.750	.926	.375	.925	.500	.789	.788	.857
cars	4	8	12	656	3	659	2	599	601	1272
% cars	100	100	100	96.8	100	96.8	100	95.8	95.9	96.4
HV	0	0	0	22	0	22	0	26	26	48
% HV	0	0	0	3.2	0	3.2	0	4.2	4.1	3.6

F. Tavani and Associates, Inc.
105 Kenilworth Street
Philadelphia, PA 19147

Conestoga & Spring Mill Roads

File Name : 06-ConSpMAM
Site Code : 00000000
Start Date : 11/14/2012
Page No : 1

Groups Printed- HV

	Spring Mill Road Southbound				Conestoga Road Westbound				Conestoga Road Eastbound				
Start Time	Left	Right	Peds	App. Total	Thru	Right	Peds	App. Total	Left	Thru	Peds	App. Total	Int. Total
07:00 AM	0	0	0	0	6	0	0	6	0	3	0	3	9
07:15 AM	0	1	0	1	2	0	0	2	0	5	0	5	8
07:30 AM	0	0	0	0	9	0	0	9	0	11	0	11	20
07:45 AM	0	0	0	0	6	0	0	6	0	5	0	5	11
Total	0	1	0	1	23	0	0	23	0	24	0	24	48
08:00 AM	0	0	0	0	6	0	0	6	0	2	0	2	8
08:15 AM	0	0	0	0	1	0	0	1	0	8	0	8	9
08:30 AM	0	1	0	1	7	0	0	7	0	3	0	3	11
08:45 AM	0	0	0	0	1	0	0	1	0	2	0	2	3
Total	0	1	0	1	15	0	0	15	0	15	0	15	31
Grand Total	0	2	0	2	38	0	0	38	0	39	0	39	79
Apprch %	0	100	0		100	0	0		0	100	0		
Total %	0	2.5	0	2.5	48.1	0	0	48.1	0	49.4	0	49.4	

	Spring Mill Road Southbound			Conestoga Road Westbound			Conestoga Road Eastbound			
Start Time	Left	Right	App. Total	Thru	Right	App. Total	Left	Thru	App. Total	Int. Total
Peak Hour Analysis From 07:30 AM to 08:15 AM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 07:30 AM										
07:30 AM	0	0	0	**9**	0	**9**	0	**11**	**11**	**20**
07:45 AM	0	0	0	6	0	6	0	5	5	11
08:00 AM	0	0	0	6	0	6	0	2	2	8
08:15 AM	0	0	0	1	0	1	0	8	8	9
Total Volume	0	0	0	22	0	22	0	26	26	48
% App. Total	0	0		100	0		0	100		
PHF	.000	.000	.000	.611	.000	.611	.000	.591	.591	.600

F. Tavani and Associates, Inc.
105 Kenilworth Street
Philadelphia, PA 19147

Conestoga Road & Ithan Avenue

File Name : 07-ConIthAM
Site Code : 00000000
Start Date : 11/14/2012
Page No : 1

Groups Printed- cars - HV

	Ithan Avenue Southbound					Conestoga Road Westbound					Ithan Avenue Northbound					Conestoga Road Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
07:00 AM	2	0	7	0	9	0	83	5	0	88	1	8	1	0	10	18	54	0	2	74	181
07:15 AM	9	2	21	0	32	0	89	16	0	105	4	14	1	0	19	41	83	0	0	124	280
07:30 AM	13	12	26	0	51	0	113	25	0	138	0	39	1	0	40	53	96	0	0	149	378
07:45 AM	19	16	47	0	82	1	112	54	1	168	2	60	4	0	66	46	116	2	0	164	480
Total	43	30	101	0	174	1	397	100	1	499	7	121	7	0	135	158	349	2	2	511	1319
08:00 AM	22	16	42	0	80	1	116	25	0	142	9	33	3	0	45	31	77	0	0	108	375
08:15 AM	7	7	21	0	35	0	102	21	0	123	3	21	4	0	28	32	93	0	0	125	311
08:30 AM	3	2	14	0	19	0	113	13	0	126	0	16	1	0	17	30	81	1	0	112	274
08:45 AM	5	3	15	0	23	4	100	13	0	117	0	17	2	1	20	35	96	0	0	131	291
Total	37	28	92	0	157	5	431	72	0	508	12	87	10	1	110	128	347	1	0	476	1251
Grand Total	80	58	193	0	331	6	828	172	1	1007	19	208	17	1	245	286	696	3	2	987	2570
Apprch %	24.2	17.5	58.3	0		0.6	82.2	17.1	0.1		7.8	84.9	6.9	0.4		29	70.5	0.3	0.2		
Total %	3.1	2.3	7.5	0	12.9	0.2	32.2	6.7	0	39.2	0.7	8.1	0.7	0	9.5	11.1	27.1	0.1	0.1	38.4	
cars	78	50	185	0	313	6	800	167	1	974	18	201	15	1	235	269	676	2	2	949	2471
% cars	97.5	86.2	95.9	0	94.6	100	96.6	97.1	100	96.7	94.7	96.6	88.2	100	95.9	94.1	97.1	66.7	100	96.1	96.1
HV	2	8	8	0	18	0	28	5	0	33	1	7	2	0	10	17	20	1	0	38	99
% HV	2.5	13.8	4.1	0	5.4	0	3.4	2.9	0	3.3	5.3	3.4	11.8	0	4.1	5.9	2.9	33.3	0	3.9	3.9

	Ithan Avenue Southbound				Conestoga Road Westbound				Ithan Avenue Northbound				Conestoga Road Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:30 AM to 08:15 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:30 AM																	
07:30 AM	13	12	26	51	0	113	25	138	0	39	1	40	**53**	96	0	149	378
07:45 AM	19	**16**	**47**	**82**	**1**	112	**54**	**167**	2	**60**	**4**	**66**	46	**116**	**2**	**164**	**479**
08:00 AM	**22**	16	42	80	1	**116**	25	142	**9**	33	3	45	31	77	0	108	375
08:15 AM	7	7	21	35	0	102	21	123	3	21	4	28	32	93	0	125	311
Total Volume	61	51	136	248	2	443	125	570	14	153	12	179	162	382	2	546	1543
% App. Total	24.6	20.6	54.8		0.4	77.7	21.9		7.8	85.5	6.7		29.7	70	0.4		
PHF	.693	.797	.723	.756	.500	.955	.579	.853	.389	.638	.750	.678	.764	.823	.250	.832	.805
cars	60	43	130	233	2	428	122	552	14	146	10	170	152	368	1	521	1476
% cars	98.4	84.3	95.6	94.0	100	96.6	97.6	96.8	100	95.4	83.3	95.0	93.8	96.3	50.0	95.4	95.7
HV	1	8	6	15	0	15	3	18	0	7	2	9	10	14	1	25	67
% HV	1.6	15.7	4.4	6.0	0	3.4	2.4	3.2	0	4.6	16.7	5.0	6.2	3.7	50.0	4.6	4.3

F. Tavani and Associates, Inc.
105 Kenilworth Street
Philadelphia, PA 19147

Conestoga Road & Ithan Avenue

File Name : 07-ConIthAM
Site Code : 00000000
Start Date : 11/14/2012
Page No : 1

Groups Printed- HV

	Ithan Avenue Southbound					Conestoga Road Westbound					Ithan Avenue Northbound					Conestoga Road Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
07:00 AM	0	0	2	0	2	0	2	1	0	3	1	0	0	0	1	1	2	0	0	3	9
07:15 AM	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	1	2	0	0	3	6
07:30 AM	0	2	2	0	4	0	5	1	0	6	0	4	0	0	4	5	9	0	0	14	28
07:45 AM	0	4	3	0	7	0	2	1	0	3	0	2	0	0	2	3	1	1	0	5	17
Total	0	6	7	0	13	0	12	3	0	15	1	6	0	0	7	10	14	1	0	25	60
08:00 AM	1	1	1	0	3	0	7	1	0	8	0	1	0	0	1	1	1	0	0	2	14
08:15 AM	0	1	0	0	1	0	1	0	0	1	0	0	2	0	2	1	3	0	0	4	8
08:30 AM	0	0	0	0	0	0	6	1	0	7	0	0	0	0	0	4	1	0	0	5	12
08:45 AM	1	0	0	0	1	0	2	0	0	2	0	0	0	0	0	1	1	0	0	2	5
Total	2	2	1	0	5	0	16	2	0	18	0	1	2	0	3	7	6	0	0	13	39
Grand Total	2	8	8	0	18	0	28	5	0	33	1	7	2	0	10	17	20	1	0	38	99
Apprch %	11.1	44.4	44.4	0		0	84.8	15.2	0		10	70	20	0		44.7	52.6	2.6	0		
Total %	2	8.1	8.1	0	18.2	0	28.3	5.1	0	33.3	1	7.1	2	0	10.1	17.2	20.2	1	0	38.4	

	Ithan Avenue Southbound				Conestoga Road Westbound				Ithan Avenue Northbound				Conestoga Road Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:30 AM to 08:15 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:30 AM																	
07:30 AM	0	2	2	4	0	5	**1**	6	0	**4**	0	**4**	**5**	**9**	0	**14**	**28**
07:45 AM	0	**4**	**3**	**7**	0	2	1	3	0	2	0	2	3	1	**1**	5	17
08:00 AM	**1**	1	1	3	0	**7**	1	**8**	0	1	0	1	1	1	0	2	14
08:15 AM	0	1	0	1	0	1	0	1	0	0	**2**	2	1	3	0	4	8
Total Volume	1	8	6	15	0	15	3	18	0	7	2	9	10	14	1	25	67
% App. Total	6.7	53.3	40		0	83.3	16.7		0	77.8	22.2		40	56	4		
PHF	.250	.500	.500	.536	.000	.536	.750	.563	.000	.438	.250	.563	.500	.389	.250	.446	.598

F. Tavani and Associates, Inc.
105 Kenilworth Street
Philadelphia, PA 19147

Conestoga Road & Lowrys Lane/Strathmore Drive

File Name : 08-ConLowAM
Site Code : 00000000
Start Date : 11/14/2012

Groups Printed- cars - HV

	Lowrys Lane Southbound					Conestoga Road Westbound					Strathmore Drive Northbound					Conestoga Road Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
07:00 AM	1	5	6	1	13	2	76	0	0	78	5	4	4	2	15	3	54	0	1	58	164
07:15 AM	0	3	8	1	12	1	99	3	1	104	11	1	0	0	12	5	83	5	1	94	222
07:30 AM	0	5	19	0	24	4	98	0	1	103	5	2	3	2	12	7	94	7	3	111	250
07:45 AM	0	3	32	0	35	4	133	1	0	138	3	5	3	0	11	18	127	5	0	150	334
Total	1	16	65	2	84	11	406	4	2	423	24	12	10	4	50	33	358	17	5	413	970
08:00 AM	1	5	16	1	23	1	105	2	1	109	3	3	3	0	9	11	99	2	0	112	253
08:15 AM	1	2	14	0	17	0	111	2	0	113	2	4	3	0	9	10	95	0	0	105	244
08:30 AM	2	6	15	0	23	2	103	2	0	107	6	0	2	0	8	9	74	3	0	86	224
08:45 AM	2	4	7	2	15	5	92	3	1	101	5	2	1	1	9	7	101	3	1	112	237
Total	6	17	52	3	78	8	411	9	2	430	16	9	9	1	35	37	369	8	1	415	958
Grand Total	7	33	117	5	162	19	817	13	4	853	40	21	19	5	85	70	727	25	6	828	1928
Apprch %	4.3	20.4	72.2	3.1		2.2	95.8	1.5	0.5		47.1	24.7	22.4	5.9		8.5	87.8	3	0.7		
Total %	0.4	1.7	6.1	0.3	8.4	1	42.4	0.7	0.2	44.2	2.1	1.1	1	0.3	4.4	3.6	37.7	1.3	0.3	42.9	
cars	7	32	113	5	157	19	795	13	4	831	39	20	18	5	82	67	712	19	6	804	1874
% cars	100	97	96.6	100	96.9	100	97.3	100	100	97.4	97.5	95.2	94.7	100	96.5	95.7	97.9	76	100	97.1	97.2
HV	0	1	4	0	5	0	22	0	0	22	1	1	1	0	3	3	15	6	0	24	54
% HV	0	3	3.4	0	3.1	0	2.7	0	0	2.6	2.5	4.8	5.3	0	3.5	4.3	2.1	24	0	2.9	2.8

	Lowrys Lane Southbound				Conestoga Road Westbound				Strathmore Drive Northbound				Conestoga Road Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:30 AM to 08:15 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:30 AM																	
07:30 AM	0	**5**	19	24	**4**	98	0	102	**5**	2	**3**	10	7	94	**7**	108	244
07:45 AM	0	3	**32**	**35**	4	**133**	1	**138**	3	**5**	3	**11**	**18**	**127**	5	**150**	**334**
08:00 AM	**1**	5	16	22	1	105	**2**	108	3	3	3	9	11	99	2	112	251
08:15 AM	1	2	14	17	0	111	2	113	2	4	3	9	10	95	0	105	244
Total Volume	2	15	81	98	9	447	5	461	13	14	12	39	46	415	14	475	1073
% App. Total	2	15.3	82.7		2	97	1.1		33.3	35.9	30.8		9.7	87.4	2.9		
PHF	.500	.750	.633	.700	.563	.840	.625	.835	.650	.700	1.00	.886	.639	.817	.500	.792	.803
cars	2	14	79	95	9	435	5	449	12	13	12	37	45	406	10	461	1042
% cars	100	93.3	97.5	96.9	100	97.3	100	97.4	92.3	92.9	100	94.9	97.8	97.8	71.4	97.1	97.1
HV	0	1	2	3	0	12	0	12	1	1	0	2	1	9	4	14	31
% HV	0	6.7	2.5	3.1	0	2.7	0	2.6	7.7	7.1	0	5.1	2.2	2.2	28.6	2.9	2.9

F. Tavani and Associates, Inc.
105 Kenilworth Street
Philadelphia, PA 19147

Conestoga Road & Lowrys Lane/Strathmore Drive

File Name : 08-ConLowAM
Site Code : 00000000
Start Date : 11/14/2012
Page No : 1

Groups Printed- HV

	Lowrys Lane Southbound					Conestoga Road Westbound					Strathmore Drive Northbound					Conestoga Road Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
07:00 AM	0	0	0	0	0	0	2	0	0	2	0	0	1	0	1	0	3	0	0	3	6
07:15 AM	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	1	0	1	0	2	5
07:30 AM	0	0	1	0	1	0	4	0	0	4	0	0	0	0	0	0	4	3	0	7	12
07:45 AM	0	1	0	0	1	0	4	0	0	4	0	0	0	0	0	0	3	0	0	3	8
Total	0	1	1	0	2	0	13	0	0	13	0	0	1	0	1	1	10	4	0	15	31
08:00 AM	0	0	1	0	1	0	4	0	0	4	1	0	0	0	1	1	1	1	0	3	9
08:15 AM	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	1	0	0	1	2
08:30 AM	0	0	2	0	2	0	2	0	0	2	0	0	0	0	0	1	1	1	0	3	7
08:45 AM	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	2	0	0	2	5
Total	0	0	3	0	3	0	9	0	0	9	1	1	0	0	2	2	5	2	0	9	23
Grand Total	0	1	4	0	5	0	22	0	0	22	1	1	1	0	3	3	15	6	0	24	54
Apprch %	0	20	80	0		0	100	0	0		33.3	33.3	33.3	0		12.5	62.5	25	0		
Total %	0	1.9	7.4	0	9.3	0	40.7	0	0	40.7	1.9	1.9	1.9	0	5.6	5.6	27.8	11.1	0	44.4	

	Lowrys Lane Southbound				Conestoga Road Westbound				Strathmore Drive Northbound				Conestoga Road Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:30 AM to 08:15 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:30 AM																	
07:30 AM	0	0	**1**	**1**	0	**4**	0	**4**	0	0	0	0	0	**4**	**3**	**7**	**12**
07:45 AM	0	**1**	0	1	0	4	0	4	0	0	0	0	0	3	0	3	8
08:00 AM	0	0	1	1	0	4	0	4	**1**	0	0	**1**	**1**	1	1	3	9
08:15 AM	0	0	0	0	0	0	0	0	0	**1**	0	1	0	1	0	1	2
Total Volume	0	1	2	3	0	12	0	12	1	1	0	2	1	9	4	14	31
% App. Total	0	33.3	66.7		0	100	0		50	50	0		7.1	64.3	28.6		
PHF	.000	.250	.500	.750	.000	.750	.000	.750	.250	.250	.000	.500	.250	.563	.333	.500	.646

F. Tavani and Associates, Inc.
105 Kenilworth Street
Philadelphia, PA 19147

Conestoga Road & Garrett Avenue/
Williams Road

File Name : 09-ConGarAM
Site Code : 21102701
Start Date : 11/14/2012
Page No : 1

Groups Printed- cars - HV

	Garrett Avenue Southbound					Conestoga Road Westbound					Williams Road Northbound					Conestoga Road Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
07:00 AM	1	0	5	1	7	0	63	1	3	67	3	1	0	0	4	3	62	1	0	66	144
07:15 AM	6	2	5	2	15	0	102	2	0	104	4	2	2	0	8	3	87	0	0	90	217
07:30 AM	5	1	7	0	13	3	98	1	2	104	2	2	3	3	10	1	102	0	0	103	230
07:45 AM	3	2	7	0	12	0	116	1	1	118	2	1	2	0	5	11	125	0	1	137	272
Total	15	5	24	3	47	3	379	5	6	393	11	6	7	3	27	18	376	1	1	396	863
08:00 AM	3	0	13	1	17	1	94	1	1	97	1	1	2	1	5	5	110	0	0	115	234
08:15 AM	4	0	10	0	14	0	102	1	1	104	1	2	2	0	5	8	94	1	2	105	228
08:30 AM	7	1	2	0	10	1	91	1	0	93	1	4	4	1	10	7	80	0	1	88	201
08:45 AM	7	1	5	0	13	1	92	5	0	98	2	1	1	1	5	7	106	2	0	115	231
Total	21	2	30	1	54	3	379	8	2	392	5	8	9	3	25	27	390	3	3	423	894
Grand Total	36	7	54	4	101	6	758	13	8	785	16	14	16	6	52	45	766	4	4	819	1757
Apprch %	35.6	6.9	53.5	4		0.8	96.6	1.7	1		30.8	26.9	30.8	11.5		5.5	93.5	0.5	0.5		
Total %	2	0.4	3.1	0.2	5.7	0.3	43.1	0.7	0.5	44.7	0.9	0.8	0.9	0.3	3	2.6	43.6	0.2	0.2	46.6	
cars	36	7	54	4	101	6	758	13	8	785	16	14	16	6	52	45	766	4	4	819	1757
% cars	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
HV	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% HV	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

	Garrett Avenue Southbound				Conestoga Road Westbound				Williams Road Northbound				Conestoga Road Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:30 AM to 08:15 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:30 AM																	
07:30 AM	**5**	1	7	13	**3**	98	**1**	102	**2**	**2**	**3**	**7**	1	102	0	103	225
07:45 AM	3	**2**	7	12	0	**116**	1	**117**	2	1	2	5	**11**	**125**	0	**136**	**270**
08:00 AM	3	0	**13**	**16**	1	94	1	96	1	1	2	4	5	110	0	115	231
08:15 AM	4	0	10	14	0	102	1	103	1	2	2	5	8	94	**1**	103	225
Total Volume	15	3	37	55	4	410	4	418	6	6	9	21	25	431	1	457	951
% App. Total	27.3	5.5	67.3		1	98.1	1		28.6	28.6	42.9		5.5	94.3	0.2		
PHF	.750	.375	.712	.859	.333	.884	1.00	.893	.750	.750	.750	.750	.568	.862	.250	.840	.881
cars	15	3	37	55	4	410	4	418	6	6	9	21	25	431	1	457	951
% cars	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
HV	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% HV	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

F. Tavani and Associates, Inc.
105 Kenilworth Street
Philadelphia, PA 19147

Conestoga Road & Garrett Avenue/
Williams Road

File Name : 09-ConGarAM
Site Code : 21102701
Start Date : 11/14/2012
Page No : 1

Groups Printed- HV

	Garrett Avenue Southbound					Conestoga Road Westbound					Williams Road Northbound					Conestoga Road Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
07:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Apprch %	0	0	0	0		0	0	0	0		0	0	0	0		0	0	0	0		
Total %																					

	Garrett Avenue Southbound				Conestoga Road Westbound				Williams Road Northbound				Conestoga Road Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:30 AM to 08:15 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:30 AM																	
07:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Volume	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% App. Total	0	0	0		0	0	0		0	0	0		0	0	0		
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000

F. Tavani and Associates, Inc.
105 Kenilworth Street
Philadelphia, PA 19147

Spring Mill and County Line Roads

File Name : 10-SpMCoLAM
Site Code : 00000000
Start Date : 11/13/2012
Page No : 1

Groups Printed- cars - HV

	County Line Road Southbound					Spring Mill Road Westbound					County Line Road Northbound					Spring Mill Road Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
07:00 AM	3	18	17	0	38	7	47	5	0	59	11	16	3	0	30	4	46	10	0	60	187
07:15 AM	6	36	12	0	54	14	55	5	0	74	11	29	7	0	47	11	53	13	0	77	252
07:30 AM	9	70	13	0	92	16	72	23	0	111	9	41	7	0	57	6	80	14	0	100	360
07:45 AM	13	78	11	0	102	13	54	15	0	82	9	54	16	0	79	11	61	19	0	91	354
Total	31	202	53	0	286	50	228	48	0	326	40	140	33	0	213	32	240	56	0	328	1153
08:00 AM	7	84	13	0	104	17	51	24	0	92	10	87	9	0	106	6	71	12	0	89	391
08:15 AM	3	90	15	0	108	15	83	14	0	112	12	63	12	0	87	11	62	14	0	87	394
08:30 AM	9	49	16	0	74	8	45	15	0	68	11	62	8	0	81	15	70	13	0	98	321
08:45 AM	6	66	20	0	92	12	47	13	0	72	8	53	7	0	68	15	49	12	0	76	308
Total	25	289	64	0	378	52	226	66	0	344	41	265	36	0	342	47	252	51	0	350	1414
Grand Total	56	491	117	0	664	102	454	114	0	670	81	405	69	0	555	79	492	107	0	678	2567
Apprch %	8.4	73.9	17.6	0		15.2	67.8	17	0		14.6	73	12.4	0		11.7	72.6	15.8	0		
Total %	2.2	19.1	4.6	0	25.9	4	17.7	4.4	0	26.1	3.2	15.8	2.7	0	21.6	3.1	19.2	4.2	0	26.4	
cars	54	480	105	0	639	101	430	110	0	641	77	397	66	0	540	70	473	102	0	645	2465
% cars	96.4	97.8	89.7	0	96.2	99	94.7	96.5	0	95.7	95.1	98	95.7	0	97.3	88.6	96.1	95.3	0	95.1	96
HV	2	11	12	0	25	1	24	4	0	29	4	8	3	0	15	9	19	5	0	33	102
% HV	3.6	2.2	10.3	0	3.8	1	5.3	3.5	0	4.3	4.9	2	4.3	0	2.7	11.4	3.9	4.7	0	4.9	4

	County Line Road Southbound				Spring Mill Road Westbound				County Line Road Northbound				Spring Mill Road Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:30 AM to 08:15 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:30 AM																	
07:30 AM	9	70	13	92	16	72	23	111	9	41	7	57	6	**80**	14	**100**	360
07:45 AM	**13**	78	11	102	13	54	15	82	9	54	**16**	79	**11**	61	**19**	91	354
08:00 AM	7	84	13	104	**17**	51	**24**	92	10	**87**	9	**106**	6	71	12	89	391
08:15 AM	3	**90**	**15**	**108**	15	**83**	14	**112**	**12**	63	12	87	11	62	14	87	**394**
Total Volume	32	322	52	406	61	260	76	397	40	245	44	329	34	274	59	367	1499
% App. Total	7.9	79.3	12.8		15.4	65.5	19.1		12.2	74.5	13.4		9.3	74.7	16.1		
PHF	.615	.894	.867	.940	.897	.783	.792	.886	.833	.704	.688	.776	.773	.856	.776	.918	.951
cars	31	317	47	395	60	246	75	381	37	239	42	318	30	263	58	351	1445
% cars	96.9	98.4	90.4	97.3	98.4	94.6	98.7	96.0	92.5	97.6	95.5	96.7	88.2	96.0	98.3	95.6	96.4
HV	1	5	5	11	1	14	1	16	3	6	2	11	4	11	1	16	54
% HV	3.1	1.6	9.6	2.7	1.6	5.4	1.3	4.0	7.5	2.4	4.5	3.3	11.8	4.0	1.7	4.4	3.6

F. Tavani and Associates, Inc.
105 Kenilworth Street
Philadelphia, PA 19147

Spring Mill and County Line Roads

File Name : 10-SpMCoLAM
Site Code : 00000000
Start Date : 11/13/2012
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Groups Printed- HV

	County Line Road Southbound					Spring Mill Road Westbound					County Line Road Northbound					Spring Mill Road Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
07:00 AM	0	0	1	0	1	0	1	1	0	2	1	0	0	0	1	1	1	1	0	3	7
07:15 AM	0	1	3	0	4	0	4	1	0	5	0	0	0	0	0	0	3	2	0	5	14
07:30 AM	0	3	1	0	4	0	2	1	0	3	1	2	0	0	3	2	3	0	0	5	15
07:45 AM	1	0	2	0	3	0	8	0	0	8	1	2	1	0	4	1	0	1	0	2	17
Total	1	4	7	0	12	0	15	3	0	18	3	4	1	0	8	4	7	4	0	15	53
08:00 AM	0	1	0	0	1	1	3	0	0	4	0	0	0	0	0	0	2	0	0	2	7
08:15 AM	0	1	2	0	3	0	1	0	0	1	1	2	1	0	4	1	6	0	0	7	15
08:30 AM	1	3	2	0	6	0	1	1	0	2	0	0	0	0	0	1	3	0	0	4	12
08:45 AM	0	2	1	0	3	0	4	0	0	4	0	2	1	0	3	3	1	1	0	5	15
Total	1	7	5	0	13	1	9	1	0	11	1	4	2	0	7	5	12	1	0	18	49
Grand Total	2	11	12	0	25	1	24	4	0	29	4	8	3	0	15	9	19	5	0	33	102
Apprch %	8	44	48	0		3.4	82.8	13.8	0		26.7	53.3	20	0		27.3	57.6	15.2	0		
Total %	2	10.8	11.8	0	24.5	1	23.5	3.9	0	28.4	3.9	7.8	2.9	0	14.7	8.8	18.6	4.9	0	32.4	

	County Line Road Southbound				Spring Mill Road Westbound				County Line Road Northbound				Spring Mill Road Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:30 AM to 08:15 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:30 AM																	
07:30 AM	0	**3**	1	**4**	0	2	**1**	3	**1**	**2**	0	3	**2**	3	0	5	15
07:45 AM	**1**	0	**2**	3	0	**8**	0	**8**	1	2	**1**	**4**	1	0	**1**	2	**17**
08:00 AM	0	1	0	1	**1**	3	0	4	0	0	0	0	0	2	0	2	7
08:15 AM	0	1	2	3	0	1	0	1	1	2	1	4	1	**6**	0	**7**	15
Total Volume	1	5	5	11	1	14	1	16	3	6	2	11	4	11	1	16	54
% App. Total	9.1	45.5	45.5		6.2	87.5	6.2		27.3	54.5	18.2		25	68.8	6.2		
PHF	.250	.417	.625	.688	.250	.438	.250	.500	.750	.750	.500	.688	.500	.458	.250	.571	.794

F. Tavani and Associates, Inc.
105 Kenilworth Street
Philadelphia, PA 19147

Ithan Avenue & County Line Road N

File Name : 11-IthCoLNAM
Site Code : 00000000
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Groups Printed- cars - HV

	Ithan Avenue Southbound				Ithan Avenue Northbound				County Line Road Eastbound				
Start Time	Thru	Right	Peds	App. Total	Left	Thru	Peds	App. Total	Left	Right	Peds	App. Total	Int. Total
07:00 AM	15	2	2	19	37	11	0	48	16	24	0	40	107
07:15 AM	26	12	0	38	38	11	0	49	18	34	0	52	139
07:30 AM	35	18	0	53	73	30	0	103	42	60	0	102	258
07:45 AM	44	19	0	63	89	33	0	122	58	73	0	131	316
Total	120	51	2	173	237	85	0	322	134	191	0	325	820
08:00 AM	34	25	0	59	84	27	0	111	37	70	1	108	278
08:15 AM	39	37	0	76	92	18	0	110	27	90	1	118	304
08:30 AM	29	29	0	58	77	17	0	94	25	63	0	88	240
08:45 AM	19	30	0	49	74	13	0	87	36	50	2	88	224
Total	121	121	0	242	327	75	0	402	125	273	4	402	1046
Grand Total	241	172	2	415	564	160	0	724	259	464	4	727	1866
Apprch %	58.1	41.4	0.5		77.9	22.1	0		35.6	63.8	0.6		
Total %	12.9	9.2	0.1	22.2	30.2	8.6	0	38.8	13.9	24.9	0.2	39	
cars	235	167	2	404	554	160	0	714	255	449	4	708	1826
% cars	97.5	97.1	100	97.3	98.2	100	0	98.6	98.5	96.8	100	97.4	97.9
HV	6	5	0	11	10	0	0	10	4	15	0	19	40
% HV	2.5	2.9	0	2.7	1.8	0	0	1.4	1.5	3.2	0	2.6	2.1

	Ithan Avenue Southbound			Ithan Avenue Northbound			County Line Road Eastbound			
Start Time	Thru	Right	App. Total	Left	Thru	App. Total	Left	Right	App. Total	Int. Total
Peak Hour Analysis From 07:30 AM to 08:15 AM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 07:30 AM										
07:30 AM	35	18	53	73	30	103	42	60	102	258
07:45 AM	**44**	19	63	89	**33**	**122**	**58**	73	**131**	**316**
08:00 AM	34	25	59	84	27	111	37	70	107	277
08:15 AM	39	**37**	**76**	**92**	18	110	27	**90**	117	303
Total Volume	152	99	251	338	108	446	164	293	457	1154
% App. Total	60.6	39.4		75.8	24.2		35.9	64.1		
PHF	.864	.669	.826	.918	.818	.914	.707	.814	.872	.913
cars	148	95	243	331	108	439	160	286	446	1128
% cars	97.4	96.0	96.8	97.9	100	98.4	97.6	97.6	97.6	97.7
HV	4	4	8	7	0	7	4	7	11	26
% HV	2.6	4.0	3.2	2.1	0	1.6	2.4	2.4	2.4	2.3

F. Tavani and Associates, Inc.
105 Kenilworth Street
Philadelphia, PA 19147

Ithan Avenue & County Line Road N

File Name : 11-IthCoLNAM
Site Code : 00000000
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Groups Printed- HV

	Ithan Avenue Southbound				Ithan Avenue Northbound				County Line Road Eastbound				
Start Time	Thru	Right	Peds	App. Total	Left	Thru	Peds	App. Total	Left	Right	Peds	App. Total	Int. Total
07:00 AM	1	0	0	1	0	0	0	0	0	1	0	1	2
07:15 AM	0	0	0	0	0	0	0	0	0	3	0	3	3
07:30 AM	3	1	0	4	4	0	0	4	2	1	0	3	11
07:45 AM	0	0	0	0	0	0	0	0	1	1	0	2	2
Total	4	1	0	5	4	0	0	4	3	6	0	9	18
08:00 AM	0	1	0	1	2	0	0	2	0	2	0	2	5
08:15 AM	1	2	0	3	1	0	0	1	1	3	0	4	8
08:30 AM	0	1	0	1	2	0	0	2	0	3	0	3	6
08:45 AM	1	0	0	1	1	0	0	1	0	1	0	1	3
Total	2	4	0	6	6	0	0	6	1	9	0	10	22
Grand Total	6	5	0	11	10	0	0	10	4	15	0	19	40
Apprch %	54.5	45.5	0		100	0	0		21.1	78.9	0		
Total %	15	12.5	0	27.5	25	0	0	25	10	37.5	0	47.5	

	Ithan Avenue Southbound			Ithan Avenue Northbound			County Line Road Eastbound			
Start Time	Thru	Right	App. Total	Left	Thru	App. Total	Left	Right	App. Total	Int. Total
Peak Hour Analysis From 07:30 AM to 08:15 AM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 07:30 AM										
07:30 AM	**3**	1	**4**	**4**	0	**4**	**2**	1	3	**11**
07:45 AM	0	0	0	0	0	0	1	1	2	2
08:00 AM	0	1	1	2	0	2	0	2	2	5
08:15 AM	1	**2**	3	1	0	1	1	**3**	**4**	8
Total Volume	4	4	8	7	0	7	4	7	11	26
% App. Total	50	50		100	0		36.4	63.6		
PHF	.333	.500	.500	.438	.000	.438	.500	.583	.688	.591

F. Tavani and Associates, Inc.
105 Kenilworth Street
Philadelphia, PA 19147

Ithan Avenue & County Line Road S

File Name : 12-IthCoLSAM
Site Code : 00000000
Start Date : 11/15/2012
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Groups Printed- cars - HV

	Ithan Avenue Southbound				County Line Road Westbound				Ithan Avenue Northbound				
Start Time	Left	Thru	Peds	App. Total	Left	Right	Peds	App. Total	Thru	Right	Peds	App. Total	Int. Total
07:00 AM	10	25	0	35	0	34	0	34	25	5	0	30	99
07:15 AM	19	41	0	60	8	35	0	43	24	0	0	24	127
07:30 AM	35	65	0	100	7	55	0	62	52	4	0	56	218
07:45 AM	39	91	0	130	4	64	0	68	54	4	0	58	256
Total	103	222	0	325	19	188	0	207	155	13	0	168	700
08:00 AM	33	77	0	110	13	54	0	67	56	2	0	58	235
08:15 AM	31	95	0	126	13	77	0	90	37	5	0	42	258
08:30 AM	34	57	0	91	6	55	0	61	39	5	0	44	196
08:45 AM	30	44	0	74	14	60	0	74	30	1	0	31	179
Total	128	273	0	401	46	246	0	292	162	13	0	175	868
Grand Total	231	495	0	726	65	434	0	499	317	26	0	343	1568
Apprch %	31.8	68.2	0		13	87	0		92.4	7.6	0		
Total %	14.7	31.6	0	46.3	4.1	27.7	0	31.8	20.2	1.7	0	21.9	
cars	228	478	0	706	64	430	0	494	308	23	0	331	1531
% cars	98.7	96.6	0	97.2	98.5	99.1	0	99	97.2	88.5	0	96.5	97.6
HV	3	17	0	20	1	4	0	5	9	3	0	12	37
% HV	1.3	3.4	0	2.8	1.5	0.9	0	1	2.8	11.5	0	3.5	2.4

	Ithan Avenue Southbound			County Line Road Westbound			Ithan Avenue Northbound			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:30 AM to 08:15 AM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 07:30 AM										
07:30 AM	35	65	100	7	55	62	52	4	56	218
07:45 AM	**39**	91	**130**	4	64	68	54	4	**58**	256
08:00 AM	33	77	110	**13**	54	67	**56**	2	58	235
08:15 AM	31	**95**	126	13	**77**	**90**	37	**5**	42	**258**
Total Volume	138	328	466	37	250	287	199	15	214	967
% App. Total	29.6	70.4		12.9	87.1		93	7		
PHF	.885	.863	.896	.712	.812	.797	.888	.750	.922	.937
cars	136	319	455	36	248	284	194	14	208	947
% cars	98.6	97.3	97.6	97.3	99.2	99.0	97.5	93.3	97.2	97.9
HV	2	9	11	1	2	3	5	1	6	20
% HV	1.4	2.7	2.4	2.7	0.8	1.0	2.5	6.7	2.8	2.1

F. Tavani and Associates, Inc.
105 Kenilworth Street
Philadelphia, PA 19147

Ithan Avenue & County Line Road S

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Groups Printed- HV

	Ithan Avenue Southbound				County Line Road Westbound				Ithan Avenue Northbound				
Start Time	Left	Thru	Peds	App. Total	Left	Right	Peds	App. Total	Thru	Right	Peds	App. Total	Int. Total
07:00 AM	1	0	0	1	0	0	0	0	0	1	0	1	2
07:15 AM	0	3	0	3	0	0	0	0	2	0	0	2	5
07:30 AM	0	4	0	4	0	2	0	2	2	1	0	3	9
07:45 AM	1	0	0	1	0	0	0	0	0	0	0	0	1
Total	2	7	0	9	0	2	0	2	4	2	0	6	17
08:00 AM	0	2	0	2	0	0	0	0	2	0	0	2	4
08:15 AM	1	3	0	4	1	0	0	1	1	0	0	1	6
08:30 AM	0	4	0	4	0	1	0	1	1	1	0	2	7
08:45 AM	0	1	0	1	0	1	0	1	1	0	0	1	3
Total	1	10	0	11	1	2	0	3	5	1	0	6	20
Grand Total	3	17	0	20	1	4	0	5	9	3	0	12	37
Apprch %	15	85	0		20	80	0		75	25	0		
Total %	8.1	45.9	0	54.1	2.7	10.8	0	13.5	24.3	8.1	0	32.4	

	Ithan Avenue Southbound			County Line Road Westbound			Ithan Avenue Northbound			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:30 AM to 08:15 AM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 07:30 AM										
07:30 AM	0	**4**	**4**	0	**2**	**2**	**2**	**1**	**3**	**9**
07:45 AM	**1**	0	1	0	0	0	0	0	0	1
08:00 AM	0	2	2	0	0	0	2	0	2	4
08:15 AM	1	3	4	**1**	0	1	1	0	1	6
Total Volume	2	9	11	1	2	3	5	1	6	20
% App. Total	18.2	81.8		33.3	66.7		83.3	16.7		
PHF	.500	.563	.688	.250	.250	.375	.625	.250	.500	.556

F. Tavani and Associates, Inc.
105 Kenilworth Street
Philadelphia, PA 19147

County Line Road & Lowrys Lane

File Name : 13-CoLLowAM
Site Code : 21102791
Start Date : 11/13/2012
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Groups Printed- cars - HV

	County Line Road Southbound				County Line Road Northbound				Lowrys Lane Eastbound				
Start Time	Thru	Right	Peds	App. Total	Left	Thru	Peds	App. Total	Left	Right	Peds	App. Total	Int. Total
07:00 AM	19	0	1	20	2	21	0	23	7	6	1	14	57
07:15 AM	20	2	0	22	3	38	0	41	4	8	1	13	76
07:30 AM	32	9	1	42	11	33	0	44	12	19	1	32	118
07:45 AM	39	5	0	44	22	59	0	81	11	30	0	41	166
Total	110	16	2	128	38	151	0	189	34	63	3	100	417
08:00 AM	42	6	0	48	17	72	0	89	19	19	0	38	175
08:15 AM	34	10	0	44	7	69	0	76	18	11	1	30	150
08:30 AM	34	5	0	39	9	58	0	67	11	9	1	21	127
08:45 AM	19	11	0	30	5	61	0	66	13	11	3	27	123
Total	129	32	0	161	38	260	0	298	61	50	5	116	575
Grand Total	239	48	2	289	76	411	0	487	95	113	8	216	992
Apprch %	82.7	16.6	0.7		15.6	84.4	0		44	52.3	3.7		
Total %	24.1	4.8	0.2	29.1	7.7	41.4	0	49.1	9.6	11.4	0.8	21.8	
cars	239	48	2	289	76	411	0	487	95	113	8	216	992
% cars	100	100	100	100	100	100	0	100	100	100	100	100	100
HV	0	0	0	0	0	0	0	0	0	0	0	0	0
% HV	0	0	0	0	0	0	0	0	0	0	0	0	0

	County Line Road Southbound			County Line Road Northbound			Lowrys Lane Eastbound			
Start Time	Thru	Right	App. Total	Left	Thru	App. Total	Left	Right	App. Total	Int. Total
Peak Hour Analysis From 07:30 AM to 08:15 AM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 07:30 AM										
07:30 AM	32	9	41	11	33	44	12	19	31	116
07:45 AM	39	5	44	**22**	59	81	11	**30**	**41**	166
08:00 AM	**42**	6	**48**	17	**72**	**89**	**19**	19	38	**175**
08:15 AM	34	**10**	44	7	69	76	18	11	29	149
Total Volume	147	30	177	57	233	290	60	79	139	606
% App. Total	83.1	16.9		19.7	80.3		43.2	56.8		
PHF	.875	.750	.922	.648	.809	.815	.789	.658	.848	.866
cars	147	30	177	57	233	290	60	79	139	606
% cars	100	100	100	100	100	100	100	100	100	100
HV	0	0	0	0	0	0	0	0	0	0
% HV	0	0	0	0	0	0	0	0	0	0

F. Tavani and Associates, Inc.
105 Kenilworth Street
Philadelphia, PA 19147

County Line Road & Lowrys Lane

File Name : 13-CoLLowAM
Site Code : 21102791
Start Date : 11/13/2012
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Groups Printed- HV

	County Line Road Southbound				County Line Road Northbound				Lowrys Lane Eastbound				
Start Time	Thru	Right	Peds	App. Total	Left	Thru	Peds	App. Total	Left	Right	Peds	App. Total	Int. Total
07:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
07:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
07:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
07:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0
08:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
08:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
08:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
08:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	0	0	0	0	0	0	0	0	0	0	0	0	0
Apprch %	0	0	0		0	0	0		0	0	0		
Total %													

	County Line Road Southbound			County Line Road Northbound			Lowrys Lane Eastbound			
Start Time	Thru	Right	App. Total	Left	Thru	App. Total	Left	Right	App. Total	Int. Total
Peak Hour Analysis From 07:30 AM to 08:15 AM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 07:30 AM										
07:30 AM	0	0	0	0	0	0	0	0	0	0
07:45 AM	0	0	0	0	0	0	0	0	0	0
08:00 AM	0	0	0	0	0	0	0	0	0	0
08:15 AM	0	0	0	0	0	0	0	0	0	0
Total Volume	0	0	0	0	0	0	0	0	0	0
% App. Total	0	0		0	0		0	0		
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000

F. Tavani and Associates, Inc.
105 Kenilworth Street
Philadelphia, PA 19147

County Line & Airdale Roads

File Name : 14-CoLAirAM
Site Code : 00000000
Start Date : 11/13/2012
Page No : 1

Groups Printed- cars - HV

	Airdale Road Southbound				County Line Road Westbound				Airdale Road Eastbound				
Start Time	Left	Right	Peds	App. Total	Thru	Right	Peds	App. Total	Left	Thru	Peds	App. Total	Int. Total
07:00 AM	2	14	1	17	42	2	0	44	20	54	0	74	135
07:15 AM	2	20	2	24	43	3	0	46	31	53	0	84	154
07:30 AM	3	24	2	29	57	3	0	60	28	76	0	104	193
07:45 AM	4	23	4	31	85	7	0	92	58	56	1	115	238
Total	11	81	9	101	227	15	0	242	137	239	1	377	720
08:00 AM	4	27	3	34	73	6	2	81	51	41	0	92	207
08:15 AM	4	22	9	35	67	4	0	71	62	43	1	106	212
08:30 AM	2	28	3	33	56	2	0	58	50	74	0	124	215
08:45 AM	1	18	6	25	70	3	5	78	53	51	0	104	207
Total	11	95	21	127	266	15	7	288	216	209	1	426	841
Grand Total	22	176	30	228	493	30	7	530	353	448	2	803	1561
Apprch %	9.6	77.2	13.2		93	5.7	1.3		44	55.8	0.2		
Total %	1.4	11.3	1.9	14.6	31.6	1.9	0.4	34	22.6	28.7	0.1	51.4	
cars	19	176	30	225	479	28	7	514	350	444	2	796	1535
% cars	86.4	100	100	98.7	97.2	93.3	100	97	99.2	99.1	100	99.1	98.3
HV	3	0	0	3	14	2	0	16	3	4	0	7	26
% HV	13.6	0	0	1.3	2.8	6.7	0	3	0.8	0.9	0	0.9	1.7

	Airdale Road Southbound			County Line Road Westbound			Airdale Road Eastbound			
Start Time	Left	Right	App. Total	Thru	Right	App. Total	Left	Thru	App. Total	Int. Total
Peak Hour Analysis From 07:30 AM to 08:15 AM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 07:30 AM										
07:30 AM	3	24	27	57	3	60	28	**76**	104	191
07:45 AM	**4**	23	27	**85**	**7**	**92**	58	56	**114**	**233**
08:00 AM	4	**27**	**31**	73	6	79	51	41	92	202
08:15 AM	4	22	26	67	4	71	**62**	43	105	202
Total Volume	15	96	111	282	20	302	199	216	415	828
% App. Total	13.5	86.5		93.4	6.6		48	52		
PHF	.938	.889	.895	.829	.714	.821	.802	.711	.910	.888
cars	13	96	109	276	19	295	197	215	412	816
% cars	86.7	100	98.2	97.9	95.0	97.7	99.0	99.5	99.3	98.6
HV	2	0	2	6	1	7	2	1	3	12
% HV	13.3	0	1.8	2.1	5.0	2.3	1.0	0.5	0.7	1.4

F. Tavani and Associates, Inc.
105 Kenilworth Street
Philadelphia, PA 19147

County Line & Airdale Roads

File Name : 14-CoLAirAM
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Groups Printed- HV

	Airdale Road Southbound				County Line Road Westbound				Airdale Road Eastbound				
Start Time	Left	Right	Peds	App. Total	Thru	Right	Peds	App. Total	Left	Thru	Peds	App. Total	Int. Total
07:00 AM	1	0	0	1	1	0	0	1	0	1	0	1	3
07:15 AM	0	0	0	0	1	0	0	1	0	0	0	0	1
07:30 AM	0	0	0	0	3	1	0	4	1	0	0	1	5
07:45 AM	2	0	0	2	1	0	0	1	1	1	0	2	5
Total	3	0	0	3	6	1	0	7	2	2	0	4	14
08:00 AM	0	0	0	0	2	0	0	2	0	0	0	0	2
08:30 AM	0	0	0	0	1	0	0	1	0	1	0	1	2
08:45 AM	0	0	0	0	5	1	0	6	1	1	0	2	8
Total	0	0	0	0	8	1	0	9	1	2	0	3	12
Grand Total	3	0	0	3	14	2	0	16	3	4	0	7	26
Apprch %	100	0	0		87.5	12.5	0		42.9	57.1	0		
Total %	11.5	0	0	11.5	53.8	7.7	0	61.5	11.5	15.4	0	26.9	

	Airdale Road Southbound			County Line Road Westbound			Airdale Road Eastbound			
Start Time	Left	Right	App. Total	Thru	Right	App. Total	Left	Thru	App. Total	Int. Total
Peak Hour Analysis From 07:30 AM to 08:15 AM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 07:30 AM										
07:30 AM	0	0	0	**3**	**1**	**4**	**1**	0	1	**5**
07:45 AM	**2**	0	**2**	1	0	1	1	**1**	**2**	5
08:00 AM	0	0	0	2	0	2	0	0	0	2
08:15 AM	0	0	0	0	0	0	0	0	0	0
Total Volume	2	0	2	6	1	7	2	1	3	12
% App. Total	100	0		85.7	14.3		66.7	33.3		
PHF	.250	.000	.250	.500	.250	.438	.500	.250	.375	.600

F. Tavani and Associates, Inc.
105 Kenilworth Street
Philadelphia, PA 19147

County Line & Roberts Roads

File Name : 15-CoLRobAM
Site Code : 00000000
Start Date : 11/13/2012
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Groups Printed- cars - HV

	County Line Road Southbound					Roberts Road Westbound					County Line Road Northbound					Roberts Road Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
07:00 AM	1	70	0	0	71	1	1	2	0	4	0	129	1	0	130	11	4	0	0	15	220
07:15 AM	1	83	4	3	91	1	3	0	1	5	0	124	2	0	126	11	4	1	0	16	238
07:30 AM	0	110	10	1	121	0	3	0	0	3	1	141	10	0	152	13	14	3	1	31	307
07:45 AM	5	119	11	2	137	0	5	4	1	10	3	143	2	0	148	14	30	1	0	45	340
Total	7	382	25	6	420	2	12	6	2	22	4	537	15	0	556	49	52	5	1	107	1105
08:00 AM	1	124	9	0	134	2	5	0	1	8	6	132	6	1	145	18	28	0	1	47	334
08:15 AM	2	111	7	1	121	0	10	2	1	13	4	191	7	0	202	21	26	4	0	51	387
08:30 AM	4	107	11	0	122	1	5	1	0	7	0	146	10	2	158	13	12	0	0	25	312
08:45 AM	0	136	7	1	144	0	7	4	0	11	0	153	15	0	168	14	10	0	1	25	348
Total	7	478	34	2	521	3	27	7	2	39	10	622	38	3	673	66	76	4	2	148	1381
Grand Total	14	860	59	8	941	5	39	13	4	61	14	1159	53	3	1229	115	128	9	3	255	2486
Apprch %	1.5	91.4	6.3	0.9		8.2	63.9	21.3	6.6		1.1	94.3	4.3	0.2		45.1	50.2	3.5	1.2		
Total %	0.6	34.6	2.4	0.3	37.9	0.2	1.6	0.5	0.2	2.5	0.6	46.6	2.1	0.1	49.4	4.6	5.1	0.4	0.1	10.3	
cars	14	813	57	8	892	5	37	13	4	59	14	1150	51	3	1218	114	128	9	3	254	2423
% cars	100	94.5	96.6	100	94.8	100	94.9	100	100	96.7	100	99.2	96.2	100	99.1	99.1	100	100	100	99.6	97.5
HV	0	47	2	0	49	0	2	0	0	2	0	9	2	0	11	1	0	0	0	1	63
% HV	0	5.5	3.4	0	5.2	0	5.1	0	0	3.3	0	0.8	3.8	0	0.9	0.9	0	0	0	0.4	2.5

	County Line Road Southbound				Roberts Road Westbound				County Line Road Northbound				Roberts Road Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:30 AM to 08:15 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:30 AM																	
07:30 AM	0	110	10	120	0	3	0	3	1	141	**10**	152	13	14	3	30	305
07:45 AM	**5**	119	**11**	**135**	0	5	**4**	9	3	143	2	148	14	**30**	1	45	337
08:00 AM	1	**124**	9	134	**2**	5	0	7	**6**	132	6	144	18	28	0	46	331
08:15 AM	2	111	7	120	0	**10**	2	**12**	4	**191**	7	**202**	**21**	26	**4**	**51**	**385**
Total Volume	8	464	37	509	2	23	6	31	14	607	25	646	66	98	8	172	1358
% App. Total	1.6	91.2	7.3		6.5	74.2	19.4		2.2	94	3.9		38.4	57	4.7		
PHF	.400	.935	.841	.943	.250	.575	.375	.646	.583	.795	.625	.800	.786	.817	.500	.843	.882
cars	8	442	35	485	2	23	6	31	14	603	23	640	66	98	8	172	1328
% cars	100	95.3	94.6	95.3	100	100	100	100	100	99.3	92.0	99.1	100	100	100	100	97.8
HV	0	22	2	24	0	0	0	0	0	4	2	6	0	0	0	0	30
% HV	0	4.7	5.4	4.7	0	0	0	0	0	0.7	8.0	0.9	0	0	0	0	2.2

F. Tavani and Associates, Inc.
105 Kenilworth Street
Philadelphia, PA 19147

County Line & Roberts Roads

File Name : 15-CoLRobAM
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Groups Printed- HV

	County Line Road Southbound					Roberts Road Westbound					County Line Road Northbound					Roberts Road Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
07:00 AM	0	5	0	0	5	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	7
07:15 AM	0	6	0	0	6	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	7
07:30 AM	0	5	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5
07:45 AM	0	5	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5
Total	0	21	0	0	21	0	1	0	0	1	0	2	0	0	2	0	0	0	0	0	24
08:00 AM	0	5	1	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6
08:15 AM	0	7	1	0	8	0	0	0	0	0	0	4	2	0	6	0	0	0	0	0	14
08:30 AM	0	5	0	0	5	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	6
08:45 AM	0	9	0	0	9	0	1	0	0	1	0	2	0	0	2	1	0	0	0	1	13
Total	0	26	2	0	28	0	1	0	0	1	0	7	2	0	9	1	0	0	0	1	39
Grand Total	0	47	2	0	49	0	2	0	0	2	0	9	2	0	11	1	0	0	0	1	63
Apprch %	0	95.9	4.1	0		0	100	0	0		0	81.8	18.2	0		100	0	0	0		
Total %	0	74.6	3.2	0	77.8	0	3.2	0	0	3.2	0	14.3	3.2	0	17.5	1.6	0	0	0	1.6	

	County Line Road Southbound				Roberts Road Westbound				County Line Road Northbound				Roberts Road Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:30 AM to 08:15 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:30 AM																	
07:30 AM	0	5	0	5	0	0	0	0	0	0	0	0	0	0	0	0	5
07:45 AM	0	5	0	5	0	0	0	0	0	0	0	0	0	0	0	0	5
08:00 AM	0	5	**1**	6	0	0	0	0	0	0	0	0	0	0	0	0	6
08:15 AM	0	**7**	1	**8**	0	0	0	0	0	**4**	**2**	**6**	0	0	0	0	**14**
Total Volume	0	22	2	24	0	0	0	0	0	4	2	6	0	0	0	0	30
% App. Total	0	91.7	8.3		0	0	0		0	66.7	33.3		0	0	0		
PHF	.000	.786	.500	.750	.000	.000	.000	.000	.000	.250	.250	.250	.000	.000	.000	.000	.536

F. Tavani and Associates, Inc.
105 Kenilworth Street
Philadelphia, PA 19147

Ithan & Aldwyn Lanes

File Name : 16-IthAldAM
Site Code : 00000000
Start Date : 11/15/2012
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Groups Printed- cars - HV

	Ithan Avenue Southbound					South Campus Westbound					Ithan Avenue Northbound					Aldwyn Lane Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
07:00 AM	1	9	1	4	15	0	0	0	3	3	7	21	1	0	29	0	0	6	0	6	53
07:15 AM	3	37	0	0	40	2	0	3	1	6	13	33	2	0	48	5	0	13	0	18	112
07:30 AM	6	51	2	1	60	2	0	1	2	5	1	67	2	0	70	5	0	21	0	26	161
07:45 AM	5	68	0	5	78	2	0	6	5	13	4	96	1	1	102	5	0	20	1	26	219
Total	15	165	3	10	193	6	0	10	11	27	25	217	6	1	249	15	0	60	1	76	545
08:00 AM	4	26	1	80	111	2	1	1	2	6	0	103	2	2	107	5	0	10	1	16	240
08:15 AM	1	44	0	115	160	1	0	4	0	5	4	85	4	0	93	1	0	8	0	9	267
08:30 AM	6	23	0	9	38	2	0	6	3	11	6	56	1	0	63	1	0	3	1	5	117
08:45 AM	7	19	0	16	42	1	0	4	5	10	1	45	1	3	50	3	0	3	0	6	108
Total	18	112	1	220	351	6	1	15	10	32	11	289	8	5	313	10	0	24	2	36	732
Grand Total	33	277	4	230	544	12	1	25	21	59	36	506	14	6	562	25	0	84	3	112	1277
Apprch %	6.1	50.9	0.7	42.3		20.3	1.7	42.4	35.6		6.4	90	2.5	1.1		22.3	0	75	2.7		
Total %	2.6	21.7	0.3	18	42.6	0.9	0.1	2	1.6	4.6	2.8	39.6	1.1	0.5	44	2	0	6.6	0.2	8.8	
cars	30	267	4	230	531	11	1	21	21	54	28	496	13	6	543	25	0	78	3	106	1234
% cars	90.9	96.4	100	100	97.6	91.7	100	84	100	91.5	77.8	98	92.9	100	96.6	100	0	92.9	100	94.6	96.6
HV	3	10	0	0	13	1	0	4	0	5	8	10	1	0	19	0	0	6	0	6	43
% HV	9.1	3.6	0	0	2.4	8.3	0	16	0	8.5	22.2	2	7.1	0	3.4	0	0	7.1	0	5.4	3.4

	Ithan Avenue Southbound				South Campus Westbound				Ithan Avenue Northbound				Aldwyn Lane Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:30 AM to 08:15 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:30 AM																	
07:30 AM	**6**	51	**2**	59	**2**	0	1	3	1	67	2	70	**5**	0	**21**	**26**	158
07:45 AM	5	**68**	0	**73**	2	0	**6**	**8**	**4**	96	1	101	5	0	20	25	**207**
08:00 AM	4	26	1	31	2	**1**	1	4	0	**103**	2	**105**	5	0	10	15	155
08:15 AM	1	44	0	45	1	0	4	5	4	85	**4**	93	1	0	8	9	152
Total Volume	16	189	3	208	7	1	12	20	9	351	9	369	16	0	59	75	672
% App. Total	7.7	90.9	1.4		35	5	60		2.4	95.1	2.4		21.3	0	78.7		
PHF	.667	.695	.375	.712	.875	.250	.500	.625	.563	.852	.563	.879	.800	.000	.702	.721	.812
cars	14	180	3	197	7	1	9	17	4	343	9	356	16	0	58	74	644
% cars	87.5	95.2	100	94.7	100	100	75.0	85.0	44.4	97.7	100	96.5	100	0	98.3	98.7	95.8
HV	2	9	0	11	0	0	3	3	5	8	0	13	0	0	1	1	28
% HV	12.5	4.8	0	5.3	0	0	25.0	15.0	55.6	2.3	0	3.5	0	0	1.7	1.3	4.2

F. Tavani and Associates, Inc.
105 Kenilworth Street
Philadelphia, PA 19147

Ithan & Aldwyn Lanes

File Name : 16-IthAldAM
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Groups Printed- HV

	Ithan Avenue Southbound					South Campus Westbound					Ithan Avenue Northbound					Aldwyn Lane Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
07:00 AM	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	1	0	1	2
07:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	2
07:30 AM	1	7	0	0	8	0	0	1	0	1	1	1	0	0	2	0	0	0	0	0	11
07:45 AM	0	0	0	0	0	0	0	1	0	1	1	4	0	0	5	0	0	0	0	0	6
Total	1	7	0	0	8	0	0	2	0	2	3	5	0	0	8	0	0	3	0	3	21
08:00 AM	1	0	0	0	1	0	0	0	0	0	0	1	0	0	1	0	0	1	0	1	3
08:15 AM	0	2	0	0	2	0	0	1	0	1	3	2	0	0	5	0	0	0	0	0	8
08:30 AM	0	1	0	0	1	1	0	0	0	1	2	2	1	0	5	0	0	1	0	1	8
08:45 AM	1	0	0	0	1	0	0	1	0	1	0	0	0	0	0	0	0	1	0	1	3
Total	2	3	0	0	5	1	0	2	0	3	5	5	1	0	11	0	0	3	0	3	22
Grand Total	3	10	0	0	13	1	0	4	0	5	8	10	1	0	19	0	0	6	0	6	43
Apprch %	23.1	76.9	0	0		20	0	80	0		42.1	52.6	5.3	0		0	0	100	0		
Total %	7	23.3	0	0	30.2	2.3	0	9.3	0	11.6	18.6	23.3	2.3	0	44.2	0	0	14	0	14	

	Ithan Avenue Southbound				South Campus Westbound				Ithan Avenue Northbound				Aldwyn Lane Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 07:30 AM to 08:15 AM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:30 AM																	
07:30 AM	**1**	**7**	0	**8**	0	0	**1**	**1**	1	1	0	2	0	0	0	0	**11**
07:45 AM	0	0	0	0	0	0	1	1	1	**4**	0	**5**	0	0	0	0	6
08:00 AM	1	0	0	1	0	0	0	0	0	1	0	1	0	0	**1**	**1**	3
08:15 AM	0	2	0	2	0	0	1	1	**3**	2	0	5	0	0	0	0	8
Total Volume	2	9	0	11	0	0	3	3	5	8	0	13	0	0	1	1	28
% App. Total	18.2	81.8	0		0	0	100		38.5	61.5	0		0	0	100		
PHF	.500	.321	.000	.344	.000	.000	.750	.750	.417	.500	.000	.650	.000	.000	.250	.250	.636

F. Tavani and Associates, Inc.
105 Kenilworth Street
Philadelphia, PA 19147

Lancaster Avenue & Spring Mill/Sproul Rd
& Kenilworth Rd/Aldwyn Ln

File Name : 01-30SproulPM
Site Code : 00000000
Start Date : 11/8/2012
Page No : 1

Groups Printed- cars - HV

	North Spring Mill Road Southbound							Lancaster Avenue Westbound							Aldwyn Lane Northwestbound							Sproul Road Northbound							Lancaster Avenue Eastbound							Kenilworth Road Southeastbound							
Start Time	Lt o Lanc	Lt o Ald					App. Total	Lt o Ald	Lt o Spr					App. Total	Lt o Spr	Lt o Lanc					App. Total	Lt o Lanc	Lt o Ken					App. Total	Lt o Ken	Lt o S Mill					App. Total	Lt o S Mill	Lt o Lanc					App. Total	Int. Total
04:00 PM	5	1	33	59	0	2	100	1	9	238	0	4	1	253	2	7	0	1	2	0	12	63	0	34	3	0	0	100	1	43	166	8	49	0	267	0	0	0	1	2	0	3	735
04:15 PM	7	1	30	59	0	2	99	1	2	206	0	5	0	214	1	20	0	1	3	0	25	37	1	24	3	0	0	65	1	47	192	11	69	0	320	0	0	0	3	3	0	6	729
04:30 PM	8	0	32	52	0	3	95	0	5	199	0	3	0	207	1	20	0	1	3	0	25	57	1	31	7	2	0	98	0	44	169	3	60	0	276	0	0	0	0	1	0	1	702
04:45 PM	10	1	54	50	0	5	120	0	2	188	0	4	0	194	3	14	0	2	2	0	21	49	0	26	6	0	0	81	0	53	185	7	67	0	312	0	0	0	2	2	0	4	732
Total	30	3	149	220	0	12	414	2	18	831	0	16	1	868	7	61	0	5	10	0	83	206	2	115	19	2	0	344	2	187	712	29	245	0	1175	0	0	0	6	8	0	14	2898
05:00 PM	11	2	36	64	1	4	118	0	4	224	0	4	0	232	0	9	0	1	3	2	15	36	0	30	3	0	0	69	0	63	223	5	77	0	368	0	0	0	1	4	0	5	807
05:15 PM	11	2	45	70	0	2	130	1	9	206	0	8	0	224	1	15	0	2	2	0	20	61	0	26	4	0	0	91	1	45	215	7	71	0	339	1	1	0	0	3	0	5	809
05:30 PM	7	3	40	50	0	0	100	0	2	224	0	10	0	236	2	14	0	0	4	1	21	45	0	23	3	0	0	71	1	66	269	7	66	1	410	0	0	0	2	3	0	5	843
05:45 PM	9	2	42	46	0	0	99	1	7	181	0	10	0	199	4	13	0	1	1	0	19	45	0	31	10	1	0	87	2	70	258	11	62	0	403	0	0	0	0	4	0	4	811
Total	38	9	163	230	1	6	447	2	22	835	0	32	0	891	7	51	0	4	10	3	75	187	0	110	20	1	0	318	4	244	965	30	276	1	1520	1	1	0	3	14	0	19	3270
Grand Total	68	12	312	450	1	18	861	4	40	1666	0	48	1	1759	14	112	0	9	20	3	158	393	2	225	39	3	0	662	6	431	1677	59	521	1	2695	1	1	0	9	22	0	33	6168
Apprch %	7.9	1.4	36.2	52.3	0.1	2.1		0.2	2.3	94.7	0	2.7	0.1		8.9	70.9	0	5.7	12.7	1.9		59.4	0.3	34	5.9	0.5	0		0.2	16	62.2	2.2	19.3	0		3	3	0	27.3	66.7	0		
Total %	1.1	0.2	5.1	7.3	0	0.3	14	0.1	0.6	27	0	0.8	0	28.5	0.2	1.8	0	0.1	0.3	0	2.6	6.4	0	3.6	0.6	0	0	10.7	0.1	7	27.2	1	8.4	0	43.7	0	0	0	0.1	0.4	0	0.5	
cars	68	12	299	440	1	18	838	4	39	1624	0	47	1	1715	14	107	0	7	19	3	150	378	2	218	39	3	0	640	6	422	1651	59	516	1	2655	1	1	0	8	22	0	32	6030
% cars	100	100	95.8	97.8	100	100	97.3	100	97.5	97.5	0	97.9	100	97.5	100	95.5	0	77.8	95	100	94.9	96.2	100	96.9	100	100	0	96.7	100	97.9	98.4	100	99	100	98.5	100	100	0	88.9	100	0	97	97.8
HV	0	0	13	10	0	0	23	0	1	42	0	1	0	44	0	5	0	2	1	0	8	15	0	7	0	0	0	22	0	9	26	0	5	0	40	0	0	0	1	0	0	1	138
% HV	0	0	4.2	2.2	0	0	2.7	0	2.5	2.5	0	2.1	0	2.5	0	4.5	0	22.2	5	0	5.1	3.8	0	3.1	0	0	0	3.3	0	2.1	1.6	0	1	0	1.5	0	0	0	11.1	0	0	3	2.2

	North Spring Mill Road Southbound						Lancaster Avenue Westbound						Aldwyn Lane Northwestbound						Sproul Road Northbound						Lancaster Avenue Eastbound						Kenilworth Road Southeastbound						
Start Time	L to Lanc	L to Ald	T to Spr	R to Lanc	R to Ken	App. Total	L to Ald	L to Spr	T to Lanc	R to Ken	R to S Mill	App. Total	L to Spr	L to Lanc	T to Ken	R to S Mill	R to Lanc	App. Total	L to Lanc	L to Ken	T to S Mill	R to Lanc	R to Ald	App. Total	L to Ken	L to S Mill	T to Lanc	R to Ald	R to Spr	App. Total	L to S Mill	L to Lanc	T to Ald	R to Spr	R to Lanc	App. Total	Int. Total
Peak Hour Analysis From 05:00 PM to 05:45 PM - Peak 1 of 1																																					
Peak Hour for Entire Intersection Begins at 05:00 PM																																					
05:00 PM	**11**	**2**	36	64	**1**	114	0	4	**224**	0	4	232	0	9	0	1	3	13	36	0	30	3	0	69	0	63	223	5	**77**	368	0	0	0	1	**4**	**5**	801
05:15 PM	11	2	**45**	**70**	**0**	**128**	**1**	**9**	206	0	8	224	1	**15**	**0**	**2**	2	**20**	**61**	**0**	26	4	0	**91**	1	45	215	7	71	339	**1**	**1**	0	0	3	5	807
05:30 PM	7	**3**	40	50	0	100	0	2	224	0	**10**	**236**	2	14	0	0	**4**	20	45	0	23	3	0	71	1	66	**269**	7	66	**409**	0	0	0	**2**	3	5	**841**
05:45 PM	9	2	42	46	0	99	1	7	181	0	10	199	**4**	13	0	1	1	19	45	0	**31**	**10**	**1**	87	**2**	**70**	258	**11**	62	403	0	0	0	0	4	4	811
Total Volume	38	9	163	230	1	441	2	22	835	0	32	891	7	51	0	4	10	72	187	0	110	20	1	318	4	244	965	30	276	1519	1	1	0	3	14	19	3260
% App. Total	8.6	2	37	52.2	0.2		0.2	2.5	93.7	0	3.6		9.7	70.8	0	5.6	13.9		58.8	0	34.6	6.3	0.3		0.3	16.1	63.5	2	18.2		5.3	5.3	0	15.8	73.7		
PHF	.864	.750	.906	.821	.250	.861	.500	.611	.932	.000	.800	.944	.438	.850	.000	.500	.625	.900	.766	.000	.887	.500	.250	.874	.500	.871	.897	.682	.896	.928	.250	.250	.000	.375	.875	.950	.969
cars	38	9	160	226	1	434	2	22	817	0	31	872	7	51	0	4	9	71	186	0	109	20	1	316	4	237	955	30	274	1500	1	1	0	3	14	19	3212
% cars	100	100	98.2	98.3	100	98.4	100	100	97.8	0	96.9	97.9	100	100	0	100	90.0	98.6	99.5	0	99.1	100	100	99.4	100	97.1	99.0	100	99.3	98.7	100	100	0	100	100	100	98.5
HV	0	0	3	4	0	7	0	0	18	0	1	19	0	0	0	0	1	1	1	0	1	0	0	2	0	7	10	0	2	19	0	0	0	0	0	0	48
% HV	0	0	1.8	1.7		1.6			2.2		3.1	2.1					10.0	1.4	0.5		0.9			0.6		2.9	1.0		0.7	1.3							1.5

F. Tavani and Associates, Inc.
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Lancaster Avenue & Spring Mill/Sproul Rd
& Kenilworth Rd/Aldwyn Ln

File Name : 01-30SproulPM
Site Code : 00000000
Start Date : 11/8/2012
Page No : 1

Groups Printed- HV

	North Spring Mill Road Southbound							Lancaster Avenue Westbound							Aldwyn Lane Northwestbound							Sproul Road Northbound							Lancaster Avenue Eastbound							Kenilworth Road Southeastbound							
Start Time	L to Lanc	L to Ald					App. Total	L to Ald	L to Spr					App. Total	L to Spr	L to Lanc					App. Total	L to Lanc	L to Ken					App. Total	L to Ken	L to S Mill					App. Total	L to S Mill	L to Lanc					App. Total	Int. Total
04:00 PM	0	0	0	0	0	0	0	0	0	10	0	0	0	10	0	2	0	0	0	0	2	3	0	1	0	0	0	4	0	1	1	0	0	0	2	0	0	0	1	0	0	1	19
04:15 PM	0	0	2	2	0	0	4	0	0	7	0	0	0	7	0	3	0	1	0	0	4	3	0	2	0	0	0	5	0	0	6	0	2	0	8	0	0	0	0	0	0	0	28
04:30 PM	0	0	3	0	0	0	3	0	1	3	0	0	0	4	0	0	0	1	0	0	1	6	0	0	0	0	0	6	0	1	3	0	1	0	5	0	0	0	0	0	0	0	19
04:45 PM	0	0	5	4	0	0	9	0	0	4	0	0	0	4	0	0	0	0	0	0	0	2	0	3	0	0	0	5	0	0	6	0	0	0	6	0	0	0	0	0	0	0	24
Total	0	0	10	6	0	0	16	0	1	24	0	0	0	25	0	5	0	2	0	0	7	14	0	6	0	0	0	20	0	2	16	0	3	0	21	0	0	0	1	0	0	1	90
05:00 PM	0	0	1	3	0	0	4	0	0	6	0	1	0	7	0	0	0	0	0	0	0	1	0	1	0	0	0	2	0	5	1	0	0	0	6	0	0	0	0	0	0	0	19
05:15 PM	0	0	0	1	0	0	1	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	2	0	0	0	0	0	0	0	4
05:30 PM	0	0	1	0	0	0	1	0	0	5	0	0	0	5	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	2	4	0	2	0	8	0	0	0	0	0	0	0	15
05:45 PM	0	0	1	0	0	0	1	0	0	6	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	3	0	0	0	0	0	0	0	10
Total	0	0	3	4	0	0	7	0	0	18	0	1	0	19	0	0	0	0	1	0	1	1	0	1	0	0	0	2	0	7	10	0	2	0	19	0	0	0	0	0	0	0	48
Grand Total	0	0	13	10	0	0	23	0	1	42	0	1	0	44	0	5	0	2	1	0	8	15	0	7	0	0	0	22	0	9	26	0	5	0	40	0	0	0	1	0	0	1	138
Apprch %	0	0	56.5	43.5	0	0		0	2.3	95.5	0	2.3	0		0	62.5	0	25	12.5	0		68.2	0	31.8	0	0	0		0	22.5	65	0	12.5	0		0	0	0	100	0	0		
Total %	0	0	9.4	7.2	0	0	16.7	0	0.7	30.4	0	0.7	0	31.9	0	3.6	0	1.4	0.7	0	5.8	10.9	0	5.1	0	0	0	15.9	0	6.5	18.8	0	3.6	0	29	0	0	0	0.7	0	0	0.7	

	North Spring Mill Road Southbound						Lancaster Avenue Westbound						Aldwyn Lane Northwestbound						Sproul Road Northbound						Lancaster Avenue Eastbound						Kenilworth Road Southeastbound						
Start Time	L to Lanc	L to Ald	T to Spr	R to Lanc	R to Ken	App. Total	L to Ald	L to Spr	T to Lanc	R to Ken	R to S Mill	App. Total	L to Spr	L to Lanc	T to Ken	R to S Mill	R to Lanc	App. Total	L to Lanc	L to Ken	T to S Mill	R to Lanc	R to Ald	App. Total	L to Ken	L to S Mill	T to Lanc	R to Ald	R to Spr	App. Total	L to S Mill	L to Lanc	T to Ald	R to Spr	R to Lanc	App. Total	Int. Total
Peak Hour Analysis From 05:00 PM to 05:45 PM - Peak 1 of 1																																					
Peak Hour for Entire Intersection Begins at 05:00 PM																																					
05:00 PM	0	0	**1**	**3**	0	**4**	0	0	**6**	0	**1**	**7**	0	0	0	0	0	0	**1**	0	**1**	0	0	**2**	0	**5**	1	0	0	6	0	0	0	0	0	0	**19**
05:15 PM	0	0	0	1	0	1	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	4
05:30 PM	0	0	1	0	0	1	0	0	5	0	0	5	0	0	0	0	**1**	**1**	0	0	0	0	0	0	0	2	**4**	0	**2**	**8**	0	0	0	0	0	0	15
05:45 PM	0	0	1	0	0	1	0	0	6	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	10
Total Volume	0	0	3	4	0	7	0	0	18	0	1	19	0	0	0	0	1	1	1	0	1	0	0	2	0	7	10	0	2	19	0	0	0	0	0	0	48
% App. Total			42.9	57.1	0		0	0	94.7	0	5.3						100		50	0	50	0	0		0	36.8	52.6	0	10.5		0	0	0	0	0		
PHF	.000	.000	.750	.333	.000	.438	.000	.000	.750	.000	.250	.679	.000	.000	.000	.000	.250	.250	.250	.000	.250	.000	.000	.250	.000	.350	.625	.000	.250	.594	.000	.000	.000	.000	.000	.000	.632

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Lancaster & Ithan Avenues

EB Peds = diag peds NE-SW
WB Peds = diag peds NW-SE

File Name : 02-30IthanPM
Site Code : 00000000
Start Date : 11/15/2012
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Groups Printed- cars - HV

	Ithan Avenue Southbound					Lancaster Avenue Westbound						Ithan Avenue Northbound					Lancaster Avenue Eastbound						
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	NW-SE Peds	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	NE-SW Peds	Peds	App. Total	Int. Total
04:00 PM	11	26	10	6	53	19	141	3	67	10	240	23	39	22	0	84	13	208	5	4	43	273	650
04:15 PM	15	50	26	3	94	12	153	5	81	13	264	8	36	15	0	59	19	174	11	1	30	235	652
04:30 PM	12	43	23	1	79	17	209	15	45	13	299	12	26	17	0	55	12	188	13	1	29	243	676
04:45 PM	18	49	20	1	88	19	124	10	72	11	236	15	22	12	0	49	24	193	16	5	31	269	642
Total	56	168	79	11	314	67	627	33	265	47	1039	58	123	66	0	247	68	763	45	11	133	1020	2620
05:00 PM	10	58	19	2	89	21	197	6	81	14	319	13	33	19	1	66	25	211	17	2	61	316	790
05:15 PM	16	55	26	1	98	22	178	8	175	14	397	21	38	22	6	87	22	243	18	3	84	370	952
05:30 PM	25	61	20	0	106	18	166	6	99	4	293	13	20	20	0	53	14	264	31	4	69	382	834
05:45 PM	14	58	8	1	81	34	143	11	104	12	304	16	32	15	0	63	19	219	25	0	88	351	799
Total	65	232	73	4	374	95	684	31	459	44	1313	63	123	76	7	269	80	937	91	9	302	1419	3375
Grand Total	121	400	152	15	688	162	1311	64	724	91	2352	121	246	142	7	516	148	1700	136	20	435	2439	5995
Apprch %	17.6	58.1	22.1	2.2		6.9	55.7	2.7	30.8	3.9		23.4	47.7	27.5	1.4		6.1	69.7	5.6	0.8	17.8		
Total %	2	6.7	2.5	0.3	11.5	2.7	21.9	1.1	12.1	1.5	39.2	2	4.1	2.4	0.1	8.6	2.5	28.4	2.3	0.3	7.3	40.7	
cars	120	392	152	15	679	162	1274	63	724	91	2314	121	239	141	7	508	146	1675	136	20	435	2412	5913
% cars	99.2	98	100	100	98.7	100	97.2	98.4	100	100	98.4	100	97.2	99.3	100	98.4	98.6	98.5	100	100	100	98.9	98.6
HV	1	8	0	0	9	0	37	1	0	0	38	0	7	1	0	8	2	25	0	0	0	27	82
% HV	0.8	2	0	0	1.3	0	2.8	1.6	0	0	1.6	0	2.8	0.7	0	1.6	1.4	1.5	0	0	0	1.1	1.4

	Ithan Avenue Southbound				Lancaster Avenue Westbound				Ithan Avenue Northbound				Lancaster Avenue Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 05:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 05:00 PM																	
05:00 PM	10	58	19	87	21	**197**	6	**224**	13	33	19	65	**25**	211	17	253	629
05:15 PM	16	55	**26**	97	22	178	8	208	**21**	**38**	**22**	**81**	22	243	18	283	**669**
05:30 PM	**25**	**61**	20	**106**	18	166	6	190	13	20	20	53	14	**264**	**31**	**309**	658
05:45 PM	14	58	8	80	**34**	143	**11**	188	16	32	15	63	19	219	25	263	594
Total Volume	65	232	73	370	95	684	31	810	63	123	76	262	80	937	91	1108	2550
% App. Total	17.6	62.7	19.7		11.7	84.4	3.8		24	46.9	29		7.2	84.6	8.2		
PHF	.650	.951	.702	.873	.699	.868	.705	.904	.750	.809	.864	.809	.800	.887	.734	.896	.953
cars	65	228	73	366	95	667	30	792	63	119	76	258	78	925	91	1094	2510
% cars	100	98.3	100	98.9	100	97.5	96.8	97.8	100	96.7	100	98.5	97.5	98.7	100	98.7	98.4
HV	0	4	0	4	0	17	1	18	0	4	0	4	2	12	0	14	40
% HV	0	1.7	0	1.1	0	2.5	3.2	2.2	0	3.3	0	1.5	2.5	1.3	0	1.3	1.6

F. Tavani and Associates, Inc.
105 Kenilworth Street
Philadelphia, PA 19147

Lancaster & Ithan Avenues

EB Peds = diag peds NE-SW
WB Peds = diag peds NW-SE

File Name : 02-30IthanPM
Site Code : 00000000
Start Date : 11/15/2012
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Groups Printed- HV

	Ithan Avenue Southbound					Lancaster Avenue Westbound						Ithan Avenue Northbound					Lancaster Avenue Eastbound						
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	NW-SE Peds	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	NE-SW Peds	Peds	App. Total	Int. Total
04:00 PM	1	0	0	0	1	0	4	0	0	0	4	0	0	0	0	0	0	4	0	0	0	4	9
04:15 PM	0	2	0	0	2	0	4	0	0	0	4	0	1	1	0	2	0	3	0	0	0	3	11
04:30 PM	0	1	0	0	1	0	9	0	0	0	9	0	1	0	0	1	0	2	0	0	0	2	13
04:45 PM	0	1	0	0	1	0	3	0	0	0	3	0	1	0	0	1	0	4	0	0	0	4	9
Total	1	4	0	0	5	0	20	0	0	0	20	0	3	1	0	4	0	13	0	0	0	13	42
05:00 PM	0	1	0	0	1	0	5	0	0	0	5	0	0	0	0	0	0	4	0	0	0	4	10
05:15 PM	0	1	0	0	1	0	5	1	0	0	6	0	2	0	0	2	1	3	0	0	0	4	13
05:30 PM	0	1	0	0	1	0	4	0	0	0	4	0	0	0	0	0	0	4	0	0	0	4	9
05:45 PM	0	1	0	0	1	0	3	0	0	0	3	0	2	0	0	2	1	1	0	0	0	2	8
Total	0	4	0	0	4	0	17	1	0	0	18	0	4	0	0	4	2	12	0	0	0	14	40
Grand Total	1	8	0	0	9	0	37	1	0	0	38	0	7	1	0	8	2	25	0	0	0	27	82
Apprch %	11.1	88.9	0	0		0	97.4	2.6	0	0		0	87.5	12.5	0		7.4	92.6	0	0	0		
Total %	1.2	9.8	0	0	11	0	45.1	1.2	0	0	46.3	0	8.5	1.2	0	9.8	2.4	30.5	0	0	0	32.9	

	Ithan Avenue Southbound				Lancaster Avenue Westbound				Ithan Avenue Northbound				Lancaster Avenue Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 05:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 05:00 PM																	
05:00 PM	0	**1**	0	**1**	0	**5**	0	5	0	0	0	0	0	**4**	0	**4**	10
05:15 PM	0	1	0	1	0	5	**1**	**6**	0	**2**	0	**2**	**1**	3	0	4	**13**
05:30 PM	0	1	0	1	0	4	0	4	0	0	0	0	0	4	0	4	9
05:45 PM	0	1	0	1	0	3	0	3	0	2	0	2	1	1	0	2	8
Total Volume	0	4	0	4	0	17	1	18	0	4	0	4	2	12	0	14	40
% App. Total	0	100	0		0	94.4	5.6		0	100	0		14.3	85.7	0		
PHF	.000	1.00	.000	1.00	.000	.850	.250	.750	.000	.500	.000	.500	.500	.750	.000	.875	.769

F. Tavani and Associates, Inc.
105 Kenilworth Street
Philadelphia, PA 19147

Lancaster Avenue & Lowrys Lane

File Name : 03-30LowrPM
Site Code : 00000000
Start Date : 11/8/2012
Page No : 1

Groups Printed- cars - HV

	Lowrys Lane Southbound					Lancaster Avenue Westbound					Lowrys Lane Northbound					Lancaster Avenue Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
04:00 PM	17	17	3	1	38	4	226	4	1	235	13	11	6	3	33	0	254	8	1	263	569
04:15 PM	13	6	3	0	22	3	200	0	0	203	3	2	6	8	19	3	246	6	3	258	502
04:30 PM	22	18	2	1	43	7	200	1	0	208	5	8	4	4	21	1	220	9	0	230	502
04:45 PM	13	11	1	0	25	3	199	1	1	204	10	4	8	10	32	1	232	8	0	241	502
Total	65	52	9	2	128	17	825	6	2	850	31	25	24	25	105	5	952	31	4	992	2075
05:00 PM	30	24	2	0	56	4	265	1	0	270	4	10	3	2	19	0	278	8	0	286	631
05:15 PM	32	12	3	0	47	5	223	0	0	228	7	12	1	7	27	0	327	3	0	330	632
05:30 PM	18	20	2	2	42	4	191	1	0	196	4	8	3	7	22	1	261	4	0	266	526
05:45 PM	16	13	3	0	32	2	208	2	0	212	4	5	8	3	20	1	272	7	0	280	544
Total	96	69	10	2	177	15	887	4	0	906	19	35	15	19	88	2	1138	22	0	1162	2333
Grand Total	161	121	19	4	305	32	1712	10	2	1756	50	60	39	44	193	7	2090	53	4	2154	4408
Apprch %	52.8	39.7	6.2	1.3		1.8	97.5	0.6	0.1		25.9	31.1	20.2	22.8		0.3	97	2.5	0.2		
Total %	3.7	2.7	0.4	0.1	6.9	0.7	38.8	0.2	0	39.8	1.1	1.4	0.9	1	4.4	0.2	47.4	1.2	0.1	48.9	
cars	161	121	19	4	305	32	1681	10	2	1725	47	60	37	44	188	6	2065	49	4	2124	4342
% cars	100	100	100	100	100	100	98.2	100	100	98.2	94	100	94.9	100	97.4	85.7	98.8	92.5	100	98.6	98.5
HV	0	0	0	0	0	0	31	0	0	31	3	0	2	0	5	1	25	4	0	30	66
% HV	0	0	0	0	0	0	1.8	0	0	1.8	6	0	5.1	0	2.6	14.3	1.2	7.5	0	1.4	1.5

	Lowrys Lane Southbound				Lancaster Avenue Westbound				Lowrys Lane Northbound				Lancaster Avenue Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 05:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 05:00 PM																	
05:00 PM	30	**24**	2	**56**	4	**265**	1	**270**	4	10	3	17	0	278	**8**	286	**629**
05:15 PM	**32**	12	**3**	47	**5**	223	0	228	**7**	**12**	1	**20**	0	**327**	3	**330**	625
05:30 PM	18	20	2	40	4	191	1	196	4	8	3	15	**1**	261	4	266	517
05:45 PM	16	13	3	32	2	208	**2**	212	4	5	**8**	17	1	272	7	280	541
Total Volume	96	69	10	175	15	887	4	906	19	35	15	69	2	1138	22	1162	2312
% App. Total	54.9	39.4	5.7		1.7	97.9	0.4		27.5	50.7	21.7		0.2	97.9	1.9		
PHF	.750	.719	.833	.781	.750	.837	.500	.839	.679	.729	.469	.863	.500	.870	.688	.880	.919
cars	96	69	10	175	15	875	4	894	17	35	15	67	2	1128	20	1150	2286
% cars	100	100	100	100	100	98.6	100	98.7	89.5	100	100	97.1	100	99.1	90.9	99.0	98.9
HV	0	0	0	0	0	12	0	12	2	0	0	2	0	10	2	12	26
% HV	0	0	0	0	0	1.4	0	1.3	10.5	0	0	2.9	0	0.9	9.1	1.0	1.1

F. Tavani and Associates, Inc.
105 Kenilworth Street
Philadelphia, PA 19147

Lancaster Avenue & Lowrys Lane

File Name : 03-30LowrPM
Site Code : 00000000
Start Date : 11/8/2012
Page No : 1

Groups Printed- HV

	Lowrys Lane Southbound					Lancaster Avenue Westbound					Lowrys Lane Northbound					Lancaster Avenue Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
04:00 PM	0	0	0	0	0	0	6	0	0	6	1	0	1	0	2	0	1	1	0	2	10
04:15 PM	0	0	0	0	0	0	7	0	0	7	0	0	0	0	0	1	7	1	0	9	16
04:30 PM	0	0	0	0	0	0	2	0	0	2	0	0	1	0	1	0	2	0	0	2	5
04:45 PM	0	0	0	0	0	0	4	0	0	4	0	0	0	0	0	0	5	0	0	5	9
Total	0	0	0	0	0	0	19	0	0	19	1	0	2	0	3	1	15	2	0	18	40
05:00 PM	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	1	0	0	1	4
05:15 PM	0	0	0	0	0	0	3	0	0	3	2	0	0	0	2	0	3	0	0	3	8
05:30 PM	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	2	1	0	3	6
05:45 PM	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	4	1	0	5	8
Total	0	0	0	0	0	0	12	0	0	12	2	0	0	0	2	0	10	2	0	12	26
Grand Total	0	0	0	0	0	0	31	0	0	31	3	0	2	0	5	1	25	4	0	30	66
Apprch %	0	0	0	0		0	100	0	0		60	0	40	0		3.3	83.3	13.3	0		
Total %	0	0	0	0	0	0	47	0	0	47	4.5	0	3	0	7.6	1.5	37.9	6.1	0	45.5	

	Lowrys Lane Southbound				Lancaster Avenue Westbound				Lowrys Lane Northbound				Lancaster Avenue Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 05:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 05:00 PM																	
05:00 PM	0	0	0	0	0	**3**	0	**3**	0	0	0	0	0	1	0	1	4
05:15 PM	0	0	0	0	0	3	0	3	**2**	0	0	**2**	0	3	0	3	**8**
05:30 PM	0	0	0	0	0	3	0	3	0	0	0	0	0	2	**1**	3	6
05:45 PM	0	0	0	0	0	3	0	3	0	0	0	0	0	**4**	1	**5**	8
Total Volume	0	0	0	0	0	12	0	12	2	0	0	2	0	10	2	12	26
% App. Total	0	0	0		0	100	0		100	0	0		0	83.3	16.7		
PHF	.000	.000	.000	.000	.000	1.00	.000	1.00	.250	.000	.000	.250	.000	.625	.500	.600	.813

F. Tavani and Associates, Inc.
105 Kenilworth Street
Philadelphia, PA 19147

Lancaster & Garrett Avenues

File Name : 04-30GarPM
Site Code : 21102772
Start Date : 11/8/2012
Page No : 1

Groups Printed- cars - HV

	Lancaster Avenue Westbound				Garrett Avenue Northbound				Lancaster Avenue Eastbound				
Start Time	Left	Thru	Peds	App. Total	Left	Right	Peds	App. Total	Thru	Right	Peds	App. Total	Int. Total
04:00 PM	9	0	0	9	3	13	4	20	0	10	0	10	39
04:15 PM	14	0	0	14	0	4	7	11	0	10	0	10	35
04:30 PM	9	0	0	9	0	7	5	12	0	9	0	9	30
04:45 PM	11	0	0	11	1	8	8	17	0	6	0	6	34
Total	43	0	0	43	4	32	24	60	0	35	0	35	138
05:00 PM	10	0	0	10	2	17	3	22	0	11	0	11	43
05:15 PM	16	0	0	16	2	3	7	12	0	14	0	14	42
05:30 PM	16	0	0	16	2	9	2	13	0	12	0	12	41
05:45 PM	5	0	0	5	0	8	5	13	0	9	0	9	27
Total	47	0	0	47	6	37	17	60	0	46	0	46	153
Grand Total	90	0	0	90	10	69	41	120	0	81	0	81	291
Apprch %	100	0	0		8.3	57.5	34.2		0	100	0		
Total %	30.9	0	0	30.9	3.4	23.7	14.1	41.2	0	27.8	0	27.8	
cars	90	0	0	90	10	69	41	120	0	81	0	81	291
% cars	100	0	0	100	100	100	100	100	0	100	0	100	100
HV	0	0	0	0	0	0	0	0	0	0	0	0	0
% HV	0	0	0	0	0	0	0	0	0	0	0	0	0

	Lancaster Avenue Westbound			Garrett Avenue Northbound			Lancaster Avenue Eastbound			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 05:00 PM to 05:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 05:00 PM										
05:00 PM	10	0	10	**2**	**17**	**19**	0	11	11	**40**
05:15 PM	**16**	0	**16**	2	3	5	0	**14**	**14**	35
05:30 PM	16	0	16	2	9	11	0	12	12	39
05:45 PM	5	0	5	0	8	8	0	9	9	22
Total Volume	47	0	47	6	37	43	0	46	46	136
% App. Total	100	0		14	86		0	100		
PHF	.734	.000	.734	.750	.544	.566	.000	.821	.821	.850
cars	47	0	47	6	37	43	0	46	46	136
% cars	100	0	100	100	100	100	0	100	100	100
HV	0	0	0	0	0	0	0	0	0	0
% HV	0	0	0	0	0	0	0	0	0	0

F. Tavani and Associates, Inc.
105 Kenilworth Street
Philadelphia, PA 19147

Lancaster & Garrett Avenues

File Name : 04-30GarPM
Site Code : 21102772
Start Date : 11/8/2012
Page No : 1

Groups Printed- HV

	Lancaster Avenue Westbound				Garrett Avenue Northbound				Lancaster Avenue Eastbound				
Start Time	Left	Thru	Peds	App. Total	Left	Right	Peds	App. Total	Thru	Right	Peds	App. Total	Int. Total
04:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
04:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
04:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
04:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0
05:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
05:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
05:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
05:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	0	0	0	0	0	0	0	0	0	0	0	0	0
Apprch %	0	0	0		0	0	0		0	0	0		
Total %													

	Lancaster Avenue Westbound			Garrett Avenue Northbound			Lancaster Avenue Eastbound			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 05:00 PM to 05:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 05:00 PM										
05:00 PM	0	0	0	0	0	0	0	0	0	0
05:15 PM	0	0	0	0	0	0	0	0	0	0
05:30 PM	0	0	0	0	0	0	0	0	0	0
05:45 PM	0	0	0	0	0	0	0	0	0	0
Total Volume	0	0	0	0	0	0	0	0	0	0
% App. Total	0	0		0	0		0	0		
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000

F. Tavani and Associates, Inc.
105 Kenilworth Street
Philadelphia, PA 19147

Sproul & Conestoga Roads

File Name : 05-SprConPM
Site Code : 00000000
Start Date : 11/14/2012
Page No : 1

Groups Printed- cars - HV

	Spoul Road Southbound					Conestoga Road Westbound					Spoul Road Northbound					Conestoga Road Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
04:00 PM	20	48	20	0	88	11	112	8	0	131	16	32	2	0	50	18	99	51	0	168	437
04:15 PM	9	67	19	0	95	6	140	10	0	156	30	33	4	0	67	24	115	40	0	179	497
04:30 PM	12	55	20	0	87	10	114	11	0	135	23	35	5	0	63	33	105	50	0	188	473
04:45 PM	9	88	23	0	120	13	124	10	0	147	37	54	4	0	95	24	130	67	0	221	583
Total	50	258	82	0	390	40	490	39	0	569	106	154	15	0	275	99	449	208	0	756	1990
05:00 PM	13	75	24	0	112	7	125	6	0	138	27	41	7	0	75	29	126	54	0	209	534
05:15 PM	11	72	25	0	108	11	155	11	0	177	19	36	9	0	64	32	136	58	0	226	575
05:30 PM	13	69	11	0	93	3	119	15	0	137	30	61	8	0	99	19	140	49	1	209	538
05:45 PM	13	71	21	0	105	6	115	14	0	135	27	44	3	0	74	23	139	53	0	215	529
Total	50	287	81	0	418	27	514	46	0	587	103	182	27	0	312	103	541	214	1	859	2176
Grand Total	100	545	163	0	808	67	1004	85	0	1156	209	336	42	0	587	202	990	422	1	1615	4166
Apprch %	12.4	67.5	20.2	0		5.8	86.9	7.4	0		35.6	57.2	7.2	0		12.5	61.3	26.1	0.1		
Total %	2.4	13.1	3.9	0	19.4	1.6	24.1	2	0	27.7	5	8.1	1	0	14.1	4.8	23.8	10.1	0	38.8	
cars	99	537	161	0	797	62	986	82	0	1130	205	330	41	0	576	197	984	420	1	1602	4105
% cars	99	98.5	98.8	0	98.6	92.5	98.2	96.5	0	97.8	98.1	98.2	97.6	0	98.1	97.5	99.4	99.5	100	99.2	98.5
HV	1	8	2	0	11	5	18	3	0	26	4	6	1	0	11	5	6	2	0	13	61
% HV	1	1.5	1.2	0	1.4	7.5	1.8	3.5	0	2.2	1.9	1.8	2.4	0	1.9	2.5	0.6	0.5	0	0.8	1.5

	Spoul Road Southbound				Conestoga Road Westbound				Spoul Road Northbound				Conestoga Road Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 05:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 05:00 PM																	
05:00 PM	**13**	**75**	24	**112**	7	125	6	138	27	41	7	75	29	126	54	209	534
05:15 PM	11	72	**25**	108	**11**	**155**	11	**177**	19	36	**9**	64	**32**	136	**58**	**226**	**575**
05:30 PM	13	69	11	93	3	119	**15**	137	**30**	**61**	8	**99**	19	**140**	49	208	537
05:45 PM	13	71	21	105	6	115	14	135	27	44	3	74	23	139	53	215	529
Total Volume	50	287	81	418	27	514	46	587	103	182	27	312	103	541	214	858	2175
% App. Total	12	68.7	19.4		4.6	87.6	7.8		33	58.3	8.7		12	63.1	24.9		
PHF	.962	.957	.810	.933	.614	.829	.767	.829	.858	.746	.750	.788	.805	.966	.922	.949	.946
cars	50	284	80	414	24	510	45	579	102	179	27	308	102	538	213	853	2154
% cars	100	99.0	98.8	99.0	88.9	99.2	97.8	98.6	99.0	98.4	100	98.7	99.0	99.4	99.5	99.4	99.0
HV	0	3	1	4	3	4	1	8	1	3	0	4	1	3	1	5	21
% HV	0	1.0	1.2	1.0	11.1	0.8	2.2	1.4	1.0	1.6	0	1.3	1.0	0.6	0.5	0.6	1.0

F. Tavani and Associates, Inc.
105 Kenilworth Street
Philadelphia, PA 19147

Sproul & Conestoga Roads

File Name : 05-SprConPM
Site Code : 00000000
Start Date : 11/14/2012
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Groups Printed- HV

	Spoul Road Southbound					Conestoga Road Westbound					Spoul Road Northbound					Conestoga Road Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
04:00 PM	1	1	0	0	2	1	9	1	0	11	0	1	0	0	1	2	2	0	0	4	18
04:15 PM	0	2	1	0	3	0	4	0	0	4	1	1	0	0	2	2	0	0	0	2	11
04:30 PM	0	0	0	0	0	0	1	1	0	2	2	0	0	0	2	0	1	1	0	2	6
04:45 PM	0	2	0	0	2	1	0	0	0	1	0	1	1	0	2	0	0	0	0	0	5
Total	1	5	1	0	7	2	14	2	0	18	3	3	1	0	7	4	3	1	0	8	40
05:00 PM	0	2	1	0	3	0	1	1	0	2	1	3	0	0	4	0	1	0	0	1	10
05:15 PM	0	1	0	0	1	2	2	0	0	4	0	0	0	0	0	0	1	0	0	1	6
05:30 PM	0	0	0	0	0	1	1	0	0	2	0	0	0	0	0	0	0	1	0	1	3
05:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	2	2
Total	0	3	1	0	4	3	4	1	0	8	1	3	0	0	4	1	3	1	0	5	21
Grand Total	1	8	2	0	11	5	18	3	0	26	4	6	1	0	11	5	6	2	0	13	61
Apprch %	9.1	72.7	18.2	0		19.2	69.2	11.5	0		36.4	54.5	9.1	0		38.5	46.2	15.4	0		
Total %	1.6	13.1	3.3	0	18	8.2	29.5	4.9	0	42.6	6.6	9.8	1.6	0	18	8.2	9.8	3.3	0	21.3	

	Spoul Road Southbound				Conestoga Road Westbound				Spoul Road Northbound				Conestoga Road Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 05:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 05:00 PM																	
05:00 PM	0	**2**	**1**	**3**	0	1	**1**	2	**1**	**3**	0	**4**	0	**1**	0	1	**10**
05:15 PM	0	1	0	1	**2**	**2**	0	**4**	0	0	0	0	0	1	0	1	6
05:30 PM	0	0	0	0	1	1	0	2	0	0	0	0	0	0	**1**	1	3
05:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	**1**	1	0	**2**	2
Total Volume	0	3	1	4	3	4	1	8	1	3	0	4	1	3	1	5	21
% App. Total	0	75	25		37.5	50	12.5		25	75	0		20	60	20		
PHF	.000	.375	.250	.333	.375	.500	.250	.500	.250	.250	.000	.250	.250	.750	.250	.625	.525

F. Tavani and Associates, Inc.
105 Kenilworth Street
Philadelphia, PA 19147

Conestoga & Spring Mill Roads

File Name : 06-ConSpMPM
Site Code : 00000000
Start Date : 11/14/2012
Page No : 1

Groups Printed- cars - HV

	Spring Mill Road Southbound				Conestoga Road Westbound				Conestoga Road Eastbound				
Start Time	Left	Right	Peds	App. Total	Thru	Right	Peds	App. Total	Left	Thru	Peds	App. Total	Int. Total
04:00 PM	5	3	0	8	165	1	0	166	1	122	0	123	297
04:15 PM	2	3	0	5	141	1	0	142	1	129	0	130	277
04:30 PM	2	6	0	8	141	2	0	143	3	128	0	131	282
04:45 PM	0	2	0	2	147	1	0	148	1	148	0	149	299
Total	9	14	0	23	594	5	0	599	6	527	0	533	1155
05:00 PM	3	1	0	4	142	0	0	142	2	151	0	153	299
05:15 PM	3	2	0	5	172	1	0	173	3	156	0	159	337
05:30 PM	5	5	0	10	144	0	0	144	4	173	0	177	331
05:45 PM	6	1	0	7	149	2	0	151	1	166	0	167	325
Total	17	9	0	26	607	3	0	610	10	646	0	656	1292
Grand Total	26	23	0	49	1201	8	0	1209	16	1173	0	1189	2447
Apprch %	53.1	46.9	0		99.3	0.7	0		1.3	98.7	0		
Total %	1.1	0.9	0	2	49.1	0.3	0	49.4	0.7	47.9	0	48.6	
cars	25	21	0	46	1174	8	0	1182	15	1163	0	1178	2406
% cars	96.2	91.3	0	93.9	97.8	100	0	97.8	93.8	99.1	0	99.1	98.3
HV	1	2	0	3	27	0	0	27	1	10	0	11	41
% HV	3.8	8.7	0	6.1	2.2	0	0	2.2	6.2	0.9	0	0.9	1.7

	Spring Mill Road Southbound			Conestoga Road Westbound			Conestoga Road Eastbound			
Start Time	Left	Right	App. Total	Thru	Right	App. Total	Left	Thru	App. Total	Int. Total
Peak Hour Analysis From 05:00 PM to 05:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 05:00 PM										
05:00 PM	3	1	4	142	0	142	2	151	153	299
05:15 PM	3	2	5	**172**	1	**173**	3	156	159	**337**
05:30 PM	5	**5**	**10**	144	0	144	**4**	**173**	**177**	331
05:45 PM	**6**	1	7	149	**2**	151	1	166	167	325
Total Volume	17	9	26	607	3	610	10	646	656	1292
% App. Total	65.4	34.6		99.5	0.5		1.5	98.5		
PHF	.708	.450	.650	.882	.375	.882	.625	.934	.927	.958
cars	17	8	25	601	3	604	10	644	654	1283
% cars	100	88.9	96.2	99.0	100	99.0	100	99.7	99.7	99.3
HV	0	1	1	6	0	6	0	2	2	9
% HV	0	11.1	3.8	1.0	0	1.0	0	0.3	0.3	0.7

F. Tavani and Associates, Inc.
105 Kenilworth Street
Philadelphia, PA 19147

Conestoga & Spring Mill Roads

File Name : 06-ConSpMPM
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Groups Printed- HV

	Spring Mill Road Southbound				Conestoga Road Westbound				Conestoga Road Eastbound				
Start Time	Left	Right	Peds	App. Total	Thru	Right	Peds	App. Total	Left	Thru	Peds	App. Total	Int. Total
04:00 PM	1	0	0	1	11	0	0	11	1	4	0	5	17
04:15 PM	0	0	0	0	6	0	0	6	0	0	0	0	6
04:30 PM	0	1	0	1	1	0	0	1	0	3	0	3	5
04:45 PM	0	0	0	0	3	0	0	3	0	1	0	1	4
Total	1	1	0	2	21	0	0	21	1	8	0	9	32
05:00 PM	0	0	0	0	2	0	0	2	0	1	0	1	3
05:15 PM	0	0	0	0	3	0	0	3	0	0	0	0	3
05:30 PM	0	1	0	1	1	0	0	1	0	0	0	0	2
05:45 PM	0	0	0	0	0	0	0	0	0	1	0	1	1
Total	0	1	0	1	6	0	0	6	0	2	0	2	9
Grand Total	1	2	0	3	27	0	0	27	1	10	0	11	41
Apprch %	33.3	66.7	0		100	0	0		9.1	90.9	0		
Total %	2.4	4.9	0	7.3	65.9	0	0	65.9	2.4	24.4	0	26.8	

	Spring Mill Road Southbound			Conestoga Road Westbound			Conestoga Road Eastbound			
Start Time	Left	Right	App. Total	Thru	Right	App. Total	Left	Thru	App. Total	Int. Total
Peak Hour Analysis From 05:00 PM to 05:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 05:00 PM										
05:00 PM	0	0	0	2	0	2	0	**1**	**1**	**3**
05:15 PM	0	0	0	**3**	0	**3**	0	0	0	3
05:30 PM	0	**1**	**1**	1	0	1	0	0	0	2
05:45 PM	0	0	0	0	0	0	0	1	1	1
Total Volume	0	1	1	6	0	6	0	2	2	9
% App. Total	0	100		100	0		0	100		
PHF	.000	.250	.250	.500	.000	.500	.000	.500	.500	.750

F. Tavani and Associates, Inc.
105 Kenilworth Street
Philadelphia, PA 19147

Conestoga Road & Ithan Avenue

File Name : 07-ConIthPM
Site Code : 00000000
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Groups Printed- cars - HV

	Ithan Avenue Southbound					Conestoga Road Westbound					Ithan Avenue Northbound					Conestoga Road Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
04:00 PM	15	29	52	0	96	3	99	8	1	111	1	3	1	0	5	19	111	2	0	132	344
04:15 PM	13	18	43	1	75	2	111	9	1	123	0	7	2	0	9	16	101	1	0	118	325
04:30 PM	12	32	30	2	76	2	121	8	0	131	1	8	2	0	11	15	112	0	0	127	345
04:45 PM	8	23	36	0	67	2	107	12	0	121	2	5	0	0	7	27	105	2	0	134	329
Total	48	102	161	3	314	9	438	37	2	486	4	23	5	0	32	77	429	5	0	511	1343
05:00 PM	17	36	45	0	98	2	125	11	1	139	1	4	1	0	6	20	134	1	0	155	398
05:15 PM	9	27	24	0	60	2	118	9	1	130	3	6	1	0	10	14	119	0	2	135	335
05:30 PM	10	11	21	0	42	2	115	7	0	124	2	5	2	0	9	15	131	4	0	150	325
05:45 PM	16	12	44	0	72	5	104	12	0	121	1	3	2	0	6	14	128	2	0	144	343
Total	52	86	134	0	272	11	462	39	2	514	7	18	6	0	31	63	512	7	2	584	1401
Grand Total	100	188	295	3	586	20	900	76	4	1000	11	41	11	0	63	140	941	12	2	1095	2744
Apprch %	17.1	32.1	50.3	0.5		2	90	7.6	0.4		17.5	65.1	17.5	0		12.8	85.9	1.1	0.2		
Total %	3.6	6.9	10.8	0.1	21.4	0.7	32.8	2.8	0.1	36.4	0.4	1.5	0.4	0	2.3	5.1	34.3	0.4	0.1	39.9	
cars	100	187	285	3	575	20	885	73	4	982	9	40	11	0	60	138	931	12	2	1083	2700
% cars	100	99.5	96.6	100	98.1	100	98.3	96.1	100	98.2	81.8	97.6	100	0	95.2	98.6	98.9	100	100	98.9	98.4
HV	0	1	10	0	11	0	15	3	0	18	2	1	0	0	3	2	10	0	0	12	44
% HV	0	0.5	3.4	0	1.9	0	1.7	3.9	0	1.8	18.2	2.4	0	0	4.8	1.4	1.1	0	0	1.1	1.6

	Ithan Avenue Southbound				Conestoga Road Westbound				Ithan Avenue Northbound				Conestoga Road Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 05:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 05:00 PM																	
05:00 PM	**17**	**36**	**45**	**98**	2	**125**	11	**138**	1	4	1	6	**20**	**134**	1	**155**	**397**
05:15 PM	9	27	24	60	2	118	9	129	**3**	**6**	1	**10**	14	119	0	133	332
05:30 PM	10	11	21	42	2	115	7	124	2	5	**2**	9	15	131	**4**	150	325
05:45 PM	16	12	44	72	**5**	104	**12**	121	1	3	2	6	14	128	2	144	343
Total Volume	52	86	134	272	11	462	39	512	7	18	6	31	63	512	7	582	1397
% App. Total	19.1	31.6	49.3		2.1	90.2	7.6		22.6	58.1	19.4		10.8	88	1.2		
PHF	.765	.597	.744	.694	.550	.924	.813	.928	.583	.750	.750	.775	.788	.955	.438	.939	.880
cars	52	86	129	267	11	462	38	511	5	18	6	29	63	510	7	580	1387
% cars	100	100	96.3	98.2	100	100	97.4	99.8	71.4	100	100	93.5	100	99.6	100	99.7	99.3
HV	0	0	5	5	0	0	1	1	2	0	0	2	0	2	0	2	10
% HV	0	0	3.7	1.8	0	0	2.6	0.2	28.6	0	0	6.5	0	0.4	0	0.3	0.7

F. Tavani and Associates, Inc.
105 Kenilworth Street
Philadelphia, PA 19147

Conestoga Road & Ithan Avenue

File Name : 07-ConIthPM
Site Code : 00000000
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Groups Printed- HV

	Ithan Avenue Southbound					Conestoga Road Westbound					Ithan Avenue Northbound					Conestoga Road Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
04:00 PM	0	0	3	0	3	0	7	1	0	8	0	1	0	0	1	0	2	0	0	2	14
04:15 PM	0	0	1	0	1	0	5	1	0	6	0	0	0	0	0	0	2	0	0	2	9
04:30 PM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1	4	0	0	5	6
04:45 PM	0	1	1	0	2	0	2	0	0	2	0	0	0	0	0	1	0	0	0	1	5
Total	0	1	5	0	6	0	15	2	0	17	0	1	0	0	1	2	8	0	0	10	34
05:00 PM	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	3
05:15 PM	0	0	2	0	2	0	0	1	0	1	2	0	0	0	2	0	1	0	0	1	6
05:30 PM	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
05:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	5	0	5	0	0	1	0	1	2	0	0	0	2	0	2	0	0	2	10
Grand Total	0	1	10	0	11	0	15	3	0	18	2	1	0	0	3	2	10	0	0	12	44
Apprch %	0	9.1	90.9	0		0	83.3	16.7	0		66.7	33.3	0	0		16.7	83.3	0	0		
Total %	0	2.3	22.7	0	25	0	34.1	6.8	0	40.9	4.5	2.3	0	0	6.8	4.5	22.7	0	0	27.3	

	Ithan Avenue Southbound				Conestoga Road Westbound				Ithan Avenue Northbound				Conestoga Road Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 05:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 05:00 PM																	
05:00 PM	0	0	**2**	**2**	0	0	0	0	0	0	0	0	0	**1**	0	**1**	3
05:15 PM	0	0	2	2	0	0	**1**	**1**	**2**	0	0	**2**	0	1	0	1	**6**
05:30 PM	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1
05:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Volume	0	0	5	5	0	0	1	1	2	0	0	2	0	2	0	2	10
% App. Total	0	0	100		0	0	100		100	0	0		0	100	0		
PHF	.000	.000	.625	.625	.000	.000	.250	.250	.250	.000	.000	.250	.000	.500	.000	.500	.417

F. Tavani and Associates, Inc.
105 Kenilworth Street
Philadelphia, PA 19147

Conestoga Road & Lowrys Lane/Strathmore Drive

File Name : 08-ConLowPM
Site Code : 00000000
Start Date : 11/14/2012
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Groups Printed- cars - HV

	Lowrys Lane Southbound					Conestoga Road Westbound					Strathmore Drive Northbound					Conestoga Road Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
04:00 PM	3	7	13	2	25	6	115	5	0	126	2	5	5	0	12	15	101	2	0	118	281
04:15 PM	0	5	7	0	12	3	107	1	0	111	3	2	8	1	14	8	110	4	0	122	259
04:30 PM	4	7	18	0	29	2	108	4	1	115	9	4	5	0	18	12	111	4	0	127	289
04:45 PM	1	1	9	0	11	6	111	1	0	118	6	1	2	0	9	12	103	5	0	120	258
Total	8	20	47	2	77	17	441	11	1	470	20	12	20	1	53	47	425	15	0	487	1087
05:00 PM	3	4	17	0	24	4	131	3	0	138	1	5	4	0	10	9	115	2	0	126	298
05:15 PM	2	3	9	0	14	5	111	5	0	121	4	2	3	0	9	11	123	5	0	139	283
05:30 PM	3	3	11	0	17	3	109	3	0	115	2	1	6	0	9	8	119	5	1	133	274
05:45 PM	1	7	15	0	23	5	105	5	0	115	8	0	4	1	13	8	137	5	0	150	301
Total	9	17	52	0	78	17	456	16	0	489	15	8	17	1	41	36	494	17	1	548	1156
Grand Total	17	37	99	2	155	34	897	27	1	959	35	20	37	2	94	83	919	32	1	1035	2243
Apprch %	11	23.9	63.9	1.3		3.5	93.5	2.8	0.1		37.2	21.3	39.4	2.1		8	88.8	3.1	0.1		
Total %	0.8	1.6	4.4	0.1	6.9	1.5	40	1.2	0	42.8	1.6	0.9	1.6	0.1	4.2	3.7	41	1.4	0	46.1	
cars	16	33	98	2	149	32	883	26	1	942	35	20	35	2	92	82	907	31	1	1021	2204
% cars	94.1	89.2	99	100	96.1	94.1	98.4	96.3	100	98.2	100	100	94.6	100	97.9	98.8	98.7	96.9	100	98.6	98.3
HV	1	4	1	0	6	2	14	1	0	17	0	0	2	0	2	1	12	1	0	14	39
% HV	5.9	10.8	1	0	3.9	5.9	1.6	3.7	0	1.8	0	0	5.4	0	2.1	1.2	1.3	3.1	0	1.4	1.7

	Lowrys Lane Southbound				Conestoga Road Westbound				Strathmore Drive Northbound				Conestoga Road Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 05:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 05:00 PM																	
05:00 PM	**3**	4	**17**	**24**	4	**131**	3	**138**	1	**5**	4	10	9	115	2	126	298
05:15 PM	2	3	9	14	**5**	111	**5**	121	4	2	3	9	**11**	123	**5**	139	283
05:30 PM	3	3	11	17	3	109	3	115	2	1	**6**	9	8	119	5	132	273
05:45 PM	1	**7**	15	23	5	105	5	115	**8**	0	4	**12**	8	**137**	5	**150**	**300**
Total Volume	9	17	52	78	17	456	16	489	15	8	17	40	36	494	17	547	1154
% App. Total	11.5	21.8	66.7		3.5	93.3	3.3		37.5	20	42.5		6.6	90.3	3.1		
PHF	.750	.607	.765	.813	.850	.870	.800	.886	.469	.400	.708	.833	.818	.901	.850	.912	.962
cars	9	15	52	76	16	455	16	487	15	8	17	40	36	491	17	544	1147
% cars	100	88.2	100	97.4	94.1	99.8	100	99.6	100	100	100	100	100	99.4	100	99.5	99.4
HV	0	2	0	2	1	1	0	2	0	0	0	0	0	3	0	3	7
% HV	0	11.8	0	2.6	5.9	0.2	0	0.4	0	0	0	0	0	0.6	0	0.5	0.6

F. Tavani and Associates, Inc.
105 Kenilworth Street
Philadelphia, PA 19147

Conestoga Road & Lowrys Lane/Strathmore Drive

File Name : 08-ConLowPM
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Groups Printed- HV

	Lowrys Lane Southbound					Conestoga Road Westbound					Strathmore Drive Northbound					Conestoga Road Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
04:00 PM	1	0	1	0	2	0	5	1	0	6	0	0	1	0	1	1	2	0	0	3	12
04:15 PM	0	1	0	0	1	1	4	0	0	5	0	0	1	0	1	0	0	0	0	0	7
04:30 PM	0	1	0	0	1	0	1	0	0	1	0	0	0	0	0	0	6	0	0	6	8
04:45 PM	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	1	1	0	2	5
Total	1	2	1	0	4	1	13	1	0	15	0	0	2	0	2	1	9	1	0	11	32
05:00 PM	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
05:15 PM	0	2	0	0	2	0	1	0	0	1	0	0	0	0	0	0	2	0	0	2	5
05:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
Total	0	2	0	0	2	1	1	0	0	2	0	0	0	0	0	0	3	0	0	3	7
Grand Total	1	4	1	0	6	2	14	1	0	17	0	0	2	0	2	1	12	1	0	14	39
Apprch %	16.7	66.7	16.7	0		11.8	82.4	5.9	0		0	0	100	0		7.1	85.7	7.1	0		
Total %	2.6	10.3	2.6	0	15.4	5.1	35.9	2.6	0	43.6	0	0	5.1	0	5.1	2.6	30.8	2.6	0	35.9	

	Lowrys Lane Southbound				Conestoga Road Westbound				Strathmore Drive Northbound				Conestoga Road Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 05:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 05:00 PM																	
05:00 PM	0	0	0	0	**1**	0	0	**1**	0	0	0	0	0	0	0	0	1
05:15 PM	0	**2**	0	**2**	0	**1**	0	1	0	0	0	0	0	**2**	0	**2**	**5**
05:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1
Total Volume	0	2	0	2	1	1	0	2	0	0	0	0	0	3	0	3	7
% App. Total	0	100	0		50	50	0		0	0	0		0	100	0		
PHF	.000	.250	.000	.250	.250	.250	.000	.500	.000	.000	.000	.000	.000	.375	.000	.375	.350

F. Tavani and Associates, Inc.
105 Kenilworth Street
Philadelphia, PA 19147

Conestoga Road & Garrett Avenue/
Williams Road

File Name : 09-ConGarPM
Site Code : 21102702
Start Date : 11/14/2012
Page No : 1

Groups Printed- cars - HV

	Garrett Avenue Southbound					Conestoga Road Westbound					Williams Road Northbound					Conestoga Road Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
04:00 PM	11	2	8	0	21	3	114	6	0	123	2	1	2	0	5	7	94	6	1	108	257
04:15 PM	3	6	15	1	25	5	107	1	0	113	1	1	5	3	10	8	116	1	1	126	274
04:30 PM	11	3	17	1	32	6	111	6	0	123	5	2	3	2	12	7	108	4	1	120	287
04:45 PM	9	7	13	0	29	1	104	3	1	109	4	2	2	0	8	12	91	3	0	106	252
Total	34	18	53	2	107	15	436	16	1	468	12	6	12	5	35	34	409	14	3	460	1070
05:00 PM	9	3	10	0	22	6	147	7	0	160	5	0	4	8	17	13	111	1	0	125	324
05:15 PM	6	2	16	0	24	2	118	4	0	124	3	0	1	4	8	4	135	0	0	139	295
05:30 PM	5	1	11	0	17	2	103	10	0	115	3	0	3	2	8	4	117	1	0	122	262
05:45 PM	7	6	14	0	27	2	118	7	2	129	5	1	3	3	12	5	125	7	0	137	305
Total	27	12	51	0	90	12	486	28	2	528	16	1	11	17	45	26	488	9	0	523	1186
Grand Total	61	30	104	2	197	27	922	44	3	996	28	7	23	22	80	60	897	23	3	983	2256
Apprch %	31	15.2	52.8	1		2.7	92.6	4.4	0.3		35	8.8	28.8	27.5		6.1	91.3	2.3	0.3		
Total %	2.7	1.3	4.6	0.1	8.7	1.2	40.9	2	0.1	44.1	1.2	0.3	1	1	3.5	2.7	39.8	1	0.1	43.6	
cars	61	30	104	2	197	27	922	44	3	996	28	7	23	22	80	60	897	23	3	983	2256
% cars	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
HV	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% HV	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

	Garrett Avenue Southbound				Conestoga Road Westbound				Williams Road Northbound				Conestoga Road Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 05:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 05:00 PM																	
05:00 PM	**9**	3	10	22	**6**	**147**	7	**160**	**5**	0	**4**	**9**	**13**	111	1	125	**316**
05:15 PM	6	2	**16**	24	2	118	4	124	3	0	1	4	4	**135**	0	**139**	291
05:30 PM	5	1	11	17	2	103	**10**	115	3	0	3	6	4	117	1	122	260
05:45 PM	7	**6**	14	**27**	2	118	7	127	5	**1**	3	9	5	125	**7**	137	300
Total Volume	27	12	51	90	12	486	28	526	16	1	11	28	26	488	9	523	1167
% App. Total	30	13.3	56.7		2.3	92.4	5.3		57.1	3.6	39.3		5	93.3	1.7		
PHF	.750	.500	.797	.833	.500	.827	.700	.822	.800	.250	.688	.778	.500	.904	.321	.941	.923
cars	27	12	51	90	12	486	28	526	16	1	11	28	26	488	9	523	1167
% cars	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
HV	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% HV	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

F. Tavani and Associates, Inc.
105 Kenilworth Street
Philadelphia, PA 19147

Conestoga Road & Garrett Avenue/
Williams Road

File Name : 09-ConGarPM
Site Code : 21102702
Start Date : 11/14/2012
Page No : 1

Groups Printed- HV

	Garrett Avenue Southbound					Conestoga Road Westbound					Williams Road Northbound					Conestoga Road Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
04:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Apprch %	0	0	0	0		0	0	0	0		0	0	0	0		0	0	0	0		
Total %																					

	Garrett Avenue Southbound				Conestoga Road Westbound				Williams Road Northbound				Conestoga Road Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 05:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 05:00 PM																	
05:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
05:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Volume	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% App. Total	0	0	0		0	0	0		0	0	0		0	0	0		
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000

F. Tavani and Associates, Inc.
105 Kenilworth Street
Philadelphia, PA 19147

Spring Mill and County Line Roads

File Name : 10-SpMCoLPM
Site Code : 00000000
Start Date : 11/13/2012
Page No : 1

Groups Printed- cars - HV

	County Line Road Southbound					Spring MIll Road Westbound					County Line Road Northbound					Spring MIll Road Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
04:00 PM	13	54	13	0	80	9	59	10	0	78	13	46	9	0	68	15	55	20	6	96	322
04:15 PM	11	45	13	1	70	11	65	9	0	85	9	45	17	0	71	16	74	22	1	113	339
04:30 PM	10	61	10	0	81	11	52	12	0	75	18	40	12	0	70	17	80	16	6	119	345
04:45 PM	9	48	8	2	67	9	45	15	0	69	17	33	8	0	58	16	60	30	3	109	303
Total	43	208	44	3	298	40	221	46	0	307	57	164	46	0	267	64	269	88	16	437	1309
05:00 PM	21	100	11	0	132	4	65	8	0	77	15	57	10	0	82	15	76	27	8	126	417
05:15 PM	15	101	16	0	132	16	53	16	0	85	17	64	14	0	95	14	77	22	7	120	432
05:30 PM	17	79	8	0	104	19	53	20	0	92	17	40	7	0	64	22	83	22	4	131	391
05:45 PM	11	110	9	0	130	16	69	7	0	92	22	38	6	0	66	12	64	22	2	100	388
Total	64	390	44	0	498	55	240	51	0	346	71	199	37	0	307	63	300	93	21	477	1628
Grand Total	107	598	88	3	796	95	461	97	0	653	128	363	83	0	574	127	569	181	37	914	2937
Apprch %	13.4	75.1	11.1	0.4		14.5	70.6	14.9	0		22.3	63.2	14.5	0		13.9	62.3	19.8	4		
Total %	3.6	20.4	3	0.1	27.1	3.2	15.7	3.3	0	22.2	4.4	12.4	2.8	0	19.5	4.3	19.4	6.2	1.3	31.1	
cars	107	591	83	3	784	95	451	96	0	642	128	363	82	0	573	127	555	180	37	899	2898
% cars	100	98.8	94.3	100	98.5	100	97.8	99	0	98.3	100	100	98.8	0	99.8	100	97.5	99.4	100	98.4	98.7
HV	0	7	5	0	12	0	10	1	0	11	0	0	1	0	1	0	14	1	0	15	39
% HV	0	1.2	5.7	0	1.5	0	2.2	1	0	1.7	0	0	1.2	0	0.2	0	2.5	0.6	0	1.6	1.3

	County Line Road Southbound				Spring MIll Road Westbound				County Line Road Northbound				Spring MIll Road Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 05:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 05:00 PM																	
05:00 PM	**21**	100	11	**132**	4	65	8	77	15	57	10	82	15	76	**27**	118	409
05:15 PM	15	101	**16**	132	16	53	16	85	17	**64**	**14**	**95**	14	77	22	113	**425**
05:30 PM	17	79	8	104	**19**	53	**20**	**92**	17	40	7	64	**22**	**83**	22	**127**	387
05:45 PM	11	**110**	9	130	16	**69**	7	92	**22**	38	6	66	12	64	22	98	386
Total Volume	64	390	44	498	55	240	51	346	71	199	37	307	63	300	93	456	1607
% App. Total	12.9	78.3	8.8		15.9	69.4	14.7		23.1	64.8	12.1		13.8	65.8	20.4		
PHF	.762	.886	.688	.943	.724	.870	.638	.940	.807	.777	.661	.808	.716	.904	.861	.898	.945
cars	64	386	41	491	55	234	51	340	71	199	37	307	63	296	93	452	1590
% cars	100	99.0	93.2	98.6	100	97.5	100	98.3	100	100	100	100	100	98.7	100	99.1	98.9
HV	0	4	3	7	0	6	0	6	0	0	0	0	0	4	0	4	17
% HV	0	1.0	6.8	1.4	0	2.5	0	1.7	0	0	0	0	0	1.3	0	0.9	1.1

F. Tavani and Associates, Inc.
105 Kenilworth Street
Philadelphia, PA 19147

Spring Mill and County Line Roads

File Name : 10-SpMCoLPM
Site Code : 00000000
Start Date : 11/13/2012
Page No : 1

Groups Printed- HV

	County Line Road Southbound					Spring MIll Road Westbound					County Line Road Northbound					Spring MIll Road Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
04:00 PM	0	1	1	0	2	0	1	1	0	2	0	0	0	0	0	0	2	0	0	2	6
04:15 PM	0	1	0	0	1	0	1	0	0	1	0	0	1	0	1	0	3	1	0	4	7
04:30 PM	0	0	1	0	1	0	1	0	0	1	0	0	0	0	0	0	2	0	0	2	4
04:45 PM	0	1	0	0	1	0	1	0	0	1	0	0	0	0	0	0	3	0	0	3	5
Total	0	3	2	0	5	0	4	1	0	5	0	0	1	0	1	0	10	1	0	11	22
05:00 PM	0	1	0	0	1	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	3
05:15 PM	0	1	3	0	4	0	1	0	0	1	0	0	0	0	0	0	2	0	0	2	7
05:30 PM	0	1	0	0	1	0	3	0	0	3	0	0	0	0	0	0	2	0	0	2	6
05:45 PM	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Total	0	4	3	0	7	0	6	0	0	6	0	0	0	0	0	0	4	0	0	4	17
Grand Total	0	7	5	0	12	0	10	1	0	11	0	0	1	0	1	0	14	1	0	15	39
Apprch %	0	58.3	41.7	0		0	90.9	9.1	0		0	0	100	0		0	93.3	6.7	0		
Total %	0	17.9	12.8	0	30.8	0	25.6	2.6	0	28.2	0	0	2.6	0	2.6	0	35.9	2.6	0	38.5	

	County Line Road Southbound				Spring MIll Road Westbound				County Line Road Northbound				Spring MIll Road Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 05:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 05:00 PM																	
05:00 PM	0	**1**	0	1	0	2	0	2	0	0	0	0	0	0	0	0	3
05:15 PM	0	1	**3**	**4**	0	1	0	1	0	0	0	0	0	**2**	0	**2**	**7**
05:30 PM	0	1	0	1	0	**3**	0	**3**	0	0	0	0	0	2	0	2	6
05:45 PM	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
Total Volume	0	4	3	7	0	6	0	6	0	0	0	0	0	4	0	4	17
% App. Total	0	57.1	42.9		0	100	0		0	0	0		0	100	0		
PHF	.000	1.00	.250	.438	.000	.500	.000	.500	.000	.000	.000	.000	.000	.500	.000	.500	.607

F. Tavani and Associates, Inc.
105 Kenilworth Street
Philadelphia, PA 19147

Ithan Avenue & County Line Road N

File Name : 11-IthCoLNPM
Site Code : 00000000
Start Date : 11/15/2012
Page No : 1

Groups Printed- cars - HV

	Ithan Avenue Southbound				Ithan Avenue Northbound				County Line Road Eastbound				
Start Time	Thru	Right	Peds	App. Total	Left	Thru	Peds	App. Total	Left	Right	Peds	App. Total	Int. Total
04:00 PM	24	19	1	44	89	31	0	120	28	81	0	109	273
04:15 PM	29	14	0	43	57	21	1	79	21	92	1	114	236
04:30 PM	28	15	0	43	58	23	0	81	33	90	0	123	247
04:45 PM	22	14	0	36	58	32	2	92	41	93	1	135	263
Total	103	62	1	166	262	107	3	372	123	356	2	481	1019
05:00 PM	42	14	0	56	86	26	0	112	38	96	0	134	302
05:15 PM	22	14	0	36	70	36	0	106	44	136	2	182	324
05:30 PM	20	13	0	33	45	29	0	74	46	131	0	177	284
05:45 PM	28	20	0	48	63	24	0	87	51	120	0	171	306
Total	112	61	0	173	264	115	0	379	179	483	2	664	1216
Grand Total	215	123	1	339	526	222	3	751	302	839	4	1145	2235
Apprch %	63.4	36.3	0.3		70	29.6	0.4		26.4	73.3	0.3		
Total %	9.6	5.5	0	15.2	23.5	9.9	0.1	33.6	13.5	37.5	0.2	51.2	
cars	213	122	1	336	521	220	3	744	301	825	4	1130	2210
% cars	99.1	99.2	100	99.1	99	99.1	100	99.1	99.7	98.3	100	98.7	98.9
HV	2	1	0	3	5	2	0	7	1	14	0	15	25
% HV	0.9	0.8	0	0.9	1	0.9	0	0.9	0.3	1.7	0	1.3	1.1

	Ithan Avenue Southbound			Ithan Avenue Northbound			County Line Road Eastbound			
Start Time	Thru	Right	App. Total	Left	Thru	App. Total	Left	Right	App. Total	Int. Total
Peak Hour Analysis From 05:00 PM to 05:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 05:00 PM										
05:00 PM	**42**	14	**56**	**86**	26	**112**	38	96	134	302
05:15 PM	22	14	36	70	**36**	106	44	**136**	**180**	**322**
05:30 PM	20	13	33	45	29	74	46	131	177	284
05:45 PM	28	**20**	48	63	24	87	**51**	120	171	306
Total Volume	112	61	173	264	115	379	179	483	662	1214
% App. Total	64.7	35.3		69.7	30.3		27	73		
PHF	.667	.763	.772	.767	.799	.846	.877	.888	.919	.943
cars	111	61	172	260	114	374	179	478	657	1203
% cars	99.1	100	99.4	98.5	99.1	98.7	100	99.0	99.2	99.1
HV	1	0	1	4	1	5	0	5	5	11
% HV	0.9	0	0.6	1.5	0.9	1.3	0	1.0	0.8	0.9

F. Tavani and Associates, Inc.
105 Kenilworth Street
Philadelphia, PA 19147

Ithan Avenue & County Line Road N

File Name : 11-IthCoLNPM
Site Code : 00000000
Start Date : 11/15/2012
Page No : 1

Groups Printed- HV

	Ithan Avenue Southbound				Ithan Avenue Northbound				County Line Road Eastbound				
Start Time	Thru	Right	Peds	App. Total	Left	Thru	Peds	App. Total	Left	Right	Peds	App. Total	Int. Total
04:00 PM	1	1	0	2	1	0	0	1	0	2	0	2	5
04:15 PM	0	0	0	0	0	0	0	0	1	2	0	3	3
04:30 PM	0	0	0	0	0	0	0	0	0	4	0	4	4
04:45 PM	0	0	0	0	0	1	0	1	0	1	0	1	2
Total	1	1	0	2	1	1	0	2	1	9	0	10	14
05:00 PM	0	0	0	0	2	0	0	2	0	2	0	2	4
05:15 PM	0	0	0	0	1	0	0	1	0	1	0	1	2
05:30 PM	1	0	0	1	1	1	0	2	0	2	0	2	5
05:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	1	0	0	1	4	1	0	5	0	5	0	5	11
Grand Total	2	1	0	3	5	2	0	7	1	14	0	15	25
Apprch %	66.7	33.3	0		71.4	28.6	0		6.7	93.3	0		
Total %	8	4	0	12	20	8	0	28	4	56	0	60	

	Ithan Avenue Southbound			Ithan Avenue Northbound			County Line Road Eastbound			
Start Time	Thru	Right	App. Total	Left	Thru	App. Total	Left	Right	App. Total	Int. Total
Peak Hour Analysis From 05:00 PM to 05:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 05:00 PM										
05:00 PM	0	0	0	**2**	0	**2**	0	**2**	**2**	4
05:15 PM	0	0	0	1	0	1	0	1	1	2
05:30 PM	**1**	0	**1**	1	**1**	2	0	2	2	**5**
05:45 PM	0	0	0	0	0	0	0	0	0	0
Total Volume	1	0	1	4	1	5	0	5	5	11
% App. Total	100	0		80	20		0	100		
PHF	.250	.000	.250	.500	.250	.625	.000	.625	.625	.550

F. Tavani and Associates, Inc.
105 Kenilworth Street
Philadelphia, PA 19147

Ithan Avenue & County Line Road S

File Name : 12-IthCoLSPM
Site Code : 00000000
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Groups Printed- cars - HV

	Ithan Avenue Southbound				County Line Road Westbound				Ithan Avenue Northbound				
Start Time	Left	Thru	Peds	App. Total	Left	Right	Peds	App. Total	Thru	Right	Peds	App. Total	Int. Total
04:00 PM	41	48	0	89	4	30	0	34	46	4	0	50	173
04:15 PM	60	63	0	123	4	36	0	40	34	7	0	41	204
04:30 PM	54	64	0	118	2	32	0	34	46	8	0	54	206
04:45 PM	64	59	1	124	6	45	0	51	45	8	0	53	228
Total	219	234	1	454	16	143	0	159	171	27	0	198	811
05:00 PM	60	80	0	140	3	58	0	61	59	14	0	73	274
05:15 PM	77	85	0	162	5	37	0	42	62	6	0	68	272
05:30 PM	74	73	2	149	8	27	0	35	46	8	0	54	238
05:45 PM	85	64	0	149	7	37	0	44	51	8	0	59	252
Total	296	302	2	600	23	159	0	182	218	36	0	254	1036
Grand Total	515	536	3	1054	39	302	0	341	389	63	0	452	1847
Apprch %	48.9	50.9	0.3		11.4	88.6	0		86.1	13.9	0		
Total %	27.9	29	0.2	57.1	2.1	16.4	0	18.5	21.1	3.4	0	24.5	
cars	511	524	3	1038	38	299	0	337	387	63	0	450	1825
% cars	99.2	97.8	100	98.5	97.4	99	0	98.8	99.5	100	0	99.6	98.8
HV	4	12	0	16	1	3	0	4	2	0	0	2	22
% HV	0.8	2.2	0	1.5	2.6	1	0	1.2	0.5	0	0	0.4	1.2

	Ithan Avenue Southbound			County Line Road Westbound			Ithan Avenue Northbound			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 05:00 PM to 05:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 05:00 PM										
05:00 PM	60	80	140	3	**58**	**61**	59	**14**	**73**	**274**
05:15 PM	77	**85**	**162**	5	37	42	**62**	6	68	272
05:30 PM	74	73	147	**8**	27	35	46	8	54	236
05:45 PM	**85**	64	149	7	37	44	51	8	59	252
Total Volume	296	302	598	23	159	182	218	36	254	1034
% App. Total	49.5	50.5		12.6	87.4		85.8	14.2		
PHF	.871	.888	.923	.719	.685	.746	.879	.643	.870	.943
cars	295	297	592	23	156	179	217	36	253	1024
% cars	99.7	98.3	99.0	100	98.1	98.4	99.5	100	99.6	99.0
HV	1	5	6	0	3	3	1	0	1	10
% HV	0.3	1.7	1.0	0	1.9	1.6	0.5	0	0.4	1.0

F. Tavani and Associates, Inc.
105 Kenilworth Street
Philadelphia, PA 19147

Ithan Avenue & County Line Road S

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Groups Printed- HV

	Ithan Avenue Southbound				County Line Road Westbound				Ithan Avenue Northbound				
Start Time	Left	Thru	Peds	App. Total	Left	Right	Peds	App. Total	Thru	Right	Peds	App. Total	Int. Total
04:00 PM	1	3	0	4	1	0	0	1	0	0	0	0	5
04:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
04:30 PM	2	3	0	5	0	0	0	0	0	0	0	0	5
04:45 PM	0	1	0	1	0	0	0	0	1	0	0	1	2
Total	3	7	0	10	1	0	0	1	1	0	0	1	12
05:00 PM	0	2	0	2	0	2	0	2	0	0	0	0	4
05:15 PM	1	0	0	1	0	1	0	1	1	0	0	1	3
05:30 PM	0	3	0	3	0	0	0	0	0	0	0	0	3
05:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	1	5	0	6	0	3	0	3	1	0	0	1	10
Grand Total	4	12	0	16	1	3	0	4	2	0	0	2	22
Apprch %	25	75	0		25	75	0		100	0	0		
Total %	18.2	54.5	0	72.7	4.5	13.6	0	18.2	9.1	0	0	9.1	

	Ithan Avenue Southbound			County Line Road Westbound			Ithan Avenue Northbound			
Start Time	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 05:00 PM to 05:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 05:00 PM										
05:00 PM	0	2	2	0	**2**	**2**	0	0	0	**4**
05:15 PM	**1**	0	1	0	1	1	**1**	0	**1**	3
05:30 PM	0	**3**	**3**	0	0	0	0	0	0	3
05:45 PM	0	0	0	0	0	0	0	0	0	0
Total Volume	1	5	6	0	3	3	1	0	1	10
% App. Total	16.7	83.3		0	100		100	0		
PHF	.250	.417	.500	.000	.375	.375	.250	.000	.250	.625

F. Tavani and Associates, Inc.
105 Kenilworth Street
Philadelphia, PA 19147

County Line Road & Lowrys Lane

File Name : 13-CoLLowPM
Site Code : 21102792
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Groups Printed- cars - HV

	County Line Road Southbound				County Line Road Northbound				Lowrys Lane Eastbound				
Start Time	Thru	Right	Peds	App. Total	Left	Thru	Peds	App. Total	Left	Right	Peds	App. Total	Int. Total
04:00 PM	42	27	1	70	7	42	0	49	7	3	3	13	132
04:15 PM	37	18	0	55	10	39	0	49	3	4	1	8	112
04:30 PM	50	22	2	74	8	41	0	49	7	8	1	16	139
04:45 PM	32	17	0	49	14	32	0	46	2	4	0	6	101
Total	161	84	3	248	39	154	0	193	19	19	5	43	484
05:00 PM	40	38	0	78	9	41	0	50	6	5	1	12	140
05:15 PM	33	33	0	66	20	49	0	69	2	4	4	10	145
05:30 PM	43	24	0	67	9	47	0	56	4	5	3	12	135
05:45 PM	37	27	1	65	13	42	0	55	4	4	0	8	128
Total	153	122	1	276	51	179	0	230	16	18	8	42	548
Grand Total	314	206	4	524	90	333	0	423	35	37	13	85	1032
Apprch %	59.9	39.3	0.8		21.3	78.7	0		41.2	43.5	15.3		
Total %	30.4	20	0.4	50.8	8.7	32.3	0	41	3.4	3.6	1.3	8.2	
cars	314	206	4	524	90	333	0	423	35	37	13	85	1032
% cars	100	100	100	100	100	100	0	100	100	100	100	100	100
HV	0	0	0	0	0	0	0	0	0	0	0	0	0
% HV	0	0	0	0	0	0	0	0	0	0	0	0	0

	County Line Road Southbound			County Line Road Northbound			Lowrys Lane Eastbound			
Start Time	Thru	Right	App. Total	Left	Thru	App. Total	Left	Right	App. Total	Int. Total
Peak Hour Analysis From 05:00 PM to 05:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 05:00 PM										
05:00 PM	40	**38**	**78**	9	41	50	**6**	**5**	**11**	139
05:15 PM	33	33	66	**20**	**49**	**69**	2	4	6	**141**
05:30 PM	**43**	24	67	9	47	56	4	5	9	132
05:45 PM	37	27	64	13	42	55	4	4	8	127
Total Volume	153	122	275	51	179	230	16	18	34	539
% App. Total	55.6	44.4		22.2	77.8		47.1	52.9		
PHF	.890	.803	.881	.638	.913	.833	.667	.900	.773	.956
cars	153	122	275	51	179	230	16	18	34	539
% cars	100	100	100	100	100	100	100	100	100	100
HV	0	0	0	0	0	0	0	0	0	0
% HV	0	0	0	0	0	0	0	0	0	0

F. Tavani and Associates, Inc.
105 Kenilworth Street
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County Line Road & Lowrys Lane

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Groups Printed- HV

	County Line Road Southbound				County Line Road Northbound				Lowrys Lane Eastbound				
Start Time	Thru	Right	Peds	App. Total	Left	Thru	Peds	App. Total	Left	Right	Peds	App. Total	Int. Total
04:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
04:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
04:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
04:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0
05:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
05:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
05:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
05:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	0	0	0	0	0	0	0	0	0	0	0	0	0
Apprch %	0	0	0		0	0	0		0	0	0		
Total %													

	County Line Road Southbound			County Line Road Northbound			Lowrys Lane Eastbound			
Start Time	Thru	Right	App. Total	Left	Thru	App. Total	Left	Right	App. Total	Int. Total
Peak Hour Analysis From 05:00 PM to 05:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 05:00 PM										
05:00 PM	0	0	0	0	0	0	0	0	0	0
05:15 PM	0	0	0	0	0	0	0	0	0	0
05:30 PM	0	0	0	0	0	0	0	0	0	0
05:45 PM	0	0	0	0	0	0	0	0	0	0
Total Volume	0	0	0	0	0	0	0	0	0	0
% App. Total	0	0		0	0		0	0		
PHF	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000

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County Line & Airdale Roads

File Name : 14-CoLAirPM
Site Code : 00000000
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Groups Printed- cars - HV

	County Line Road Southbound				Airdale Road Westbound				Airdale Road Eastbound				
Start Time	Left	Right	Peds	App. Total	Thru	Right	Peds	App. Total	Left	Thru	Peds	App. Total	Int. Total
04:00 PM	1	33	1	35	66	2	0	68	38	53	1	92	195
04:15 PM	0	34	1	35	69	1	0	70	40	54	1	95	200
04:30 PM	3	25	4	32	86	3	0	89	37	74	0	111	232
04:45 PM	6	27	1	34	91	3	1	95	31	42	0	73	202
Total	10	119	7	136	312	9	1	322	146	223	2	371	829
05:00 PM	2	33	7	42	84	2	0	86	36	51	0	87	215
05:15 PM	4	26	4	34	77	5	1	83	47	61	0	108	225
05:30 PM	5	31	5	41	87	6	0	93	43	48	0	91	225
05:45 PM	1	26	3	30	90	3	0	93	40	51	0	91	214
Total	12	116	19	147	338	16	1	355	166	211	0	377	879
Grand Total	22	235	26	283	650	25	2	677	312	434	2	748	1708
Apprch %	7.8	83	9.2		96	3.7	0.3		41.7	58	0.3		
Total %	1.3	13.8	1.5	16.6	38.1	1.5	0.1	39.6	18.3	25.4	0.1	43.8	
cars	22	234	26	282	644	25	2	671	310	430	2	742	1695
% cars	100	99.6	100	99.6	99.1	100	100	99.1	99.4	99.1	100	99.2	99.2
HV	0	1	0	1	6	0	0	6	2	4	0	6	13
% HV	0	0.4	0	0.4	0.9	0	0	0.9	0.6	0.9	0	0.8	0.8

	County Line Road Southbound			Airdale Road Westbound			Airdale Road Eastbound			
Start Time	Left	Right	App. Total	Thru	Right	App. Total	Left	Thru	App. Total	Int. Total
Peak Hour Analysis From 05:00 PM to 05:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 05:00 PM										
05:00 PM	2	**33**	35	84	2	86	36	51	87	208
05:15 PM	4	26	30	77	5	82	**47**	**61**	**108**	**220**
05:30 PM	**5**	31	**36**	87	**6**	**93**	43	48	91	220
05:45 PM	1	26	27	**90**	3	93	40	51	91	211
Total Volume	12	116	128	338	16	354	166	211	377	859
% App. Total	9.4	90.6		95.5	4.5		44	56		
PHF	.600	.879	.889	.939	.667	.952	.883	.865	.873	.976
cars	12	116	128	337	16	353	165	210	375	856
% cars	100	100	100	99.7	100	99.7	99.4	99.5	99.5	99.7
HV	0	0	0	1	0	1	1	1	2	3
% HV	0	0	0	0.3	0	0.3	0.6	0.5	0.5	0.3

F. Tavani and Associates, Inc.
105 Kenilworth Street
Philadelphia, PA 19147

County Line & Airdale Roads

File Name : 14-CoLAirPM
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Groups Printed- HV

	County Line Road Southbound				Airdale Road Westbound				Airdale Road Eastbound				
Start Time	Left	Right	Peds	App. Total	Thru	Right	Peds	App. Total	Left	Thru	Peds	App. Total	Int. Total
04:00 PM	0	1	0	1	2	0	0	2	0	0	0	0	3
04:15 PM	0	0	0	0	0	0	0	0	1	1	0	2	2
04:30 PM	0	0	0	0	1	0	0	1	0	1	0	1	2
04:45 PM	0	0	0	0	2	0	0	2	0	1	0	1	3
Total	0	1	0	1	5	0	0	5	1	3	0	4	10
05:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
05:15 PM	0	0	0	0	1	0	0	1	0	0	0	0	1
05:30 PM	0	0	0	0	0	0	0	0	0	1	0	1	1
05:45 PM	0	0	0	0	0	0	0	0	1	0	0	1	1
Total	0	0	0	0	1	0	0	1	1	1	0	2	3
Grand Total	0	1	0	1	6	0	0	6	2	4	0	6	13
Apprch %	0	100	0		100	0	0		33.3	66.7	0		
Total %	0	7.7	0	7.7	46.2	0	0	46.2	15.4	30.8	0	46.2	

	County Line Road Southbound			Airdale Road Westbound			Airdale Road Eastbound			
Start Time	Left	Right	App. Total	Thru	Right	App. Total	Left	Thru	App. Total	Int. Total
Peak Hour Analysis From 05:00 PM to 05:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 05:00 PM										
05:00 PM	0	0	0	0	0	0	0	0	0	0
05:15 PM	0	0	0	**1**	0	**1**	0	0	0	**1**
05:30 PM	0	0	0	0	0	0	0	**1**	**1**	1
05:45 PM	0	0	0	0	0	0	**1**	0	1	1
Total Volume	0	0	0	1	0	1	1	1	2	3
% App. Total	0	0		100	0		50	50		
PHF	.000	.000	.000	.250	.000	.250	.250	.250	.500	.750

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Philadelphia, PA 19147

County Line & Roberts Roads

File Name : 15-CoLRobPM
Site Code : 00000000
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Groups Printed- cars - HV

	County Line Road Southbound					Roberts Road Westbound					County Line Road Northbound					Roberts Road Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
04:00 PM	3	160	20	3	186	0	4	5	2	11	0	124	6	0	130	7	6	6	0	19	346
04:15 PM	0	151	13	1	165	3	5	2	4	14	1	131	4	0	136	5	9	2	0	16	331
04:30 PM	1	145	12	2	160	2	5	0	2	9	0	119	6	0	125	10	8	1	1	20	314
04:45 PM	3	151	11	1	166	2	13	1	0	16	2	116	15	2	135	2	6	0	3	11	328
Total	7	607	56	7	677	7	27	8	8	50	3	490	31	2	526	24	29	9	4	66	1319
05:00 PM	3	147	16	2	168	1	8	4	0	13	0	111	4	0	115	9	4	1	1	15	311
05:15 PM	2	178	9	0	189	3	7	2	0	12	0	136	5	1	142	8	7	0	3	18	361
05:30 PM	3	178	18	0	199	0	8	2	1	11	4	117	10	0	131	8	6	0	2	16	357
05:45 PM	3	138	16	0	157	5	2	3	1	11	0	137	9	1	147	11	8	0	1	20	335
Total	11	641	59	2	713	9	25	11	2	47	4	501	28	2	535	36	25	1	7	69	1364
Grand Total	18	1248	115	9	1390	16	52	19	10	97	7	991	59	4	1061	60	54	10	11	135	2683
Apprch %	1.3	89.8	8.3	0.6		16.5	53.6	19.6	10.3		0.7	93.4	5.6	0.4		44.4	40	7.4	8.1		
Total %	0.7	46.5	4.3	0.3	51.8	0.6	1.9	0.7	0.4	3.6	0.3	36.9	2.2	0.1	39.5	2.2	2	0.4	0.4	5	
cars	18	1239	111	9	1377	16	52	19	10	97	7	973	58	4	1042	59	54	10	11	134	2650
% cars	100	99.3	96.5	100	99.1	100	100	100	100	100	100	98.2	98.3	100	98.2	98.3	100	100	100	99.3	98.8
HV	0	9	4	0	13	0	0	0	0	0	0	18	1	0	19	1	0	0	0	1	33
% HV	0	0.7	3.5	0	0.9	0	0	0	0	0	0	1.8	1.7	0	1.8	1.7	0	0	0	0.7	1.2

	County Line Road Southbound				Roberts Road Westbound				County Line Road Northbound				Roberts Road Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 05:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 05:00 PM																	
05:00 PM	**3**	147	16	166	1	**8**	**4**	**13**	0	111	4	115	9	4	**1**	14	308
05:15 PM	2	**178**	9	189	3	7	2	12	0	136	5	141	8	7	0	15	**357**
05:30 PM	3	178	**18**	**199**	0	8	2	10	**4**	117	**10**	131	8	6	0	14	354
05:45 PM	3	138	16	157	**5**	2	3	10	0	**137**	9	**146**	**11**	**8**	0	**19**	332
Total Volume	11	641	59	711	9	25	11	45	4	501	28	533	36	25	1	62	1351
% App. Total	1.5	90.2	8.3		20	55.6	24.4		0.8	94	5.3		58.1	40.3	1.6		
PHF	.917	.900	.819	.893	.450	.781	.688	.865	.250	.914	.700	.913	.818	.781	.250	.816	.946
cars	11	640	56	707	9	25	11	45	4	495	28	527	35	25	1	61	1340
% cars	100	99.8	94.9	99.4	100	100	100	100	100	98.8	100	98.9	97.2	100	100	98.4	99.2
HV	0	1	3	4	0	0	0	0	0	6	0	6	1	0	0	1	11
% HV	0	0.2	5.1	0.6	0	0	0	0	0	1.2	0	1.1	2.8	0	0	1.6	0.8

F. Tavani and Associates, Inc.
105 Kenilworth Street
Philadelphia, PA 19147

County Line & Roberts Roads

File Name : 15-CoLRobPM
Site Code : 00000000
Start Date : 11/13/2012
Page No : 1

Groups Printed- HV

	County Line Road Southbound					Roberts Road Westbound					County Line Road Northbound					Roberts Road Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
04:00 PM	0	2	1	0	3	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	6
04:15 PM	0	1	0	0	1	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	4
04:30 PM	0	1	0	0	1	0	0	0	0	0	0	4	0	0	4	0	0	0	0	0	5
04:45 PM	0	4	0	0	4	0	0	0	0	0	0	2	1	0	3	0	0	0	0	0	7
Total	0	8	1	0	9	0	0	0	0	0	0	12	1	0	13	0	0	0	0	0	22
05:00 PM	0	0	1	0	1	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	3
05:15 PM	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	1	0	0	0	1	3
05:30 PM	0	0	0	0	0	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	3
05:45 PM	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Total	0	1	3	0	4	0	0	0	0	0	0	6	0	0	6	1	0	0	0	1	11
Grand Total	0	9	4	0	13	0	0	0	0	0	0	18	1	0	19	1	0	0	0	1	33
Apprch %	0	69.2	30.8	0		0	0	0	0		0	94.7	5.3	0		100	0	0	0		
Total %	0	27.3	12.1	0	39.4	0	0	0	0	0	0	54.5	3	0	57.6	3	0	0	0	3	

	County Line Road Southbound				Roberts Road Westbound				County Line Road Northbound				Roberts Road Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 05:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 05:00 PM																	
05:00 PM	0	0	1	1	0	0	0	0	0	2	0	2	0	0	0	0	**3**
05:15 PM	0	**1**	0	1	0	0	0	0	0	1	0	1	**1**	0	0	**1**	3
05:30 PM	0	0	0	0	0	0	0	0	0	**3**	0	**3**	0	0	0	0	3
05:45 PM	0	0	**2**	**2**	0	0	0	0	0	0	0	0	0	0	0	0	2
Total Volume	0	1	3	4	0	0	0	0	0	6	0	6	1	0	0	1	11
% App. Total	0	25	75		0	0	0		0	100	0		100	0	0		
PHF	.000	.250	.375	.500	.000	.000	.000	.000	.000	.500	.000	.500	.250	.000	.000	.250	.917

F. Tavani and Associates, Inc.
105 Kenilworth Street
Philadelphia, PA 19147

Ithan & Aldwyn Avenues

File Name : 16-IthAldPM
Site Code : 00000000
Start Date : 11/15/2012
Page No : 1

Groups Printed- cars - HV

	Ithan Avenue Southbound					South Campus Westbound					Ithan Avenue Northbound					Aldwyn Lane Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
04:00 PM	6	65	3	34	108	4	0	5	2	11	18	32	3	1	54	4	2	3	0	9	182
04:15 PM	7	60	1	13	81	1	2	4	6	13	6	23	1	4	34	3	0	9	0	12	140
04:30 PM	7	60	3	15	85	1	0	8	6	15	11	26	2	2	41	2	0	5	0	7	148
04:45 PM	13	62	3	16	94	1	1	10	3	15	8	23	0	1	32	1	0	3	0	4	145
Total	33	247	10	78	368	7	3	27	17	54	43	104	6	8	161	10	2	20	0	32	615
05:00 PM	8	71	2	31	112	3	1	9	5	18	9	34	0	0	43	0	0	2	0	2	175
05:15 PM	18	74	4	71	167	1	0	5	3	9	14	35	3	0	52	1	0	3	0	4	232
05:30 PM	17	71	7	30	125	2	1	10	1	14	6	28	0	0	34	1	0	3	2	6	179
05:45 PM	8	51	8	23	90	2	1	13	0	16	5	33	2	0	40	2	0	5	0	7	153
Total	51	267	21	155	494	8	3	37	9	57	34	130	5	0	169	4	0	13	2	19	739
Grand Total	84	514	31	233	862	15	6	64	26	111	77	234	11	8	330	14	2	33	2	51	1354
Apprch %	9.7	59.6	3.6	27		13.5	5.4	57.7	23.4		23.3	70.9	3.3	2.4		27.5	3.9	64.7	3.9		
Total %	6.2	38	2.3	17.2	63.7	1.1	0.4	4.7	1.9	8.2	5.7	17.3	0.8	0.6	24.4	1	0.1	2.4	0.1	3.8	
cars	79	508	31	233	851	15	6	59	26	106	71	230	11	8	320	14	2	31	2	49	1326
% cars	94	98.8	100	100	98.7	100	100	92.2	100	95.5	92.2	98.3	100	100	97	100	100	93.9	100	96.1	97.9
HV	5	6	0	0	11	0	0	5	0	5	6	4	0	0	10	0	0	2	0	2	28
% HV	6	1.2	0	0	1.3	0	0	7.8	0	4.5	7.8	1.7	0	0	3	0	0	6.1	0	3.9	2.1

	Ithan Avenue Southbound				South Campus Westbound				Ithan Avenue Northbound				Aldwyn Lane Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 05:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 05:00 PM																	
05:00 PM	8	71	2	81	**3**	**1**	9	13	9	34	0	43	0	0	2	2	139
05:15 PM	**18**	**74**	4	**96**	1	0	5	6	**14**	**35**	**3**	**52**	1	0	3	4	**158**
05:30 PM	17	71	7	95	2	1	10	13	6	28	0	34	1	0	3	4	146
05:45 PM	8	51	**8**	67	2	1	**13**	**16**	5	33	2	40	**2**	0	**5**	**7**	130
Total Volume	51	267	21	339	8	3	37	48	34	130	5	169	4	0	13	17	573
% App. Total	15	78.8	6.2		16.7	6.2	77.1		20.1	76.9	3		23.5	0	76.5		
PHF	.708	.902	.656	.883	.667	.750	.712	.750	.607	.929	.417	.813	.500	.000	.650	.607	.907
cars	49	265	21	335	8	3	35	46	33	128	5	166	4	0	13	17	564
% cars	96.1	99.3	100	98.8	100	100	94.6	95.8	97.1	98.5	100	98.2	100	0	100	100	98.4
HV	2	2	0	4	0	0	2	2	1	2	0	3	0	0	0	0	9
% HV	3.9	0.7	0	1.2	0	0	5.4	4.2	2.9	1.5	0	1.8	0	0	0	0	1.6

F. Tavani and Associates, Inc.
105 Kenilworth Street
Philadelphia, PA 19147

Ithan & Aldwyn Avenues

File Name : 16-IthAldPM
Site Code : 00000000
Start Date : 11/15/2012
Page No : 1

Groups Printed- HV

	Ithan Avenue Southbound					South Campus Westbound					Ithan Avenue Northbound					Aldwyn Lane Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
04:00 PM	0	2	0	0	2	0	0	0	0	0	4	0	0	0	4	0	0	0	0	0	6
04:15 PM	2	1	0	0	3	0	0	1	0	1	1	2	0	0	3	0	0	0	0	0	7
04:30 PM	0	1	0	0	1	0	0	1	0	1	0	0	0	0	0	0	0	2	0	2	4
04:45 PM	1	0	0	0	1	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	2
Total	3	4	0	0	7	0	0	3	0	3	5	2	0	0	7	0	0	2	0	2	19
05:00 PM	1	0	0	0	1	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	2
05:15 PM	0	0	0	0	0	0	0	1	0	1	0	1	0	0	1	0	0	0	0	0	2
05:30 PM	1	1	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
05:45 PM	0	1	0	0	1	0	0	1	0	1	0	1	0	0	1	0	0	0	0	0	3
Total	2	2	0	0	4	0	0	2	0	2	1	2	0	0	3	0	0	0	0	0	9
Grand Total	5	6	0	0	11	0	0	5	0	5	6	4	0	0	10	0	0	2	0	2	28
Apprch %	45.5	54.5	0	0		0	0	100	0		60	40	0	0		0	0	100	0		
Total %	17.9	21.4	0	0	39.3	0	0	17.9	0	17.9	21.4	14.3	0	0	35.7	0	0	7.1	0	7.1	

	Ithan Avenue Southbound				South Campus Westbound				Ithan Avenue Northbound				Aldwyn Lane Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 05:00 PM to 05:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 05:00 PM																	
05:00 PM	**1**	0	0	1	0	0	0	0	**1**	0	0	**1**	0	0	0	0	2
05:15 PM	0	0	0	0	0	0	**1**	**1**	0	**1**	0	1	0	0	0	0	2
05:30 PM	1	**1**	0	**2**	0	0	0	0	0	0	0	0	0	0	0	0	2
05:45 PM	0	1	0	1	0	0	1	1	0	1	0	1	0	0	0	0	**3**
Total Volume	2	2	0	4	0	0	2	2	1	2	0	3	0	0	0	0	9
% App. Total	50	50	0		0	0	100		33.3	66.7	0		0	0	0		
PHF	.500	.500	.000	.500	.000	.000	.500	.500	.250	.500	.000	.750	.000	.000	.000	.000	.750

F. Tavani and Associates, Inc.
105 Kenilworth Street
Philadelphia, PA 19147

Lancaster Avenue & Spring Mill/Sproul Rd
& Kenilworth Rd/Aldwyn Ln

File Name : 01-30SproulEve
Site Code : 00000000
Start Date : 12/11/2012
Page No : 1

Groups Printed- cars - HV

	North Spring Mill Road Southbound							Lancaster Avenue Westbound							Aldwyn Lane Northwestbound							Sproul Road Northbound							Lancaster Avenue Eastbound							Kenilworth Road Southeastbound							
Start Time	L to Lanc	L to Ald					App. Total	L to Ald	L to Spr					App. Total	L to Spr	L to Lanc					App. Total	L to Lanc	L to Ken					App. Total	L to Ken	L to S Mill					App. Total	L to S Mill	L to Lanc					App. Total	Int. Total
06:00 PM	3	2	69	29	0	2	105	0	5	176	0	19	0	200	1	13	0	4	0	0	18	48	0	20	10	0	0	78	1	43	260	16	64	0	384	1	1	1	0	2	2	7	792
06:15 PM	8	7	41	41	0	2	99	1	4	192	0	9	0	206	7	9	1	2	0	0	19	41	0	31	9	3	0	84	0	54	323	21	55	0	453	0	0	0	0	2	2	4	865
06:30 PM	8	7	35	52	0	0	102	1	1	181	0	7	0	190	4	5	0	0	0	0	9	34	0	30	13	4	0	81	1	51	264	12	72	0	400	0	1	0	0	2	0	3	785
06:45 PM	5	3	35	52	0	2	97	0	1	168	1	2	0	172	0	6	0	0	2	0	8	30	0	15	9	0	0	54	2	59	295	18	47	0	421	0	0	0	1	1	2	4	756
Total	24	19	180	174	0	6	403	2	11	717	1	37	0	768	12	33	1	6	2	0	54	153	0	96	41	7	0	297	4	207	1142	67	238	0	1658	1	2	1	1	7	6	18	3198
07:00 PM	3	0	24	32	0	0	59	0	10	169	0	8	0	187	0	10	0	4	5	0	19	37	1	13	4	0	0	55	1	43	167	9	30	0	250	0	0	0	1	3	0	4	574
07:15 PM	1	0	17	35	0	0	53	0	5	170	0	0	0	175	0	6	0	4	2	0	12	32	0	16	4	1	0	53	3	48	160	7	29	0	247	0	0	0	0	2	0	2	542
07:30 PM	5	2	27	34	0	0	68	0	8	182	0	17	0	207	0	4	0	0	0	0	4	21	0	6	4	0	0	31	2	28	134	7	20	0	191	0	0	0	0	1	0	1	502
07:45 PM	4	0	14	33	0	2	53	0	5	188	0	7	1	201	0	3	0	0	1	0	4	21	0	8	2	1	0	32	1	30	120	14	36	0	201	1	0	0	0	2	2	5	496
Total	13	2	82	134	0	2	233	0	28	709	0	32	1	770	0	23	0	8	8	0	39	111	1	43	14	2	0	171	7	149	581	37	115	0	889	1	0	0	1	8	2	12	2114
Grand Total	37	21	262	308	0	8	636	2	39	1426	1	69	1	1538	12	56	1	14	10	0	93	264	1	139	55	9	0	468	11	356	1723	104	353	0	2547	2	2	1	2	15	8	30	5312
Apprch %	5.8	3.3	41.2	48.4	0	1.3		0.1	2.5	92.7	0.1	4.5	0.1		12.9	60.2	1.1	15.1	10.8	0		56.4	0.2	29.7	11.8	1.9	0		0.4	14	67.6	4.1	13.9	0		6.7	6.7	3.3	6.7	50	26.7		
Total %	0.7	0.4	4.9	5.8	0	0.2	12	0	0.7	26.8	0	1.3	0	29	0.2	1.1	0	0.3	0.2	0	1.8	5	0	2.6	1	0.2	0	8.8	0.2	6.7	32.4	2	6.6	0	47.9	0	0	0	0	0.3	0.2	0.6	
cars	36	21	259	299	0	8	623	2	39	1403	1	65	0	1510	12	53	1	14	9	0	89	262	1	138	55	9	0	465	11	353	1711	104	346	0	2525	2	2	1	2	15	8	30	5242
% cars	97.3	100	98.9	97.1	0	100	98	100	100	98.4	100	94.2	0	98.2	100	94.6	100	100	90	0	95.7	99.2	100	99.3	100	100	0	99.4	100	99.2	99.3	100	98	0	99.1	100	100	100	100	100	100	100	98.7
HV	1	0	3	9	0	0	13	0	0	23	0	4	1	28	0	3	0	0	1	0	4	2	0	1	0	0	0	3	0	3	12	0	7	0	22	0	0	0	0	0	0	0	70
% HV	2.7	0	1.1	2.9	0	0	2	0	0	1.6	0	5.8	100	1.8	0	5.4	0	0	10	0	4.3	0.8	0	0.7	0	0	0	0.6	0	0.8	0.7	0	2	0	0.9	0	0	0	0	0	0	0	1.3

	North Spring Mill Road Southbound						Lancaster Avenue Westbound						Aldwyn Lane Northwestbound						Sproul Road Northbound						Lancaster Avenue Eastbound						Kenilworth Road Southeastbound						
Start Time	L to Lanc	L to Ald	T to Spr	R to Lanc	R to Ken	App. Total	L to Ald	L to Spr	T to Lanc	R to Ken	R to S Mill	App. Total	L to Spr	L to Lanc	T to Ken	R to S Mill	R to Lanc	App. Total	L to Lanc	L to Ken	T to S Mill	R to Lanc	R to Ald	App. Total	L to Ken	L to S Mill	T to Lanc	R to Ald	R to Spr	App. Total	L to S Mill	L to Lanc	T to Ald	R to Spr	R to Lanc	App. Total	Int. Total
Peak Hour Analysis From 06:00 PM to 06:45 PM - Peak 1 of 1																																					
Peak Hour for Entire Intersection Begins at 06:00 PM																																					
06:00 PM	3	2	**69**	29	0	**103**	0	**5**	176	0	**19**	200	1	**13**	**0**	**4**	0	18	**48**	**0**	20	10	0	78	1	43	260	16	64	384	**1**	**1**	**1**	0	**2**	**5**	788
06:15 PM	**8**	**7**	41	41	0	97	**1**	**4**	**192**	0	9	**206**	**7**	9	**1**	2	0	**19**	41	0	**31**	**9**	**3**	**84**	0	54	**323**	**21**	55	**453**	0	0	0	0	2	2	**861**
06:30 PM	8	7	35	**52**	**0**	102	1	1	181	0	7	190	4	5	0	0	0	9	34	0	30	**13**	**4**	81	1	51	264	12	**72**	400	0	1	0	0	2	3	785
06:45 PM	5	3	35	52	0	95	0	1	168	**1**	2	172	0	6	0	0	**2**	8	30	0	15	9	0	54	**2**	**59**	295	18	47	421	0	0	0	**1**	1	2	752
Total Volume	24	19	180	174	0	397	2	11	717	1	37	768	12	33	1	6	2	54	153	0	96	41	7	297	4	207	1142	67	238	1658	1	2	1	1	7	12	3186
% App. Total	6	4.8	45.3	43.8	0		0.3	1.4	93.4	0.1	4.8		22.2	61.1	1.9	11.1	3.7		51.5	0	32.3	13.8	2.4		0.2	12.5	68.9	4	14.4		8.3	16.7	8.3	8.3	58.3		
PHF	.750	.679	.652	.837	.000	.964	.500	.550	.934	.250	.487	.932	.429	.635	.250	.375	.250	.711	.797	.000	.774	.788	.438	.884	.500	.877	.884	.798	.826	.915	.250	.500	.250	.250	.875	.600	.925
cars	23	19	179	171	0	392	2	11	703	1	34	751	12	33	1	6	2	54	152	0	95	41	7	295	4	206	1132	67	231	1640	1	2	1	1	7	12	3144
% cars	95.8	100	99.4	98.3	0	98.7	100	100	98.0	100	91.9	97.8	100	100	100	100	100	100	99.3	0	99.0	100	100	99.3	100	99.5	99.1	100	97.1	98.9	100	100	100	100	100	100	98.7
HV	1	0	1	3	0	5	0	0	14	0	3	17	0	0	0	0	0	0	1	0	1	0	0	2	0	1	10	0	7	18	0	0	0	0	0	0	42
% HV	4.2		0.6	1.7		1.3			2.0		8.1	2.2							0.7		1.0			0.7		0.5	0.9		2.9	1.1						1.3	

F. Tavani and Associates, Inc.
105 Kenilworth Street
Philadelphia, PA 19147

Lancaster Avenue & Spring Mill/Sproul Rd
& Kenilworth Rd/Aldwyn Ln

File Name : 01-30SproulEve
Site Code : 00000000
Start Date : 12/11/2012
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Groups Printed- HV

	North Spring Mill Road Southbound							Lancaster Avenue Westbound							Aldwyn Lane Northwestbound							Sproul Road Northbound							Lancaster Avenue Eastbound							Kenilworth Road Southeastbound							
Start Time	L to Lanc	L to Ald					App. Total	L to Ald	L to Spr					App. Total	L to Spr	L to Lanc					App. Total	L to Lanc	L to Ken					App. Total	L to Ken	L to S Mill					App. Total	L to S Mill	L to Lanc					App. Total	Int. Total
06:00 PM	0	0	1	1	0	0	2	0	0	7	0	1	0	8	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	2	0	5	0	7	0	0	0	0	0	0	0	18
06:15 PM	1	0	0	0	0	0	1	0	0	1	0	1	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	4	0	0	0	0	0	0	0	7
06:30 PM	0	0	0	0	0	0	0	0	0	2	0	1	0	3	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	1	1	0	2	0	4	0	0	0	0	0	0	0	8
06:45 PM	0	0	0	2	0	0	2	0	0	4	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	3	0	0	0	0	0	0	0	9
Total	1	0	1	3	0	0	5	0	0	14	0	3	0	17	0	0	0	0	0	0	0	1	0	1	0	0	0	2	0	1	10	0	7	0	18	0	0	0	0	0	0	0	42
07:00 PM	0	0	1	0	0	0	1	0	0	3	0	1	0	4	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6
07:15 PM	0	0	0	1	0	0	1	0	0	2	0	0	0	2	0	2	0	0	0	0	2	1	0	0	0	0	0	1	0	0	1	0	0	0	1	0	0	0	0	0	0	0	7
07:30 PM	0	0	1	5	0	0	6	0	0	4	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	2	0	0	0	0	0	0	0	12
07:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	3
Total	0	0	2	6	0	0	8	0	0	9	0	1	1	11	0	3	0	0	1	0	4	1	0	0	0	0	0	1	0	2	2	0	0	0	4	0	0	0	0	0	0	0	28
Grand Total	1	0	3	9	0	0	13	0	0	23	0	4	1	28	0	3	0	0	1	0	4	2	0	1	0	0	0	3	0	3	12	0	7	0	22	0	0	0	0	0	0	0	70
Apprch %	7.7	0	23.1	69.2	0	0		0	0	82.1	0	14.3	3.6		0	75	0	0	25	0		66.7	0	33.3	0	0	0		0	13.6	54.5	0	31.8	0		0	0	0	0	0	0	
Total %	1.4	0	4.3	12.9	0	0	18.6	0	0	32.9	0	5.7	1.4	40	0	4.3	0	0	1.4	0	5.7	2.9	0	1.4	0	0	0	4.3	0	4.3	17.1	0	10	0	31.4	0	0	0	0	0	0	0	

	North Spring Mill Road Southbound						Lancaster Avenue Westbound						Aldwyn Lane Northwestbound						Sproul Road Northbound						Lancaster Avenue Eastbound						Kenilworth Road Southeastbound						
Start Time	L to Lanc	L to Ald	T to Spr	R to Lanc	R to Ken	App. Total	L to Ald	L to Spr	T to Lanc	R to Ken	R to S Mill	App. Total	L to Spr	L to Lanc	T to Ken	R to S Mill	R to Lanc	App. Total	L to Lanc	L to Ken	T to S Mill	R to Lanc	R to Ald	App. Total	L to Ken	L to S Mill	T to Lanc	R to Ald	R to Spr	App. Total	L to S Mill	L to Lanc	T to Ald	R to Spr	R to Lanc	App. Total	Int. Total
Peak Hour Analysis From 06:00 PM to 06:45 PM - Peak 1 of 1																																					
Peak Hour for Entire Intersection Begins at 06:00 PM																																					
06:00 PM	0	0	**1**	1	0	**2**	0	0	**7**	0	**1**	**8**	0	0	0	0	0	0	**1**	0	0	0	0	**1**	0	0	2	0	**5**	**7**	0	0	0	0	0	0	**18**
06:15 PM	**1**	0	0	0	0	1	0	0	1	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**4**	0	0	4	0	0	0	0	0	0	7
06:30 PM	0	0	0	0	0	0	0	0	2	0	1	3	0	0	0	0	0	0	0	0	**1**	0	0	1	0	**1**	1	0	2	4	0	0	0	0	0	0	8
06:45 PM	0	0	0	**2**	0	2	0	0	4	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	9
Total	1	0	1	3	0	5	0	0	14	0	3	17	0	0	0	0	0	0	1	0	1	0	0	2	0	1	10	0	7	18	0	0	0	0	0	0	42
Volume																																					
% App. Total	20	0	20	60	0		0	0	82.4	0	17.6		0	0	0	0	0		50	0	50	0	0		0	5.6	55.6	0	38.9		0	0	0	0	0		
PHF	.250	.000	.250	.375	.000	.625	.000	.000	.500	.000	.750	.531	.000	.000	.000	.000	.000	.000	.250	.000	.250	.000	.000	.500	.000	.250	.625	.000	.350	.643	.000	.000	.000	.000	.000	.000	.583

F. Tavani and Associates, Inc.
105 Kenilworth Street
Philadelphia, PA 19147

Lancaster & Ithan Avenues

EB Peds = diag peds NE-SW
WB Peds = diag peds NW-SE

File Name : 02-30IthanEve
Site Code : 00000000
Start Date : 12/11/2012
Page No : 1

Groups Printed- cars - HV

	Ithan Avenue Southbound					Lancaster Avenue Westbound						Ithan Avenue Northbound					Lancaster Avenue Eastbound						
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	NW-SE Peds	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	NE-SW Peds	Peds	App. Total	Int. Total
06:00 PM	15	51	12	10	88	44	164	19	82	94	403	7	24	9	0	40	34	178	52	35	76	375	906
06:15 PM	11	44	12	37	104	62	144	14	78	151	449	14	26	10	4	54	27	176	49	47	92	391	998
06:30 PM	4	32	10	39	85	65	164	26	172	236	663	16	26	6	0	48	37	170	43	137	71	458	1254
06:45 PM	7	52	17	45	121	49	135	15	118	332	649	18	74	21	5	118	29	147	32	128	24	360	1248
Total	37	179	51	131	398	220	607	74	450	813	2164	55	150	46	9	260	127	671	176	347	263	1584	4406
07:00 PM	5	29	5	42	81	34	126	14	68	175	417	21	51	14	0	86	17	153	28	99	49	346	930
07:15 PM	4	13	12	15	44	29	152	9	76	98	364	32	37	24	0	93	23	133	18	38	57	269	770
07:30 PM	15	28	10	8	61	41	104	9	64	56	274	26	26	18	2	72	14	101	14	6	50	185	592
07:45 PM	5	28	10	0	43	21	106	13	85	93	318	18	16	18	0	52	6	115	6	2	43	172	585
Total	29	98	37	65	229	125	488	45	293	422	1373	97	130	74	2	303	60	502	66	145	199	972	2877
Grand Total	66	277	88	196	627	345	1095	119	743	1235	3537	152	280	120	11	563	187	1173	242	492	462	2556	7283
Apprch %	10.5	44.2	14	31.3		9.8	31	3.4	21	34.9		27	49.7	21.3	2		7.3	45.9	9.5	19.2	18.1		
Total %	0.9	3.8	1.2	2.7	8.6	4.7	15	1.6	10.2	17	48.6	2.1	3.8	1.6	0.2	7.7	2.6	16.1	3.3	6.8	6.3	35.1	
cars	65	273	85	196	619	345	1073	116	743	1235	3512	152	274	120	11	557	181	1164	241	492	462	2540	7228
% cars	98.5	98.6	96.6	100	98.7	100	98	97.5	100	100	99.3	100	97.9	100	100	98.9	96.8	99.2	99.6	100	100	99.4	99.2
HV	1	4	3	0	8	0	22	3	0	0	25	0	6	0	0	6	6	9	1	0	0	16	55
% HV	1.5	1.4	3.4	0	1.3	0	2	2.5	0	0	0.7	0	2.1	0	0	1.1	3.2	0.8	0.4	0	0	0.6	0.8

	Ithan Avenue Southbound				Lancaster Avenue Westbound				Ithan Avenue Northbound				Lancaster Avenue Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 06:00 PM to 07:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 06:00 PM																	
06:00 PM	**15**	51	12	**78**	44	**164**	19	227	7	24	9	40	34	**178**	**52**	**264**	**609**
06:15 PM	11	44	12	67	62	144	14	220	14	26	10	50	27	176	49	252	589
06:30 PM	4	32	10	46	**65**	164	**26**	**255**	16	26	6	48	**37**	170	43	250	599
06:45 PM	7	**52**	**17**	76	49	135	15	199	**18**	**74**	**21**	**113**	29	147	32	208	596
Total Volume	37	179	51	267	220	607	74	901	55	150	46	251	127	671	176	974	2393
% App. Total	13.9	67	19.1		24.4	67.4	8.2		21.9	59.8	18.3		13	68.9	18.1		
PHF	.617	.861	.750	.856	.846	.925	.712	.883	.764	.507	.548	.555	.858	.942	.846	.922	.982
cars	36	177	48	261	220	593	71	884	55	146	46	247	122	666	176	964	2356
% cars	97.3	98.9	94.1	97.8	100	97.7	95.9	98.1	100	97.3	100	98.4	96.1	99.3	100	99.0	98.5
HV	1	2	3	6	0	14	3	17	0	4	0	4	5	5	0	10	37
% HV	2.7	1.1	5.9	2.2	0	2.3	4.1	1.9	0	2.7	0	1.6	3.9	0.7	0	1.0	1.5

F. Tavani and Associates, Inc.
105 Kenilworth Street
Philadelphia, PA 19147

Lancaster & Ithan Avenues

EB Peds = diag peds NE-SW
WB Peds = diag peds NW-SE

File Name : 02-30IthanEve
Site Code : 00000000
Start Date : 12/11/2012
Page No : 1

Groups Printed- HV

	Ithan Avenue Southbound					Lancaster Avenue Westbound						Ithan Avenue Northbound					Lancaster Avenue Eastbound						
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	NW-SE Peds	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	NE-SW Peds	Peds	App. Total	Int. Total
06:00 PM	0	1	1	0	2	0	6	1	0	0	7	0	1	0	0	1	2	0	0	0	0	2	12
06:15 PM	1	1	1	0	3	0	2	2	0	0	4	0	0	0	0	0	1	3	0	0	0	4	11
06:30 PM	0	0	1	0	1	0	2	0	0	0	2	0	0	0	0	0	1	0	0	0	0	1	4
06:45 PM	0	0	0	0	0	0	4	0	0	0	4	0	3	0	0	3	1	2	0	0	0	3	10
Total	1	2	3	0	6	0	14	3	0	0	17	0	4	0	0	4	5	5	0	0	0	10	37
07:00 PM	0	1	0	0	1	0	2	0	0	0	2	0	0	0	0	0	1	1	0	0	0	2	5
07:15 PM	0	0	0	0	0	0	2	0	0	0	2	0	1	0	0	1	0	2	0	0	0	2	5
07:30 PM	0	1	0	0	1	0	4	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	5
07:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	1	1	0	0	2	3
Total	0	2	0	0	2	0	8	0	0	0	8	0	2	0	0	2	1	4	1	0	0	6	18
Grand Total	1	4	3	0	8	0	22	3	0	0	25	0	6	0	0	6	6	9	1	0	0	16	55
Apprch %	12.5	50	37.5	0		0	88	12	0	0		0	100	0	0		37.5	56.2	6.2	0	0		
Total %	1.8	7.3	5.5	0	14.5	0	40	5.5	0	0	45.5	0	10.9	0	0	10.9	10.9	16.4	1.8	0	0	29.1	

	Ithan Avenue Southbound				Lancaster Avenue Westbound				Ithan Avenue Northbound				Lancaster Avenue Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 06:00 PM to 06:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 06:00 PM																	
06:00 PM	0	**1**	**1**	2	0	**6**	1	**7**	0	1	0	1	**2**	0	0	2	**12**
06:15 PM	**1**	1	1	**3**	0	2	**2**	4	0	0	0	0	1	**3**	0	**4**	11
06:30 PM	0	0	1	1	0	2	0	2	0	0	0	0	1	0	0	1	4
06:45 PM	0	0	0	0	0	4	0	4	0	**3**	0	**3**	1	2	0	3	10
Total Volume	1	2	3	6	0	14	3	17	0	4	0	4	5	5	0	10	37
% App. Total	16.7	33.3	50		0	82.4	17.6		0	100	0		50	50	0		
PHF	.250	.500	.750	.500	.000	.583	.375	.607	.000	.333	.000	.333	.625	.417	.000	.625	.771

F. Tavani and Associates, Inc.
105 Kenilworth Street
Philadelphia, PA 19147

Sproul & Conestoga Roads

File Name : 05-sprconeve
Site Code : 00000000
Start Date : 12/11/2012
Page No : 1

Groups Printed- cars - HV

	Sproul Road Southbound					Conestoga Road Westbound					Sproul Road Northbound					Conestoga Road Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
06:00 PM	17	61	17	1	96	6	74	10	0	90	35	37	7	0	79	24	172	44	0	240	505
06:15 PM	21	42	25	0	88	5	106	7	0	118	21	44	12	0	77	28	150	39	0	217	500
06:30 PM	29	40	18	0	87	9	72	10	0	91	22	32	8	0	62	27	150	60	0	237	477
06:45 PM	16	43	18	0	77	7	66	10	0	83	25	31	3	0	59	26	94	32	0	152	371
Total	83	186	78	1	348	27	318	37	0	382	103	144	30	0	277	105	566	175	0	846	1853
07:00 PM	9	31	15	0	55	8	75	14	0	97	21	22	4	0	47	17	82	42	0	141	340
07:15 PM	8	22	10	0	40	4	79	5	0	88	27	29	4	0	60	8	71	37	0	116	304
07:30 PM	6	29	7	0	42	3	60	3	0	66	14	18	7	0	39	11	47	31	0	89	236
07:45 PM	10	28	10	0	48	3	69	2	0	74	18	10	1	0	29	10	43	28	0	81	232
Total	33	110	42	0	185	18	283	24	0	325	80	79	16	0	175	46	243	138	0	427	1112
Grand Total	116	296	120	1	533	45	601	61	0	707	183	223	46	0	452	151	809	313	0	1273	2965
Apprch %	21.8	55.5	22.5	0.2		6.4	85	8.6	0		40.5	49.3	10.2	0		11.9	63.6	24.6	0		
Total %	3.9	10	4	0	18	1.5	20.3	2.1	0	23.8	6.2	7.5	1.6	0	15.2	5.1	27.3	10.6	0	42.9	
cars	116	295	119	1	531	43	597	61	0	701	183	221	45	0	449	151	809	312	0	1272	2953
% cars	100	99.7	99.2	100	99.6	95.6	99.3	100	0	99.2	100	99.1	97.8	0	99.3	100	100	99.7	0	99.9	99.6
HV	0	1	1	0	2	2	4	0	0	6	0	2	1	0	3	0	0	1	0	1	12
% HV	0	0.3	0.8	0	0.4	4.4	0.7	0	0	0.8	0	0.9	2.2	0	0.7	0	0	0.3	0	0.1	0.4

	Sproul Road Southbound				Conestoga Road Westbound				Sproul Road Northbound				Conestoga Road Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 06:00 PM to 07:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 06:00 PM																	
06:00 PM	17	**61**	17	**95**	6	74	**10**	90	**35**	37	7	**79**	24	**172**	44	**240**	**504**
06:15 PM	21	42	**25**	88	5	**106**	7	**118**	21	**44**	**12**	77	**28**	150	39	217	500
06:30 PM	**29**	40	18	87	**9**	72	10	91	22	32	8	62	27	150	**60**	237	477
06:45 PM	16	43	18	77	7	66	10	83	25	31	3	59	26	94	32	152	371
Total Volume	83	186	78	347	27	318	37	382	103	144	30	277	105	566	175	846	1852
% App. Total	23.9	53.6	22.5		7.1	83.2	9.7		37.2	52	10.8		12.4	66.9	20.7		
PHF	.716	.762	.780	.913	.750	.750	.925	.809	.736	.818	.625	.877	.938	.823	.729	.881	.919
cars	83	185	78	346	25	314	37	376	103	143	30	276	105	566	174	845	1843
% cars	100	99.5	100	99.7	92.6	98.7	100	98.4	100	99.3	100	99.6	100	100	99.4	99.9	99.5
HV	0	1	0	1	2	4	0	6	0	1	0	1	0	0	1	1	9
% HV	0	0.5	0	0.3	7.4	1.3	0	1.6	0	0.7	0	0.4	0	0	0.6	0.1	0.5

F. Tavani and Associates, Inc.
105 Kenilworth Street
Philadelphia, PA 19147

Sproul & Conestoga Roads

File Name : 05-sprconeve
Site Code : 00000000
Start Date : 12/11/2012
Page No : 1

Groups Printed- HV

	Sproul Road Southbound					Conestoga Road Westbound					Sproul Road Northbound					Conestoga Road Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
06:00 PM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	1	0	1	2
06:15 PM	0	0	0	0	0	1	2	0	0	3	0	1	0	0	1	0	0	0	0	0	4
06:30 PM	0	1	0	0	1	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	2
06:45 PM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1
Total	0	1	0	0	1	2	4	0	0	6	0	1	0	0	1	0	0	1	0	1	9
07:00 PM	0	0	1	0	1	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	2
07:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	1
07:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	1	0	1	0	0	0	0	0	0	1	1	0	2	0	0	0	0	0	3
Grand Total	0	1	1	0	2	2	4	0	0	6	0	2	1	0	3	0	0	1	0	1	12
Apprch %	0	50	50	0		33.3	66.7	0	0		0	66.7	33.3	0		0	0	100	0		
Total %	0	8.3	8.3	0	16.7	16.7	33.3	0	0	50	0	16.7	8.3	0	25	0	0	8.3	0	8.3	

	Sproul Road Southbound				Conestoga Road Westbound				Sproul Road Northbound				Conestoga Road Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 06:00 PM to 06:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 06:00 PM																	
06:00 PM	0	0	0	0	0	1	0	1	0	0	0	0	0	0	**1**	**1**	2
06:15 PM	0	0	0	0	**1**	**2**	0	**3**	0	**1**	0	**1**	0	0	0	0	**4**
06:30 PM	0	**1**	0	**1**	1	0	0	1	0	0	0	0	0	0	0	0	2
06:45 PM	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	1
Total Volume	0	1	0	1	2	4	0	6	0	1	0	1	0	0	1	1	9
% App. Total	0	100	0		33.3	66.7	0		0	100	0		0	0	100		
PHF	.000	.250	.000	.250	.500	.500	.000	.500	.000	.250	.000	.250	.000	.000	.250	.250	.563

F. Tavani and Associates, Inc.
105 Kenilworth Street
Philadelphia, PA 19147

Conestoga & Spring Mill Roads

File Name : 06-ConSpMEve
Site Code : 00000000
Start Date : 12/11/2012
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Groups Printed- cars - HV

	Spring Mill Road Southbound				Conestoga Road Westbound				Conestoga Road Eastbound				
Start Time	Left	Right	Peds	App. Total	Thru	Right	Peds	App. Total	Left	Thru	Peds	App. Total	Int. Total
06:00 PM	2	3	0	5	91	0	0	91	0	200	0	200	296
06:15 PM	2	1	0	3	120	0	0	120	0	187	0	187	310
06:30 PM	1	1	0	2	87	2	0	89	0	186	0	186	277
06:45 PM	1	0	0	1	83	0	0	83	1	112	0	113	197
Total	6	5	0	11	381	2	0	383	1	685	0	686	1080
07:00 PM	1	1	0	2	100	2	0	102	1	95	0	96	200
07:15 PM	0	1	0	1	88	0	0	88	2	80	0	82	171
07:30 PM	0	0	0	0	60	0	0	60	2	64	0	66	126
07:45 PM	2	0	0	2	79	0	0	79	0	51	0	51	132
Total	3	2	0	5	327	2	0	329	5	290	0	295	629
Grand Total	9	7	0	16	708	4	0	712	6	975	0	981	1709
Apprch %	56.2	43.8	0		99.4	0.6	0		0.6	99.4	0		
Total %	0.5	0.4	0	0.9	41.4	0.2	0	41.7	0.4	57.1	0	57.4	
cars	9	7	0	16	702	4	0	706	6	974	0	980	1702
% cars	100	100	0	100	99.2	100	0	99.2	100	99.9	0	99.9	99.6
HV	0	0	0	0	6	0	0	6	0	1	0	1	7
% HV	0	0	0	0	0.8	0	0	0.8	0	0.1	0	0.1	0.4

	Spring Mill Road Southbound			Conestoga Road Westbound			Conestoga Road Eastbound			
Start Time	Left	Right	App. Total	Thru	Right	App. Total	Left	Thru	App. Total	Int. Total
Peak Hour Analysis From 06:00 PM to 07:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 06:00 PM										
06:00 PM	**2**	**3**	**5**	91	0	91	0	**200**	**200**	296
06:15 PM	2	1	3	**120**	0	**120**	0	187	187	**310**
06:30 PM	1	1	2	87	**2**	89	0	186	186	277
06:45 PM	1	0	1	83	0	83	**1**	112	113	197
Total Volume	6	5	11	381	2	383	1	685	686	1080
% App. Total	54.5	45.5		99.5	0.5		0.1	99.9		
PHF	.750	.417	.550	.794	.250	.798	.250	.856	.858	.871
cars	6	5	11	375	2	377	1	685	686	1074
% cars	100	100	100	98.4	100	98.4	100	100	100	99.4
HV	0	0	0	6	0	6	0	0	0	6
% HV	0	0	0	1.6	0	1.6	0	0	0	0.6

F. Tavani and Associates, Inc.
105 Kenilworth Street
Philadelphia, PA 19147

Conestoga & Spring Mill Roads

File Name : 06-ConSpMEve
Site Code : 00000000
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Page No : 1

Groups Printed- HV

	Spring Mill Road Southbound				Conestoga Road Westbound				Conestoga Road Eastbound				
Start Time	Left	Right	Peds	App. Total	Thru	Right	Peds	App. Total	Left	Thru	Peds	App. Total	Int. Total
06:00 PM	0	0	0	0	1	0	0	1	0	0	0	0	1
06:15 PM	0	0	0	0	3	0	0	3	0	0	0	0	3
06:30 PM	0	0	0	0	1	0	0	1	0	0	0	0	1
06:45 PM	0	0	0	0	1	0	0	1	0	0	0	0	1
Total	0	0	0	0	6	0	0	6	0	0	0	0	6
07:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
07:15 PM	0	0	0	0	0	0	0	0	0	1	0	1	1
07:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
07:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	1	0	1	1
Grand Total	0	0	0	0	6	0	0	6	0	1	0	1	7
Apprch %	0	0	0		100	0	0		0	100	0		
Total %	0	0	0	0	85.7	0	0	85.7	0	14.3	0	14.3	

	Spring Mill Road Southbound			Conestoga Road Westbound			Conestoga Road Eastbound			
Start Time	Left	Right	App. Total	Thru	Right	App. Total	Left	Thru	App. Total	Int. Total
Peak Hour Analysis From 06:00 PM to 06:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 06:00 PM										
06:00 PM	0	0	0	1	0	1	0	0	0	1
06:15 PM	0	0	0	**3**	0	**3**	0	0	0	**3**
06:30 PM	0	0	0	1	0	1	0	0	0	1
06:45 PM	0	0	0	1	0	1	0	0	0	1
Total Volume	0	0	0	6	0	6	0	0	0	6
% App. Total	0	0		100	0		0	0		
PHF	.000	.000	.000	.500	.000	.500	.000	.000	.000	.500

F. Tavani and Associates, Inc.
105 Kenilworth Street
Philadelphia, PA 19147

Conestoga Road & Ithan Avenue

File Name : 07-conitheve
Site Code : 00000000
Start Date : 12/11/2012
Page No : 1

Groups Printed- cars - HV

	Ithan Avenue Southbound					Conestoga Road Westbound					Ithan Avenue Northbound					Conestoga Road Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
06:00 PM	9	9	13	0	31	3	72	11	0	86	0	13	4	0	17	31	126	2	0	159	293
06:15 PM	2	7	14	0	23	2	97	17	0	116	1	25	1	0	27	38	126	1	0	165	331
06:30 PM	7	1	11	0	19	3	76	25	0	104	0	22	3	0	25	49	124	1	0	174	322
06:45 PM	6	3	17	0	26	3	61	16	0	80	1	15	0	0	16	28	79	0	0	107	229
Total	24	20	55	0	99	11	306	69	0	386	2	75	8	0	85	146	455	4	0	605	1175
07:00 PM	9	4	21	0	34	0	69	6	0	75	1	7	0	0	8	11	74	1	0	86	203
07:15 PM	12	12	17	0	41	1	57	11	0	69	0	6	2	0	8	10	49	0	0	59	177
07:30 PM	2	4	6	0	12	0	55	6	0	61	0	2	0	0	2	8	45	1	0	54	129
07:45 PM	5	1	10	0	16	0	55	3	0	58	0	0	1	0	1	7	31	0	0	38	113
Total	28	21	54	0	103	1	236	26	0	263	1	15	3	0	19	36	199	2	0	237	622
Grand Total	52	41	109	0	202	12	542	95	0	649	3	90	11	0	104	182	654	6	0	842	1797
Apprch %	25.7	20.3	54	0		1.8	83.5	14.6	0		2.9	86.5	10.6	0		21.6	77.7	0.7	0		
Total %	2.9	2.3	6.1	0	11.2	0.7	30.2	5.3	0	36.1	0.2	5	0.6	0	5.8	10.1	36.4	0.3	0	46.9	
cars	52	41	106	0	199	12	540	95	0	647	3	90	11	0	104	180	654	6	0	840	1790
% cars	100	100	97.2	0	98.5	100	99.6	100	0	99.7	100	100	100	0	100	98.9	100	100	0	99.8	99.6
HV	0	0	3	0	3	0	2	0	0	2	0	0	0	0	0	2	0	0	0	2	7
% HV	0	0	2.8	0	1.5	0	0.4	0	0	0.3	0	0	0	0	0	1.1	0	0	0	0.2	0.4

	Ithan Avenue Southbound				Conestoga Road Westbound				Ithan Avenue Northbound				Conestoga Road Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 06:00 PM to 07:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 06:00 PM																	
06:00 PM	**9**	**9**	13	**31**	**3**	72	11	86	0	13	**4**	17	31	**126**	**2**	159	293
06:15 PM	2	7	14	23	2	**97**	17	**116**	**1**	**25**	1	**27**	38	126	1	165	**331**
06:30 PM	7	1	11	19	3	76	**25**	104	0	22	3	25	**49**	124	1	**174**	322
06:45 PM	6	3	**17**	26	3	61	16	80	1	15	0	16	28	79	0	107	229
Total Volume	24	20	55	99	11	306	69	386	2	75	8	85	146	455	4	605	1175
% App. Total	24.2	20.2	55.6		2.8	79.3	17.9		2.4	88.2	9.4		24.1	75.2	0.7		
PHF	.667	.556	.809	.798	.917	.789	.690	.832	.500	.750	.500	.787	.745	.903	.500	.869	.887
cars	24	20	52	96	11	304	69	384	2	75	8	85	145	455	4	604	1169
% cars	100	100	94.5	97.0	100	99.3	100	99.5	100	100	100	100	99.3	100	100	99.8	99.5
HV	0	0	3	3	0	2	0	2	0	0	0	0	1	0	0	1	6
% HV	0	0	5.5	3.0	0	0.7	0	0.5	0	0	0	0	0.7	0	0	0.2	0.5

F. Tavani and Associates, Inc.
105 Kenilworth Street
Philadelphia, PA 19147

Conestoga Road & Ithan Avenue

File Name : 07-conitheve
Site Code : 00000000
Start Date : 12/11/2012
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Groups Printed- HV

	Ithan Avenue Southbound					Conestoga Road Westbound					Ithan Avenue Northbound					Conestoga Road Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
06:00 PM	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	2
06:15 PM	0	0	1	0	1	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	3
06:30 PM	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
06:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	3	0	3	0	2	0	0	2	0	0	0	0	0	1	0	0	0	1	6
07:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1
07:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1
Grand Total	0	0	3	0	3	0	2	0	0	2	0	0	0	0	0	2	0	0	0	2	7
Apprch %	0	0	100	0		0	100	0	0		0	0	0	0		100	0	0	0		
Total %	0	0	42.9	0	42.9	0	28.6	0	0	28.6	0	0	0	0	0	28.6	0	0	0	28.6	

	Ithan Avenue Southbound				Conestoga Road Westbound				Ithan Avenue Northbound				Conestoga Road Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 06:00 PM to 06:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 06:00 PM																	
06:00 PM	0	0	**1**	**1**	0	0	0	0	0	0	0	0	**1**	0	0	**1**	2
06:15 PM	0	0	1	1	0	**2**	0	**2**	0	0	0	0	0	0	0	0	**3**
06:30 PM	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1
06:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Volume	0	0	3	3	0	2	0	2	0	0	0	0	1	0	0	1	6
% App. Total	0	0	100		0	100	0		0	0	0		100	0	0		
PHF	.000	.000	.750	.750	.000	.250	.000	.250	.000	.000	.000	.000	.250	.000	.000	.250	.500

F. Tavani and Associates, Inc.
105 Kenilworth Street
Philadelphia, PA 19147

Lancaster Avenue & Spring Mill/Sproul Rd
& Kenilworth Rd/Aldwyn Ln
Homecoming

File Name : 30SproulSat
Site Code : 00000000
Start Date : 10/27/2012
Page No : 1

Groups Printed- cars - HV

	North Spring Mill Road Southbound							Lancaster Avenue Westbound							Aldwyn Lane Northwestbound							Sproul Road Northbound							Lancaster Avenue Eastbound							Kenilworth Road Southeastbound							
Start Time	Lto Lanc	Lto Ald					App. Total	Lto Ald	Lto Spr					App. Total	Lto Spr	Lto Lanc					App. Total	Lto Lanc	Lto Ken					App. Total	Lto Ken	Lto S Mill					App. Total	Lto S Mill	Lto Lanc					App. Total	Int. Total
12:00 PM	10	0	28	42	0	0	80	0	4	179	0	8	0	191	1	10	0	0	3	0	14	44	0	31	1	0	0	76	1	52	230	21	51	0	355	0	1	0	1	3	0	5	721
12:15 PM	5	0	24	54	0	0	83	0	1	204	0	16	0	221	0	13	0	1	0	0	14	46	1	25	8	1	0	81	0	60	207	19	30	0	316	0	0	0	1	1	0	2	717
12:30 PM	14	0	20	52	0	0	86	0	2	174	0	5	0	181	2	5	0	1	0	0	8	51	0	26	5	2	0	84	0	66	188	11	35	0	300	0	0	0	0	4	0	4	663
12:45 PM	11	0	18	40	0	11	80	0	2	155	0	9	0	166	1	13	0	2	1	3	20	54	0	16	4	0	0	74	1	64	239	14	38	0	356	0	0	0	1	1	0	2	698
Total	40	0	90	188	0	11	329	0	9	712	0	38	0	759	4	41	0	4	4	3	56	195	1	98	18	3	0	315	2	242	864	65	154	0	1327	0	1	0	3	9	0	13	2799
01:00 PM	11	0	24	50	0	2	87	0	7	182	0	9	0	198	0	6	0	2	0	0	8	32	0	23	7	0	0	62	1	53	177	10	37	0	278	0	0	0	0	4	0	4	637
01:15 PM	17	0	20	41	0	6	84	0	2	162	0	7	0	171	0	11	0	2	0	0	13	37	0	21	8	5	0	71	2	45	203	13	32	0	295	0	0	0	1	4	0	5	639
01:30 PM	15	0	15	66	0	0	96	0	4	206	0	6	0	216	0	6	0	0	1	3	10	27	0	16	4	1	0	48	2	44	194	13	39	0	292	1	0	0	0	1	0	2	664
01:45 PM	15	0	21	60	0	2	98	0	2	173	0	7	0	182	0	5	0	2	1	0	8	29	0	18	5	1	0	53	3	56	191	11	27	0	288	0	0	0	1	1	0	2	631
Total	58	0	80	217	0	10	365	0	15	723	0	29	0	767	0	28	0	6	2	3	39	125	0	78	24	7	0	234	8	198	765	47	135	0	1153	1	0	0	2	10	0	13	2571
02:00 PM	27	0	24	59	0	5	115	0	7	177	0	9	0	193	0	10	0	0	0	0	10	33	0	23	2	1	0	59	2	43	159	19	31	0	254	0	0	0	0	3	0	3	634
02:15 PM	10	0	27	57	0	3	97	0	4	176	0	11	0	191	2	6	0	0	1	0	9	26	0	17	3	1	0	47	0	37	152	9	27	0	225	1	0	0	1	1	0	3	572
02:30 PM	7	0	23	73	0	0	103	0	3	179	0	7	0	189	0	10	0	0	0	0	10	30	0	16	3	0	0	49	3	45	170	11	34	0	263	0	1	0	0	5	0	6	620
02:45 PM	7	0	19	61	0	4	91	0	3	183	0	4	0	190	0	14	0	0	1	0	15	26	0	18	5	2	0	51	1	51	142	13	35	0	242	0	0	0	0	1	0	1	590
Total	51	0	93	250	0	12	406	0	17	715	0	31	0	763	2	40	0	0	2	0	44	115	0	74	13	4	0	206	6	176	623	52	127	0	984	1	1	0	1	10	0	13	2416
Grand Total	149	0	263	655	0	33	1100	0	41	2150	0	98	0	2289	6	109	0	10	8	6	139	435	1	250	55	14	0	755	16	616	2252	164	416	0	3464	2	2	0	6	29	0	39	7786
Apprch %	13.5	0	23.9	59.5	0	3		0	1.8	93.9	0	4.3	0		4.3	78.4	0	7.2	5.8	4.3		57.6	0.1	33.1	7.3	1.9	0		0.5	17.8	65	4.7	12	0		5.1	5.1	0	15.4	74.4	0		
Total %	1.9	0	3.4	8.4	0	0.4	14.1	0	0.5	27.6	0	1.3	0	29.4	0.1	1.4	0	0.1	0.1	0.1	1.8	5.6	0	3.2	0.7	0.2	0	9.7	0.2	7.9	28.9	2.1	5.3	0	44.5	0	0	0	0.1	0.4	0	0.5	
cars	145	0	257	643	0	33	1078	0	41	2106	0	96	0	2243	6	109	0	10	7	6	138	426	1	243	51	14	0	735	16	612	2223	164	409	0	3424	2	2	0	5	29	0	38	7656
% cars	97.3	0	97.7	98.2	0	100	98	0	100	98	0	98	0	98	100	100	0	100	87.5	100	99.3	97.9	100	97.2	92.7	100	0	97.4	100	99.4	98.7	100	98.3	0	98.8	100	100	0	83.3	100	0	97.4	98.3
HV	4	0	6	12	0	0	22	0	0	44	0	2	0	46	0	0	0	0	1	0	1	9	0	7	4	0	0	20	0	4	29	0	7	0	40	0	0	0	1	0	0	1	130
% HV	2.7	0	2.3	1.8	0	0	2	0	0	2	0	2	0	2	0	0	0	0	12.5	0	0.7	2.1	0	2.8	7.3	0	0	2.6	0	0.6	1.3	0	1.7	0	1.2	0	0	0	16.7	0	0	2.6	1.7

F. Tavani and Associates, Inc.
105 Kenilworth Street
Philadelphia, PA 19147

Lancaster Avenue & Spring Mill/Sproul Rd
& Kenilworth Rd/Aldwyn Ln
Homecoming

File Name : 30SproulSat
Site Code : 00000000
Start Date : 10/27/2012

	North Spring Mill Road Southbound						Lancaster Avenue Westbound						Aldwyn Lane Northwestbound						Sproul Road Northbound						Lancaster Avenue Eastbound						Kenilworth Road Southeastbound						
Start Time	L to Lanc	L to Ald	T to Spr	R to Lanc	R to Ken	App. Total	L to Ald	L to Spr	T to Lanc	R to Ken	R to S Mill	App. Total	L to Spr	L to Lanc	T to Ken	R to S Mill	R to Lanc	App. Total	L to Lanc	L to Ken	T to S Mill	R to Lanc	R to Ald	App. Total	L to Ken	L to S Mill	T to Lanc	R to Ald	R to Spr	App. Total	L to S Mill	L to Lanc	T to Ald	R to Spr	R to Lanc	App. Total	Int. Total
Peak Hour Analysis From 12:00 PM to 12:45 PM - Peak 1 of 1																																					
Peak Hour for Entire Intersection Begins at 12:00 PM																																					
12:00 PM	10	0	**28**	42	0	80	0	**4**	179	0	8	191	1	10	0	0	**3**	14	44	0	**31**	**1**	**0**	**76**	**1**	52	230	**21**	**51**	355	0	**1**	0	**1**	3	**5**	**721**
12:15 PM	5	0	24	**54**	**0**	**83**	**0**	**1**	**204**	0	**16**	**221**	0	**13**	**0**	**1**	**0**	**14**	46	**1**	25	**8**	1	81	0	60	207	19	30	316	0	0	0	1	1	2	717
12:30 PM	**14**	**0**	20	52	0	**86**	0	2	174	0	5	181	**2**	5	0	1	0	8	51	0	26	5	**2**	**84**	0	**66**	188	11	35	300	0	0	0	0	**4**	4	663
12:45 PM	11	0	18	40	0	69	0	2	155	0	9	166	1	13	0	**2**	1	**17**	**54**	**0**	16	4	0	74	1	64	**239**	14	38	**356**	0	0	0	1	1	2	684
Total Volume	40	0	90	188	0	318	0	9	712	0	38	759	4	41	0	4	4	53	195	1	98	18	3	315	2	242	864	65	154	1327	0	1	0	3	9	13	2785
% App. Total	12.6	0	28.3	59.1	0		0	1.2	93.8	0	5		7.5	77.4	0	7.5	7.5		61.9	0.3	31.1	5.7	1		0.2	18.2	65.1	4.9	11.6		0	7.7	0	23.1	69.2		
PHF	.714	.000	.804	.870	.000	.924	.000	.563	.873	.000	.594	.859	.500	.788	.000	.500	.333	.779	.903	.250	.790	.563	.375	.938	.500	.917	.904	.774	.755	.932	.000	.250	.000	.750	.563	.650	.966
cars	40	0	88	182	0	310	0	9	699	0	37	745	4	41	0	4	4	53	190	1	95	17	3	306	2	240	852	65	153	1312	0	1	0	2	9	12	2738
% cars	100	0	97.8	96.8	0	97.5	0	100	98.2	0	97.4	98.2	100	100	0	100	100	100	97.4	100	96.9	94.4	100	97.1	100	99.2	98.6	100	99.4	98.9	0	100	0	66.7	100	92.3	98.3
HV	0	0	2	6	0	8	0	0	13	0	1	14	0	0	0	0	0	0	5	0	3	1	0	9	0	2	12	0	1	15	0	0	0	1	0	1	47
% HV	0	0	2.2	3.2		2.5			1.8		2.6	1.8							2.6		3.1	5.6		2.9		0.8	1.4		0.6	1.1				33.3	0	7.7	1.7

F. Tavani and Associates, Inc.
105 Kenilworth Street
Philadelphia, PA 19147

Lancaster Avenue & Spring Mill/Sproul Rd
& Kenilworth Rd/Aldwyn Ln
Homecoming

File Name : 30SproulSat
Site Code : 00000000
Start Date : 10/27/2012
Page No : 1

Groups Printed- HV

	North Spring Mill Road Southbound							Lancaster Avenue Westbound							Aldwyn Lane Northwestbound							Sproul Road Northbound							Lancaster Avenue Eastbound							Kenilworth Road Southeastbound							
Start Time	Lt o Lanc	Lt o Ald					App. Total	Lt o Ald	Lt o Spr					App. Total	Lt o Spr	Lt o Lanc					App. Total	Lt o Lanc	Lt o Ken					App. Total	Lt o Ken	Lt o S Mill					App. Total	Lt o S Mill	Lt o Lanc					App. Total	Int. Total
12:00 PM	0	0	1	2	0	0	3	0	0	4	0	0	0	4	0	0	0	0	0	0	0	2	0	0	0	0	0	2	0	2	3	0	0	0	5	0	0	0	0	0	0	14
12:15 PM	0	0	0	1	0	0	1	0	0	3	0	1	0	4	0	0	0	0	0	0	0	1	0	1	0	0	0	2	0	0	1	0	1	0	2	0	0	0	1	0	0	1	10
12:30 PM	0	0	1	2	0	0	3	0	0	3	0	0	0	3	0	0	0	0	0	0	0	2	0	2	1	0	0	5	0	0	2	0	0	0	2	0	0	0	0	0	0	0	13
12:45 PM	0	0	0	1	0	0	1	0	0	3	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	0	0	6	0	0	0	0	0	0	0	10
Total	0	0	2	6	0	0	8	0	0	13	0	1	0	14	0	0	0	0	0	0	0	5	0	3	1	0	0	9	0	2	12	0	1	0	15	0	0	0	1	0	0	1	47
01:00 PM	0	0	0	2	0	0	2	0	0	6	0	0	0	6	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	1	3	0	1	0	5	0	0	0	0	0	0	0	14
01:15 PM	0	0	0	0	0	0	0	0	0	3	0	0	0	3	0	0	0	0	0	0	0	1	0	3	1	0	0	5	0	0	2	0	1	0	3	0	0	0	0	0	0	0	11
01:30 PM	1	0	0	2	0	0	3	0	0	1	0	0	0	1	0	0	0	0	1	0	1	0	0	0	1	0	0	1	0	1	4	0	0	0	5	0	0	0	0	0	0	0	11
01:45 PM	0	0	2	1	0	0	3	0	0	5	0	0	0	5	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9
Total	1	0	2	5	0	0	8	0	0	15	0	0	0	15	0	0	0	0	1	0	1	2	0	4	2	0	0	8	0	2	9	0	2	0	13	0	0	0	0	0	0	0	45
02:00 PM	2	0	0	0	0	0	2	0	0	3	0	1	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	1	0	4	0	0	0	0	0	0	0	10
02:15 PM	0	0	1	0	0	0	1	0	0	4	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	6
02:30 PM	0	0	0	0	0	0	0	0	0	7	0	0	0	7	0	0	0	0	0	0	0	2	0	0	0	0	0	2	0	0	4	0	2	0	6	0	0	0	0	0	0	0	15
02:45 PM	1	0	1	1	0	0	3	0	0	2	0	0	0	2	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	0	0	0	1	0	0	0	0	0	0	0	7
Total	3	0	2	1	0	0	6	0	0	16	0	1	0	17	0	0	0	0	0	0	0	2	0	0	1	0	0	3	0	0	8	0	4	0	12	0	0	0	0	0	0	0	38
Grand Total	4	0	6	12	0	0	22	0	0	44	0	2	0	46	0	0	0	0	1	0	1	9	0	7	4	0	0	20	0	4	29	0	7	0	40	0	0	0	1	0	0	1	130
Apprch %	18.2	0	27.3	54.5	0	0		0	0	95.7	0	4.3	0		0	0	0	0	100	0		45	0	35	20	0	0		0	10	72.5	0	17.5	0		0	0	0	100	0	0		
Total %	3.1	0	4.6	9.2	0	0	16.9	0	0	33.8	0	1.5	0	35.4	0	0	0	0	0.8	0	0.8	6.9	0	5.4	3.1	0	0	15.4	0	3.1	22.3	0	5.4	0	30.8	0	0	0	0.8	0	0	0.8	

	North Spring Mill Road Southbound						Lancaster Avenue Westbound						Aldwyn Lane Northwestbound						Sproul Road Northbound						Lancaster Avenue Eastbound						Kenilworth Road Southeastbound						
Start Time	L to Lanc	L to Ald	T to Spr	R to Lanc	R to Ken	App. Total	L to Ald	L to Spr	T to Lanc	R to Ken	R to S Mill	App. Total	L to Spr	L to Lanc	T to Ken	R to S Mill	R to Lanc	App. Total	L to Lanc	L to Ken	T to S Mill	R to Lanc	R to Ald	App. Total	L to Ken	L to S Mill	T to Lanc	R to Ald	R to Spr	App. Total	L to S Mill	L to Lanc	T to Ald	R to Spr	R to Lanc	App. Total	Int. Total
Peak Hour Analysis From 12:00 PM to 12:45 PM - Peak 1 of 1																																					
Peak Hour for Entire Intersection Begins at 12:00 PM																																					
12:00 PM	0	0	**1**	**2**	0	**3**	0	0	**4**	0	0	**4**	0	0	0	0	0	0	**2**	0	0	0	0	2	0	**2**	3	0	0	5	0	0	0	0	0	0	**14**
12:15 PM	0	0	0	1	0	1	0	0	3	0	**1**	4	0	0	0	0	0	0	1	0	1	0	0	2	0	0	1	0	**1**	2	0	0	0	**1**	0	**1**	10
12:30 PM	0	0	1	2	0	3	0	0	3	0	0	3	0	0	0	0	0	0	2	0	**2**	**1**	0	**5**	0	0	2	0	0	2	0	0	0	0	0	0	13
12:45 PM	0	0	0	1	0	1	0	0	3	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**6**	0	0	**6**	0	0	0	0	0	0	10
Total	0	0	2	6	0	8	0	0	13	0	1	14	0	0	0	0	0	0	5	0	3	1	0	9	0	2	12	0	1	15	0	0	0	1	0	1	47
Volume																																					
% App. Total			25	75	0		0	0	92.9	0	7.1								55.6	0	33.3	11.1	0		0	13.3	80	0	6.7					100			
PHF	.000	.000	.500	.750	.000	.667	.000	.000	.813	.000	.250	.875	.000	.000	.000	.000	.000	.000	.625	.000	.375	.250	.000	.450	.000	.250	.500	.000	.250	.625	.000	.000	.000	.250	.000	.250	.839

F. Tavani and Associates, Inc.
105 Kenilworth Street
Philadelphia, PA 19147

Ithan and 30
Homecoming
EB Peds = diag peds NE-SW
WB Peds = diag peds NW-SE

File Name : 30IthanSAT
Site Code : 00111111
Start Date : 10/27/2012
Page No : 1

Groups Printed- cars - HV

	Ithan Avenue Southbound					Lacaster Avenue Westbound						Ithan Avenue Northbound					Lacaster Avenue Eastbound						
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	NW-SE Peds	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	NE-SW Peds	Peds	App. Total	Int. Total
12:00 PM	9	15	14	29	67	33	139	12	82	28	294	8	15	5	6	34	20	134	29	24	110	317	712
12:15 PM	18	29	18	37	102	23	173	16	93	44	349	16	19	13	19	67	23	132	43	4	139	341	859
12:30 PM	10	24	3	21	58	33	197	21	125	56	432	8	23	9	7	47	23	180	38	5	173	419	956
12:45 PM	12	29	18	16	75	37	192	13	202	32	476	15	19	14	6	54	29	187	56	39	143	454	1059
Total	49	97	53	103	302	126	701	62	502	160	1551	47	76	41	38	202	95	633	166	72	565	1531	3586
01:00 PM	4	31	22	35	92	32	140	7	189	45	413	5	22	12	11	50	16	166	28	31	134	375	930
01:15 PM	11	43	16	42	112	43	213	18	174	40	488	5	25	6	2	38	16	183	40	10	126	375	1013
01:30 PM	0	0	16	105	121	39	202	15	196	52	504	8	24	8	12	52	20	171	46	6	124	367	1044
01:45 PM	7	28	15	167	217	34	190	12	218	64	518	11	22	10	22	65	24	158	51	1	122	356	1156
Total	22	102	69	349	542	148	745	52	777	201	1923	29	93	36	47	205	76	678	165	48	506	1473	4143
02:00 PM	9	29	14	48	100	47	178	15	261	85	586	15	7	8	30	60	16	162	23	4	108	313	1059
02:15 PM	13	16	13	71	113	28	193	16	299	54	590	6	22	14	13	55	22	151	41	41	108	363	1121
02:30 PM	0	0	14	106	120	29	196	13	272	95	605	15	23	16	11	65	20	158	39	42	113	372	1162
02:45 PM	9	19	15	140	183	30	200	9	245	136	620	23	24	17	9	73	18	165	37	42	117	379	1255
Total	31	64	56	365	516	134	767	53	1077	370	2401	59	76	55	63	253	76	636	140	129	446	1427	4597
Grand Total	102	263	178	817	1360	408	2213	167	2356	731	5875	135	245	132	148	660	247	1947	471	249	1517	4431	12326
Apprch %	7.5	19.3	13.1	60.1		6.9	37.7	2.8	40.1	12.4		20.5	37.1	20	22.4		5.6	43.9	10.6	5.6	34.2		
Total %	0.8	2.1	1.4	6.6	11	3.3	18	1.4	19.1	5.9	47.7	1.1	2	1.1	1.2	5.4	2	15.8	3.8	2	12.3	35.9	
cars	93	263	173	817	1346	407	2167	163	2356	731	5824	133	245	131	148	657	241	1925	471	249	1517	4403	12230
% cars	91.2	100	97.2	100	99	99.8	97.9	97.6	100	100	99.1	98.5	100	99.2	100	99.5	97.6	98.9	100	100	100	99.4	99.2
HV	9	0	5	0	14	1	46	4	0	0	51	2	0	1	0	3	6	22	0	0	0	28	96
% HV	8.8	0	2.8	0	1	0.2	2.1	2.4	0	0	0.9	1.5	0	0.8	0	0.5	2.4	1.1	0	0	0	0.6	0.8

	Ithan Avenue Southbound				Lacaster Avenue Westbound				Ithan Avenue Northbound				Lacaster Avenue Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 12:00 PM to 12:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 12:00 PM																	
12:00 PM	9	15	14	38	33	139	12	184	8	15	5	28	20	134	29	183	433
12:15 PM	**18**	**29**	**18**	**65**	23	173	16	212	**16**	19	13	**48**	23	132	43	198	523
12:30 PM	10	24	3	37	33	**197**	**21**	**251**	8	**23**	9	40	23	180	38	241	569
12:45 PM	12	29	18	59	**37**	192	13	242	15	19	**14**	48	**29**	**187**	**56**	**272**	**621**
Total Volume	49	97	53	199	126	701	62	889	47	76	41	164	95	633	166	894	2146
% App. Total	24.6	48.7	26.6		14.2	78.9	7		28.7	46.3	25		10.6	70.8	18.6		
PHF	.681	.836	.736	.765	.851	.890	.738	.885	.734	.826	.732	.854	.819	.846	.741	.822	.864
cars	41	97	50	188	125	689	58	872	46	76	40	162	92	621	166	879	2101
% cars	83.7	100	94.3	94.5	99.2	98.3	93.5	98.1	97.9	100	97.6	98.8	96.8	98.1	100	98.3	97.9
HV	8	0	3	11	1	12	4	17	1	0	1	2	3	12	0	15	45
% HV	16.3	0	5.7	5.5	0.8	1.7	6.5	1.9	2.1	0	2.4	1.2	3.2	1.9	0	1.7	2.1

F. Tavani and Associates, Inc.
105 Kenilworth Street
Philadelphia, PA 19147

Ithan and 30
Homecoming
EB Peds = diag peds NE-SW
WB Peds = diag peds NW-SE

File Name : 30IthanSAT
Site Code : 00111111
Start Date : 10/27/2012
Page No : 1

Groups Printed- HV

	Ithan Avenue Southbound					Lacaster Avenue Westbound						Ithan Avenue Northbound					Lacaster Avenue Eastbound						
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	NW-SE Peds	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	NE-SW Peds	Peds	App. Total	Int. Total
12:00 PM	0	0	0	0	0	0	2	0	0	0	2	0	0	0	0	0	1	2	0	0	0	3	5
12:15 PM	7	0	0	0	7	0	3	0	0	0	3	1	0	1	0	2	1	2	0	0	0	3	15
12:30 PM	1	0	0	0	1	1	5	4	0	0	10	0	0	0	0	0	0	2	0	0	0	2	13
12:45 PM	0	0	3	0	3	0	2	0	0	0	2	0	0	0	0	0	1	6	0	0	0	7	12
Total	8	0	3	0	11	1	12	4	0	0	17	1	0	1	0	2	3	12	0	0	0	15	45
01:00 PM	0	0	0	0	0	0	4	0	0	0	4	0	0	0	0	0	0	3	0	0	0	3	7
01:15 PM	0	0	0	0	0	0	3	0	0	0	3	0	0	0	0	0	1	1	0	0	0	2	5
01:30 PM	0	0	0	0	0	0	4	0	0	0	4	0	0	0	0	0	0	1	0	0	0	1	5
01:45 PM	1	0	0	0	1	0	5	0	0	0	5	1	0	0	0	1	0	0	0	0	0	0	7
Total	1	0	0	0	1	0	16	0	0	0	16	1	0	0	0	1	1	5	0	0	0	6	24
02:00 PM	0	0	1	0	1	0	2	0	0	0	2	0	0	0	0	0	1	5	0	0	0	6	9
02:15 PM	0	0	1	0	1	0	7	0	0	0	7	0	0	0	0	0	0	0	0	0	0	0	8
02:30 PM	0	0	0	0	0	0	5	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	5
02:45 PM	0	0	0	0	0	0	4	0	0	0	4	0	0	0	0	0	1	0	0	0	0	1	5
Total	0	0	2	0	2	0	18	0	0	0	18	0	0	0	0	0	2	5	0	0	0	7	27
Grand Total	9	0	5	0	14	1	46	4	0	0	51	2	0	1	0	3	6	22	0	0	0	28	96
Apprch %	64.3	0	35.7	0		2	90.2	7.8	0	0		66.7	0	33.3	0		21.4	78.6	0	0	0		
Total %	9.4	0	5.2	0	14.6	1	47.9	4.2	0	0	53.1	2.1	0	1	0	3.1	6.2	22.9	0	0	0	29.2	

	Ithan Avenue Southbound				Lacaster Avenue Westbound				Ithan Avenue Northbound				Lacaster Avenue Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 12:00 PM to 12:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 12:00 PM																	
12:00 PM	0	0	0	0	0	2	0	2	0	0	0	0	**1**	2	0	3	5
12:15 PM	**7**	0	0	**7**	0	3	0	3	**1**	0	**1**	**2**	1	2	0	3	**15**
12:30 PM	1	0	0	1	**1**	**5**	**4**	**10**	0	0	0	0	0	2	0	2	13
12:45 PM	0	0	**3**	3	0	2	0	2	0	0	0	0	1	**6**	0	**7**	12
Total Volume	8	0	3	11	1	12	4	17	1	0	1	2	3	12	0	15	45
% App. Total	72.7	0	27.3		5.9	70.6	23.5		50	0	50		20	80	0		
PHF	.286	.000	.250	.393	.250	.600	.250	.425	.250	.000	.250	.250	.750	.500	.000	.536	.750

F. Tavani and Associates, Inc.
105 Kenilworth Street
Philadelphia, PA 19147

Sproul & Conestoga Roads
Homecoming

File Name : SprConSat
Site Code : 00000000
Start Date : 10/27/2012
Page No : 1

Groups Printed- cars - HV

	Sproul Road Southbound					Conestoga Road Westbound					Sproul Road Northbound					Conestoga Road Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
12:00 PM	15	37	18	0	70	8	85	13	0	106	23	33	6	1	63	22	58	33	0	113	352
12:15 PM	13	29	20	1	63	2	82	18	0	102	32	40	10	0	82	31	82	34	0	147	394
12:30 PM	11	23	15	0	49	0	81	12	0	93	32	31	12	0	75	34	99	34	0	167	384
12:45 PM	12	28	13	0	53	3	107	13	0	123	33	41	5	0	79	21	81	41	0	143	398
Total	51	117	66	1	235	13	355	56	0	424	120	145	33	1	299	108	320	142	0	570	1528
01:00 PM	11	27	15	3	56	3	100	8	0	111	27	31	8	0	66	17	74	41	1	133	366
01:15 PM	8	29	19	1	57	6	86	2	0	94	33	29	7	0	69	25	102	33	0	160	380
01:30 PM	8	30	6	0	44	7	88	11	0	106	26	27	9	0	62	14	94	41	1	150	362
01:45 PM	10	27	10	0	47	3	101	14	0	118	38	35	2	0	75	15	101	46	0	162	402
Total	37	113	50	4	204	19	375	35	0	429	124	122	26	0	272	71	371	161	2	605	1510
02:00 PM	12	28	17	0	57	4	75	14	0	93	32	31	4	1	68	25	76	40	0	141	359
02:15 PM	9	31	17	0	57	4	95	9	0	108	34	42	10	0	86	14	84	35	1	134	385
02:30 PM	14	31	17	0	62	4	64	14	0	82	29	19	5	1	54	14	85	43	0	142	340
02:45 PM	9	37	14	0	60	7	74	13	0	94	21	33	4	0	58	19	103	44	1	167	379
Total	44	127	65	0	236	19	308	50	0	377	116	125	23	2	266	72	348	162	2	584	1463
Grand Total	132	357	181	5	675	51	1038	141	0	1230	360	392	82	3	837	251	1039	465	4	1759	4501
Apprch %	19.6	52.9	26.8	0.7		4.1	84.4	11.5	0		43	46.8	9.8	0.4		14.3	59.1	26.4	0.2		
Total %	2.9	7.9	4	0.1	15	1.1	23.1	3.1	0	27.3	8	8.7	1.8	0.1	18.6	5.6	23.1	10.3	0.1	39.1	
cars	125	349	179	5	658	51	1031	133	0	1215	358	386	82	3	829	241	1030	463	4	1738	4440
% cars	94.7	97.8	98.9	100	97.5	100	99.3	94.3	0	98.8	99.4	98.5	100	100	99	96	99.1	99.6	100	98.8	98.6
HV	7	8	2	0	17	0	7	8	0	15	2	6	0	0	8	10	9	2	0	21	61
% HV	5.3	2.2	1.1	0	2.5	0	0.7	5.7	0	1.2	0.6	1.5	0	0	1	4	0.9	0.4	0	1.2	1.4

	Sproul Road Southbound				Conestoga Road Westbound				Sproul Road Northbound				Conestoga Road Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 12:00 PM to 12:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 12:00 PM																	
12:00 PM	**15**	**37**	18	**70**	**8**	85	13	106	23	33	6	62	22	58	33	113	351
12:15 PM	13	29	**20**	62	2	82	**18**	102	32	40	10	**82**	31	82	34	147	393
12:30 PM	11	23	15	49	0	81	12	93	32	31	**12**	75	**34**	**99**	34	**167**	384
12:45 PM	12	28	13	53	3	**107**	13	**123**	**33**	**41**	5	79	21	81	**41**	143	**398**
Total Volume	51	117	66	234	13	355	56	424	120	145	33	298	108	320	142	570	1526
% App. Total	21.8	50	28.2		3.1	83.7	13.2		40.3	48.7	11.1		18.9	56.1	24.9		
PHF	.850	.791	.825	.836	.406	.829	.778	.862	.909	.884	.688	.909	.794	.808	.866	.853	.959
cars	49	115	65	229	13	353	52	418	119	142	33	294	104	317	141	562	1503
% cars	96.1	98.3	98.5	97.9	100	99.4	92.9	98.6	99.2	97.9	100	98.7	96.3	99.1	99.3	98.6	98.5
HV	2	2	1	5	0	2	4	6	1	3	0	4	4	3	1	8	23
% HV	3.9	1.7	1.5	2.1	0	0.6	7.1	1.4	0.8	2.1	0	1.3	3.7	0.9	0.7	1.4	1.5

F. Tavani and Associates, Inc.
105 Kenilworth Street
Philadelphia, PA 19147

Sproul & Conestoga Roads
Homecoming

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	Sproul Road Southbound					Conestoga Road Westbound					Sproul Road Northbound					Conestoga Road Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
12:00 PM	0	1	1	0	2	0	1	2	0	3	0	0	0	0	0	1	0	1	0	2	7
12:15 PM	0	1	0	0	1	0	0	2	0	2	1	2	0	0	3	0	3	0	0	3	9
12:30 PM	2	0	0	0	2	0	0	0	0	0	0	1	0	0	1	3	0	0	0	3	6
12:45 PM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1
Total	2	2	1	0	5	0	2	4	0	6	1	3	0	0	4	4	3	1	0	8	23
01:00 PM	0	1	0	0	1	0	0	1	0	1	0	1	0	0	1	0	1	0	0	1	4
01:15 PM	0	1	0	0	1	0	0	0	0	0	0	1	0	0	1	3	1	0	0	4	6
01:30 PM	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1	0	0	0	1	2
01:45 PM	1	2	0	0	3	0	1	1	0	2	1	1	0	0	2	0	0	0	0	0	7
Total	1	4	0	0	5	0	2	2	0	4	1	3	0	0	4	4	2	0	0	6	19
02:00 PM	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	1	0	2	3
02:15 PM	0	2	0	0	2	0	1	1	0	2	0	0	0	0	0	0	2	0	0	2	6
02:30 PM	1	0	1	0	2	0	2	1	0	3	0	0	0	0	0	1	2	0	0	3	8
02:45 PM	2	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Total	4	2	1	0	7	0	3	2	0	5	0	0	0	0	0	2	4	1	0	7	19
Grand Total	7	8	2	0	17	0	7	8	0	15	2	6	0	0	8	10	9	2	0	21	61
Apprch %	41.2	47.1	11.8	0		0	46.7	53.3	0		25	75	0	0		47.6	42.9	9.5	0		
Total %	11.5	13.1	3.3	0	27.9	0	11.5	13.1	0	24.6	3.3	9.8	0	0	13.1	16.4	14.8	3.3	0	34.4	

	Sproul Road Southbound				Conestoga Road Westbound				Sproul Road Northbound				Conestoga Road Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 12:00 PM to 12:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 12:00 PM																	
12:00 PM	0	**1**	**1**	**2**	0	**1**	**2**	**3**	0	0	0	0	1	0	**1**	2	7
12:15 PM	0	1	0	1	0	0	2	2	**1**	**2**	0	**3**	0	**3**	0	**3**	**9**
12:30 PM	**2**	0	0	2	0	0	0	0	0	1	0	1	**3**	0	0	3	6
12:45 PM	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	1
Total Volume	2	2	1	5	0	2	4	6	1	3	0	4	4	3	1	8	23
% App. Total	40	40	20		0	33.3	66.7		25	75	0		50	37.5	12.5		
PHF	.250	.500	.250	.625	.000	.500	.500	.500	.250	.375	.000	.333	.333	.250	.250	.667	.639

F. Tavani and Associates, Inc.
105 Kenilworth Street
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Spring Mill & Conestoga Roads
Homecoming

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	Spring Mill Road Southbound				Conestoga Road Westbound				Conestoga Road Eastbound				
Start Time	Left	Right	Peds	App. Total	Thru	Right	Peds	App. Total	Left	Thru	Peds	App. Total	Int. Total
12:00 PM	1	1	0	2	105	1	0	106	3	85	0	88	196
12:15 PM	1	3	0	4	100	3	0	103	0	110	0	110	217
12:30 PM	4	2	0	6	88	1	0	89	3	113	0	116	211
12:45 PM	5	5	0	10	120	0	0	120	0	94	0	94	224
Total	11	11	0	22	413	5	0	418	6	402	0	408	848
01:00 PM	1	9	0	10	104	0	0	104	1	86	0	87	201
01:15 PM	1	5	0	6	91	1	0	92	1	112	0	113	211
01:30 PM	0	3	0	3	103	1	0	104	3	109	0	112	219
01:45 PM	0	6	0	6	105	0	0	105	1	107	0	108	219
Total	2	23	0	25	403	2	0	405	6	414	0	420	850
02:00 PM	1	2	0	3	97	0	0	97	5	89	0	94	194
02:15 PM	2	0	0	2	102	0	0	102	3	104	0	107	211
02:30 PM	1	0	0	1	78	1	0	79	3	103	0	106	186
02:45 PM	0	5	0	5	90	0	0	90	2	115	0	117	212
Total	4	7	0	11	367	1	0	368	13	411	0	424	803
Grand Total	17	41	0	58	1183	8	0	1191	25	1227	0	1252	2501
Apprch %	29.3	70.7	0		99.3	0.7	0		2	98	0		
Total %	0.7	1.6	0	2.3	47.3	0.3	0	47.6	1	49.1	0	50.1	
cars	17	41	0	58	1180	8	0	1188	25	1224	0	1249	2495
% cars	100	100	0	100	99.7	100	0	99.7	100	99.8	0	99.8	99.8
HV	0	0	0	0	3	0	0	3	0	3	0	3	6
% HV	0	0	0	0	0.3	0	0	0.3	0	0.2	0	0.2	0.2

	Spring Mill Road Southbound			Conestoga Road Westbound			Conestoga Road Eastbound			
Start Time	Left	Right	App. Total	Thru	Right	App. Total	Left	Thru	App. Total	Int. Total
Peak Hour Analysis From 12:00 PM to 12:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 12:00 PM										
12:00 PM	1	1	2	105	1	106	**3**	85	88	196
12:15 PM	1	3	4	100	**3**	103	0	110	110	217
12:30 PM	4	2	6	88	1	89	3	**113**	**116**	211
12:45 PM	**5**	**5**	**10**	**120**	0	**120**	0	94	94	**224**
Total Volume	11	11	22	413	5	418	6	402	408	848
% App. Total	50	50		98.8	1.2		1.5	98.5		
PHF	.550	.550	.550	.860	.417	.871	.500	.889	.879	.946
cars	11	11	22	411	5	416	6	399	405	843
% cars	100	100	100	99.5	100	99.5	100	99.3	99.3	99.4
HV	0	0	0	2	0	2	0	3	3	5
% HV	0	0	0	0.5	0	0.5	0	0.7	0.7	0.6

F. Tavani and Associates, Inc.
105 Kenilworth Street
Philadelphia, PA 19147

Spring Mill & Conestoga Roads
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	Spring Mill Road Southbound				Conestoga Road Westbound				Conestoga Road Eastbound				
Start Time	Left	Right	Peds	App. Total	Thru	Right	Peds	App. Total	Left	Thru	Peds	App. Total	Int. Total
12:00 PM	0	0	0	0	1	0	0	1	0	0	0	0	1
12:15 PM	0	0	0	0	1	0	0	1	0	2	0	2	3
12:30 PM	0	0	0	0	0	0	0	0	0	1	0	1	1
12:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	2	0	0	2	0	3	0	3	5
01:00 PM	0	0	0	0	1	0	0	1	0	0	0	0	1
01:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
01:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
01:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	1	0	0	1	0	0	0	0	1
02:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
02:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
02:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
02:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	0	0	0	0	3	0	0	3	0	3	0	3	6
Apprch %	0	0	0		100	0	0		0	100	0		
Total %	0	0	0	0	50	0	0	50	0	50	0	50	

	Spring Mill Road Southbound			Conestoga Road Westbound			Conestoga Road Eastbound			
Start Time	Left	Right	App. Total	Thru	Right	App. Total	Left	Thru	App. Total	Int. Total
Peak Hour Analysis From 12:00 PM to 12:45 PM - Peak 1 of 1										
Peak Hour for Entire Intersection Begins at 12:00 PM										
12:00 PM	0	0	0	**1**	0	**1**	0	0	0	1
12:15 PM	0	0	0	1	0	1	0	**2**	**2**	**3**
12:30 PM	0	0	0	0	0	0	0	1	1	1
12:45 PM	0	0	0	0	0	0	0	0	0	0
Total Volume	0	0	0	2	0	2	0	3	3	5
% App. Total	0	0		100	0		0	100		
PHF	.000	.000	.000	.500	.000	.500	.000	.375	.375	.417

F. Tavani and Associates, Inc.
105 Kenilworth Street
Philadelphia, PA 19147

Ithan & Conestoga Roads
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Groups Printed- cars - HV

	Ithan Avenue Southbound					Conestoga Road Westbound					Ithan Avenue Northbound					Conestoga Road Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
12:00 PM	7	5	25	0	37	3	72	12	1	88	0	4	3	0	7	7	66	0	0	73	205
12:15 PM	3	2	13	0	18	1	71	8	1	81	2	11	1	0	14	18	77	0	2	97	210
12:30 PM	11	1	4	0	16	3	78	7	2	90	1	5	0	0	6	17	87	0	0	104	216
12:45 PM	1	2	10	1	14	10	80	9	2	101	0	6	1	0	7	12	74	0	1	87	209
Total	22	10	52	1	85	17	301	36	6	360	3	26	5	0	34	54	304	0	3	361	840
01:00 PM	4	3	13	0	20	1	87	7	0	95	0	5	0	0	5	10	73	0	0	83	203
01:15 PM	5	5	14	0	24	1	60	5	0	66	2	4	0	0	6	19	91	0	2	112	208
01:30 PM	6	4	14	1	25	0	81	8	1	90	1	4	1	0	6	17	85	0	0	102	223
01:45 PM	4	4	15	0	23	1	82	8	1	92	0	2	1	0	3	17	79	2	0	98	216
Total	19	16	56	1	92	3	310	28	2	343	3	15	2	0	20	63	328	2	2	395	850
02:00 PM	5	5	9	0	19	2	77	5	0	84	0	5	2	1	8	10	74	0	2	86	197
02:15 PM	8	3	13	0	24	3	81	3	0	87	1	2	0	0	3	24	66	0	0	90	204
02:30 PM	1	4	10	0	15	0	60	10	1	71	1	7	1	0	9	8	88	0	0	96	191
02:45 PM	7	1	20	0	28	0	62	7	1	70	2	3	0	1	6	9	80	1	0	90	194
Total	21	13	52	0	86	5	280	25	2	312	4	17	3	2	26	51	308	1	2	362	786
Grand Total	62	39	160	2	263	25	891	89	10	1015	10	58	10	2	80	168	940	3	7	1118	2476
Apprch %	23.6	14.8	60.8	0.8		2.5	87.8	8.8	1		12.5	72.5	12.5	2.5		15	84.1	0.3	0.6		
Total %	2.5	1.6	6.5	0.1	10.6	1	36	3.6	0.4	41	0.4	2.3	0.4	0.1	3.2	6.8	38	0.1	0.3	45.2	
cars	62	37	154	2	255	24	884	83	10	1001	10	58	10	2	80	164	928	3	7	1102	2438
% cars	100	94.9	96.2	100	97	96	99.2	93.3	100	98.6	100	100	100	100	100	97.6	98.7	100	100	98.6	98.5
HV	0	2	6	0	8	1	7	6	0	14	0	0	0	0	0	4	12	0	0	16	38
% HV	0	5.1	3.8	0	3	4	0.8	6.7	0	1.4	0	0	0	0	0	2.4	1.3	0	0	1.4	1.5

	Ithan Avenue Southbound				Conestoga Road Westbound				Ithan Avenue Northbound				Conestoga Road Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 12:00 PM to 12:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 12:00 PM																	
12:00 PM	7	**5**	**25**	**37**	3	72	**12**	87	0	4	**3**	7	7	66	0	73	204
12:15 PM	3	2	13	18	1	71	8	80	**2**	**11**	1	**14**	**18**	77	0	95	207
12:30 PM	**11**	1	4	16	3	78	7	88	1	5	0	6	17	**87**	0	**104**	**214**
12:45 PM	1	2	10	13	**10**	**80**	9	**99**	0	6	1	7	12	74	0	86	205
Total Volume	22	10	52	84	17	301	36	354	3	26	5	34	54	304	0	358	830
% App. Total	26.2	11.9	61.9		4.8	85	10.2		8.8	76.5	14.7		15.1	84.9	0		
PHF	.500	.500	.520	.568	.425	.941	.750	.894	.375	.591	.417	.607	.750	.874	.000	.861	.970
cars	22	8	51	81	16	299	35	350	3	26	5	34	52	300	0	352	817
% cars	100	80.0	98.1	96.4	94.1	99.3	97.2	98.9	100	100	100	100	96.3	98.7	0	98.3	98.4
HV	0	2	1	3	1	2	1	4	0	0	0	0	2	4	0	6	13
% HV	0	20.0	1.9	3.6	5.9	0.7	2.8	1.1	0	0	0	0	3.7	1.3	0	1.7	1.6

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	Ithan Avenue Southbound					Conestoga Road Westbound					Ithan Avenue Northbound					Conestoga Road Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
12:00 PM	0	1	1	0	2	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	3
12:15 PM	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	1	1	0	0	2	4
12:30 PM	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	1	1	0	0	2	3
12:45 PM	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	3
Total	0	2	1	0	3	1	2	1	0	4	0	0	0	0	0	2	4	0	0	6	13
01:00 PM	0	0	1	0	1	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	2
01:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	2
01:30 PM	0	0	1	0	1	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	2
01:45 PM	0	0	0	0	0	0	1	2	0	3	0	0	0	0	0	0	1	0	0	1	4
Total	0	0	2	0	2	0	2	3	0	5	0	0	0	0	0	0	3	0	0	3	10
02:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
02:15 PM	0	0	1	0	1	0	2	0	0	2	0	0	0	0	0	0	1	0	0	1	4
02:30 PM	0	0	2	0	2	0	1	2	0	3	0	0	0	0	0	1	2	0	0	3	8
02:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	2	2
Total	0	0	3	0	3	0	3	2	0	5	0	0	0	0	0	2	5	0	0	7	15
Grand Total	0	2	6	0	8	1	7	6	0	14	0	0	0	0	0	4	12	0	0	16	38
Apprch %	0	25	75	0		7.1	50	42.9	0		0	0	0	0		25	75	0	0		
Total %	0	5.3	15.8	0	21.1	2.6	18.4	15.8	0	36.8	0	0	0	0	0	10.5	31.6	0	0	42.1	

	Ithan Avenue Southbound				Conestoga Road Westbound				Ithan Avenue Northbound				Conestoga Road Eastbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 12:00 PM to 12:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 12:00 PM																	
12:00 PM	0	**1**	**1**	**2**	0	0	**1**	1	0	0	0	0	0	0	0	0	3
12:15 PM	0	0	0	0	0	**2**	0	**2**	0	0	0	0	**1**	1	0	**2**	**4**
12:30 PM	0	0	0	0	**1**	0	0	1	0	0	0	0	1	1	0	2	3
12:45 PM	0	1	0	1	0	0	0	0	0	0	0	0	0	**2**	0	2	3
Total Volume	0	2	1	3	1	2	1	4	0	0	0	0	2	4	0	6	13
% App. Total	0	66.7	33.3		25	50	25		0	0	0		33.3	66.7	0		
PHF	.000	.500	.250	.375	.250	.250	.250	.500	.000	.000	.000	.000	.500	.500	.000	.750	.813

AM PEAK HOUR

Intersection	Unsignalized or Signalized?	Approach	Initial Unmet Demand				Excessive Unmet Demand			
			Queues			Findings / Summary	Queues			Findings / Summary
Route 30 and Route 320	Signalized	WB	1	0	2	A, B	2	0	3	A, B
	Signalized	EB	0	2	0		1	4	1	
	Signalized	NB	0	0	1		0	0	0	
	Signalized	SB	0	1	0		2	1	0	
Route 30 and Ithan Avenue	Signalized	WB	0	0	0	A, B, C	0	2	0	A, B
	Signalized	EB	0	0	0		1	1	1	
	Signalized	NB	0	0	0		1	3	0	
	Signalized	SB	0	0	0		1	0	2	
Route 320 and Conestoga Rd	Signalized	WB	0	0	0	A, B, C	1	0	1	A, B, C
	Signalized	EB	0	0	0		0	2	1	
	Signalized	NB	1	0	0		3	1	0	

AM PEAK HOUR

Intersection	Unsignalized or Signalized?	Approach	Initial Unmet Demand				Excessive Unmet Demand			
			Queues			Findings / Summary	Queues			Findings / Summary
Roberts Rd and County Line Rd	Unsignalized	NB	0	0	0	A, D	0	0	0	A, D
	Unsignalized	SB	0	0	0		0	0	0	
Airedale Rd and County Line Rd	Unsignalized	EB	0	0	0	E	0	0	0	E
	Unsignalized	SB	0	0	0		5+	5+	5+	

Purpose

The purpose of this table is to summarize observations which were made in the first week of December 2012 subsequent to establishing the peak hours of the 'ordinary traffic conditions' scenario. The township engineer requested that traffic volume inputs in the level of service models reflect traffic demand as well as traffic served, so FTA prepared this table to summarize whether the actual counts reflect proper volume inputs for the model or if there is a significantly oversaturated condition in which traffic demands consistently are unmet. In addition a related but slightly different notion -- ***initial*** unmet demand (IUD) -- was also documented per page 18-14 of the HCM 2010 edition. IUD is documented in the first columns of the above table and as shown 3 observations of unserved vehicles ("queues"), if any at the beginning of the subject peak hour were documented and then a determination was made whether to include a non-zero value in the IUD field of the software. ***Excessive*** unmet demand was determined by revisiting the subject intersection during the peak 15-minute period of the peak hour and taking data samples relative to excessive, unserved vehicles ("queues"), if any. If over-saturation appeared sustained for an extended time, it was noted (per the HCM), as were any other anomalies.

Note that, in all cases, only intersections having one or more approaches which were noted as possibly having operational issues by data collectors (during the traffic counts) were actually visited and documented above. Finally, some conclusions are similar in multiple locations, so rather than write the same text repeatedly, a key was prepared (below) and letters were used as appropriate to summarize the respective condition(s) / finding(s) which were observed / determined.

Summary Key

A. *Sustained,* unserved traffic demands are *not* present and so no adjustments were made.
B. LOS F ratings are a function of long cycle length and heavy demand but traffic is generally served in one given cycle (i.e., vehicles typically do not wait for 2nd cycle
C. Peak demands appear to be random, cycle-by-cycle fluctuations which are to be ignored (per HCM2010 18-14).
D. LOS F ratings at this unsignalized location are conservative as it appears the platooning / gap creating effects of adjacent signalized intersections are not reflected.
E. Queues at this unsignalized intersection are a function of an immediately adjacent signalized intersection which has a metering effect on the subject intersection. Queues are therefore not a function of unserved demand / oversaturation but rather other geometric factors unrelated to the subject intersection.

PM PEAK HOUR

Intersection	Unsignalized or Signalized?	Approach	Initial Unmet Demand				Excessive Unmet Demand			
			Queues			Findings / Summary	Queues			Findings / Summary
Route 30 and Route 320	Signalized	WB	2	0	0	A, B	3	4	1	A, B
	Signalized	EB	0	2	1		2	0	3	
	Signalized	NB	1	0	0		5	3	0	
	Signalized	SB	0	2	2		2	3	1	
Route 30 and Ithan Avenue	Signalized	WB	0	0	0	A, B	0	1	2	A, B
	Signalized	EB	0	0	0		3	2	0	
	Signalized	NB	0	0	0		3	0	4	
	Signalized	SB	0	0	0		3	0	2	
Route 320 and Conestoga Rd	Signalized	WB	0	1	0	A, B	0	2	1	A, B, C
	Signalized	EB	0	0	0		2	0	4	
	Signalized	SB	0	0	2		0	3	3	

PM PEAK HOUR

Intersection	Unsignalized or Signalized?	Approach	Initial Unmet Demand				Excessive Unmet Demand			
			Queues			Findings / Summary	Queues			Findings / Summary
Roberts Rd and County Line Rd	Unsignalized	NB	0	0	0	A, D	0	0	0	A, D
	Unsignalized	SB	0	0	0		0	0	0	
Airedale Rd and County Line Rd	Unsignalized	EB	0	0	0	E	0	0	0	E
	Unsignalized	SB	5+	5+	5+		5+	5+	5+	

Purpose

The purpose of this table is to summarize observations which were made in the first week of December 2012 subsequent to establishing the peak hours of the 'ordinary traffic conditions' scenario. The township engineer requested that traffic volume inputs in the level of service models reflect traffic demand as well as traffic served, so FTA prepared this table to summarize whether the actual counts reflect proper volume inputs for the model or if there is a significantly oversaturated condition in which traffic demands consistently are unmet. In addition a related but slightly different notion -- ***initial*** unmet demand (IUD) -- was also documented per page 18-14 of the HCM 2010 edition. IUD is documented in the first columns of the above table and as shown 3 observations of unserved vehicles ("queues"), if any at the beginning of the subject peak hour were documented and then a determination was made whether to include a non-zero value in the IUD field of the software. ***Excessive*** unmet demand was determined by revisiting the subject intersection during the peak 15-minute period of the peak hour and taking data samples relative to excessive, unserved vehicles ("queues"), if any. If over-saturation appeared sustained for an extended time, it was noted (per the HCM), as were any other anomalies.

Note that, in all cases, only intersections having one or more approaches which were noted as possibly having operational issues by data collectors (during the traffic counts) were actually visited and documented above. Finally, some conclusions are similar in multiple locations, so rather than write the same text repeatedly, a key was prepared (below) and letters were used as appropriate to summarize the respective condition(s) / finding(s) which were observed / determined.

Summary Key

A. *Sustained,* unserved traffic demands are *not* present and so no adjustments were made.
B. LOS F ratings are a function of long cycle length and heavy demand but traffic is generally served in one given cycle (i.e., vehicles typically do not wait for 2nd cycle)
C. Peak demands appear to be random, cycle-by-cycle fluctuations which are to be ignored (per HCM2010 18-14).
D. LOS F ratings at this unsignalized location are conservative as it appears the platooning / gap creating effects of adjacent signalized intersections are not reflected.
E. Queues at this unsignalized intersection are a function of an immediately adjacent signalized intersection which has a metering effect on the subject intersection. Queues are therefore not a function of unserved demand / oversaturation but rather other geometric factors unrelated to the subject intersection.

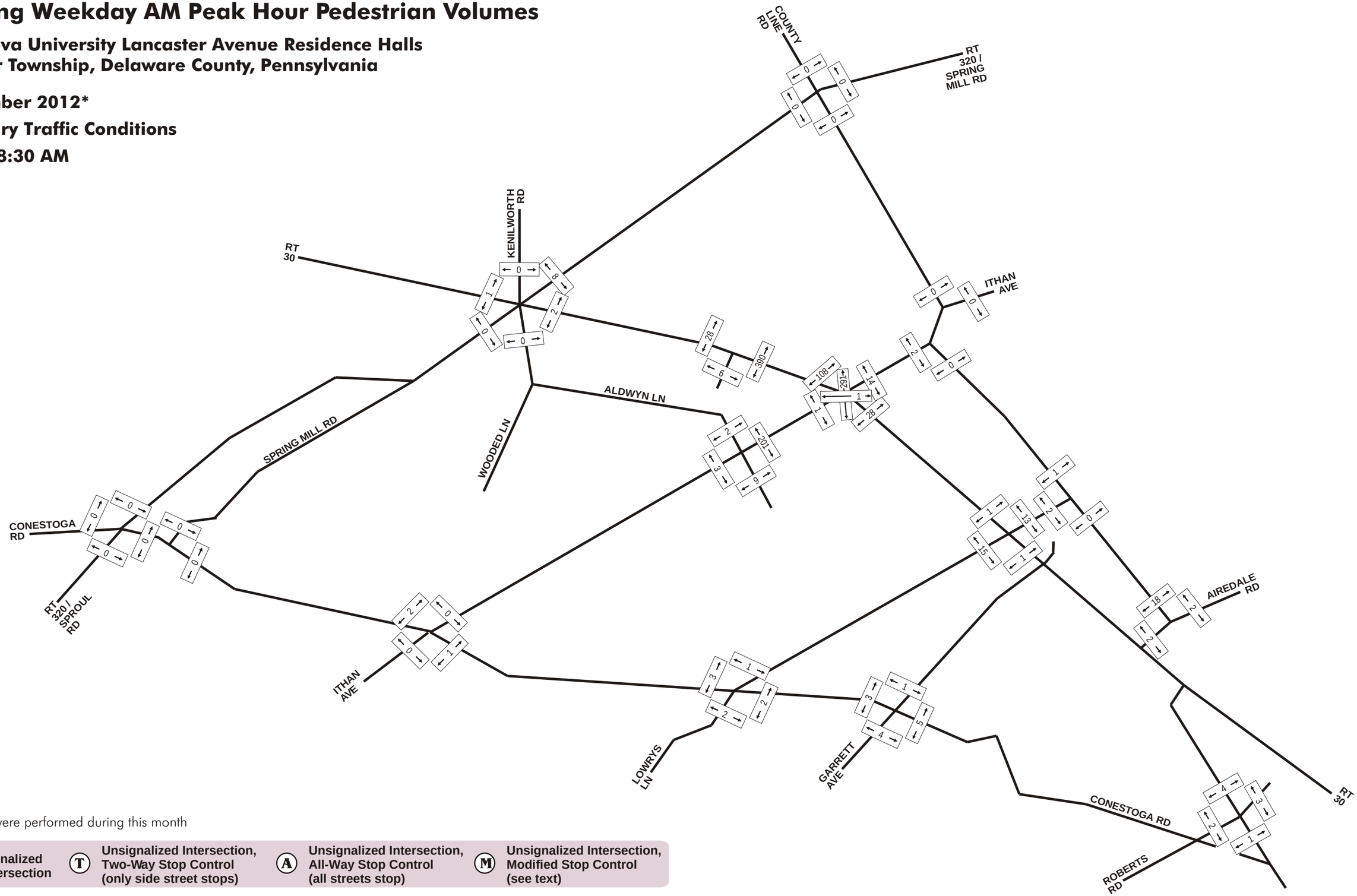
Existing Weekday AM Peak Hour Pedestrian Volumes

Villanova University Lancaster Avenue Residence Halls
Radnor Township, Delaware County, Pennsylvania

November 2012*

Ordinary Traffic Conditions

7:30 - 8:30 AM



* counts were performed during this month

Signalized Intersection | **(T) Unsignalized Intersection, Two-Way Stop Control (only side street stops)** | **(A) Unsignalized Intersection, All-Way Stop Control (all streets stop)** | **(M) Unsignalized Intersection, Modified Stop Control (see text)**

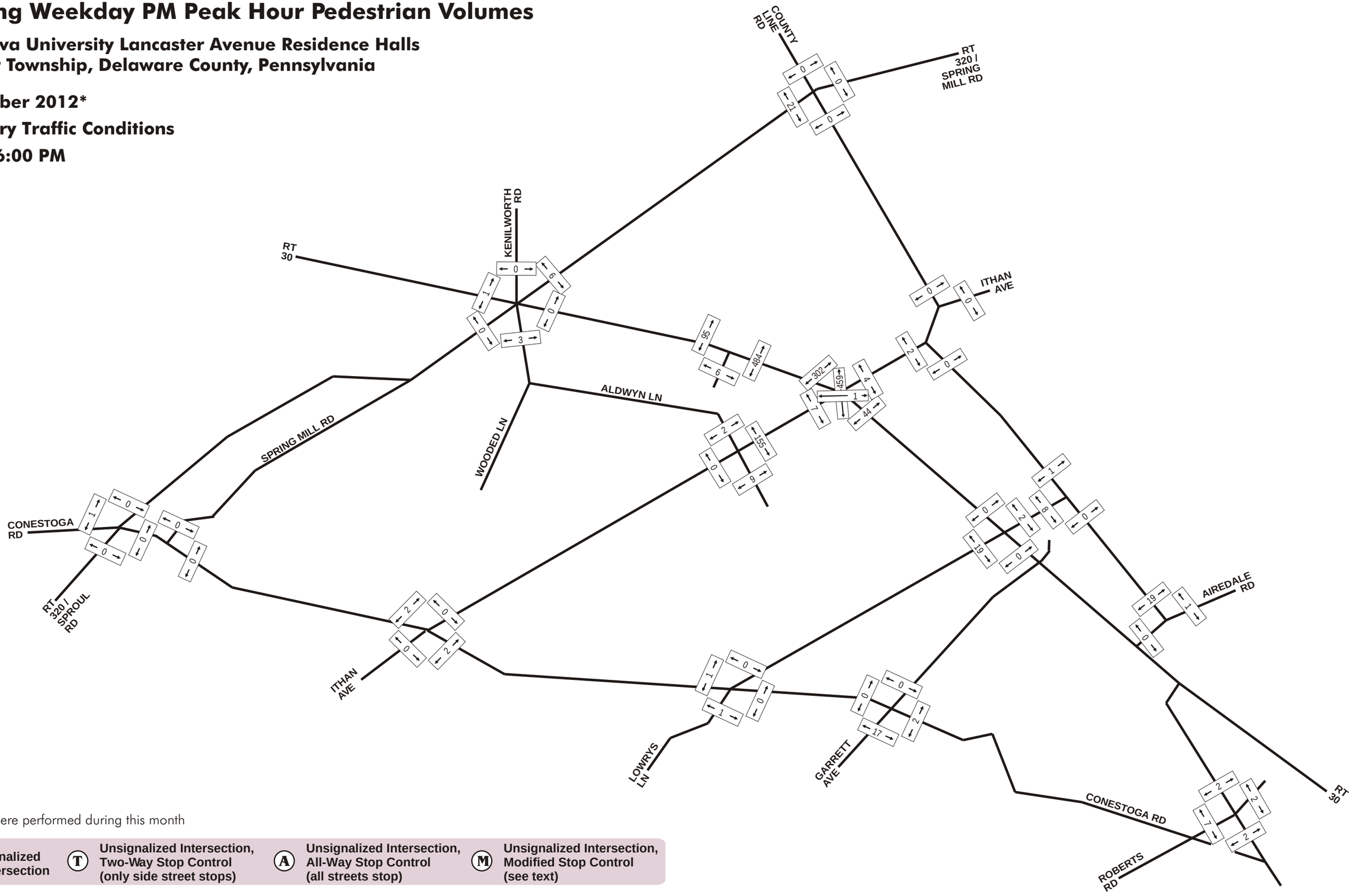
Existing Weekday PM Peak Hour Pedestrian Volumes

Villanova University Lancaster Avenue Residence Halls
Radnor Township, Delaware County, Pennsylvania

November 2012*

Ordinary Traffic Conditions

5:00 - 6:00 PM



* counts were performed during this month

Signalized Intersection	(T) Unsignalized Intersection, Two-Way Stop Control (only side street stops)	(A) Unsignalized Intersection, All-Way Stop Control (all streets stop)	(M) Unsignalized Intersection, Modified Stop Control (see text)

F. Tavani and Associates, Inc.
Traffic Engineering and Planning

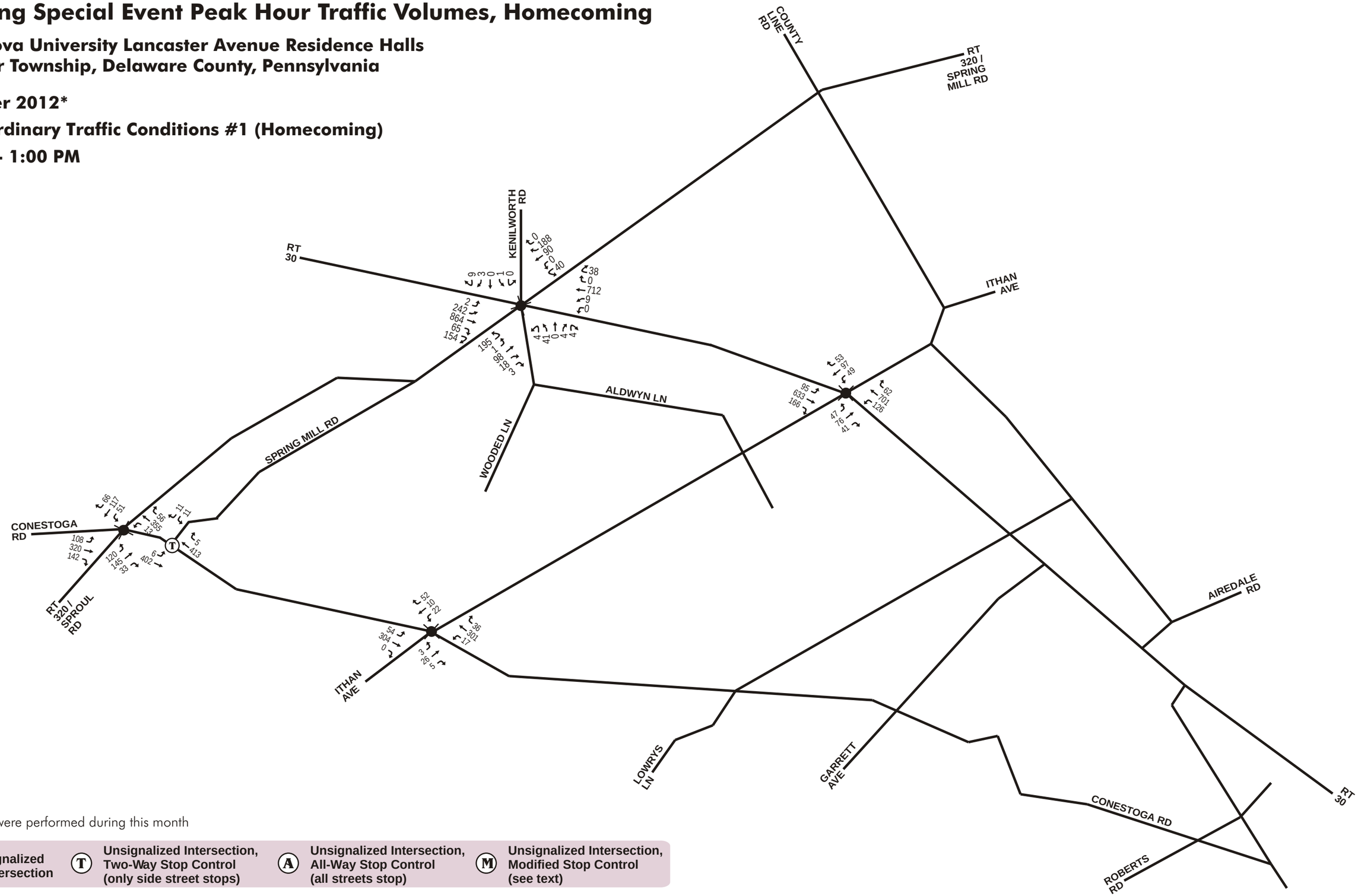
Existing Special Event Peak Hour Traffic Volumes, Homecoming

Villanova University Lancaster Avenue Residence Halls
Radnor Township, Delaware County, Pennsylvania

October 2012*

Extraordinary Traffic Conditions #1 (Homecoming)

12:00 - 1:00 PM



* counts were performed during this month

Signalized Intersection	(T) Unsignalized Intersection, Two-Way Stop Control (only side street stops)	(A) Unsignalized Intersection, All-Way Stop Control (all streets stop)	(M) Unsignalized Intersection, Modified Stop Control (see text)

F. Tavani and Associates, Inc.
Traffic Engineering and Planning

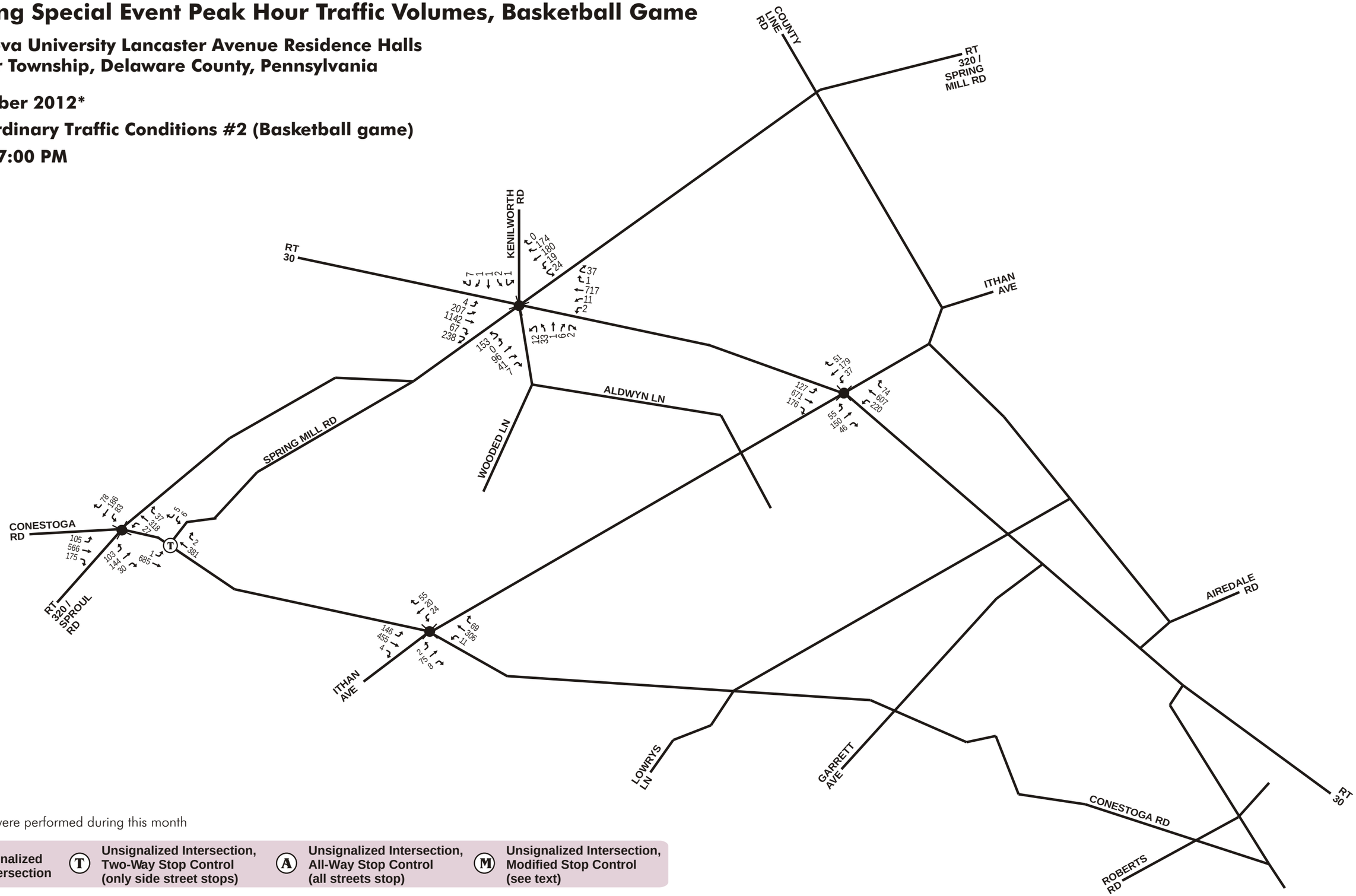
Existing Special Event Peak Hour Traffic Volumes, Basketball Game

Villanova University Lancaster Avenue Residence Halls
Radnor Township, Delaware County, Pennsylvania

December 2012*

Extraordinary Traffic Conditions #2 (Basketball game)

6:00 - 7:00 PM

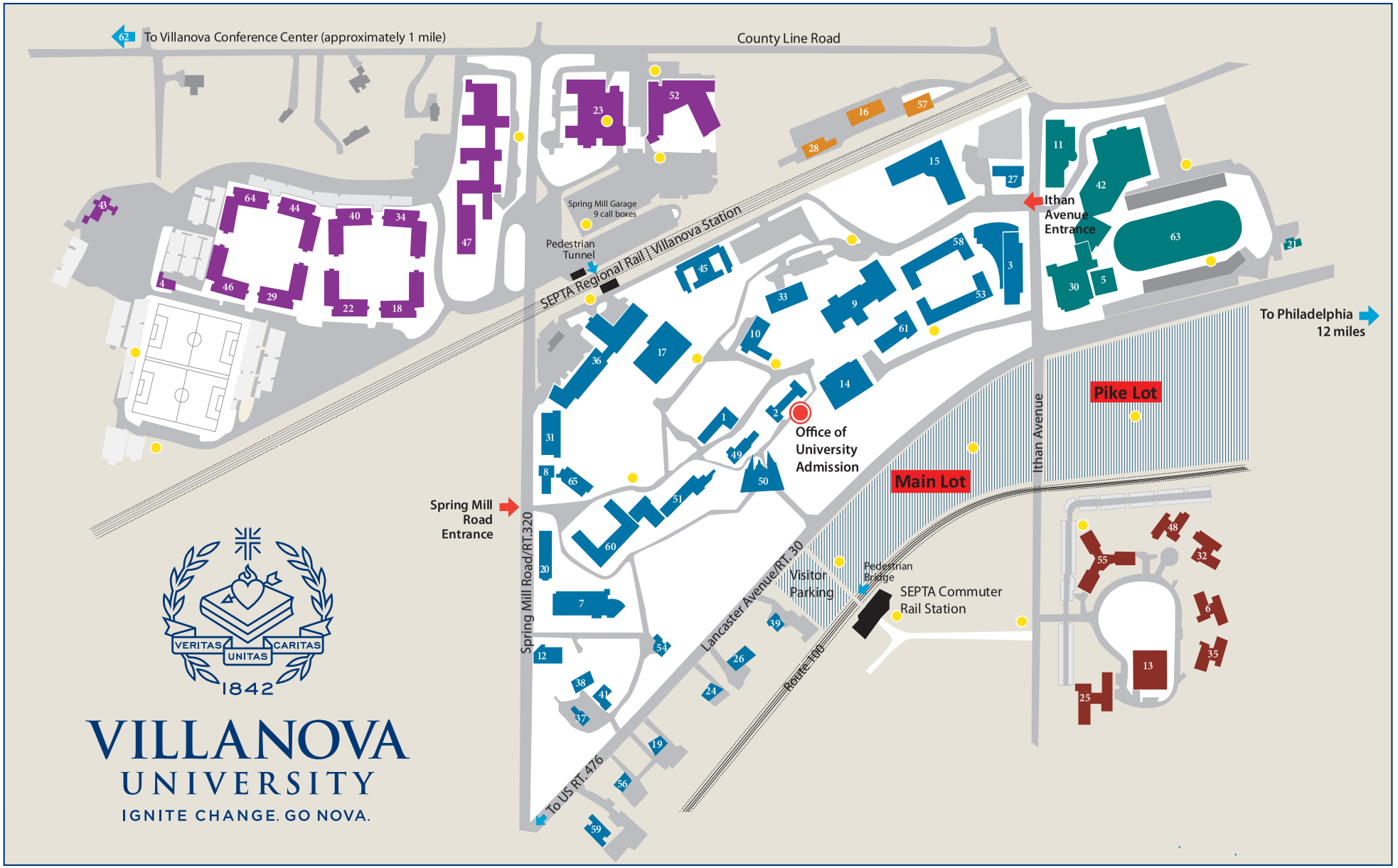


* counts were performed during this month

Signalized Intersection	(T) Unsignalized Intersection, Two-Way Stop Control (only side street stops)	(A) Unsignalized Intersection, All-Way Stop Control (all streets stop)	(M) Unsignalized Intersection, Modified Stop Control (see text)

APPENDIX F

Campus Key Map


To Villanova Conference Center (approximately 1 mile)
County Line Road
Spring Mill Garage
9 call boxes
Pedestrian
Tunnel
SEPTA Regional Rail | Villanova Station
Ithan
Avenue
Entrance
To Philadelphia
12 miles
Pike Lot
Ithan Avenue
Office of
University
Admission
Main Lot
Spring Mill
Road
Entrance
Spring Mill Road/RT.320
Lancaster Avenue/RT. 30
Visitor
Parking
Pedestrian
Bridge
SEPTA Commuter
Rail Station
Route 100
To US RT. 476
VERITAS
UNITAS
CARITAS
1842
VILLANOVA
UNIVERSITY
IGNITE CHANGE. GO NOVA.

1. **ALUMNI HALL** ● (1849)
Residence hall, gymnasium for intramural athletics

2. **AUSTIN HALL** • ● (1924)
Office of University Admission, residence hall

3. **BARTLEY HALL** • ● (1958)
Villanova School of Business, Office of the Dean, administrative offices, faculty offices, Applied Finance Laboratory, classrooms, dining facilities, Graduate Business Programs, Print Center, ATM

4. **BURNS HALL** • (1978)
Augustinian residence

5. **BUTLER ANNEX** (1968)
Athletic facility

6. **CAUGHLIN HALL** • ● (1989)
Residence hall

7. **CEER: CENTER FOR ENGINEERING EDUCATION AND RESEARCH** • ● (1997)
College of Engineering, Office of the Dean, administrative offices, laboratories, conference rooms, auditorium, dining facility

8. **CHEMICAL ENGINEERING BUILDING** (1947)
Chemical Engineering offices,classrooms, laboratories

9. **CONNELLY CENTER** • (1980)
Auxiliary Services, Presidents' Lounge, International Student Advisor, Office of Human Services (students with disabilities), student lounges, cinema, meeting rooms, information desk, cyber lounge, dining facilities, convenience/video store, Art Gallery, ATM

10. **CORR HALL** • ● (1914)
Office for Mission and Ministry, Office of the Vice President for Mission and Ministry, Center for Faith and Learning, Center for Peace and Justice Education, residence hall, Greek Affairs, chapel

11. **DAVIS CENTER** • (2007)
Men's and women's basketball offices, men's and women's basketball practice facilities, Intramural/Recreation Department, fitness center

12. **DELUREY HALL** ● (1943)
Residence hall

13. **DONAHUE HALL** • (1985)
Dining facilities, convenience store, ATM

14. **DOUGHERTY HALL** • (1955)
Office of the Vice President for Student Life, Center for Multicultural Affairs, Office of the Dean of Students, Offices of Dining Services, Student Government office, Wildcard office, dining facilities, student organization offices, lounges, barber shop, bank, ATM

15. **DRISCOLL HALL** • ● (2008)
College of Nursing, Office of the Dean, administrative offices, faculty offices, Center for Nursing Research, Center for Global and Public Health, auditorium, lecture halls, seminar rooms, classrooms, Clinical Simulation Laboratories, chapel, reading room, dining facility

16. **FACILITIES MANAGEMENT BUILDING** • (1965)
Facilities Management main office, staff, shops

17. **FALVEY MEMORIAL LIBRARY** • ● (1949)
Library, University Communication: Creative Services, Learning Support Services *(moving from Vasey Hall in January 2012)*, Writing Center, Mathematics Center, Augustinian Institute, Augustinian Historical Institute, dining facility

18. **FARLEY HALL** • (2000)
Residence hall, fitness center

19. **FARRELL HALL** • ● (1960)
Office of Public Safety, parking office

20. **FEDIGAN HALL** • ● (1930)
Residence hall

21. **GALBERRY HALL** (1940)
University Graphic Services, Conference Services

22. **GALLEN HALL** • ● (2000)
Residence hall

23. **GAREY HALL** • (1958)
Alumni Center, University Advancement: Alumni Relations and Development, Department of Communication, Career Services office, Honors Program, IGIS: Institute for Global Interdisciplinary Studies, Custodial Services, classrooms

24. **GERAGHTY HALL** (1958)
Office of the Dean of Enrollment Management, University Communication: Media Relations, NHI: National Hispanic Institute

25. **GOOD COUNSEL HALL** ● (1969)
Residence hall

26. **GRIFFIN HALL** (1964)
University Communication: Constituent Publications, Marketing and University Advancement–Communication

27. **HEALTH SERVICES BUILDING** • (2002)
Counseling Center, Center for Health and Wellness Education, Health Center, VEMS: Villanova Emergency Medical Service

28. **HEATING PLANT** (1950)

29. **JACKSON HALL** • ● (2000)
Residence hall

30. **JAKE NEVIN FIELD HOUSE** • (1932)
Athletic Department offices, Director of Athletics, basketball court, other athletic facilities

31. **JOHN BARRY HALL** • (1947)
Naval R.O.T.C. headquarters, classrooms

32. **KATHARINE HALL** • ● (1986)
Residence hall

33. **KENNEDY HALL** • (1968)
University Shop, Office of Financial Assistance, Office of Residence Life, Bursar's Office, Mail Services, College of Liberal Arts and Sciences Office of Graduate Studies, Office of the Dean of Graduate Studies

34. **KLEKOTKA HALL** • ● (1994)
Residence hall

35. **MCGUIRE HALL** • ● (1989)
Residence hall

36. **MENDEL SCIENCE CENTER** • ● (1961)
Classrooms, lecture halls, laboratories, administrative offices, student public computing labs, observatory, greenhouse

37. **MIDDLETON HALL** (1943)
International Studies, Office of Research and Sponsored Projects

38. **MILITARY SCIENCES BUILDING** • (1949)
Army R.O.T.C. headquarters, classrooms

39. **MORIARTY HALL** ● (1963)
Residence hall

40. **MOULDEN HALL** • ● (1994)
Residence hall

41. **O'DWYER HALL** ● (1941)
Residence hall

42. **PAVILION** • (1985)
Basketball stadium, indoor sports complex, athletic offices, locker rooms, swimming pool, 200-meter indoor track, ATM

43. **PICOTTE HALL AT DUNDALE** • ● (1974)
Office of University Advancement, Office of the Vice President for University Advancement

44. **RUDOLPH HALL** • ● (1994)
Residence hall

45. **ST. AUGUSTINE CENTER FOR THE LIBERAL ARTS** • ● (1992)
College of Liberal Arts and Sciences, Office of the Dean, Catholic Relief Services, The Theology Institute, administrative offices, faculty offices, seminar rooms, dining facility

46. **ST. CLARE HALL** • ● (2000)
Residence hall

47. **ST. MARY HALL** • ● (1964)
Human Resources, Procurement, Payroll, Financial Affairs, Budget, OPIR: Office of Planning and Institutional Research, Graduate Programs in Human Resource Development, administrative offices, residence hall, dining facility, University Senate office, chapel, pool, gymnasium, Music Activities, Art Conservatory, student mail services, ATM

48. **ST. MONICA HALL** • ● (1986)
Residence hall

49. **ST. RITA HALL** ● (1913)
Residence hall, Campus Ministry offices

50. **ST. THOMAS OF VILLANOVA CHURCH** • (1887)
Parish church for local community and Villanova University students

51. **ST. THOMAS OF VILLANOVA MONASTERY** • (1901 & 1934)
Augustinian residence and care center, Augustinian Heritage Room, Augustinian Way of Life Center

52. **SCHOOL OF LAW** • (2009)
Office of the Dean, administrative offices, classrooms, lounges, Law Library, Moot Court, dining facility, ATM

53. **SHEEHAN HALL** • ● (1957)
Residence hall

54. **SIMPSON HALL** • ● (1948)
Residence hall

55. **STANFORD HALL** • ● (1971)
Residence hall, fitness center, Office of Continuing Studies

56. **STONE HALL** (1957)
Office of Environmental Health and Safety

57. **STRUCTURAL ENGINEERING TEACHING AND RESEARCH LABORATORY** • (2005)
Structural member and load testing facility, environmental room, wet room, material testing room

58. **SULLIVAN HALL** • ● (1953)
Residence hall

59. **TECHNOLOGY SERVICES BUILDING** • ● (1993)
General computing and technology information, administrative offices for UNIT: University Information Technologies, Office of the Vice President for Technology and Chief Information Officer, CIT: Center for Instructional Technologies main office, Network and Communications, University Information Systems, faculty/staff training facility

60. **TOLENTINE HALL** • (1929)
Office of the University President; Offices of the Vice President for Academic Affairs, Vice President for Administration and Finance, Vice President for University Communication, Vice President and General Counsel; College of Engineering offices; Registrar's Office; other administrative offices; classrooms; Department of Psychology (labs, offices); CIT: Center for Instructional Technologies; video/teleconference facility

61. **VASEY HALL** • (1931)
VITAL: Villanova Institute for Teaching and Learning, Office of Part-time Studies, Summer Sessions Program, Theatre Department, theatre, offices, classrooms, TechZone Computer Support Center, Learning Support Services *(moving to Falvey Library in January 2012)*

62. **VILLANOVA CONFERENCE CENTER** • (1998)
Hotel accommodations, meeting space, guest dining facility, special events catering, Office of Executive Programs, Executive M.B.A. Program, Executive Education

63. **VILLANOVA STADIUM** • (1927)
Stadium (playing field for varsity football, lacrosse, etc.), track, athletic weight room, Grounds Department

64. **WELSH HALL** • ● (1994)
Residence hall

65. **WHITE HALL** • (1974)
Chemical Engineering offices, classrooms, laboratories

• Handicap Accessible Parking Areas

● Call Box indicator: Phones located at buildings with direct-dial to Public Safety are indicated on key; free-standing Call Boxes to Public Safety are indicated on map

APPENDIX G

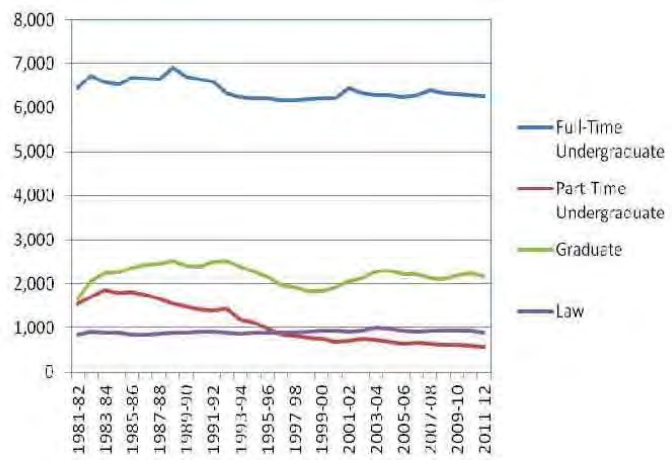
Trip Generation

Trip Generation Notes

The project includes new on-campus residential space for existing students, new Villanova-centric retail, and other related elements including a parking garage, a pedestrian bridge, etc. The project is likely to result in a reduction in peak hour traffic since currently-commuting students will become campus-residing students. A number of parking spaces in the proposed Pike Garage will be occupied by the new campus-residing students and these parking spaces will not 'turn over' during peak periods in the same fashion as they do today. Even so, the applicant was asked to treat **all** parking spaces as having an activity (i.e., a weekday peak period turnover level) comparable to that which exists today. Thus, the trip generation rates of existing campus parking spaces becomes a focus of this study.

Details of trip generation for the project are provided on the next three pages. Note that the remainder of this text is based on a submittal entitled **Deliverable #2** which was shared with the township and PennDOT in 2013.

Trip generation at a university or college is principally a function of the student body. Student population at Villanova has remained consistent and flat for the last 20+ years as depicted in the following chart:



The project includes no net new instructional space and is principally aimed at addressing currently-unmet student desires, namely more on-campus housing for existing undergraduate upperclassmen (juniors and seniors). At present there are 1,779 of the 2,982 full-time undergraduate juniors and seniors living off campus[1] and so they currently commute to classes, often during weekday commuter peak periods. Thus, if the project is constructed, the majority of these commuters will be living on campus and as a result peak hour traffic both at site driveways *and* in the study area generally will be reduced as a result of the project.

[1] Fall 2012 semester data.

It should be noted that students who once lived off-campus in rental housing will likely be replaced by new tenants. Those tenants may be students of other institutions or may not be students at all, but in any event it is unlikely that all the new tenants will be other Villanova students. Even if they are, they will probably be Villanova students who live more remotely, and thus the net impact to the study area and the campus will be the same (i.e., a reduction in traffic). Even so, there is no practical way to *remove* peak hour traffic associated with the currently-commuting undergraduate students from the existing counts at the intersections in the study area, and so for this reason future peak hour traffic estimates are doubly conservative – *not only are driveway volumes not adjusted (reduced) to reflect students who will be living on campus but also the intersections in the study area are also not adjusted (reduced) to reflect students who will be living on campus.*

SITE-DERIVED TRIP GENERATION

Traffic counts were not conducted at every driveway to every parking facility on the entire campus nor were students polled to determine mass transit usage, but some measure of site-specific trip generation can still be derived from collected data.

There are 1,783 parking spaces found on the Main Lot, the Pike Lot, and the Visitor's Lot (combined). These spaces represent 34.7% of total parking supply. Determining the traffic activity (i.e., entering and exiting traffic) of these parking lots and dividing by the parking supply factor (34.7%) will yield approximate campus-wide trip generation activity which can then be compared with the number of students currently attending Villanova (10,127) so that a trip generation rate per student can be derived. This rate can then be compared with ITE rates, as an added back-check.

TRIP GENERATION TRAFFIC COUNTS

Turning Movement (manual) and Automatic Traffic Recorder (ATR) traffic counts were conducted at every driveway serving the Main and Pike Lots in Fall 2011. The trip generation activity gathered from the turning movement counts is summarized in Table 1:

Table 1 – Main Lot + Pike Lot + Visitor Lot Traffic Activity, All Driveways

Source/Date	AM Peak Hour[6]			PM Peak Hour[7]		
	IN	OUT	TOTAL	IN	OUT	TOTAL
09/2011, TM counts	405	50	455	352	404	756

The potential use of this data as a building block for forecasting trip generation arising from the project is a critical element of study and so was validated a few different ways. The focus of the validation effort was placed on the four driveways along Ithan Avenue which, collectively, process the majority of traffic to and from the parking lots.

Table 2 summarizes the gathered traffic count data with the first row being a repeat of the trip generation numbers contained in Table 1 (but as a subset of just Ithan Avenue driveways). Note that an 8th column is introduced in Table 2, namely the sum of AM and PM peak hour total entering/exiting activity. It is this value which can be used as a metric to gauge the validity of the 2011 turning movement data. Note that additional turning movement counts were conducted in 2013 as well, as shown in the table below.

Table 2 – Main Lot + Pike Lot + Visitor Lot Traffic Activity, Ithan Avenue Driveways

Source/Date	AM Peak Hour[2]			PM Peak Hour[3]			AM + PM
	IN	OUT	TOTAL	IN	OUT	TOTAL	TOTAL
09/2011, TM counts (Thursday)	299	7	306	210	236	446	752
02/2013, TM counts (Thursday)	307	13	320	211	220	431	751
10/2011, ATR counts (Thursday)	251	11	262	218	222	440	702
10/2011, ATR counts (Tuesday)	257	17	274	229	213	442	716

Review of the gathered data confirms that the 09/2011 turning movement traffic counts continues to be valid as the basis of trip generation for the project. Raw count data is provided in the appendix of this deliverable.

VILLANOVA TRIP GENERATION vs PUBLISHED TRIP GENERATION

Similar to the parking demand exercise, the gathered traffic counts can be used to generate a University-specific trip generation rate. This rate can be compared with rates published by the Institute of Transportation Engineers (ITE) in its publication, Trip Generation. Trip Generation is a collection of empirical data which has been combined, reviewed, and statistically analyzed to generate parking rates to be used as a guide in planning new facilities. Trip Generation includes dozens of different land use categories including Land Use Code 550: University/College.

To generate a parking demand *rate*, traffic count data must be correlated with a variable. Trip Generation incorporates the use of two variables for University/College land uses, namely "students" and "employees". The student-based dataset is larger and appears to be the more appropriate variable.

As mentioned earlier, the current student population totals 10,127 students. AM peak hour traffic activity totals 455 trips and PM peak hour traffic totals 756 trips (see Table 1). Villanova-specific trip generation rates derived from school population and comparison with ITE's LUC 550 category rates follows in Table 3 and Table 4:

Table 3: Trip Generation Rate Derivation

TIME PERIOD	TOTAL TRIPS	PARKING SUPPLY FACTOR APPLIED	DIVIDED BY STUDENT BODY
AM Peak Hour	455	1311	0.129
PM Peak Hour	756	2179	0.215

[2] 7:45-8:45 AM from 2011 turning movement counts (8:00 to 9:00 used for ATR data).

[3] 5:00-6:00 PM from 2011 turning movement counts (same hour used for ATR data).

Table 4: Trip Generation Rate Comparison

DATA SOURCE	TRIP GENERATION RATE (PER STUDENT)		
	AM Peak Hour	PM Peak Hour	AM + PM Combined
Villanova	0.129	0.215	0.344
ITE	0.170	0.170	0.340

Villanova-specific rates are reasonably well-correlated with ITE data. Note this exercise does not specifically address the influence of mass transit, though whatever patronage of mass transit currently exists is reflected in collected traffic count data. More importantly, this exercise was merely just that – an exercise – since the project does not include any new students and in fact is expected to result in a reduction of class day peak period traffic to and from the site since currently-commuting juniors and seniors will now be living in the new housing of the site. The project does, however, feature an increase in parking spaces and as previously mentioned and agreed, this study examines the potential traffic associated with that increase in parking spaces by applying site-specific trip generation rates (using parking spaces as a variable) to the proposed increase in parking supply (a total net increase of 19 spaces). The trip generation rates to be used are summarized in Tables 5 through 8:

Table 5: Project Trip Generation Rate Derivation

TIME PERIOD	TOTAL TRIPS	PARKING SPACES SERVED	TRIP GENERATION RATE PER SPACE
AM Peak Hour	455	1783	0.255
PM Peak Hour	756	1783	0.424

Table 6 – Trip Generation Directional Split Derivation

09/2011, TM counts	AM Peak Hour			PM Peak Hour		
	IN	OUT	TOTAL	IN	OUT	TOTAL
Volumes	405	50	455	352	404	756
Percentages	89%	11%	100%	47%	53%	100%

Table 7 – Project Trip Generation Rates

Trip Generation Rate (Trips per Parking Space)	AM Peak Hour			PM Peak Hour		
	IN	OUT	TOTAL	IN	OUT	TOTAL
	0.227	0.028	0.255	0.199	0.225	0.424

The project is parking-neutral and traffic impact of the project is principally a complex reassignment of taking current traffic at existing driveways/intersections and redistributing that activity based on proposed changes to various parking supplies and locations, effectively redirecting existing traffic to new driveway locations and affecting turning movement assignment at certain intersections as well.

The process in which "site traffic" assignment was carried out was as follows:

1) existing traffic presently found at driveways serving Main Lot and Pike Lot were removed from said driveways and all affected intersections in the study area;
2) reassigned traffic – based on changes to parking supply at the SAC garage, the Pike Lot, the Main Lot, and the several small lots west of Church Walk – were added to the study area; and
3) new retail traffic was added to study area.

For step 1) traffic at the Main Lot and Pike Lot was first removed from the driveways leading to those locations and was secondly removed from all affected intersections in the study area based on laws of proportionality for all corresponding feeder movements at each successive upstream intersection.

For step 2), new traffic which corresponds to increases in parking supply was introduced to the study area using the trip generation rates shown in Table 7 (peak hour trips per parking space) on the previous page. The entry/exit percentages along the cordon lines of the study area were based upon a detailed review of existing turning movement volumes at the current driveways serving Main Lot and Pike Lot. This is a revised approach which was prepared in response to the January 2015 Township Traffic Engineer review letter (principally comment #10). More details regarding the derivation of these percentages are shown in the next appendix.

For step 3), new retail traffic was derived from Scenario 1 as outlined in a letter to the Township Traffic Engineer dated 1 December 2014. The use of trip generation from Scenario 1 was requested by the Township Traffic Engineer in a review letter dated 28 January 2015. Copies of each letter are provided in **Appendix A**. A reprint of the trip generation table follows below:

SCENARIO 1: Convenience Mart (ITE LUC 852), Bistro (932), and Bookstore (868)

KSF	ITE LUC	AM PEAK HOUR		PM PEAK HOUR	
		IN	OUT	IN	OUT
5.29	Conv Mart	82	82	90	93
5.40	Bistro	36	29	35	24
9.75	Bookstore	6	6	80	74
	TOTAL	124	117	205	191
	25% NEW	31	29	51	48

The last row is new vehicular traffic assigned to the study area intersections and driveways. The difference between total traffic and the last row are trips attributable to captured (internal walking) trips by students, staff, visitors, etc. as previously endorsed by the Township Traffic Engineer.

New retail traffic was added to the study area using cordon line percentages as explained for step 2. Assignment to specific parking opportunities (WLA, Pike Garage, etc.) was based on these percentages as well logic and proximity of parking (e.g., western-side retail store fronts are more convenient to WLA parking opportunities while eastern-side retail store fronts are more convenient to Pike Garage). Note also the exact locations of stores have not been finalized and limited parking immediately south of LAH buildings is unlikely to be used by retail patrons as these spaces may have

low turnover, though retail trip distribution has been revised to reflect a comment by the Township Traffic Engineer.

Finally, some of the 25% New (vehicular) traffic is possibly passby traffic already existing on Route 30, but no such discount or credit was taken.

Appendix H provides added details about each of these three steps, including presentation of multiple trip assignment worksheets.

APPENDIX H

Trip Distribution

Trip Distribution Notes

The main exercise of the study is to reassign turning movement traffic volumes to reflect parking supply location changes. After existing Main Lot and Pike Lot traffic is removed, new traffic is added, the mechanism of which was detailed at the end of the introductory text of the last appendix.

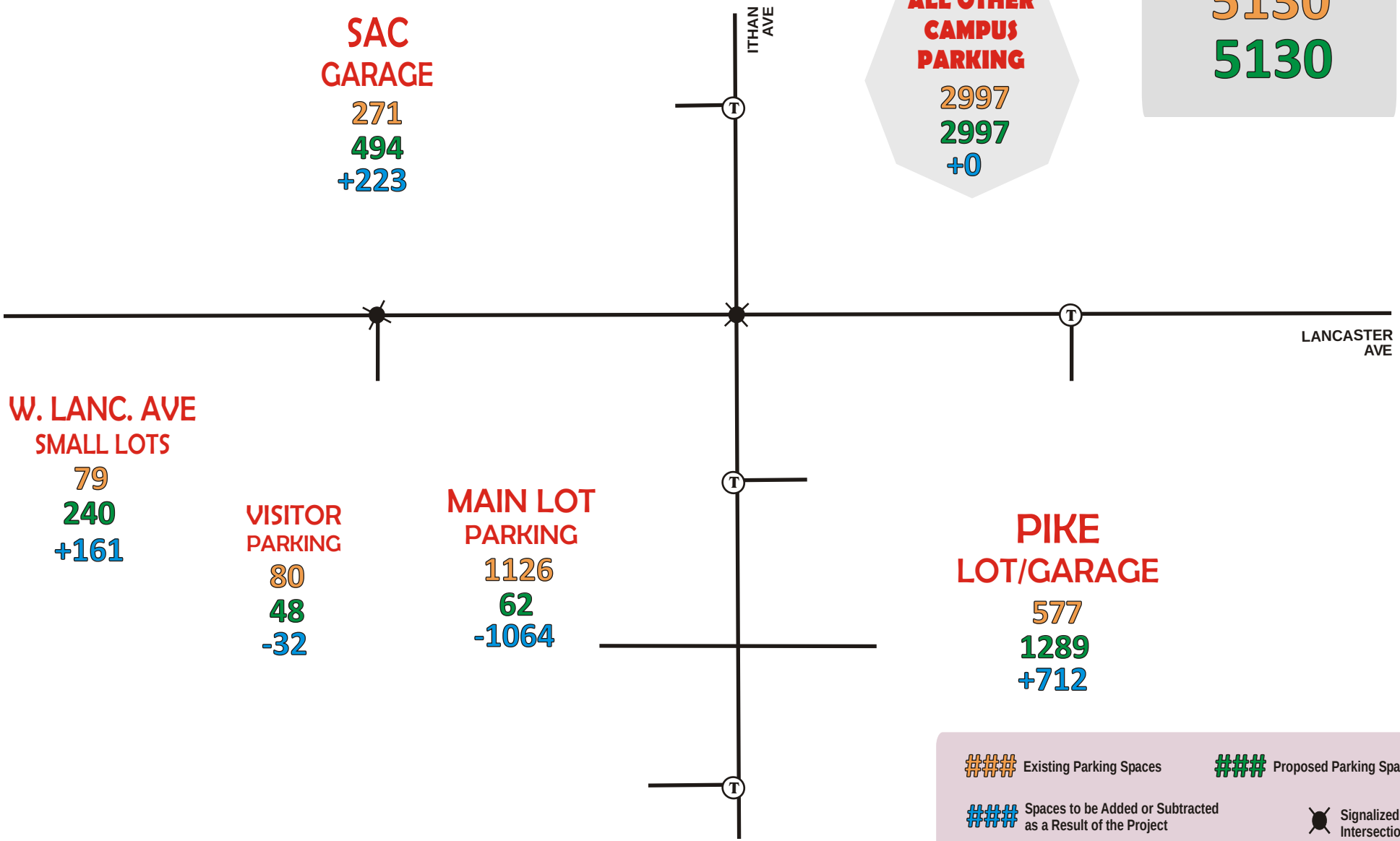
Turning movement volumes at subsequent downstream intersections are revised proportionately to the increase or decrease in parking spaces. Likewise, subsequent downstream/upstream 'feeder' turning movements are also modified proportionately, all of which is detailed in the remainder of this appendix.

Site traffic was added to 2020 and 2025 *Base* (i.e., No Build) conditions to generate 2020 and 2025 *Projected* (i.e., Build) conditions. Note that *Base* conditions reflect background growth using rates which were developed by the Delaware Valley Regional Planning Commission (DVRPC) as recommended in a letter to PennDOT dated 26 April 2013 and included in **Appendix A**. Background growth spreadsheets are included at the end of this appendix.

On Campus Parking Spaces

Villanova University Lancaster Avenue Residence Halls
Radnor Township, Delaware County, Pennsylvania

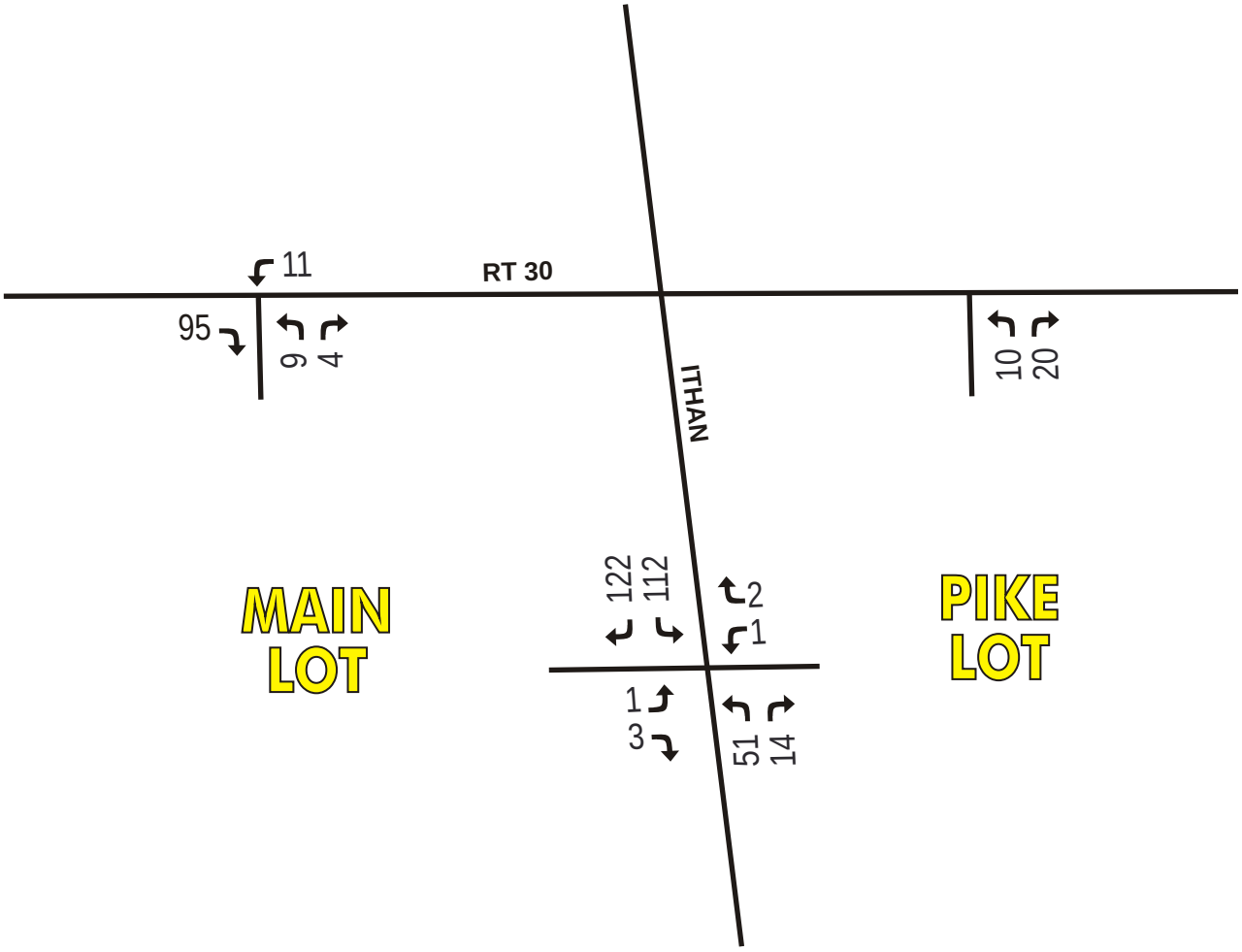
March 2015



Trip Distribution Model Explanation Worksheet

AM PEAK HR

March 2015



Existing turning movement patterns help predict future overall (N, S, E, W) distribution for future trips.

First, a total of all inbound and outbound trips into the two existing parking areas are determined. Next, total traffic entering and exiting the cordon line immediately surrounding these two areas are calculated.

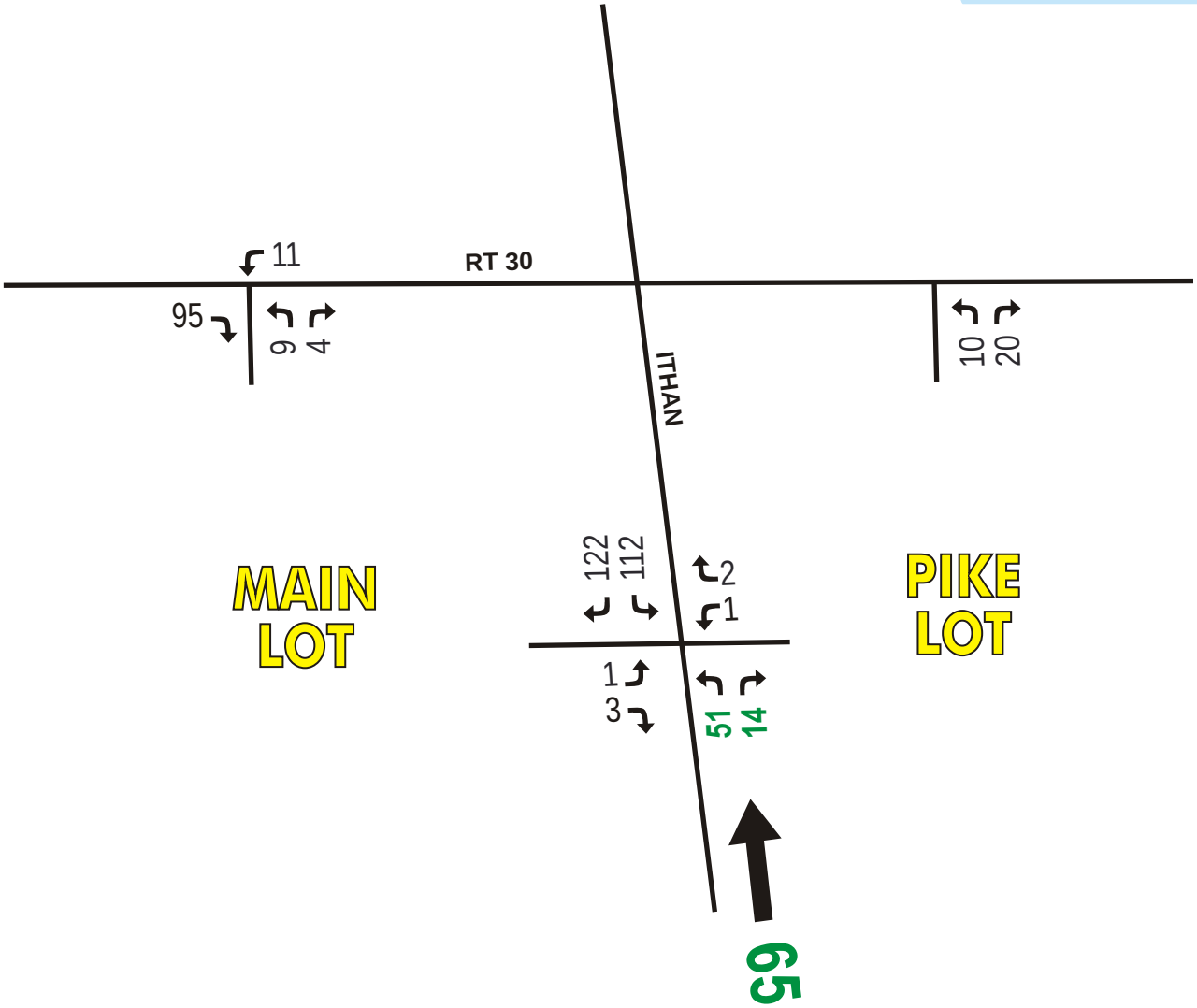
Some trips are straight forward, such as the entering and exiting trips shown on the next page...

Trip Distribution Model Explanation Worksheet

AM PEAK HR

March 2015

TOTAL IN: 405
TOTAL OUT: 50



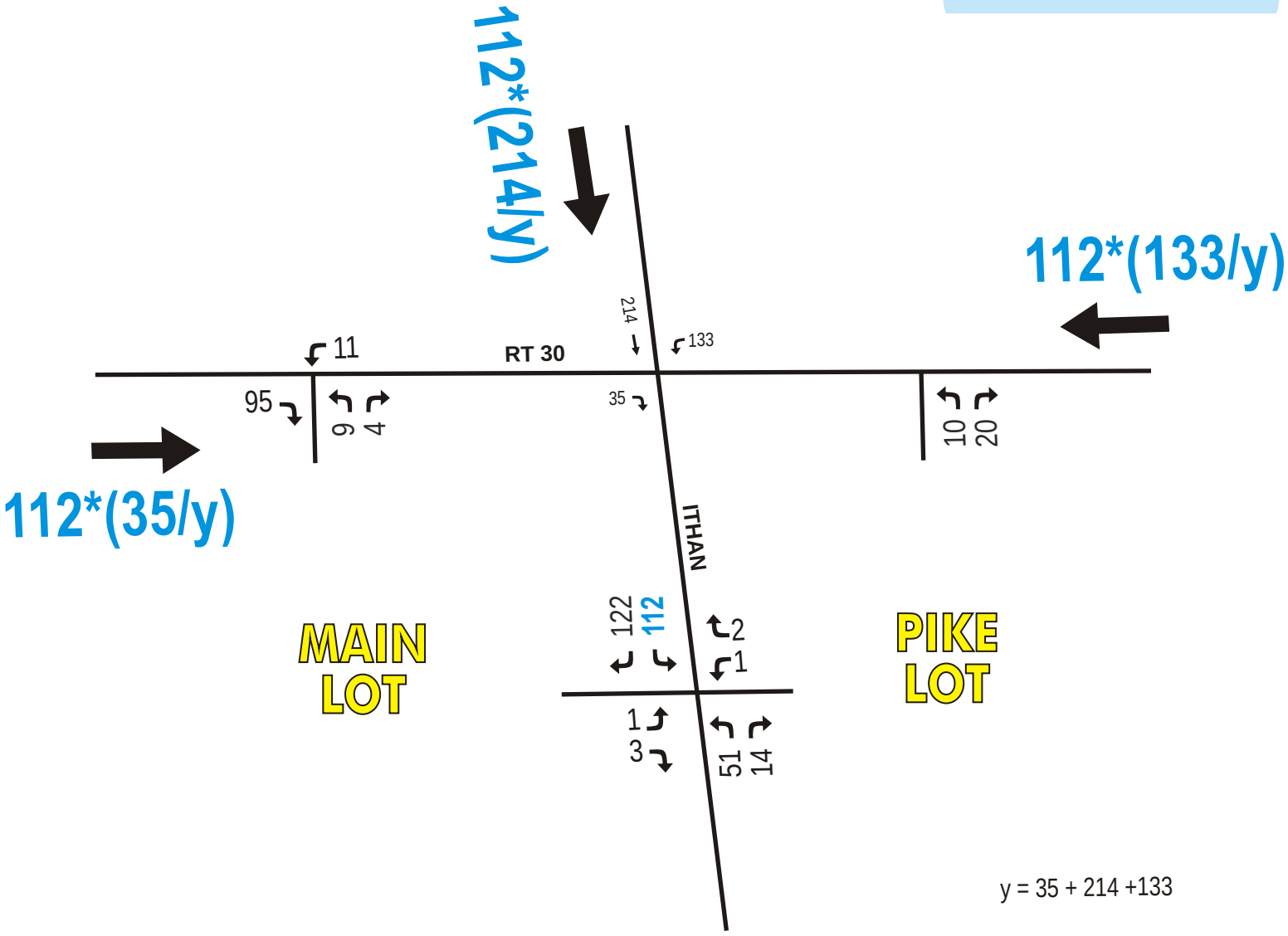
Remaining turning movements are completed in the same fashion: using logic and ascribing proportionate likelihood (based on existing turning movement volumes during the AM peak hour at the intersection of Route 30 and Ithan) over multiple feeder legs, one combination of which is shown on the next page...

Trip Distribution Model Explanation Worksheet

AM PEAK HR

March 2015

TOTAL IN: 405
TOTAL OUT: 50



y = 35 + 214 +133

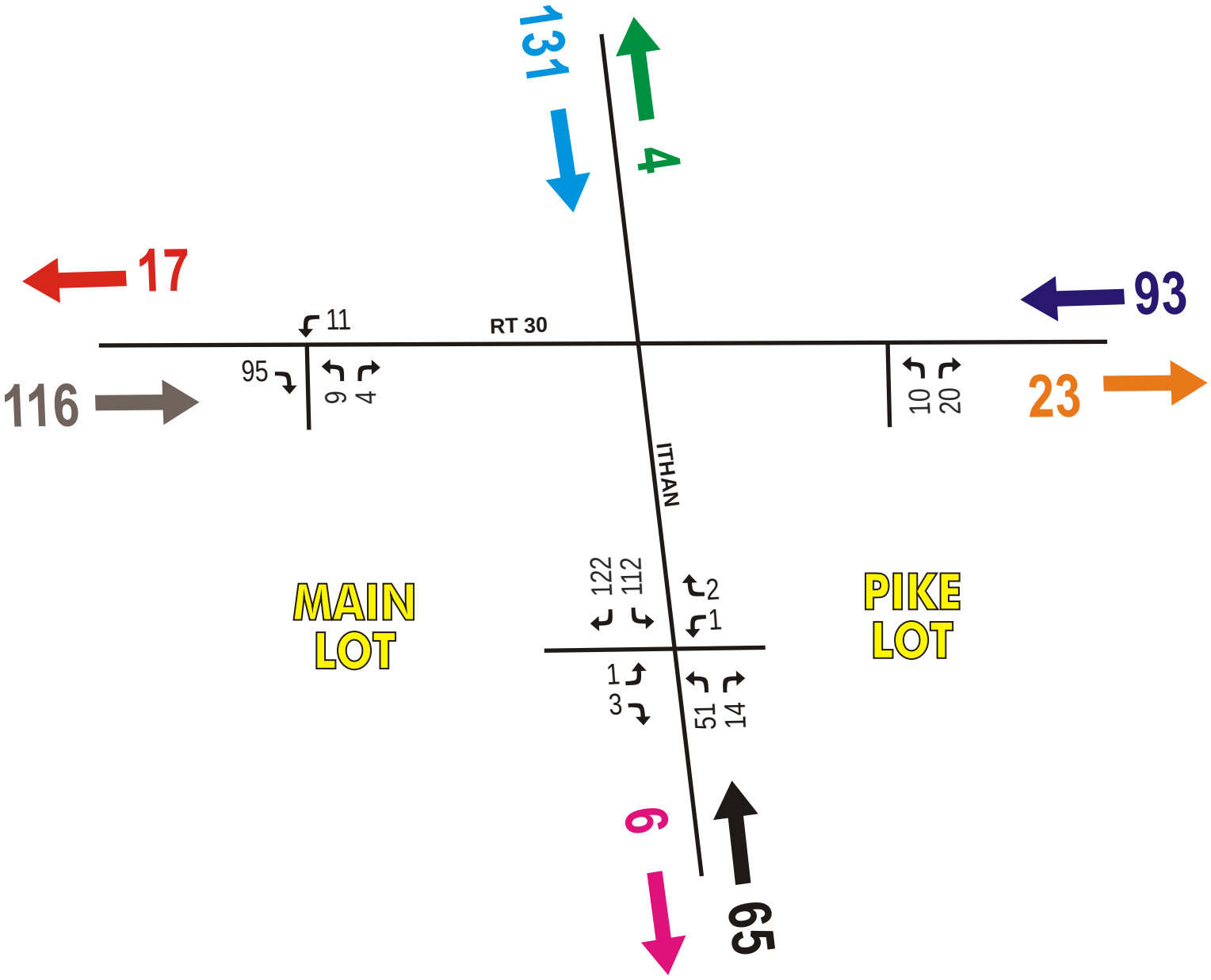
Remaining turning movements are shown on the next page...

Trip Distribution Model Explanation Worksheet

AM PEAK HR

March 2015

TOTAL IN: 405
TOTAL OUT: 50

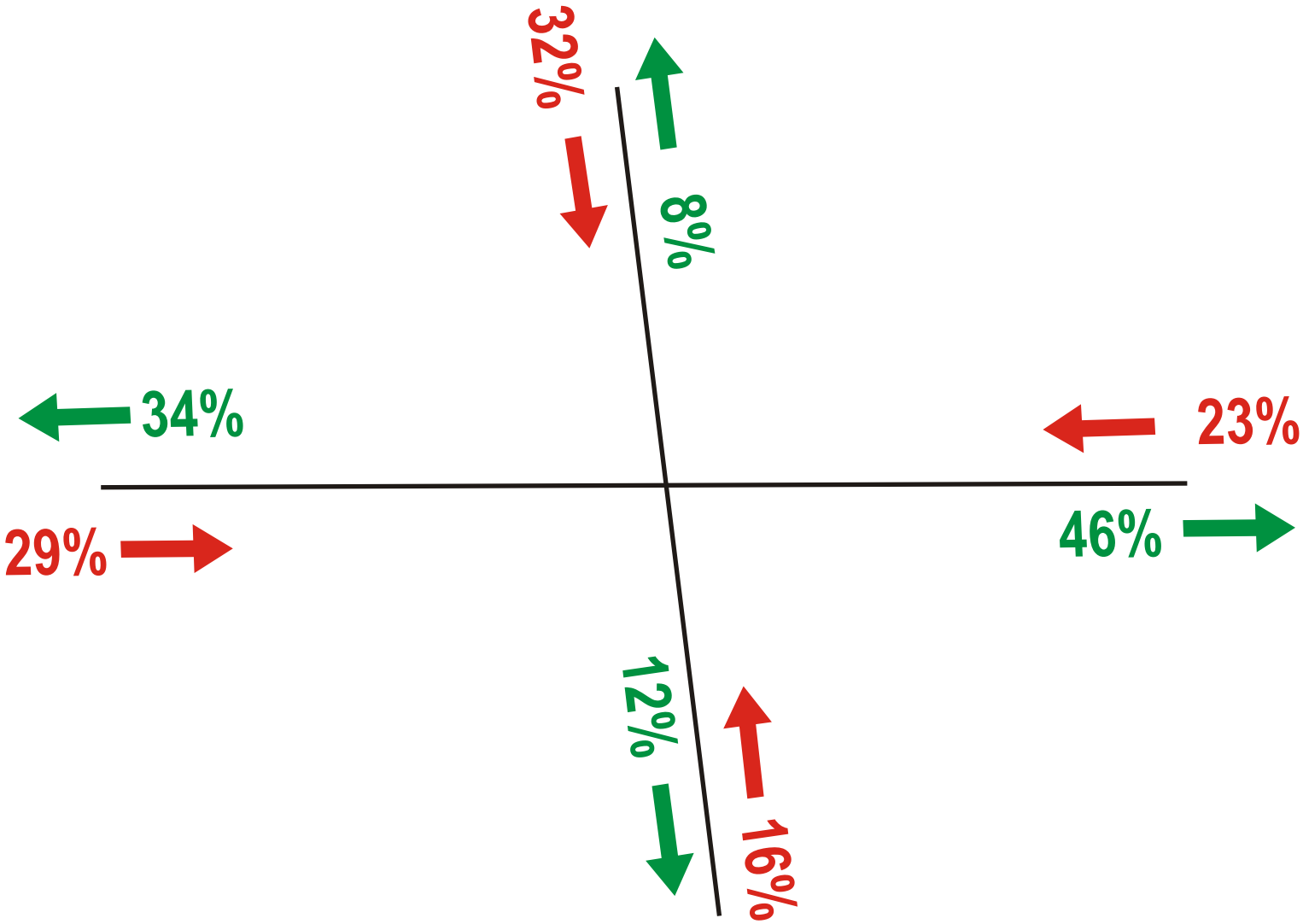


..and finally .on the next page trips are converted to percentages by dividing by 405 or 50...

Trip Distribution Model Explanation Worksheet

AM PEAK HR

March 2015



These percentages apply to existing AM peak hour activity.

Note that 55% of inbound trips come from the north on Ithan and the east on Rt 30. A minority of traffic (29%) arrives from the vicinity of the Blue Route. An even smaller minority (16%) arrives from the south on Ithan.

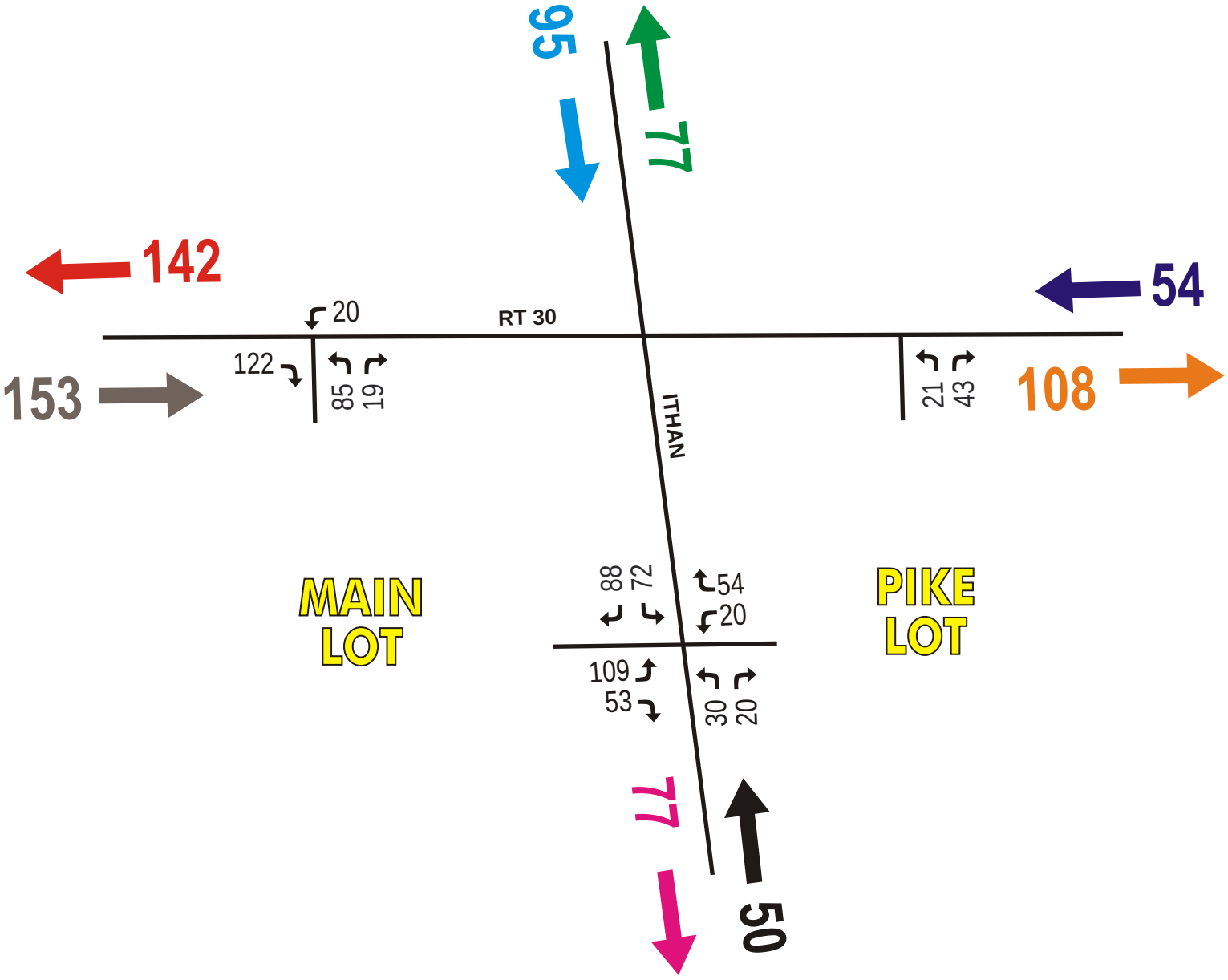
These results are only for the AM peak hour. The entire process must be repeated for PM peak hour activity. The final two pages of which are shown next.

Trip Distribution Model Explanation Worksheet

PM PEAK HR

March 2015

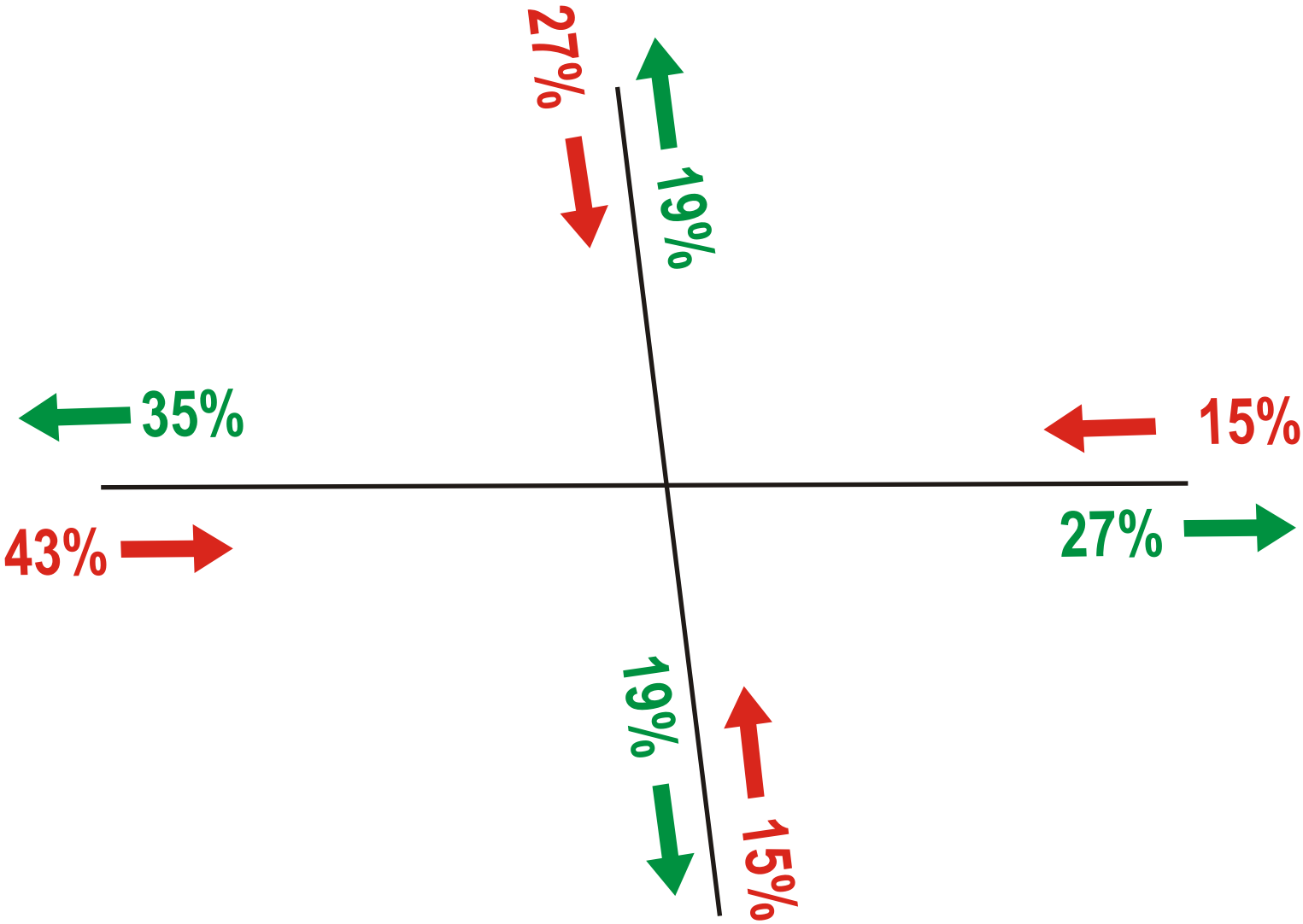
TOTAL IN: 352
TOTAL OUT: 404



Trip Distribution Model Explanation Worksheet

PM PEAK HR

March 2015



These percentages apply to existing PM peak hour activity.

Note that 42% of inbound trips come from the north on Ithan and the east on Rt 30. 43% arrives from the vicinity of the Blue Route. An minority (15%) arrives from the south on Ithan.

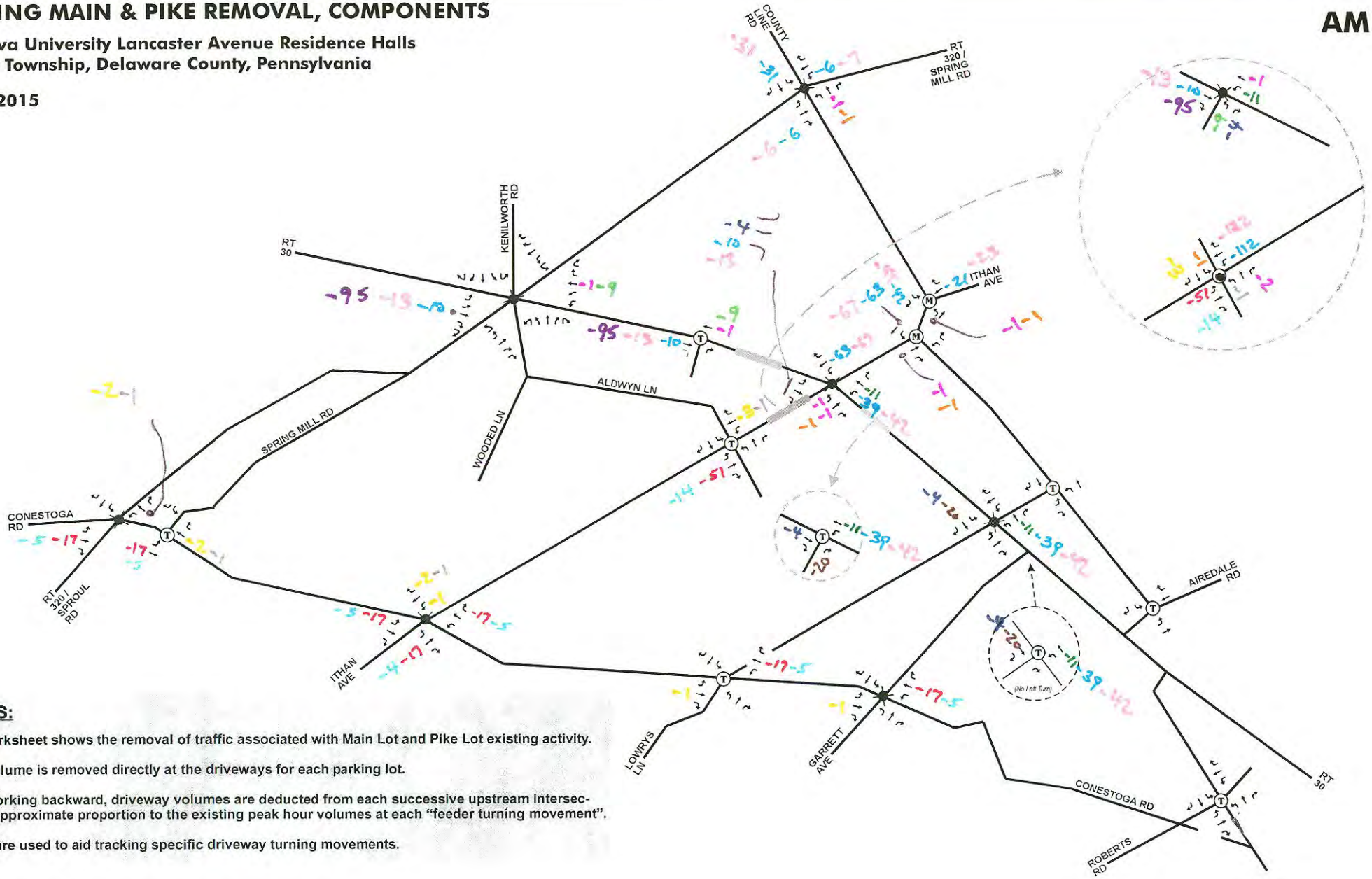
These percentages were used as starting points of the overall model for PM trips which were added to the study area on the WLL, SAC, PIKE, and VISITOR lots on the next several worksheets. The percentages used as starting points AM trips are shown in Figure AM-5.

EXISTING MAIN & PIKE REMOVAL, COMPONENTS

AM

Villanova University Lancaster Avenue Residence Halls
Radnor Township, Delaware County, Pennsylvania

March 2015



NOTES:

This worksheet shows the removal of traffic associated with Main Lot and Pike Lot existing activity.

First, volume is removed directly at the driveways for each parking lot.

Next, working backward, driveway volumes are deducted from each successive upstream intersection in approximate proportion to the existing peak hour volumes at each "feeder turning movement".

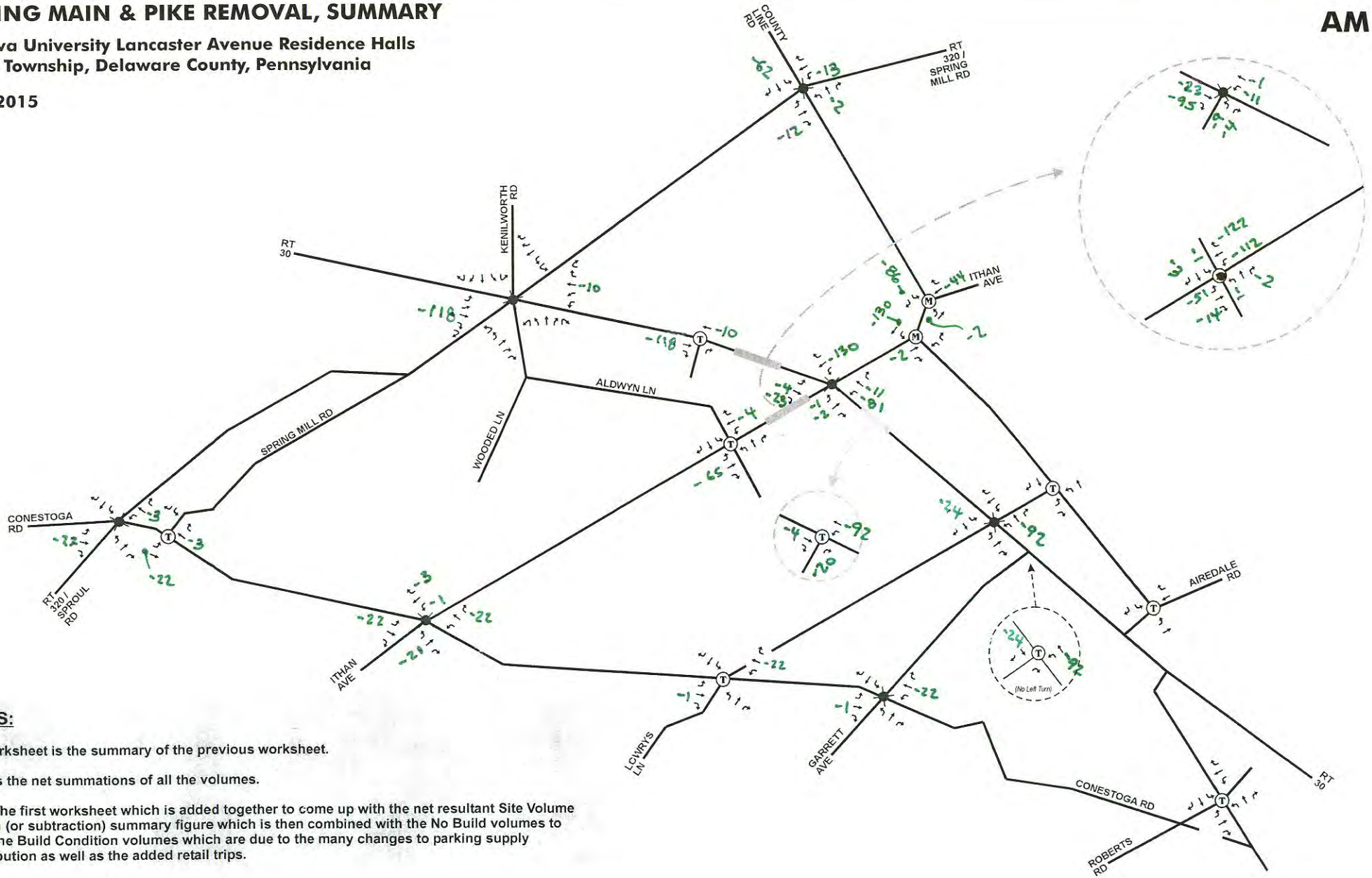
Colors are used to aid tracking specific driveway turning movements.

EXISTING MAIN & PIKE REMOVAL, SUMMARY

AM

Villanova University Lancaster Avenue Residence Halls
Radnor Township, Delaware County, Pennsylvania

March 2015



NOTES:

This worksheet is the summary of the previous worksheet.

It shows the net summations of all the volumes.

This is the first worksheet which is added together to come up with the net resultant Site Volume addition (or subtraction) summary figure which is then combined with the No Build volumes to derive the Build Condition volumes which are due to the many changes to parking supply redistribution as well as the added retail trips.

SAC GARAGE PARKING SUPPLY ADDITION

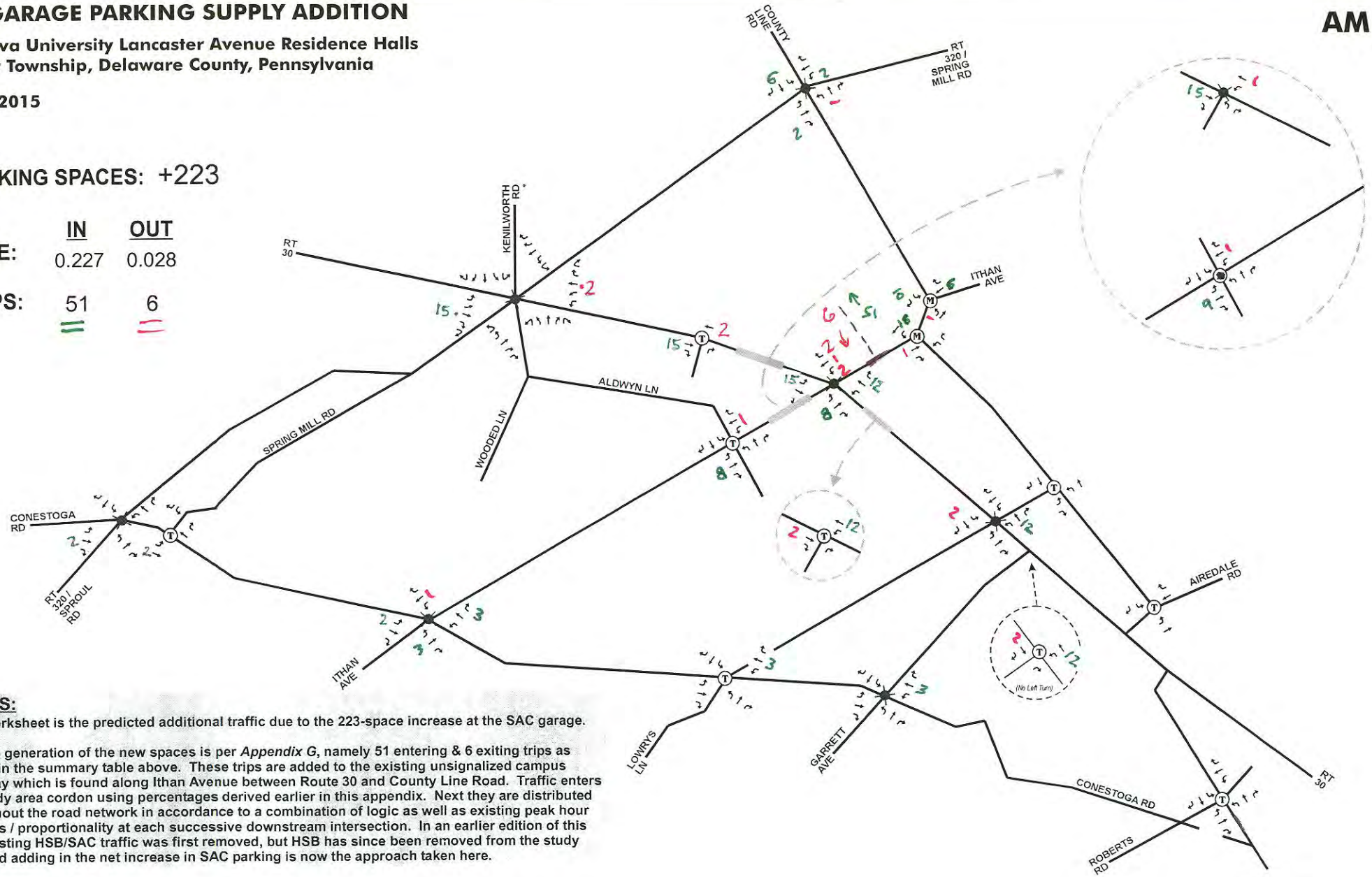
AM

Villanova University Lancaster Avenue Residence Halls
Radnor Township, Delaware County, Pennsylvania

March 2015

PARKING SPACES: +223

	IN	OUT
RATE:	0.227	0.028
TRIPS:	51	6



NOTES:

This worksheet is the predicted additional traffic due to the 223-space increase at the SAC garage.

The trip generation of the new spaces is per *Appendix G*, namely 51 entering & 6 exiting trips as shown in the summary table above. These trips are added to the existing unsignalized campus driveway which is found along Ithan Avenue between Route 30 and County Line Road. Traffic enters the study area cordon using percentages derived earlier in this appendix. Next they are distributed throughout the road network in accordance to a combination of logic as well as existing peak hour volumes / proportionality at each successive downstream intersection. In an earlier edition of this TIS, existing HSB/SAC traffic was first removed, but HSB has since been removed from the study area and adding in the net increase in SAC parking is now the approach taken here.

WLL LOT PARKING SUPPLY

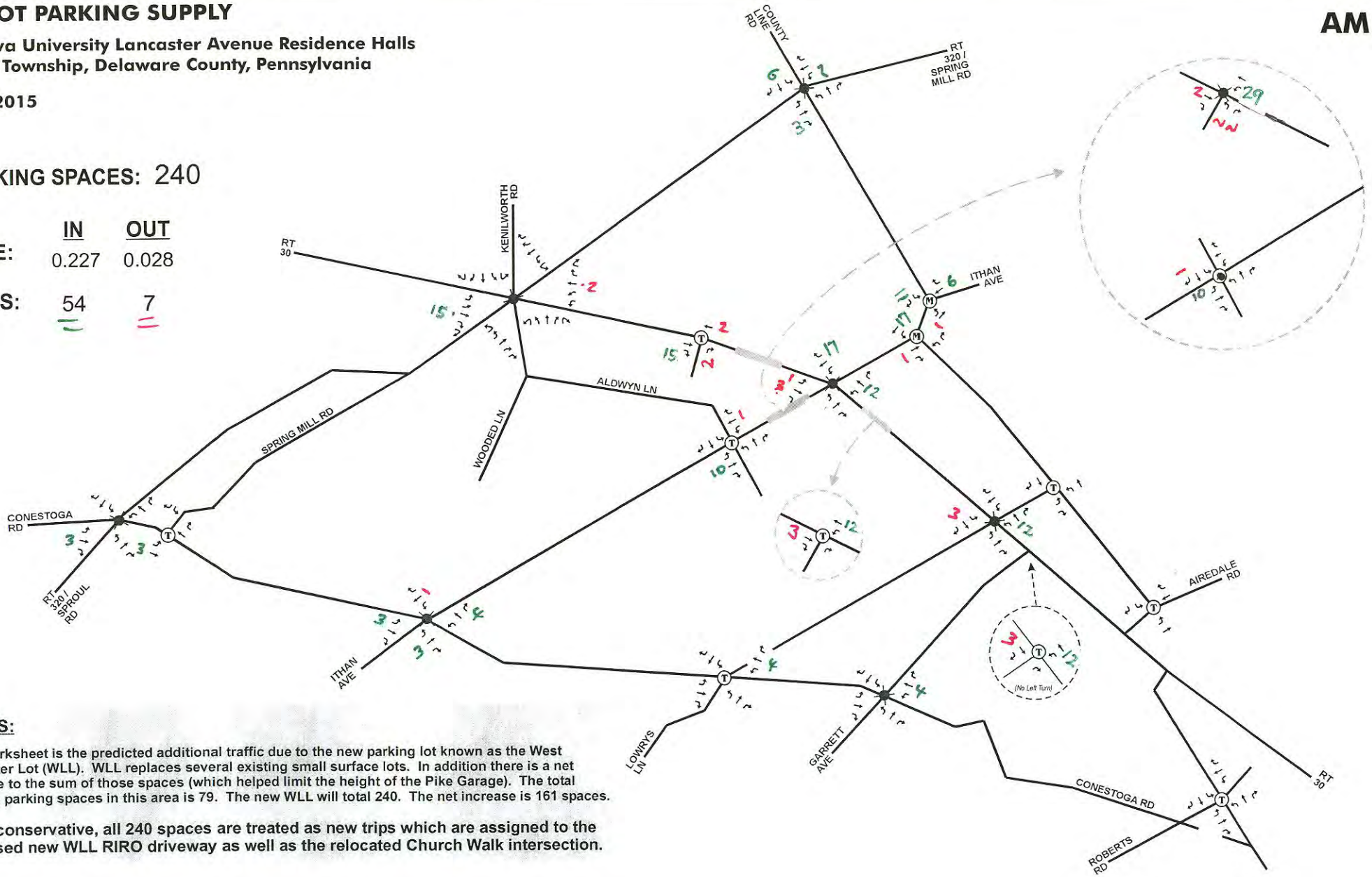
AM

Villanova University Lancaster Avenue Residence Halls
Radnor Township, Delaware County, Pennsylvania

March 2015

PARKING SPACES: 240

	IN	OUT
RATE:	0.227	0.028
TRIPS:	54	7



NOTES:

This worksheet is the predicted additional traffic due to the new parking lot known as the West Lancaster Lot (WLL). WLL replaces several existing small surface lots. In addition there is a net increase to the sum of those spaces (which helped limit the height of the Pike Garage). The total existing parking spaces in this area is 79. The new WLL will total 240. The net increase is 161 spaces.

To be conservative, all 240 spaces are treated as new trips which are assigned to the proposed new WLL RIRO driveway as well as the relocated Church Walk intersection.

MAIN & VIS LOTS PARKING SUPPLY

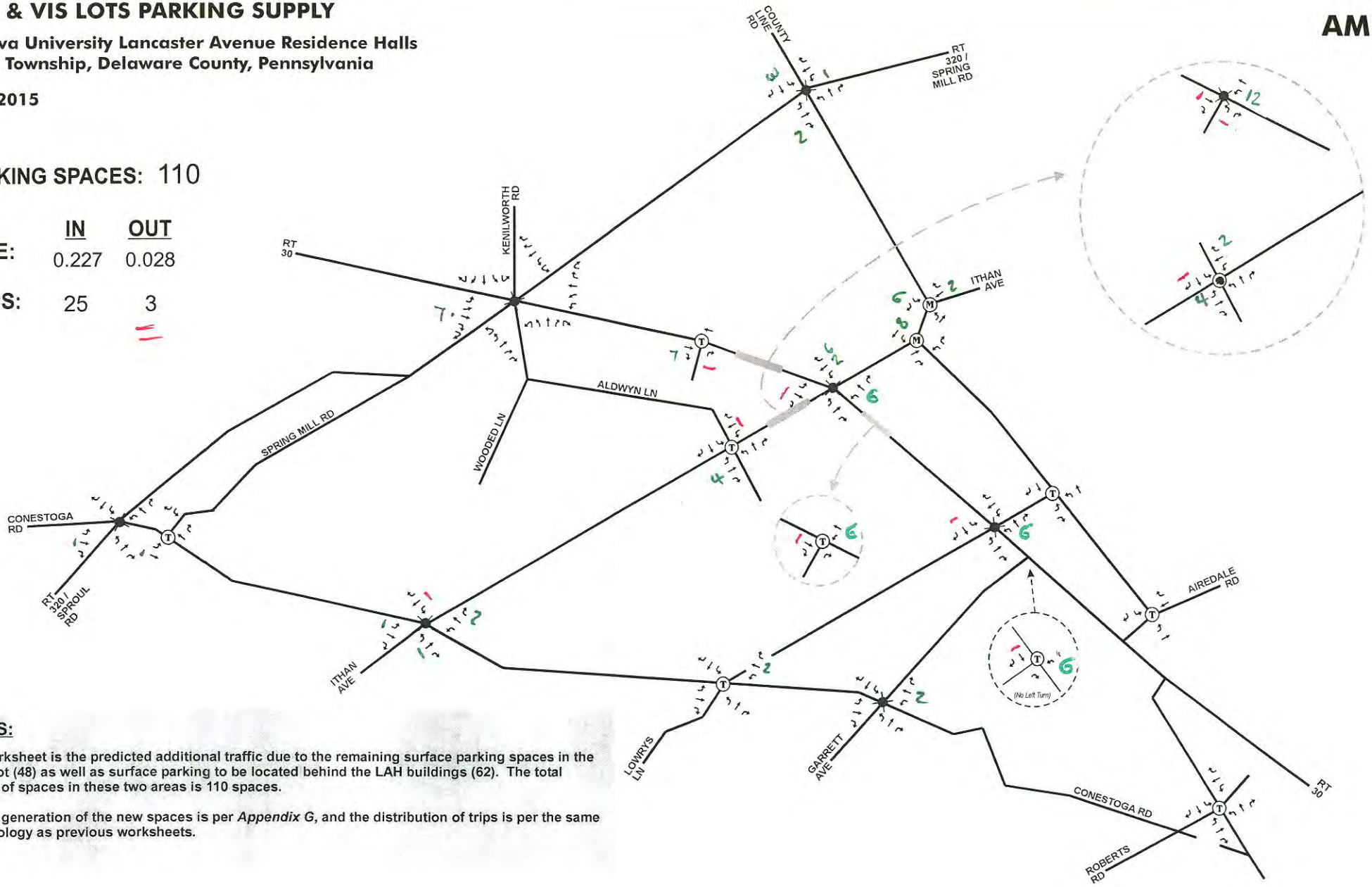
AM

Villanova University Lancaster Avenue Residence Halls
Radnor Township, Delaware County, Pennsylvania

March 2015

PARKING SPACES: 110

	IN	OUT
RATE:	0.227	0.028
TRIPS:	25	3



NOTES:

This worksheet is the predicted additional traffic due to the remaining surface parking spaces in the visitor lot (48) as well as surface parking to be located behind the LAH buildings (62). The total number of spaces in these two areas is 110 spaces.

The trip generation of the new spaces is per *Appendix G*, and the distribution of trips is per the same methodology as previous worksheets.

PIKE GARAGE PARKING SUPPLY

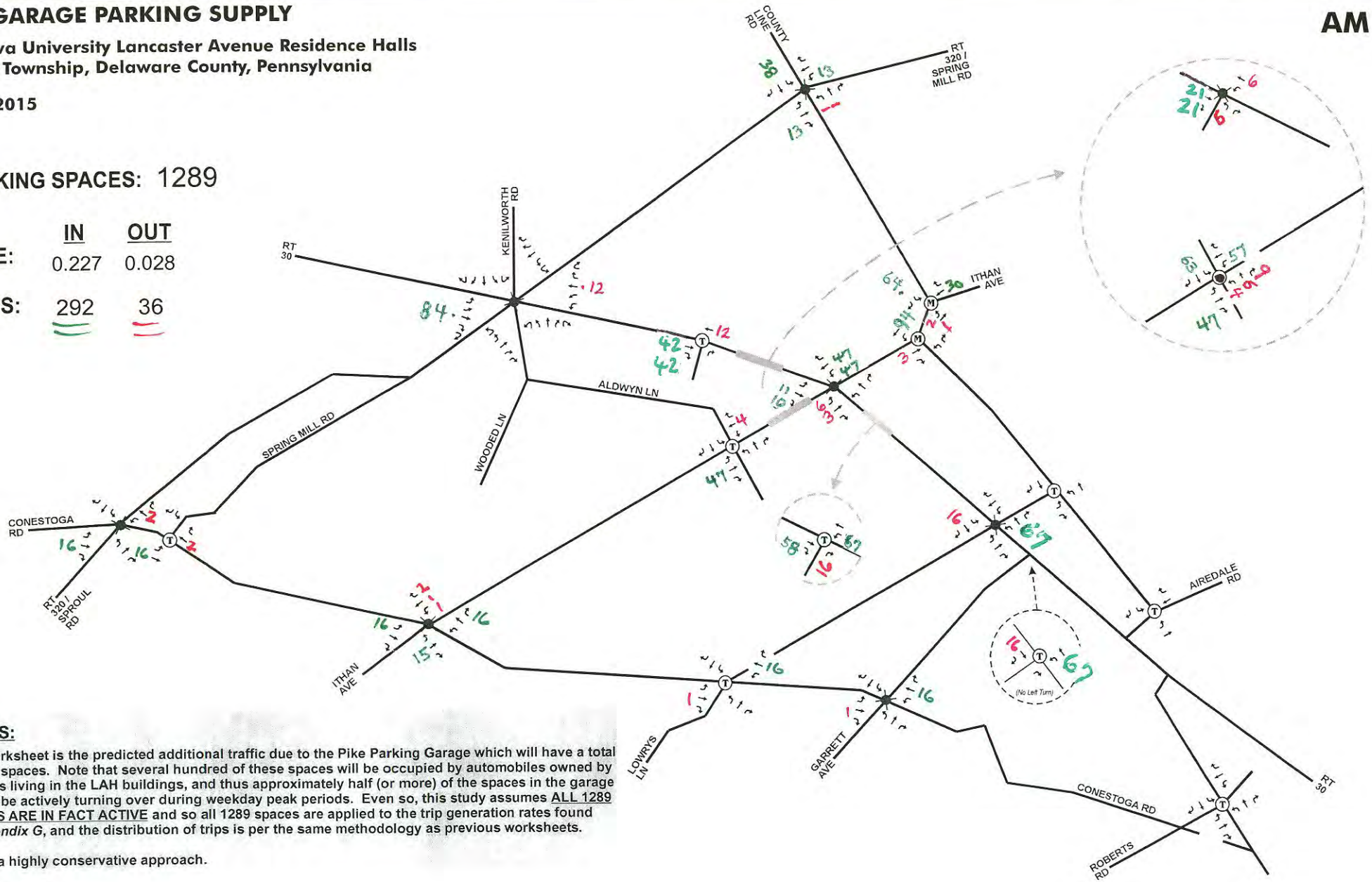
AM

Villanova University Lancaster Avenue Residence Halls
Radnor Township, Delaware County, Pennsylvania

March 2015

PARKING SPACES: 1289

	IN	OUT
RATE:	0.227	0.028
TRIPS:	292	36



NOTES:

This worksheet is the predicted additional traffic due to the Pike Parking Garage which will have a total of 1289 spaces. Note that several hundred of these spaces will be occupied by automobiles owned by students living in the LAH buildings, and thus approximately half (or more) of the spaces in the garage will not be actively turning over during weekday peak periods. Even so, this study assumes ALL 1289 SPACES ARE IN FACT ACTIVE and so all 1289 spaces are applied to the trip generation rates found in *Appendix G*, and the distribution of trips is per the same methodology as previous worksheets.

This is a highly conservative approach.

RETAIL

AM

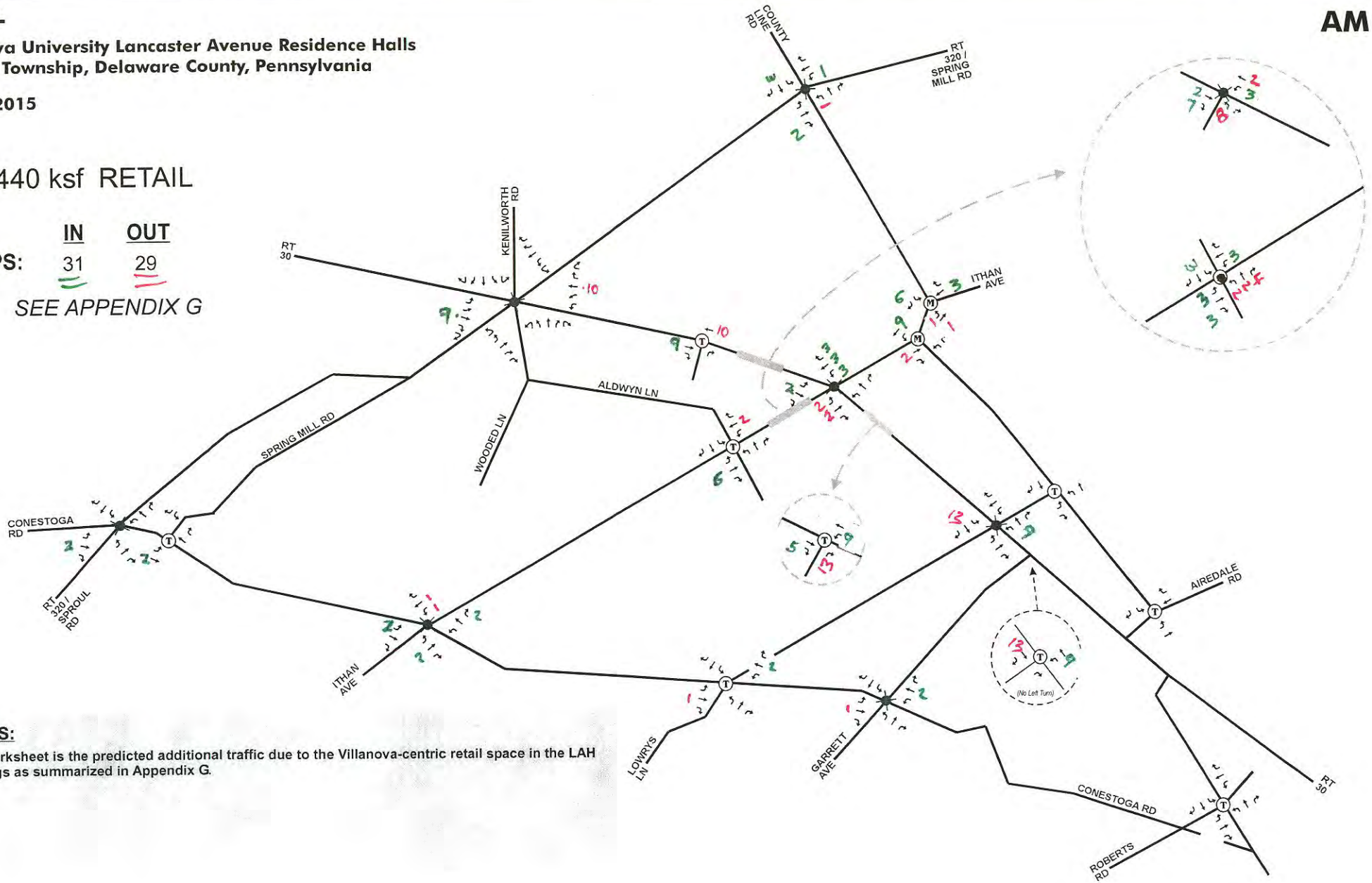
Villanova University Lancaster Avenue Residence Halls
Radnor Township, Delaware County, Pennsylvania

March 2015

20.440 ksf RETAIL

TRIPS:	IN	OUT
	31	29

SEE APPENDIX G



NOTES:

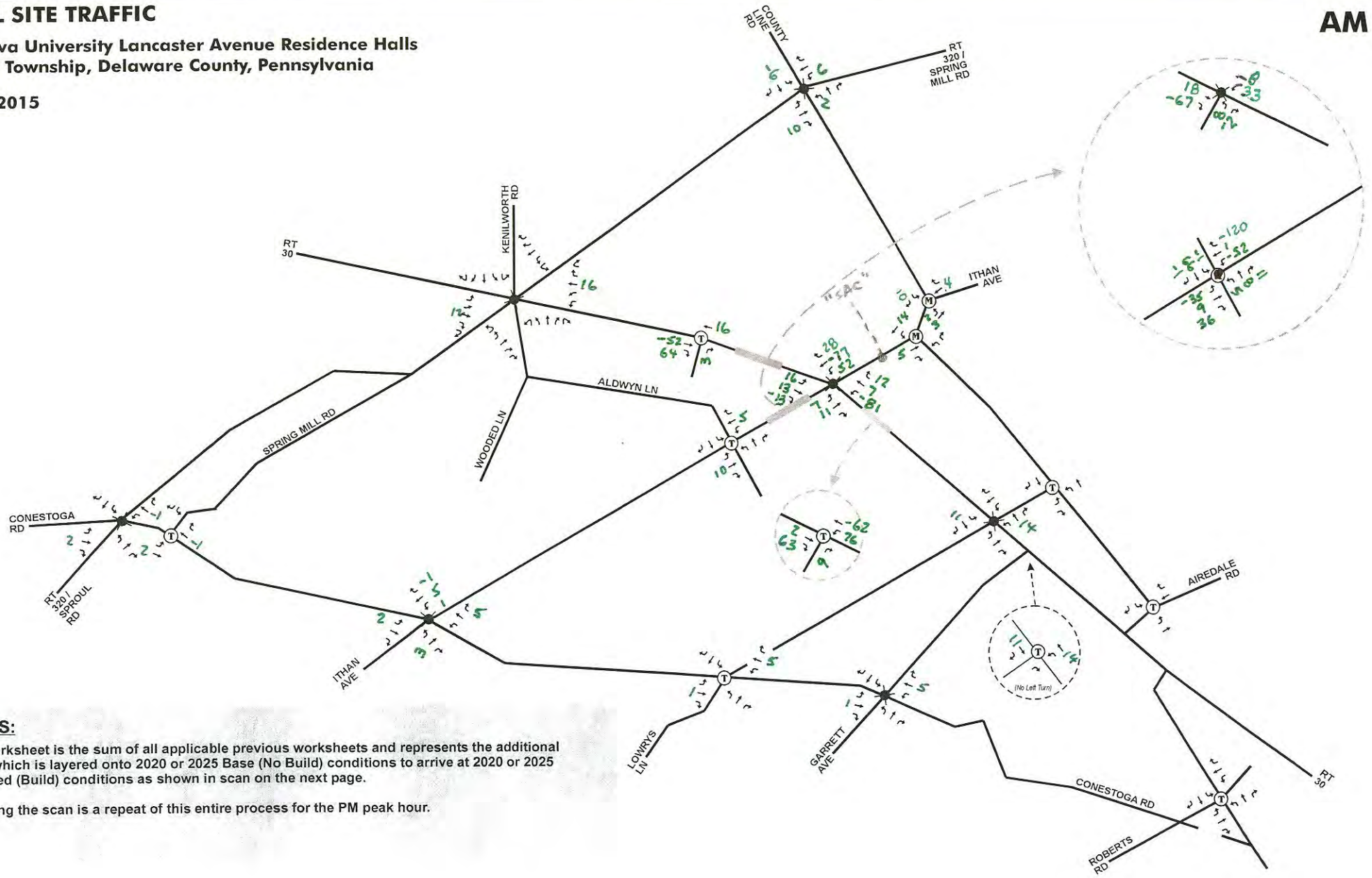
This worksheet is the predicted additional traffic due to the Villanova-centric retail space in the LAH buildings as summarized in Appendix G.

TOTAL SITE TRAFFIC

AM

Villanova University Lancaster Avenue Residence Halls
Radnor Township, Delaware County, Pennsylvania

March 2015



NOTES:

This worksheet is the sum of all applicable previous worksheets and represents the additional traffic which is layered onto 2020 or 2025 Base (No Build) conditions to arrive at 2020 or 2025 Projected (Build) conditions as shown in scan on the next page.

Following the scan is a repeat of this entire process for the PM peak hour.

F. Tavani and Associates, Inc.
Traffic Engineering and Planning

Worksheet #9 aka

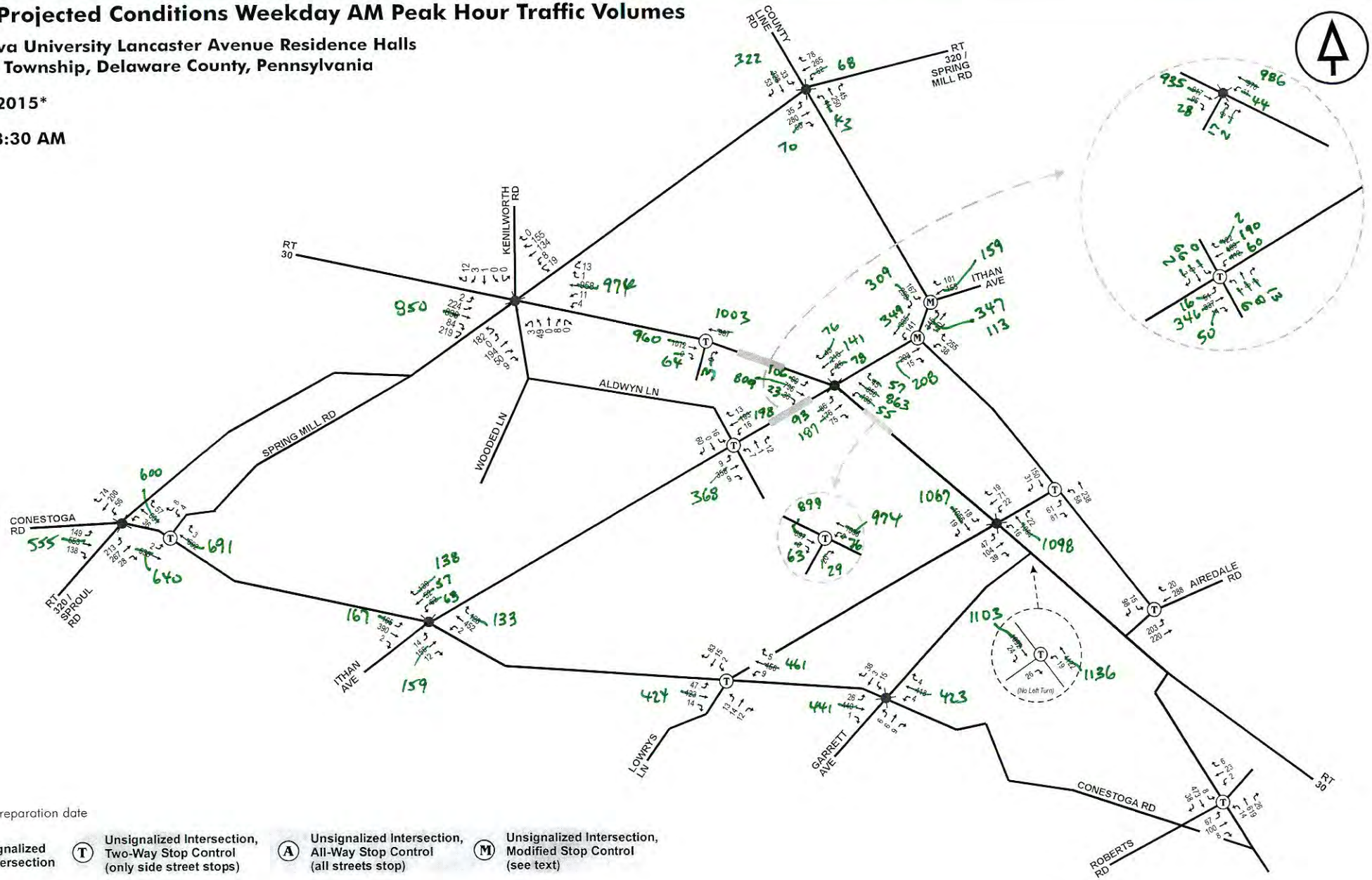
Figure 11

2020 Projected Conditions Weekday AM Peak Hour Traffic Volumes

Villanova University Lancaster Avenue Residence Halls
Radnor Township, Delaware County, Pennsylvania

March 2015*

7:30 - 8:30 AM



* figure preparation date

Signalized Intersection

(T) Unsignalized Intersection, Two-Way Stop Control (only side street stops)

(A) Unsignalized Intersection, All-Way Stop Control (all streets stop)

(M) Unsignalized Intersection, Modified Stop Control (see text)

Worksheet #10 aka

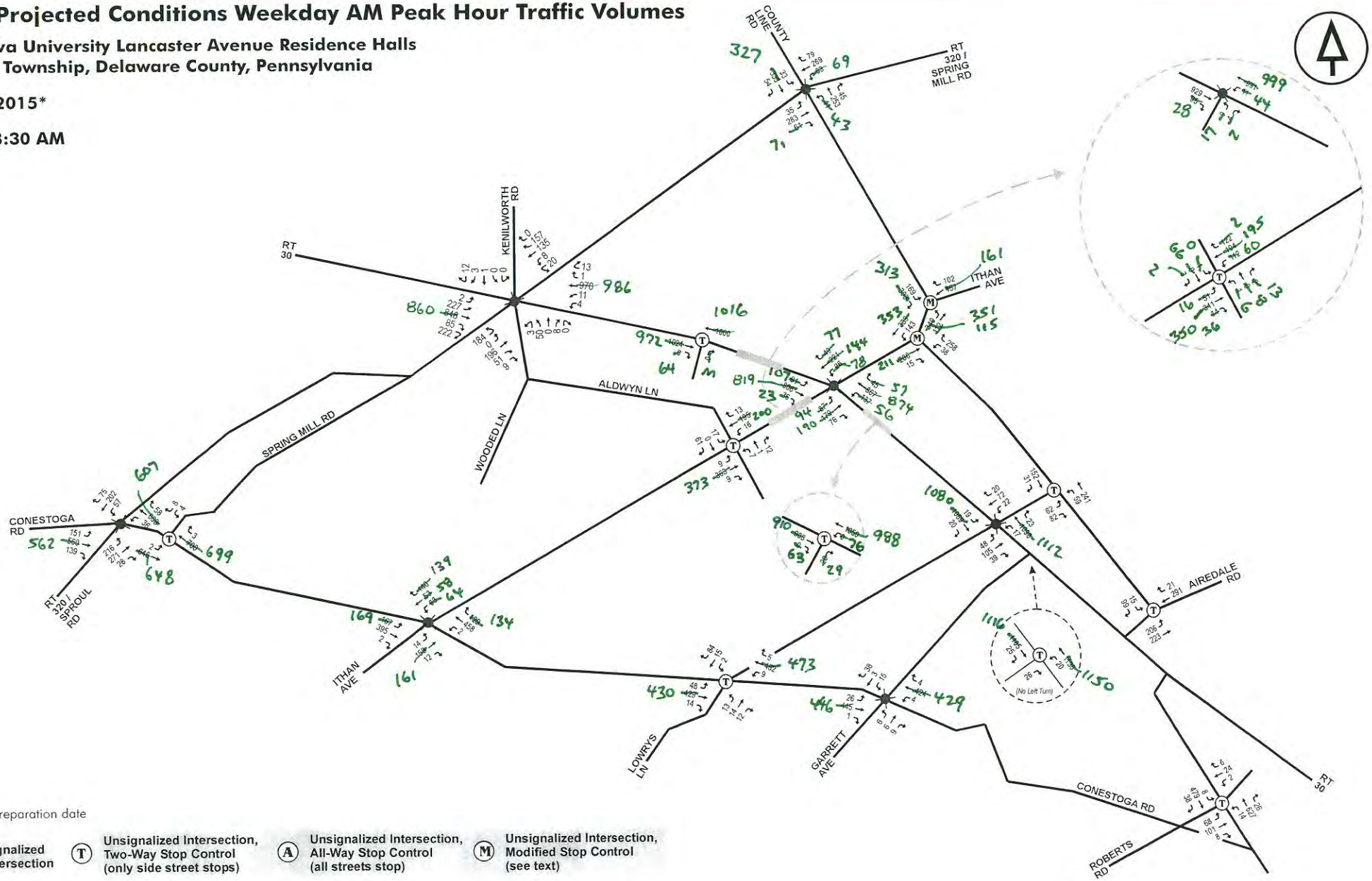
Figure 13

2025 Projected Conditions Weekday AM Peak Hour Traffic Volumes

Villanova University Lancaster Avenue Residence Halls
Radnor Township, Delaware County, Pennsylvania

March 2015*

7:30 - 8:30 AM



* figure preparation date

Signalized Intersection

(T) Unsignalized Intersection, Two-Way Stop Control (only side street stops)

(A) Unsignalized Intersection, All-Way Stop Control (all streets stop)

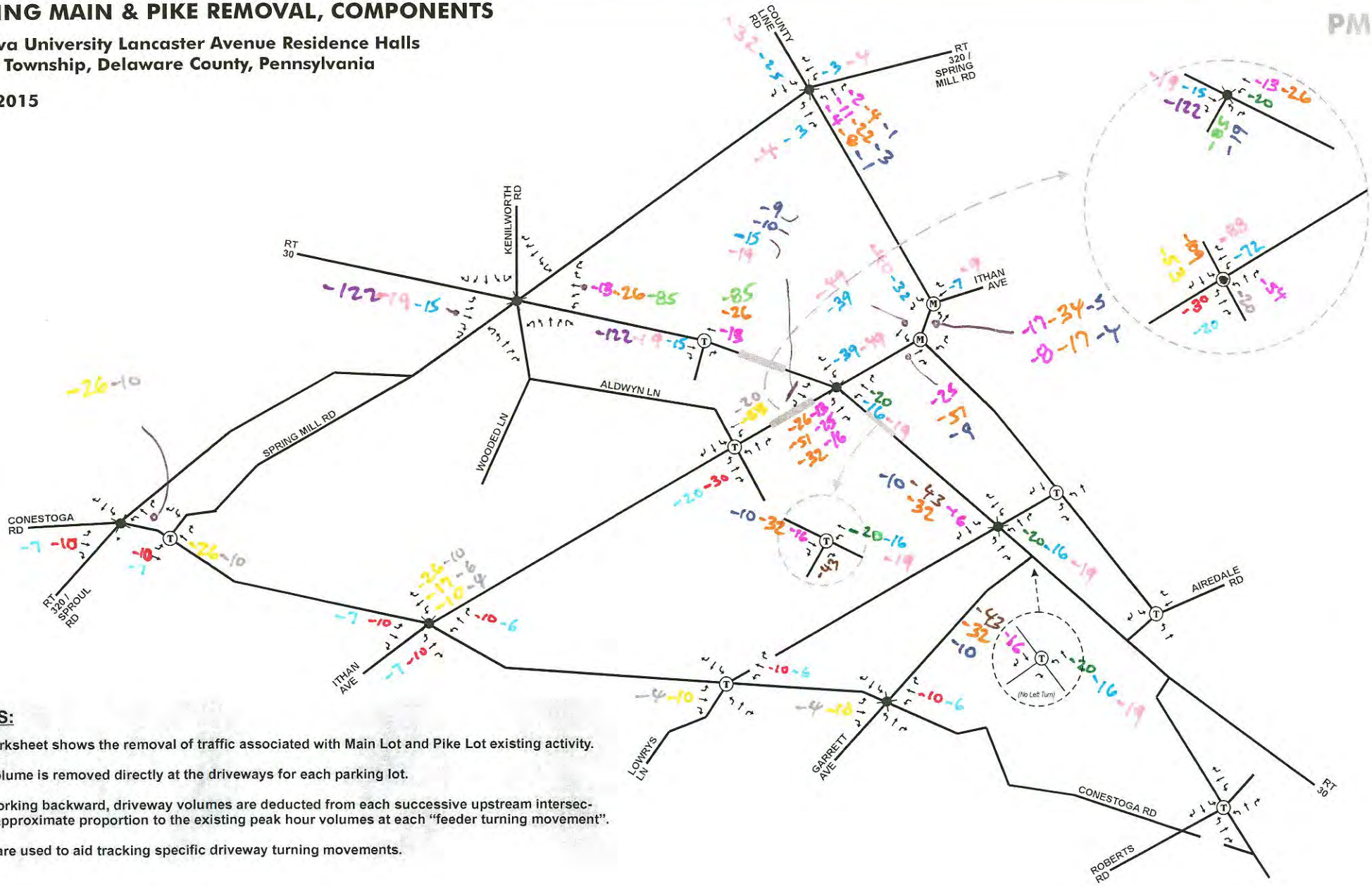
(M) Unsignalized Intersection, Modified Stop Control (see text)

EXISTING MAIN & PIKE REMOVAL, COMPONENTS

PM

Villanova University Lancaster Avenue Residence Halls
Radnor Township, Delaware County, Pennsylvania

March 2015



NOTES:

This worksheet shows the removal of traffic associated with Main Lot and Pike Lot existing activity.

First, volume is removed directly at the driveways for each parking lot.

Next, working backward, driveway volumes are deducted from each successive upstream intersection in approximate proportion to the existing peak hour volumes at each "feeder turning movement".

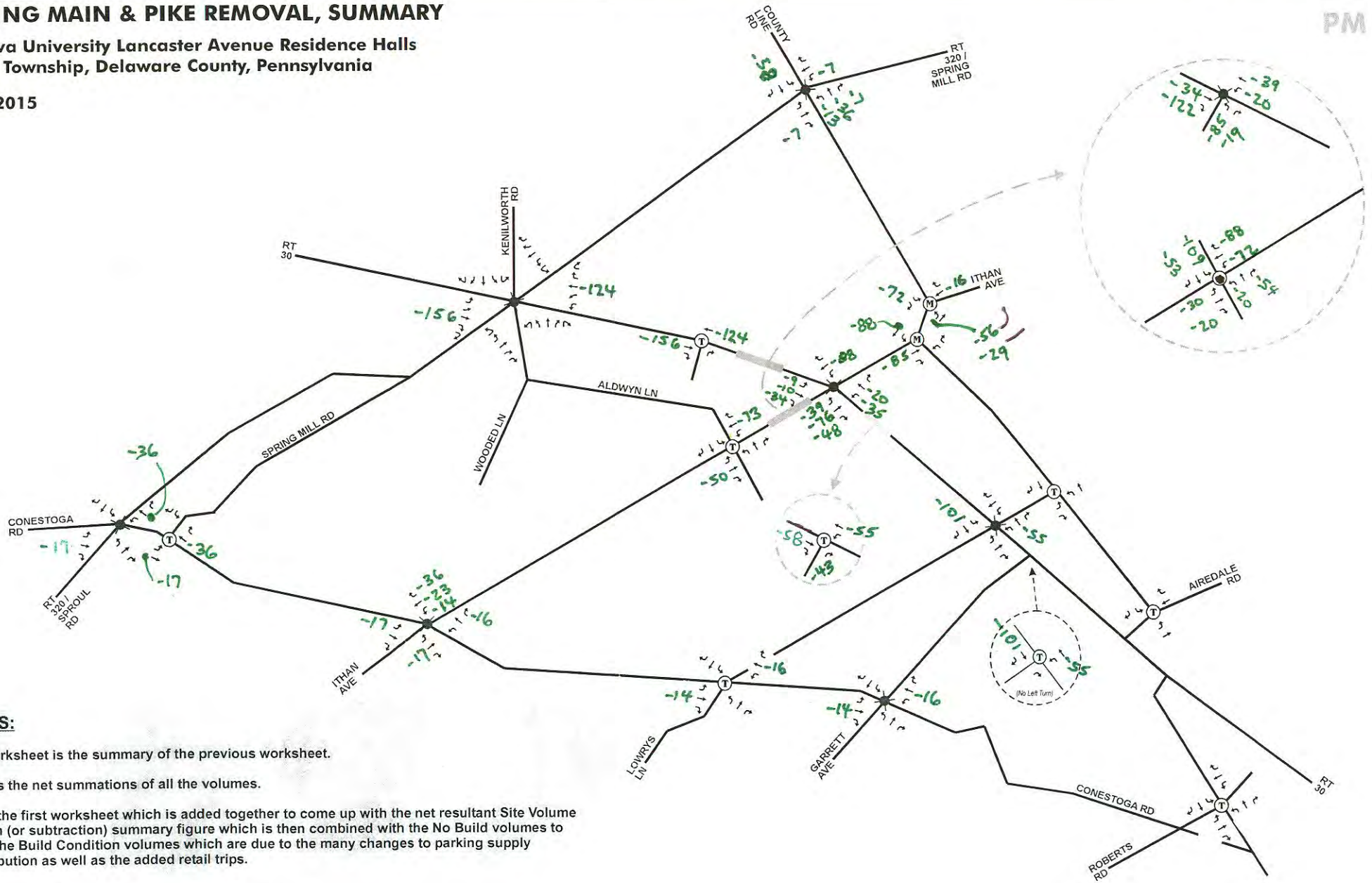
Colors are used to aid tracking specific driveway turning movements.

EXISTING MAIN & PIKE REMOVAL, SUMMARY

Villanova University Lancaster Avenue Residence Halls
Radnor Township, Delaware County, Pennsylvania

March 2015

PM



NOTES:

This worksheet is the summary of the previous worksheet.

It shows the net summations of all the volumes.

This is the first worksheet which is added together to come up with the net resultant Site Volume addition (or subtraction) summary figure which is then combined with the No Build volumes to derive the Build Condition volumes which are due to the many changes to parking supply redistribution as well as the added retail trips.

SAC GARAGE PARKING SUPPLY ADDITION

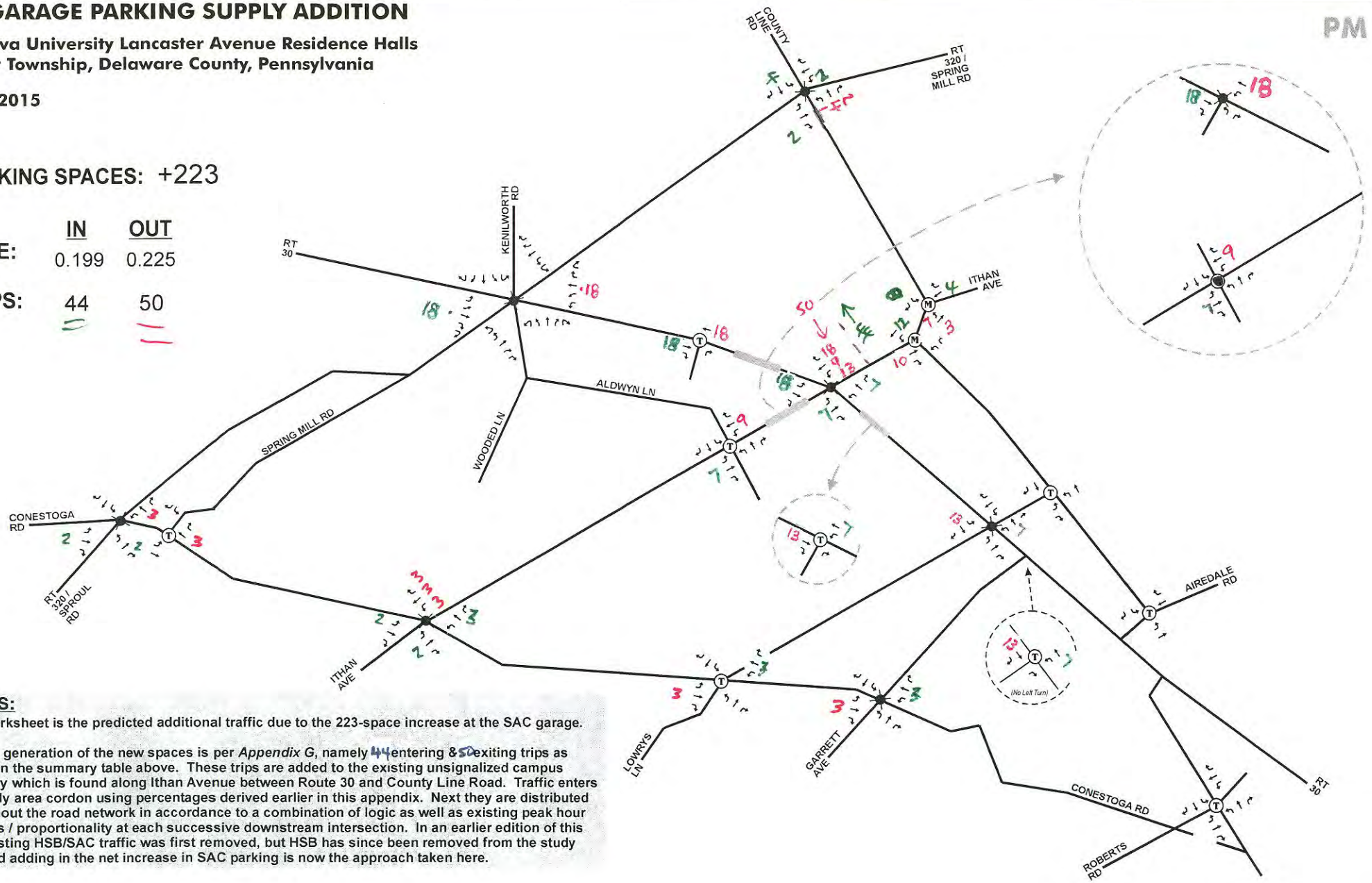
Villanova University Lancaster Avenue Residence Halls
Radnor Township, Delaware County, Pennsylvania

March 2015

PM

PARKING SPACES: +223

	IN	OUT
RATE:	0.199	0.225
TRIPS:	44	50



NOTES:

This worksheet is the predicted additional traffic due to the 223-space increase at the SAC garage.

The trip generation of the new spaces is per *Appendix G*, namely 44 entering & 50 exiting trips as shown in the summary table above. These trips are added to the existing unsignalized campus driveway which is found along Ithan Avenue between Route 30 and County Line Road. Traffic enters the study area cordon using percentages derived earlier in this appendix. Next they are distributed throughout the road network in accordance to a combination of logic as well as existing peak hour volumes / proportionality at each successive downstream intersection. In an earlier edition of this TIS, existing HSB/SAC traffic was first removed, but HSB has since been removed from the study area and adding in the net increase in SAC parking is now the approach taken here.

WLL LOT PARKING SUPPLY

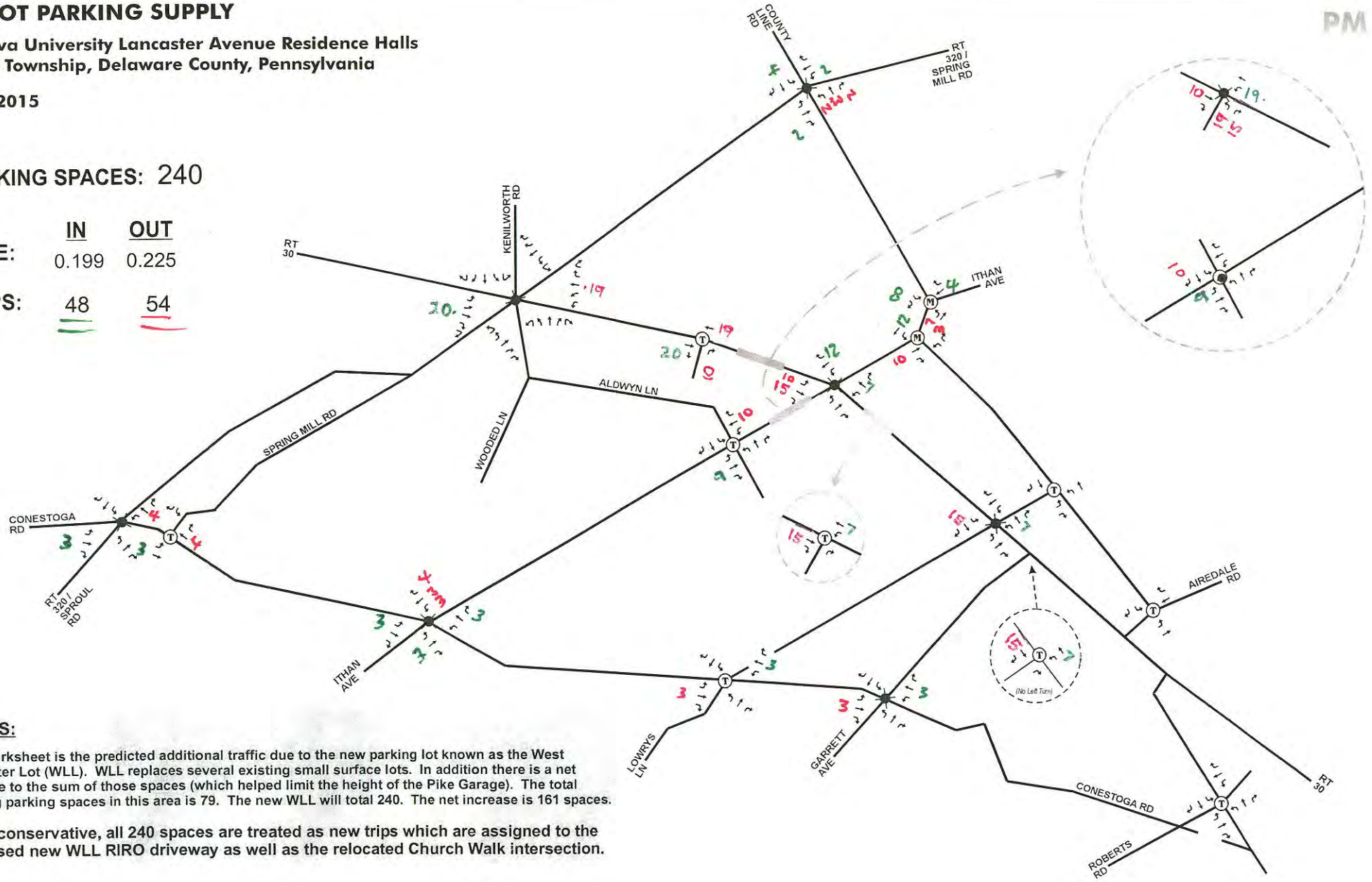
Villanova University Lancaster Avenue Residence Halls
Radnor Township, Delaware County, Pennsylvania

March 2015

PM

PARKING SPACES: 240

	IN	OUT
RATE:	0.199	0.225
TRIPS:	48	54



NOTES:

This worksheet is the predicted additional traffic due to the new parking lot known as the West Lancaster Lot (WLL). WLL replaces several existing small surface lots. In addition there is a net increase to the sum of those spaces (which helped limit the height of the Pike Garage). The total existing parking spaces in this area is 79. The new WLL will total 240. The net increase is 161 spaces.

To be conservative, all 240 spaces are treated as new trips which are assigned to the proposed new WLL RIRO driveway as well as the relocated Church Walk intersection.

MAIN & VIS LOTS PARKING SUPPLY

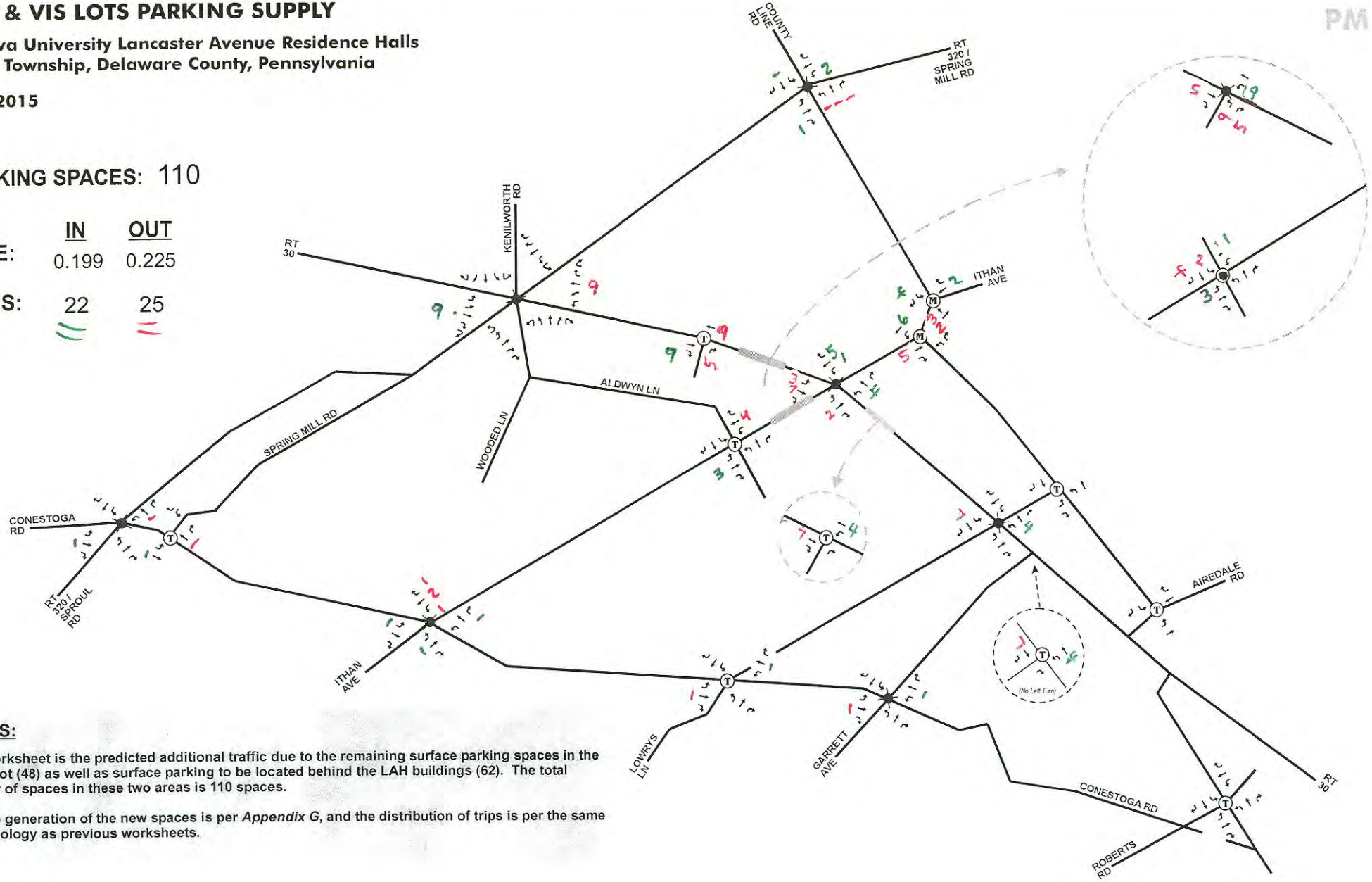
Villanova University Lancaster Avenue Residence Halls
Radnor Township, Delaware County, Pennsylvania

March 2015

PM

PARKING SPACES: 110

	IN	OUT
RATE:	0.199	0.225
TRIPS:	22	25



NOTES:

This worksheet is the predicted additional traffic due to the remaining surface parking spaces in the visitor lot (48) as well as surface parking to be located behind the LAH buildings (62). The total number of spaces in these two areas is 110 spaces.

The trip generation of the new spaces is per *Appendix G*, and the distribution of trips is per the same methodology as previous worksheets.

PIKE GARAGE PARKING SUPPLY

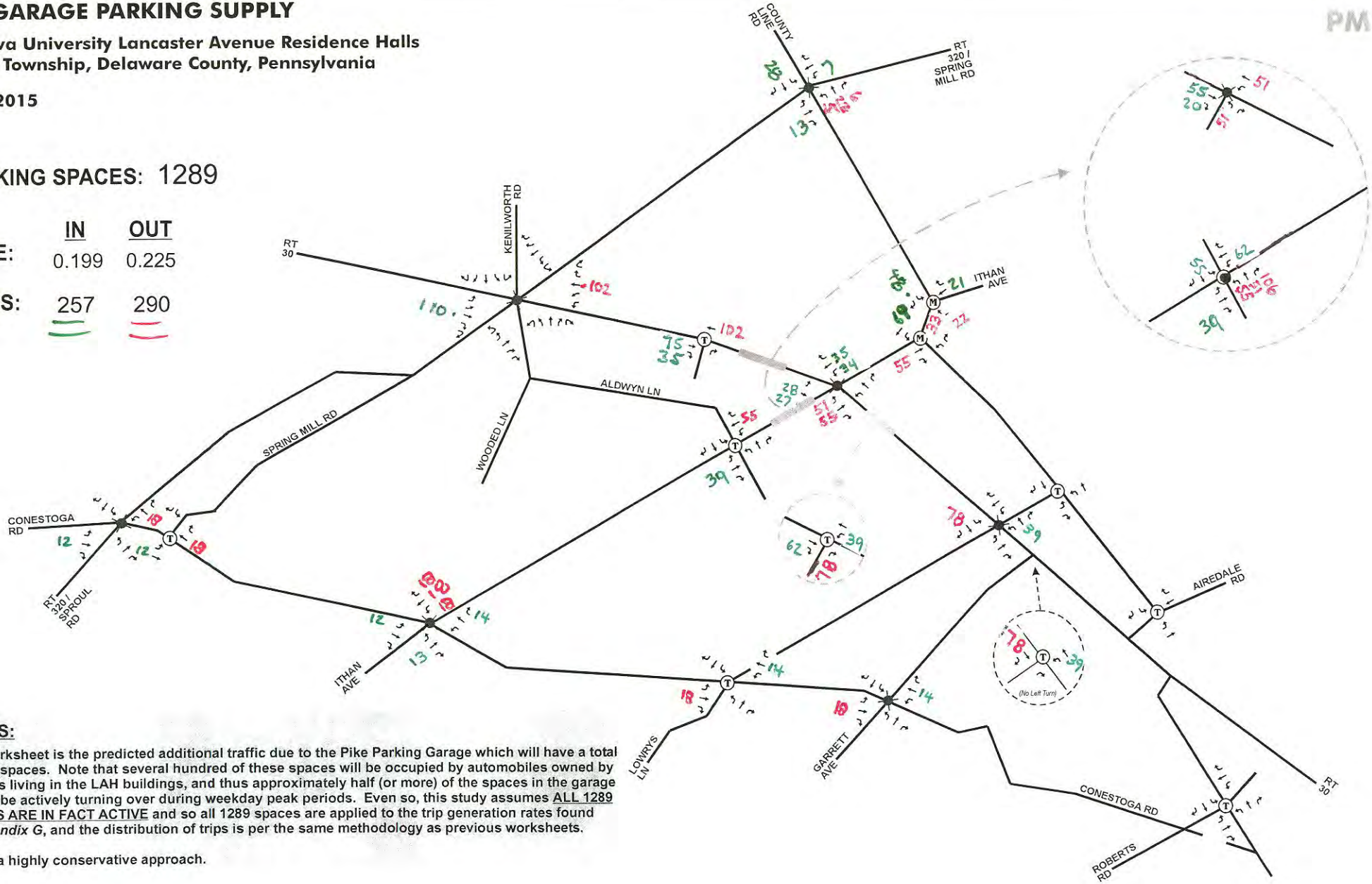
Villanova University Lancaster Avenue Residence Halls
Radnor Township, Delaware County, Pennsylvania

March 2015

PM

PARKING SPACES: 1289

	IN	OUT
RATE:	0.199	0.225
TRIPS:	257	290



NOTES:

This worksheet is the predicted additional traffic due to the Pike Parking Garage which will have a total of 1289 spaces. Note that several hundred of these spaces will be occupied by automobiles owned by students living in the LAH buildings, and thus approximately half (or more) of the spaces in the garage will not be actively turning over during weekday peak periods. Even so, this study assumes ALL 1289 SPACES ARE IN FACT ACTIVE and so all 1289 spaces are applied to the trip generation rates found in *Appendix G*, and the distribution of trips is per the same methodology as previous worksheets.

This is a highly conservative approach.

RETAIL

PM

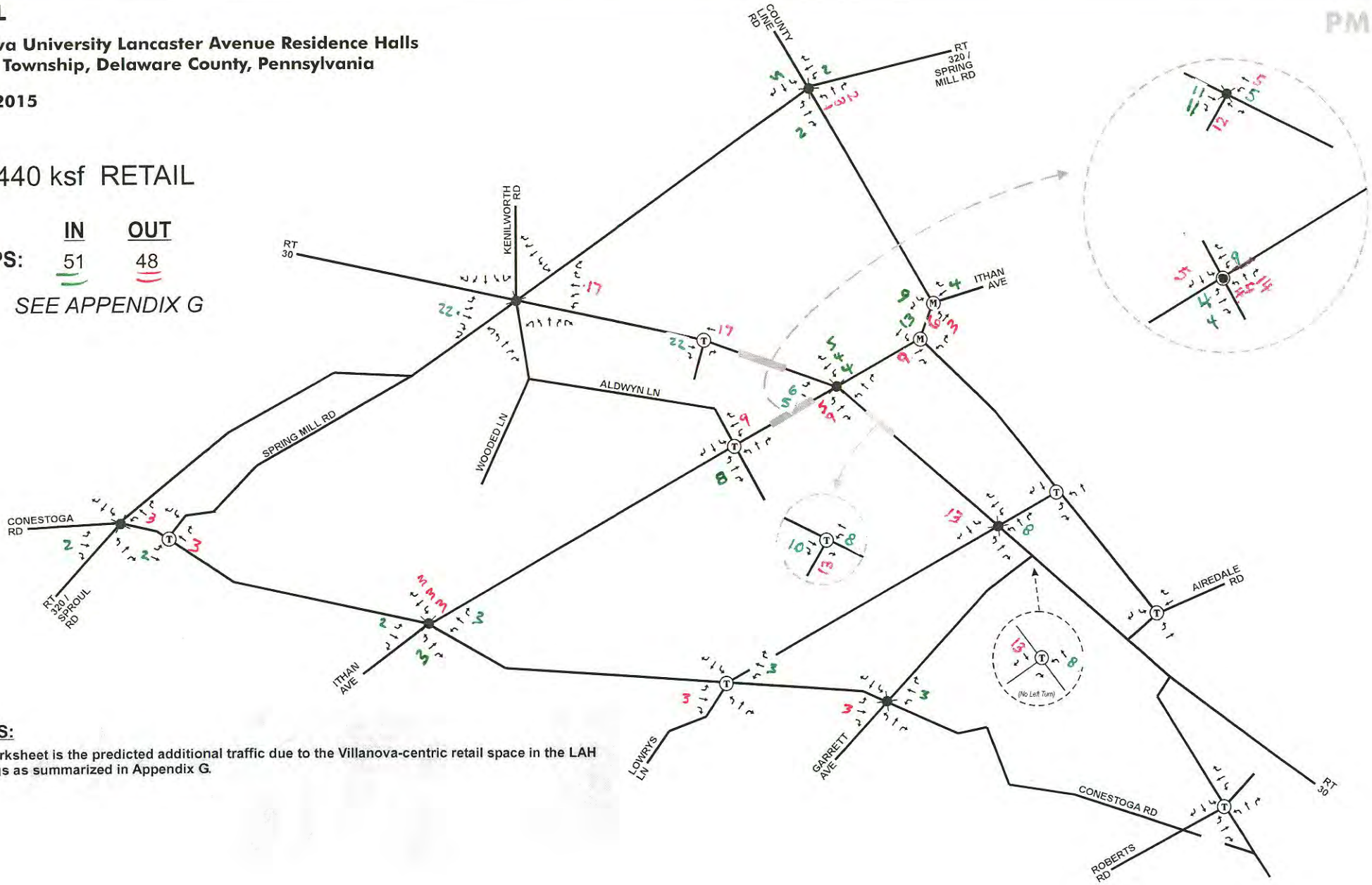
Villanova University Lancaster Avenue Residence Halls
Radnor Township, Delaware County, Pennsylvania

March 2015

20.440 ksf RETAIL

	IN	OUT
TRIPS:	51	48

SEE APPENDIX G



NOTES:

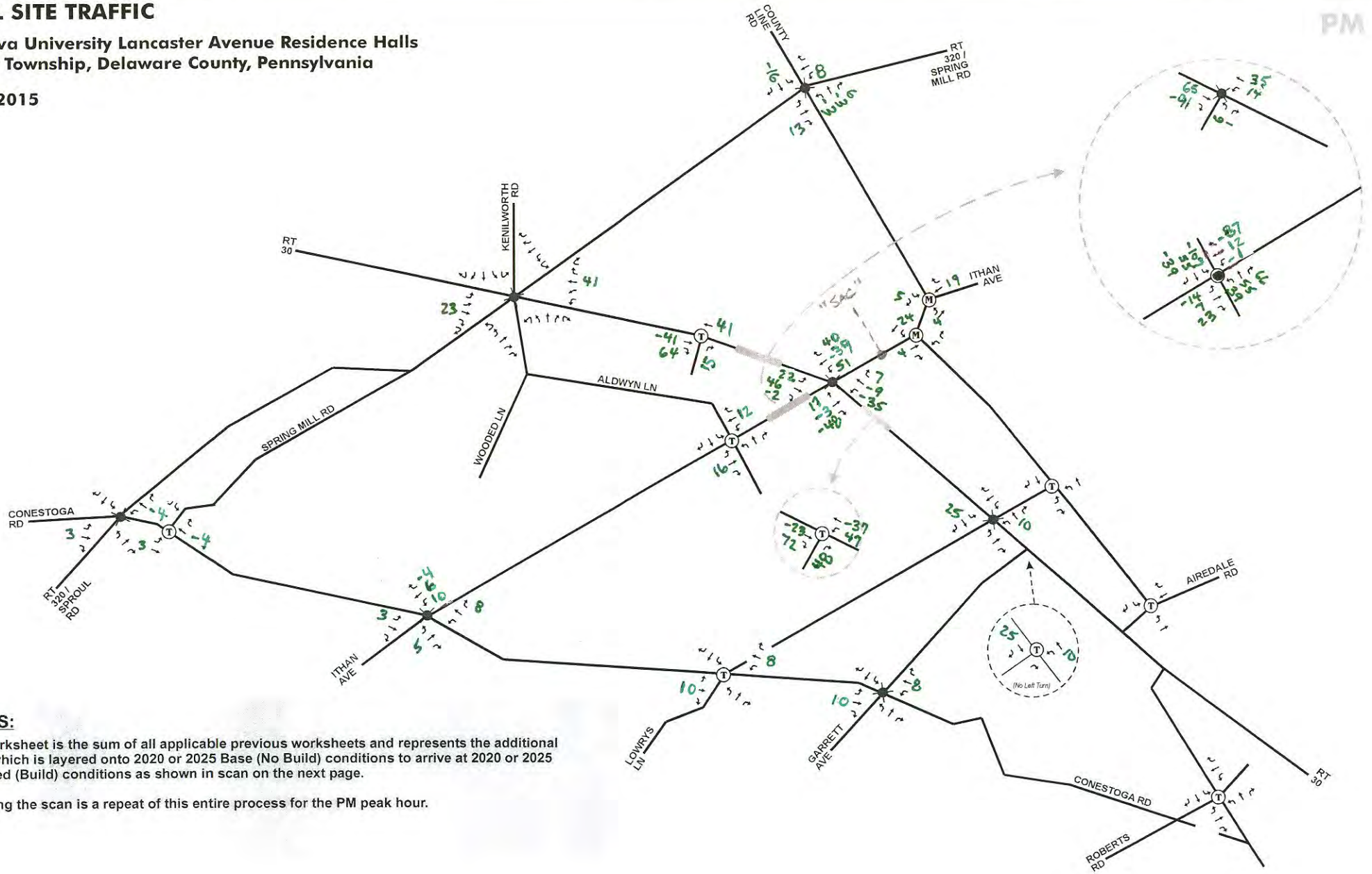
This worksheet is the predicted additional traffic due to the Villanova-centric retail space in the LAH buildings as summarized in Appendix G.

TOTAL SITE TRAFFIC

Villanova University Lancaster Avenue Residence Halls
Radnor Township, Delaware County, Pennsylvania

March 2015

PM



NOTES:

This worksheet is the sum of all applicable previous worksheets and represents the additional traffic which is layered onto 2020 or 2025 Base (No Build) conditions to arrive at 2020 or 2025 Projected (Build) conditions as shown in scan on the next page.

Following the scan is a repeat of this entire process for the PM peak hour.

Worksheet #19 aka

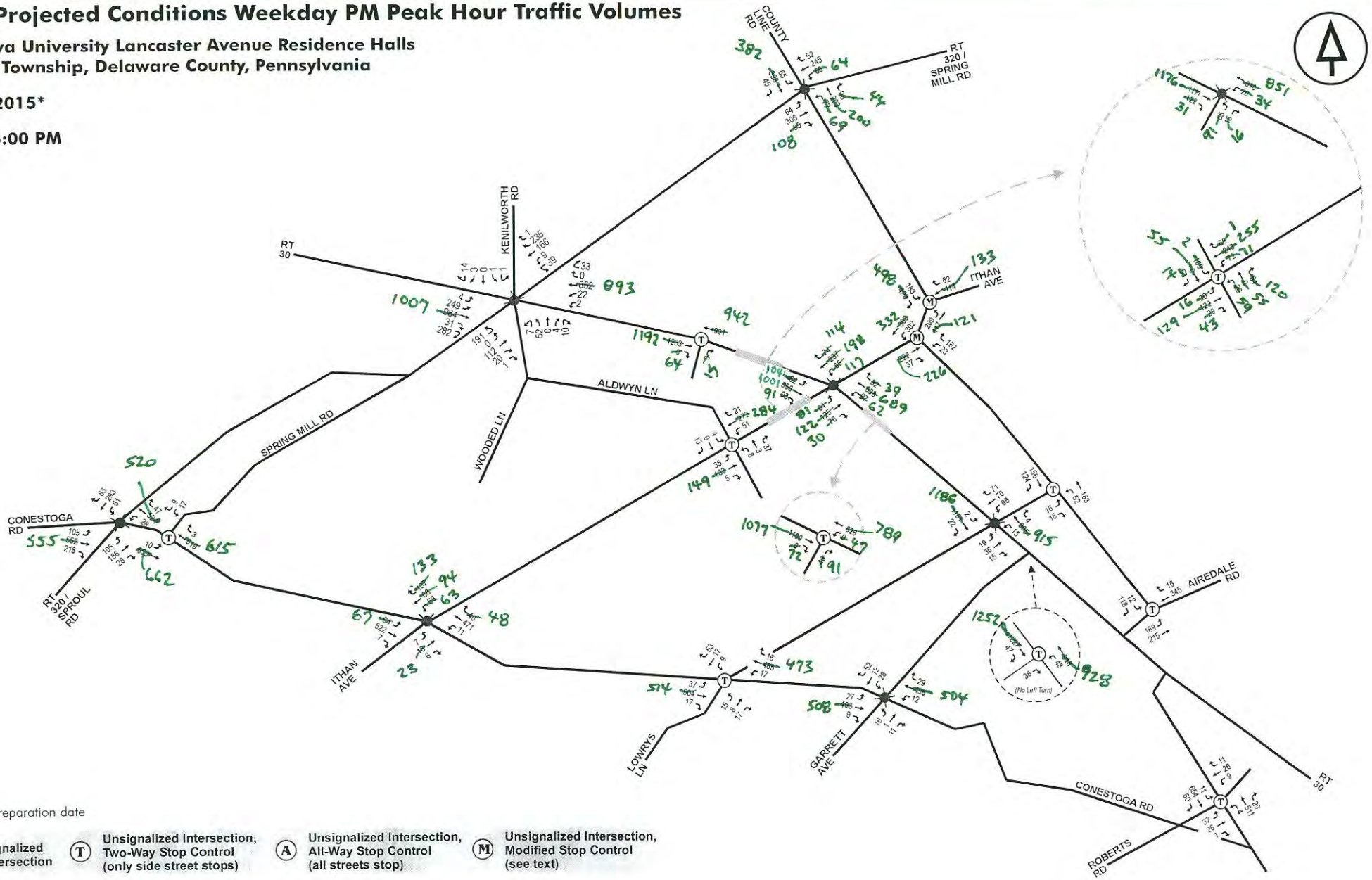
Figure 12

2020 Projected Conditions Weekday PM Peak Hour Traffic Volumes

Villanova University Lancaster Avenue Residence Halls
Radnor Township, Delaware County, Pennsylvania

March 2015*

5:00 - 6:00 PM



* figure preparation date

Signalized Intersection

(T) Unsignalized Intersection, Two-Way Stop Control (only side street stops)

(A) Unsignalized Intersection, All-Way Stop Control (all streets stop)

(M) Unsignalized Intersection, Modified Stop Control (see text)

Worksheet #20 aka

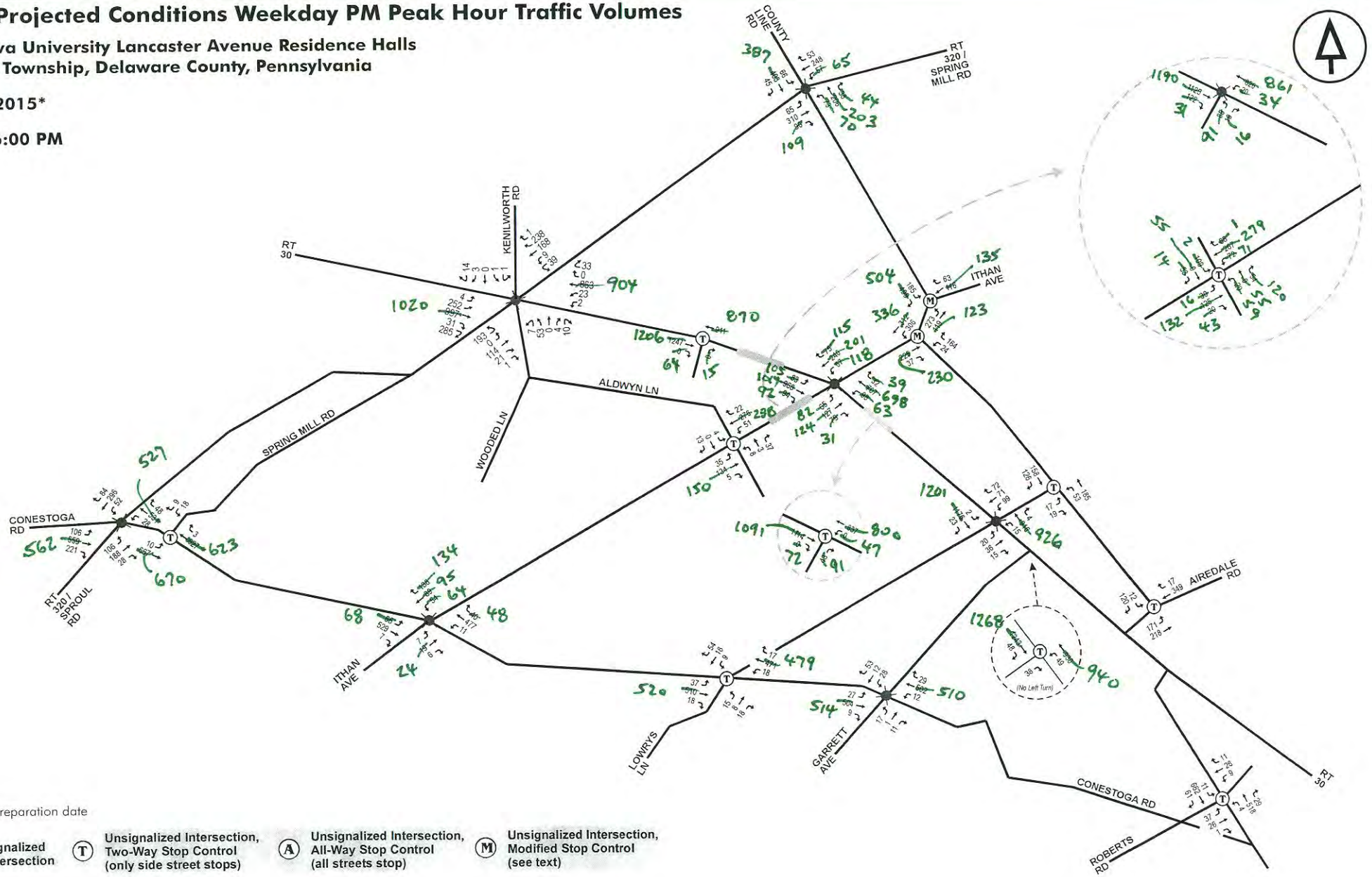
Figure 14

2025 Projected Conditions Weekday PM Peak Hour Traffic Volumes

Villanova University Lancaster Avenue Residence Halls
Radnor Township, Delaware County, Pennsylvania

March 2015*

5:00 - 6:00 PM



* figure preparation date

Signalized Intersection

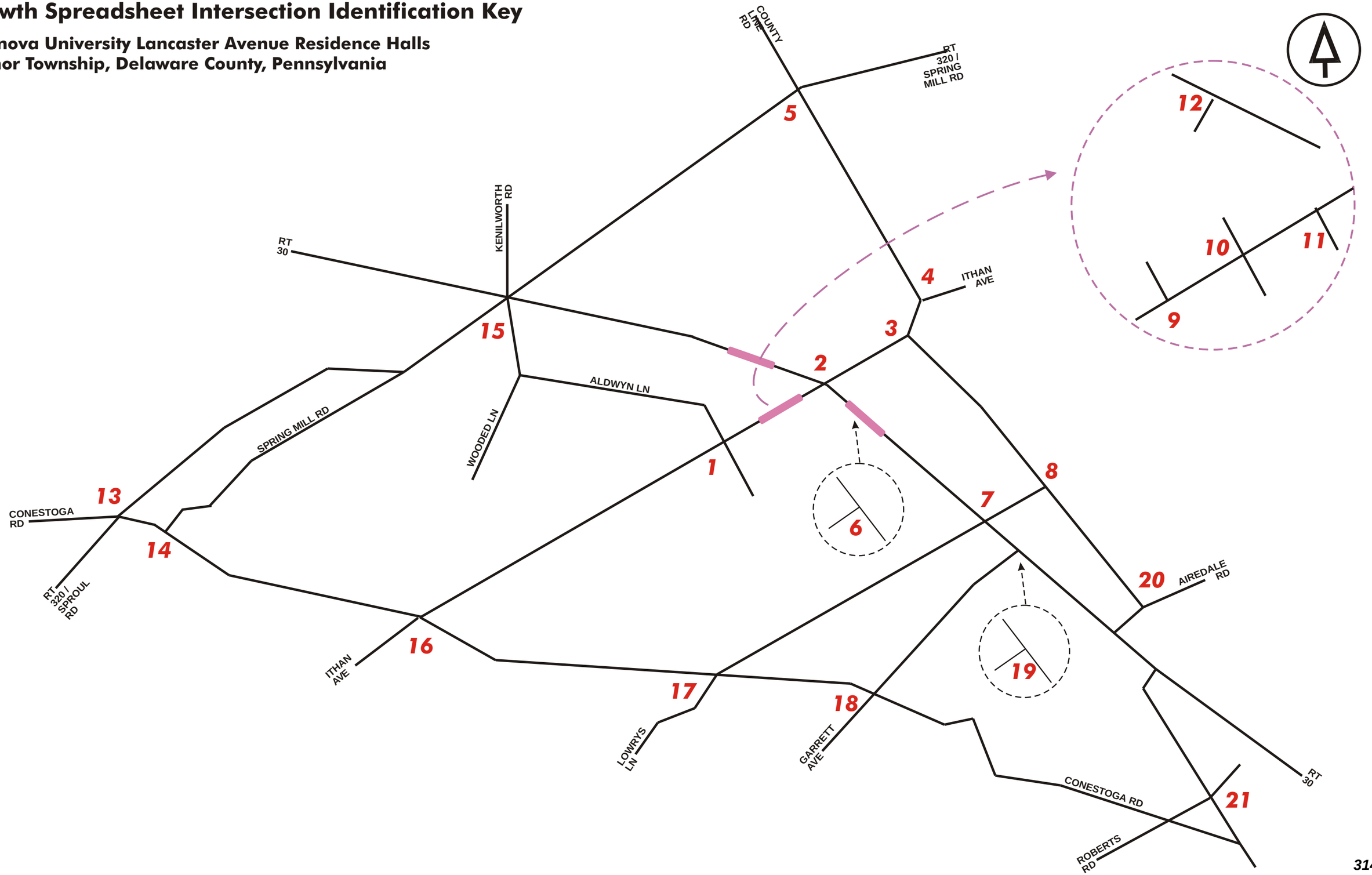
(T) Unsignalized Intersection, Two-Way Stop Control (only side street stops)

(A) Unsignalized Intersection, All-Way Stop Control (all streets stop)

(M) Unsignalized Intersection, Modified Stop Control (see text)

Growth Spreadsheet Intersection Identification Key

Villanova University Lancaster Avenue Residence Halls
Radnor Township, Delaware County, Pennsylvania



AM

INPUT --> 0.0025
8

	59	60
	0	
	16	16
	13	13
	189	193
1	16	
	12	
	1	
	7	
	9	
	351	358
	9	9
	35	36
	780	796
	88	90
	47	48
	214	218
2	25	26
	44	45
	839	856
	133	136
	74	75
	173	176
	84	86
	328	335
	138	141
3	250	255
	37	38
	199	203
	15	15
	293	299
	164	167
4	99	101
	152	155
	108	110
	338	345
	52	53
	322	328
	32	33
	76	78
	260	265
5	61	62
	44	45
	245	250
	40	41
	59	60
	274	280
	34	35
	879	897
6	1016	1036
	20	
	19	19
	1035	1056
	18	18
	19	19
	70	71
7	21	21
	22	22
	1063	1084
	16	16
	38	39
	102	104
	46	47
	30	31
	147	150
8	233	238
	57	58
	79	81
	60	61
	3	
9	1	
	149	152
	393	401
	122	
	149	*
10	112	
	14	
	329	*
	51	
	382	*
	329	*
11	1	
	2	
	95	
	899	917
	959	978
12	11	
	4	
	9	

	135	138
	542	553
	146	149
	73	74
	196	200
13	55	56
	56	57
	589	601
	35	36
	27	28
	262	267
	209	213
	625	638
	2	2
	8	8
14	4	4
	3	3
	678	692
	215	219
	82	84
	821	838
	220	224
	2	2
	12	12
	3	3
	1	1
15	0	0
	0	0
	0	0
	152	155
	131	134
	8	8
	19	19
	13	13
	1	1
	939	958
	11	11
	4	4
	0	0
	8	8
	0	0
	48	49
	3	3
	9	9
	49	50
	190	194
	0	0
	178	182
	2	2
	382	390
	162	165
	136	139
	51	52
	61	62
16	125	128
	443	452
	2	2
	12	12
	153	156
	14	14
	14	14
	415	423
	46	47
	81	83
	15	15
	2	2
17	5	5
	447	456
	9	9
	12	12
	14	14
	13	13
	1	1
	431	440
	25	26
	37	38
	3	3
	15	15
18	4	4
	410	418
	4	4
	9	9
	6	6
	6	6
	24	24
	1070	1092
	1100	1122
19	19	19
	25	26

	96	98
	15	15
	20	20
20	282	288
	216	220
	199	203
	37	38
	464	473
	8	8
	6	6
	23	23
	2	2
21	25	26
	607	619
	14	14
	8	8
	98	100
	66	67

* Balance from Int 9

PM

0.0025
8

	13	13
	0	
	4	4
	21	21
	267	272
1	51	
	37	
	3	
	8	
	5	
	130	133
	34	35
	91	93
	937	956
	80	82
	73	74
	232	237
2	65	66
	31	32
	684	698
	95	97
	76	78
	123	125
	63	64
	302	308
	296	302
3	159	162
	23	23
	36	37
	218	222
	483	493
	179	183
4	61	62
	112	114
	115	117
	264	269
	44	45
	390	398
	64	65
	51	52
	240	245
5	55	56
	37	38
	199	203
	71	72
	93	95
	300	306
	63	64
	1078	1100
6	810	826
	43	
	22	22
	1138	1161
	2	2
	70	71
	69	70
	96	98
7	4	4
	887	905
	15	15
	15	15
	35	36
	19	19
	122	124
	153	156
8	179	183
	51	52
	18	18
	16	16
	53	
9	109	
	258	263
	149	152
	88	
	258	*
10	72	
	30	
	208	*
	30	
	208	*
	418	*
11	54	
	20	
	122	
	1089	1111
	800	816
12	20	
	19	
	85	

	214	218
	541	552
	103	105
	81	83
	287	293
13	50	51
	46	47
	514	524
	27	28
	27	28
	182	186
	103	105
	646	659
	10	10
	9	9
14	17	17
	3	3
	607	619
	276	282
	30	31
	965	984
	244	249
	4	4
	14	14
	3	3
	0	0
15	1	1
	1	1
	1	1
	230	235
	163	166
	9	9
	38	39
	32	33
	0	0
	835	852
	22	22
	2	2
	10	10
	4	4
	0	0
	51	52
	7	7
	1	1
	20	20
	110	112
	0	0
	187	191
	7	7
	512	522
	63	64
	134	137
	86	88
	52	53
16	39	40
	462	471
	11	11
	6	6
	18	18
	7	7
	17	17
	494	504
	36	37
	52	53
	17	17
	9	9
17	16	16
	456	465
	17	17
	17	17
	8	8
	15	15
	9	9
	488	498
	26	27
	51	52
	12	12
	27	28
18	28	29
	486	496
	12	12
	11	11
	1	1
	16	16
	46	47
	1203	1227
	900	918
19	47	48
	37	38

* Balance from Int 9

	116	118
	12	12
	16	16
20	338	345
	211	215
	166	169
	59	60
	641	654
	11	11
	11	11
	25	26
	9	9
21	28	29
	501	511
	4	4
	1	1
	25	26
	36	37

FUTURE NO BUILD

means no growth applied (site driveway movement)

AM

INPUT --> 0.0025 / 13

	59	61
	0	
	16	17
	13	13
	189	195
1	16	
	12	
	1	
	7	
	9	
	351	363
	9	9
	35	36
	780	806
	88	91
	47	49
	214	221
2	25	26
	44	45
	839	867
	133	137
	74	76
	173	179
	84	87
	328	339
	138	143
3	250	258
	37	38
	199	206
	15	15
	293	303
	164	169
4	99	102
	152	157
	108	112
	338	349
	52	54
	322	333
	32	33
	76	79
	260	269
5	61	63
	44	45
	245	253
	40	41
	59	61
	274	283
	34	35
	879	908
6	1016	1050
	20	
	19	20
	1035	1069
	18	19
	19	20
	70	72
7	21	22
	22	23
	1063	1098
	16	17
	38	39
	102	105
	46	48
	30	31
	147	152
8	233	241
	57	59
	79	82
	60	62
	3	
9	1	
	149	154
	393	406
	122	
	149	*
10	112	
	14	
	329	*
	51	
	382	*
	329	*
11	1	
	2	
	95	
	899	929
	959	991
12	11	
	4	
	9	

	135	139
	542	560
	146	151
	73	75
	196	202
13	55	57
	56	58
	589	608
	35	36
	27	28
	262	271
	209	216
	625	646
	2	2
	8	8
14	4	4
	3	3
	678	700
	215	222
	82	85
	821	848
	220	227
	2	2
	12	12
	3	3
	1	1
15	0	0
	0	0
	0	0
	152	157
	131	135
	8	8
	19	20
	13	13
	1	1
	939	970
	11	11
	4	4
	0	0
	8	8
	0	0
	48	50
	3	3
	9	9
	49	51
	190	196
	0	0
	178	184
	2	2
	382	395
	162	167
	136	140
	51	53
16	61	63
	125	129
	443	458
	2	2
	12	12
	153	158
	14	14
	14	14
	415	429
	46	48
	81	84
	15	15
17	2	2
	5	5
	447	462
	9	9
	12	12
	14	14
	13	13
	1	1
	431	445
	25	26
	37	38
	3	3
18	15	15
	4	4
	410	424
	4	4
	9	9
	6	6
	6	6
	24	25
	1070	1105
19	1100	1136
	19	20
	25	26

* Balance from Int 9

	96	99
	15	15
20	20	21
	282	291
	216	223
	199	206
	37	38
	464	479
	8	8
	6	6
	23	24
21	2	2
	25	26
	607	627
	14	14
	8	8
	98	101
	66	68

PM

0.0025 / 13

	13	13
	0	
	4	4
	21	22
	267	276
1	51	
	37	
	3	
	8	
	5	
	130	134
	34	35
	91	94
	937	968
	80	83
	73	75
	232	240
2	65	67
	31	32
	684	707
	95	98
	76	79
	123	127
	63	65
	302	312
	296	306
3	159	164
	23	24
	36	37
	218	225
	483	499
	179	185
4	61	63
	112	116
	115	119
	264	273
	44	45
	390	403
	64	66
	51	53
	240	248
5	55	57
	37	38
	199	206
	71	73
	93	96
	300	310
	63	65
	1078	1114
6	810	837
	43	
	22	23
	1138	1176
	2	2
	70	72
	69	71
7	96	99
	4	4
	887	916
	15	15
	15	15
	35	36
	19	20
	122	126
	153	158
8	179	185
	51	53
	18	19
	16	17
	53	
9	109	
	258	267
	149	154
	88	
	258	*
10	72	
	30	
	208	*
	30	
	208	*
	418	*
11	54	
	20	
	122	
	1089	1125
	800	826
12	20	
	19	
	85	

	214	221
	541	559
	103	106
	81	84
	287	296
13	50	52
	46	48
	514	531
	27	28
	27	28
	182	188
	103	106
	646	667
	10	10
	9	9
14	17	18
	3	3
	607	627
	276	285
	30	31
	965	997
	244	252
	4	4
	14	14
	3	3
	0	0
15	1	1
	1	1
	1	1
	230	238
	163	168
	9	9
	38	39
	32	33
	0	0
	835	863
	22	23
	2	2
	10	10
	4	4
	0	0
	51	53
	7	7
	1	1
	20	21
	110	114
	0	0
	187	193
	7	7
	512	529
	63	65
	134	138
	86	89
16	52	54
	39	40
	462	477
	11	11
	6	6
	18	19
	7	7
	17	18
	494	510
	36	37
	52	54
	17	18
17	9	9
	16	17
	456	471
	17	18
	17	18
	8	8
	15	15
	9	9
	488	504
	26	27
	51	53
	12	12
18	27	28
	28	29
	486	502
	12	12
	11	11
	1	1
	16	17
	46	48
	1203	1243
19	900	930
	47	49
	37	38

* Balance from Int 9

	116	120
	12	12
20	16	17
	338	349
	211	218
	166	171
	59	61
	641	662
	11	11
	11	11
	25	26
21	9	9
	28	29
	501	518
	4	4
	1	1
	25	26
	36	37

FUTURE
NO BUILD + 5

means no growth applied (site driveway movement)

APPENDIX I

Capacity Analyses

Capacity Analysis Notes

The study area includes a large number of intersections.

Synchro files outputs on the following pages are arranged as follows:

- Existing,
- 2020 Base,
- 2020 Projected,
- 2025 Base, and
- 2025 Projected

AM peak hour worksheets are printed first followed by PM peak hour worksheets.

Note that some signalized intersections are not eligible for HCM 2010 analysis, specifically *Synchro* node numbers 7, 11, and 27. Percentile Delay methodology was instead utilized.

PennDOT concerns over pedestrian impacts regarding adding a new exclusive right-turn lane on the EB approach of Lancaster Avenue at the intersection of Lancaster Avenue and Ithan Avenue have been expressed and thus this alternative is not part of these worksheets.

Note that some unsignalized intersections are also not eligible for HCM 2010 analysis, specifically *Synchro* node numbers 2 and 38. Percentile Delay methodology was instead utilized with overall delay assumed to be a midpoint of the LOS letter grade category determined in the results. Changes in delay estimates, if any, between scenarios were based in part on relative ICU ratio changes.

Other notes:

- Ped calls were observed at the intersection of Lancaster Avenue and Ithan Avenue (node 27) and found to be at least once per cycle (30/hr) but was increased by 50% in the analysis (45 calls) to account for potential added activity and provide a measure of conservativeness.
- Ped calls at the intersection of Lancaster Avenue and Ithan Avenue were kept constant in all five scenarios to add further conservativeness to the analysis. The likely outcome of the project will be to reduce ped activity at the intersection of Lancaster Avenue and Ithan Avenue which in turn should reduce ped calls, but this potential was ignored.

A *Synchro* Node Number diagram is provided on the next page.

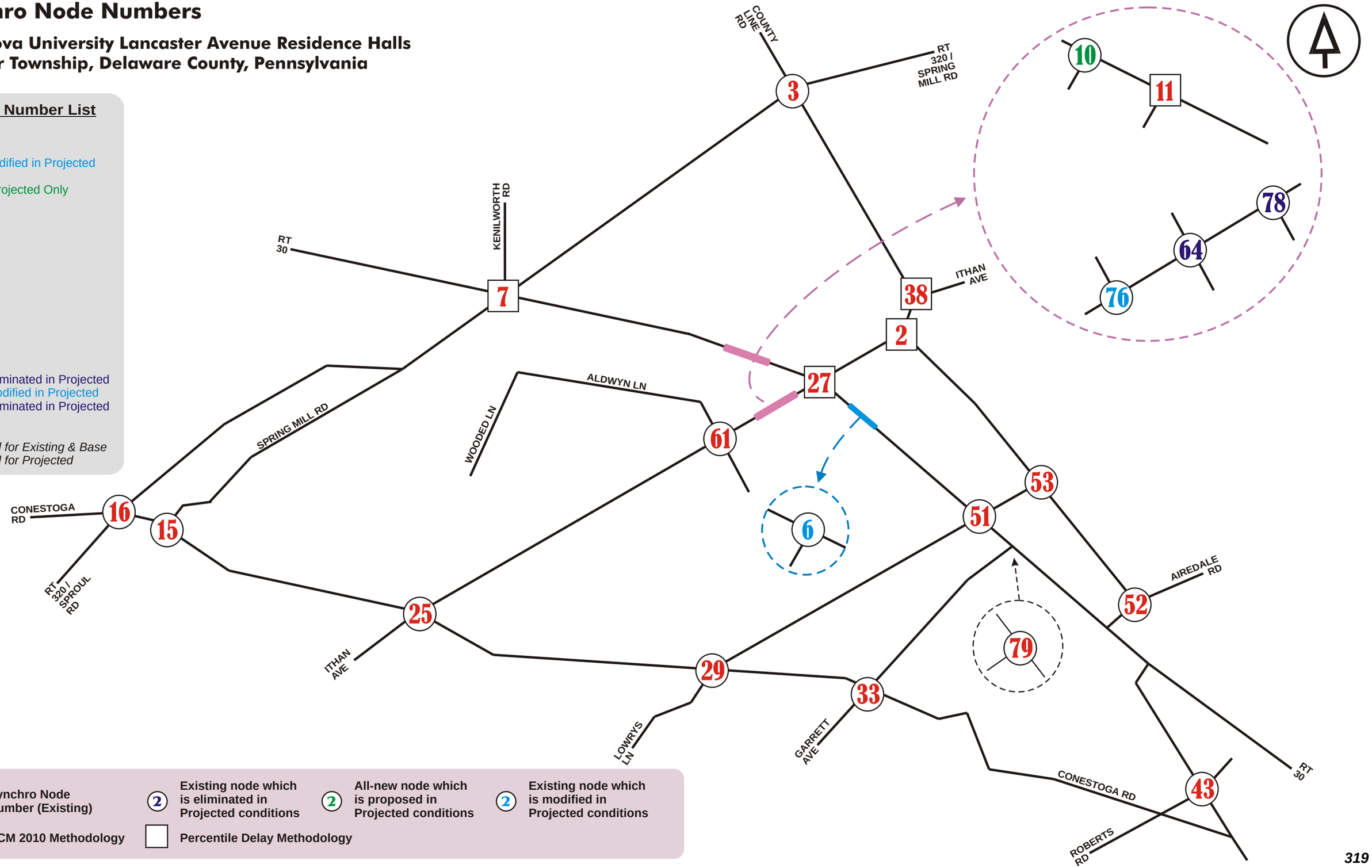
Synchro Node Numbers

Villanova University Lancaster Avenue Residence Halls
Radnor Township, Delaware County, Pennsylvania

Node Number List

2
3
6 – Modified in Projected
7
10 – Projected Only
11
15
16
25
27
29
33
38
43
51
52
53
61
64 – Eliminated in Projected
76 – Modified in Projected
78 – Eliminated in Projected
79

21 Total for Existing & Base
20 Total for Projected



2 Synchro Node Number (Existing)
2 Existing node which is eliminated in Projected conditions
2 All-new node which is proposed in Projected conditions
2 Existing node which is modified in Projected conditions
HCM 2010 Methodology
Percentile Delay Methodology

Lane Group	EBL2	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR	WBR2	NBL2	NBL
Lane Configurations												
Volume (vph)	2	220	821	82	215	4	11	939	1	13	3	48
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width (ft)	10	10	11	11	14	10	12	12	12	12	10	10
Grade (%)			3%					-2%				
Storage Length (ft)		300		0			75		0			0
Storage Lanes		1		1			1		0			0
Taper Length (ft)		25					25					25
Lane Util. Factor	0.95	1.00	0.95	0.95	1.00	0.95	1.00	0.95	0.95	0.95	1.00	1.00
Frt			0.986		0.850			0.998				
Flt Protected		0.950					0.950					
Satd. Flow (prot)	0	1497	3058	0	1531	0	1645	3283	0	0	0	0
Flt Permitted		0.101					0.258					
Satd. Flow (perm)	0	159	3058	0	1531	0	447	3283	0	0	0	0
Right Turn on Red					Yes					Yes		
Satd. Flow (RTOR)					161			1				
Link Speed (mph)			35					35				
Link Distance (ft)			577					1609				
Travel Time (s)			11.2					31.3				
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Adj. Flow (vph)	2	229	855	85	224	4	11	978	1	14	3	50
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	231	940	0	224	0	15	993	0	0	0	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Right	Left	Left	Left	Right	Right	Left	Left
Median Width(ft)			12					12				
Link Offset(ft)			0					0				
Crosswalk Width(ft)			10					10				
Two way Left Turn Lane												
Headway Factor	1.19	1.19	1.14	1.14	1.01	1.16	1.06	1.06	1.06	1.06	1.18	1.18
Turning Speed (mph)	15	15		9	9	15	15		9	9	15	15
Number of Detectors	1	1	1		0	1	1	1			1	1
Detector Template	Left	Left	Thru		Right	Left	Left	Thru			Left	Left
Leading Detector (ft)	20	37	37		0	20	37	37			20	20
Trailing Detector (ft)	0	-3	-3		0	0	-3	-3			0	0
Detector 1 Position(ft)	0	-3	-3		0	0	-3	-3			0	0
Detector 1 Size(ft)	20	40	40		37	20	40	40			20	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex			Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0		0.0	0.0	0.0	0.0			0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0		0.0	0.0	0.0	0.0			0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0		0.0	0.0	0.0	0.0			0.0	0.0
Turn Type	pm+pt	pm+pt	NA		Perm	Perm	Perm	NA			Perm	Perm
Protected Phases	5	5	2					6				
Permitted Phases	2	2			2	6	6				10	10
Detector Phase	5	5	2		2	6	6	6			10	10
Switch Phase												
Minimum Initial (s)	3.0	3.0	15.0		15.0	15.0	15.0	15.0			3.0	3.0

Lane Group	NBT	NBR	SBT	SBR	SBR2	NEL2	NEL	NET	NER	NER2	SWL2	SWL
Lane Configurations												
Volume (vph)	0	8	1	3	12	178	0	190	49	9	19	8
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width (ft)	10	10	10	10	10	12	12	11	11	11	10	10
Grade (%)	1%		-3%					3%				
Storage Length (ft)		0		0			200		0			150
Storage Lanes		0		0			1		0			1
Taper Length (ft)							25					25
Lane Util. 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
Frt	0.982		0.873					0.965				
Flt Protected	0.958						0.950					0.950
Satd. Flow (prot)	1498	0	1418	0	0	0	1604	1575	0	0	0	1573
Flt Permitted	0.743						0.152					0.600
Satd. Flow (perm)	1162	0	1418	0	0	0	257	1575	0	0	0	994
Right Turn on Red					No					No		
Satd. Flow (RTOR)												
Link Speed (mph)	25		25					40				
Link Distance (ft)	492		597					1336				
Travel Time (s)	13.4		16.3					22.8				
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Adj. Flow (vph)	0	8	1	3	12	185	0	198	51	9	20	8
Shared Lane Traffic (%)												
Lane Group Flow (vph)	61	0	16	0	0	0	185	258	0	0	0	28
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Right	Left	Left	Left	Right	Right	Left	Left
Median Width(ft)	0		0					12				
Link Offset(ft)	0		0					0				
Crosswalk Width(ft)	10		10					10				
Two way Left Turn Lane												
Headway Factor	1.18	1.18	1.15	1.15	1.15	1.09	1.09	1.14	1.14	1.14	1.12	1.12
Turning Speed (mph)		9		9	9	15	15		9	9	15	15
Number of Detectors	1		1			1	1	1			1	1
Detector Template	Thru		Thru			Left	Left	Thru			Left	Left
Leading Detector (ft)	37		37			20	37	37			20	37
Trailing Detector (ft)	-3		-3			0	-3	-3			0	-3
Detector 1 Position(ft)	-3		-3			0	-3	-3			0	-3
Detector 1 Size(ft)	40		40			20	40	40			20	40
Detector 1 Type	Cl+Ex		Cl+Ex			Cl+Ex	Cl+Ex	Cl+Ex			Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0		0.0			0.0	0.0	0.0			0.0	0.0
Detector 1 Queue (s)	0.0		0.0			0.0	0.0	0.0			0.0	0.0
Detector 1 Delay (s)	0.0		0.0			0.0	0.0	0.0			0.0	0.0
Turn Type	NA		NA			pm+pt	pm+pt	NA			Perm	Perm
Protected Phases	10		9			3	3	8				
Permitted Phases						8	8				4	4
Detector Phase	10		9			3	3	8			4	4
Switch Phase												
Minimum Initial (s)	3.0		3.0			3.0	3.0	3.0			3.0	3.0

Lane Group	SWT	SWR
Lane Configurations		
Volume (vph)	131	152
Ideal Flow (vphpl)	1800	1800
Lane Width (ft)	10	10
Grade (%)	-7%	
Storage Length (ft)		0
Storage Lanes		0
Taper Length (ft)		
Lane Util. Factor	1.00	1.00
Frt	0.919	
Flt Protected		
Satd. Flow (prot)	1522	0
Flt Permitted		
Satd. Flow (perm)	1522	0
Right Turn on Red		
Satd. Flow (RTOR)		
Link Speed (mph)	25	
Link Distance (ft)	3168	
Travel Time (s)	86.4	
Peak Hour Factor	0.96	0.96
Heavy Vehicles (%)	5%	5%
Adj. Flow (vph)	136	158
Shared Lane Traffic (%)		
Lane Group Flow (vph)	294	0
Enter Blocked Intersection	No	No
Lane Alignment	Left	Right
Median Width(ft)	12	
Link Offset(ft)	0	
Crosswalk Width(ft)	10	
Two way Left Turn Lane		
Headway Factor	1.12	1.12
Turning Speed (mph)		9
Number of Detectors	1	
Detector Template	Thru	
Leading Detector (ft)	37	
Trailing Detector (ft)	-3	
Detector 1 Position(ft)	-3	
Detector 1 Size(ft)	40	
Detector 1 Type	Cl+Ex	
Detector 1 Channel		
Detector 1 Extend (s)	0.0	
Detector 1 Queue (s)	0.0	
Detector 1 Delay (s)	0.0	
Turn Type	NA	
Protected Phases	4	
Permitted Phases		
Detector Phase	4	
Switch Phase		
Minimum Initial (s)	3.0	

Lane Group	EBL2	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR	WBR2	NBL2	NBL
Minimum Split (s)	13.0	13.0	21.0		21.0	21.0	21.0	21.0			13.0	13.0
Total Split (s)	16.0	16.0	55.0		55.0	39.0	39.0	39.0			32.0	32.0
Total Split (%)	10.0%	10.0%	34.4%		34.4%	24.4%	24.4%	24.4%			20.0%	20.0%
Maximum Green (s)	10.0	10.0	49.0		49.0	33.0	33.0	33.0			26.0	26.0
Yellow Time (s)	3.0	3.0	3.0		3.0	3.0	3.0	3.0			3.0	3.0
All-Red Time (s)	3.0	3.0	3.0		3.0	3.0	3.0	3.0			3.0	3.0
Lost Time Adjust (s)		0.5	0.5		0.5		0.5	0.5				
Total Lost Time (s)		6.5	6.5		6.5		6.5	6.5				
Lead/Lag	Lead	Lead				Lag	Lag	Lag			Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0	3.0	3.0			3.0	3.0
Recall Mode	None	None	Max		Max	None	None	None			None	None
Walk Time (s)			7.0		7.0	7.0	7.0	7.0				
Flash Dont Walk (s)			20.0		20.0	20.0	20.0	20.0				
Pedestrian Calls (#/hr)			0		0	0	0	0				
Act Effct Green (s)		49.2	49.2		49.2		33.0	33.0				
Actuated g/C Ratio		0.42	0.42		0.42		0.28	0.28				
v/c Ratio		1.31	0.73		0.30		0.12	1.07				
Control Delay		201.2	35.2		9.7		40.8	92.7				
Queue Delay		0.0	0.0		0.0		0.0	0.0				
Total Delay		201.2	35.2		9.7		40.8	92.7				
LOS		F	D		A		D	F				
Approach Delay			58.6					91.9				
Approach LOS			E					F				
90th %ile Green (s)	10.0	10.0	49.0		49.0	33.0	33.0	33.0			17.8	17.8
90th %ile Term Code	Max	Max	MaxR		MaxR	Max	Max	Max			Gap	Gap
70th %ile Green (s)	10.0	10.0	49.0		49.0	33.0	33.0	33.0			14.3	14.3
70th %ile Term Code	Max	Max	MaxR		MaxR	Max	Max	Max			Gap	Gap
50th %ile Green (s)	10.0	10.0	49.0		49.0	33.0	33.0	33.0			11.3	11.3
50th %ile Term Code	Max	Max	MaxR		MaxR	Max	Max	Max			Gap	Gap
30th %ile Green (s)	10.0	10.0	49.0		49.0	33.0	33.0	33.0			9.5	9.5
30th %ile Term Code	Max	Max	MaxR		MaxR	Max	Max	Max			Gap	Gap
10th %ile Green (s)	10.0	10.0	49.0		49.0	33.0	33.0	33.0			0.0	0.0
10th %ile Term Code	Max	Max	MaxR		MaxR	Max	Max	Max			Skip	Skip
Queue Length 50th (ft)		~172	292		27		8	~417				
Queue Length 95th (ft)		#414	492		101		32	#713				
Internal Link Dist (ft)			497					1529				
Turn Bay Length (ft)		300					75					
Base Capacity (vph)		176	1284		736		125	924				
Starvation Cap Reductn		0	0		0		0	0				
Spillback Cap Reductn		0	0		0		0	0				
Storage Cap Reductn		0	0		0		0	0				
Reduced v/c Ratio		1.31	0.73		0.30		0.12	1.07				

Intersection Summary	
Area Type:	Other
Cycle Length: 160	
Actuated Cycle Length: 117.2	
Natural Cycle: 150	

Lane Group	NBT	NBR	SBT	SBR	SBR2	NEL2	NEL	NET	NER	NER2	SWL2	SWL
Minimum Split (s)	13.0		13.0			13.0	13.0	13.0			13.0	13.0
Total Split (s)	32.0		32.0			15.0	15.0	41.0			26.0	26.0
Total Split (%)	20.0%		20.0%			9.4%	9.4%	25.6%			16.3%	16.3%
Maximum Green (s)	26.0		26.0			9.0	9.0	35.0			20.0	20.0
Yellow Time (s)	3.0		3.0			4.0	4.0	4.0			4.0	4.0
All-Red Time (s)	3.0		3.0			2.0	2.0	2.0			2.0	2.0
Lost Time Adjust (s)	0.5		0.5				0.5	0.5				0.5
Total Lost Time (s)	6.5		6.5				6.5	6.5				6.5
Lead/Lag	Lag		Lead			Lead	Lead				Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0		3.0			3.0	3.0	3.0			3.0	3.0
Recall Mode	None		None			None	None	None			None	None
Walk Time (s)								7.0				
Flash Dont Walk (s)								25.0				
Pedestrian Calls (#/hr)								0				
Act Effct Green (s)	11.1		6.6				35.0	35.0				19.8
Actuated g/C Ratio	0.09		0.06				0.30	0.30				0.17
v/c Ratio	0.55		0.20				1.05	0.55				0.17
Control Delay	72.7		63.8				120.7	42.9				50.2
Queue Delay	0.0		0.0				0.0	0.0				0.0
Total Delay	72.7		63.8				120.7	42.9				50.2
LOS	E		E				F	D				D
Approach Delay	72.7		63.8					75.4				
Approach LOS	E		E					E				
90th %ile Green (s)	17.8		9.3			9.0	9.0	35.0			20.0	20.0
90th %ile Term Code	Gap		Gap			Max	Max	Max			Max	Max
70th %ile Green (s)	14.3		7.9			9.0	9.0	35.0			20.0	20.0
70th %ile Term Code	Gap		Gap			Max	Max	Hold			Max	Max
50th %ile Green (s)	11.3		0.0			9.0	9.0	35.0			20.0	20.0
50th %ile Term Code	Gap		Skip			Max	Max	Hold			Max	Max
30th %ile Green (s)	9.5		0.0			9.0	9.0	35.0			20.0	20.0
30th %ile Term Code	Gap		Skip			Max	Max	Hold			Max	Max
10th %ile Green (s)	0.0		0.0			9.0	9.0	35.0			20.0	20.0
10th %ile Term Code	Skip		Skip			Max	Max	Hold			Max	Max
Queue Length 50th (ft)	43		11				~110	156				18
Queue Length 95th (ft)	98		39				#312	301				54
Internal Link Dist (ft)	412		517					1256				
Turn Bay Length (ft)							200					150
Base Capacity (vph)	256		313				176	470				167
Starvation Cap Reductn	0		0				0	0				0
Spillback Cap Reductn	0		0				0	0				0
Storage Cap Reductn	0		0				0	0				0
Reduced v/c Ratio	0.24		0.05				1.05	0.55				0.17

Intersection Summary

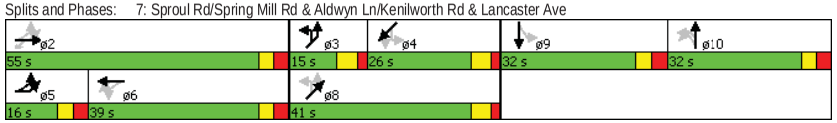
Lane Group	SWT	SWR
Minimum Split (s)	13.0	
Total Split (s)	26.0	
Total Split (%)	16.3%	
Maximum Green (s)	20.0	
Yellow Time (s)	4.0	
All-Red Time (s)	2.0	
Lost Time Adjust (s)	0.5	
Total Lost Time (s)	6.5	
Lead/Lag	Lag	
Lead-Lag Optimize?		
Vehicle Extension (s)	3.0	
Recall Mode	None	
Walk Time (s)		
Flash Dont Walk (s)		
Pedestrian Calls (#/hr)		
Act Effct Green (s)	19.8	
Actuated g/C Ratio	0.17	
v/c Ratio	1.15	
Control Delay	146.3	
Queue Delay	0.0	
Total Delay	146.3	
LOS	F	
Approach Delay	137.9	
Approach LOS	F	
90th %ile Green (s)	20.0	
90th %ile Term Code	Max	
70th %ile Green (s)	20.0	
70th %ile Term Code	Max	
50th %ile Green (s)	20.0	
50th %ile Term Code	Max	
30th %ile Green (s)	20.0	
30th %ile Term Code	Max	
10th %ile Green (s)	20.0	
10th %ile Term Code	Max	
Queue Length 50th (ft)	~248	
Queue Length 95th (ft)	#521	
Internal Link Dist (ft)	3088	
Turn Bay Length (ft)		
Base Capacity (vph)	256	
Starvation Cap Reductn	0	
Spillback Cap Reductn	0	
Storage Cap Reductn	0	
Reduced v/c Ratio	1.15	

Intersection Summary

Control Type: Actuated-Uncoordinated	
Maximum v/c Ratio: 1.31	
Intersection Signal Delay: 79.4	Intersection LOS: E
Intersection Capacity Utilization 105.6%	ICU Level of Service G
Analysis Period (min) 15	
90th %ile Actuated Cycle: 135.1	
70th %ile Actuated Cycle: 130.2	
50th %ile Actuated Cycle: 113.3	
30th %ile Actuated Cycle: 111.5	
10th %ile Actuated Cycle: 96	

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 7: Sproul Rd/Spring Mill Rd & Aldwyn Ln/Kenilworth Rd & Lancaster Ave



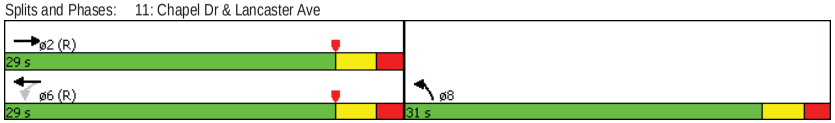
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	899	95	11	959	9	4
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width (ft)	11	11	11	11	12	12
Lane Util. Factor	0.95	0.95	0.95	0.95	1.00	1.00
Frt	0.986				0.961	
Flt Protected				0.999	0.966	
Satd. Flow (prot)	3196	0	0	3238	1638	0
Flt Permitted				0.942	0.966	
Satd. Flow (perm)	3196	0	0	3053	1638	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	22				4	
Link Speed (mph)	35			35	25	
Link Distance (ft)	1609			1285	319	
Travel Time (s)	31.3			25.0	8.7	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	977	103	12	1042	10	4
Shared Lane Traffic (%)						
Lane Group Flow (vph)	1080	0	0	1054	14	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	12			12	12	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	10			10	10	
Two way Left Turn Lane						
Headway Factor	1.12	1.12	1.12	1.12	1.07	1.07
Turning Speed (mph)		9	15		15	9
Number of Detectors	1		1	1	1	
Detector Template	Thru		Left	Thru	Left	
Leading Detector (ft)	37		20	37	37	
Trailing Detector (ft)	-3		0	-3	-3	
Detector 1 Position(ft)	-3		0	-3	-3	
Detector 1 Size(ft)	40		20	40	40	
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	
Turn Type	NA		Perm	NA	Prot	
Protected Phases	2			6	8	
Permitted Phases			6			
Detector Phase	2		6	6	8	
Switch Phase						
Minimum Initial (s)	10.0		10.0	10.0	4.0	
Minimum Split (s)	21.0		21.0	21.0	28.0	
Total Split (s)	29.0		29.0	29.0	31.0	
Total Split (%)	48.3%		48.3%	48.3%	51.7%	
Maximum Green (s)	24.0		24.0	24.0	26.0	
Yellow Time (s)	3.0		3.0	3.0	3.0	

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
All-Red Time (s)	2.0		2.0	2.0	2.0	
Lost Time Adjust (s)	0.5			0.5	0.5	
Total Lost Time (s)	5.5			5.5	5.5	
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Recall Mode	C-Max		C-Max	C-Max	None	
Walk Time (s)	10.0		10.0	10.0	7.0	
Flash Dont Walk (s)	0.0		0.0	0.0	16.0	
Pedestrian Calls (#/hr)	0		0	0	0	
Act Effct Green (s)	56.5			56.5	5.6	
Actuated g/C Ratio	0.94			0.94	0.09	
v/c Ratio	0.36			0.37	0.09	
Control Delay	1.5			3.7	22.5	
Queue Delay	0.0			0.0	0.0	
Total Delay	1.5			3.7	22.5	
LOS	A			A	C	
Approach Delay	1.5			3.7	22.5	
Approach LOS	A			A	C	
90th %ile Green (s)	42.8		42.8	42.8	7.2	
90th %ile Term Code	Coord		Coord	Coord	Gap	
70th %ile Green (s)	55.0		55.0	55.0	0.0	
70th %ile Term Code	Coord		Coord	Coord	Skip	
50th %ile Green (s)	55.0		55.0	55.0	0.0	
50th %ile Term Code	Coord		Coord	Coord	Skip	
30th %ile Green (s)	55.0		55.0	55.0	0.0	
30th %ile Term Code	Coord		Coord	Coord	Skip	
10th %ile Green (s)	55.0		55.0	55.0	0.0	
10th %ile Term Code	Coord		Coord	Coord	Skip	
Queue Length 50th (ft)	0			0	3	
Queue Length 95th (ft)	97			348	18	
Internal Link Dist (ft)	1529			1205	239	
Turn Bay Length (ft)						
Base Capacity (vph)	3009			2873	698	
Starvation Cap Reductn	0			0	0	
Spillback Cap Reductn	0			0	0	
Storage Cap Reductn	0			0	0	
Reduced v/c Ratio	0.36			0.37	0.02	

Intersection Summary			
Area Type:	Other		
Cycle Length: 60			
Actuated Cycle Length: 60			
Offset: 55 (92%), Referenced to phase 2:EBT and 6:WBTL, Start of Yellow			
Natural Cycle: 60			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.37			
Intersection Signal Delay: 2.7		Intersection LOS: A	
Intersection Capacity Utilization 48.7%		ICU Level of Service A	

Analysis Period (min) 15

Splits and Phases: 11: Chapel Dr & Lancaster Ave



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	88	780	35	133	839	44	84	173	74	25	214	47
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width (ft)	10	10	10	10	10	10	10	10	10	10	10	10
Grade (%)		0%			3%			1%			0%	
Storage Length (ft)	140		0	70		0	105		0	65		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.994			0.992			0.955			0.973	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1520	3022	0	1497	2970	0	1512	1520	0	1520	1557	0
Flt Permitted	0.180			0.187			0.332			0.363		
Satd. Flow (perm)	288	3022	0	295	2970	0	529	1520	0	581	1557	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		35			35			25			25	
Link Distance (ft)		1285			2035			183			973	
Travel Time (s)		25.0			39.6			5.0			26.5	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Adj. Flow (vph)	94	830	37	141	893	47	89	184	79	27	228	50
Shared Lane Traffic (%)												
Lane Group Flow (vph)	94	867	0	141	940	0	89	263	0	27	278	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		10			10			10			10	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		10			10			10			10	
Two way Left Turn Lane												
Headway Factor	1.17	1.17	1.17	1.19	1.19	1.19	1.18	1.18	1.18	1.17	1.17	1.17
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	0		1	0		1	1		1	1	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (ft)	37	0		37	0		37	37		37	37	
Trailing Detector (ft)	-3	0		-3	0		-3	-3		-3	-3	
Detector 1 Position(ft)	-3	0		-3	0		-3	-3		-3	-3	
Detector 1 Size(ft)	40	6		40	6		40	40		40	40	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2			6			8			4		
Detector Phase	5	2		1	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	3.0	34.0		3.0	34.0		3.0	3.0		3.0	3.0	

Lane Group	ø9
Lane Configurations	
Volume (vph)	
Ideal Flow (vphpl)	
Lane Width (ft)	
Grade (%)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Lane Util. Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	
Heavy Vehicles (%)	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Enter Blocked Intersection	
Lane Alignment	
Median Width(ft)	
Link Offset(ft)	
Crosswalk Width(ft)	
Two way Left Turn Lane	
Headway Factor	
Turning Speed (mph)	
Number of Detectors	
Detector Template	
Leading Detector (ft)	
Trailing Detector (ft)	
Detector 1 Position(ft)	
Detector 1 Size(ft)	
Detector 1 Type	
Detector 1 Channel	
Detector 1 Extend (s)	
Detector 1 Queue (s)	
Detector 1 Delay (s)	
Turn Type	
Protected Phases	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	24.0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Split (s)	13.0	40.0		13.0	40.0		13.0	13.0		13.0	13.0	
Total Split (s)	13.0	44.0		15.0	46.0		35.0	35.0		35.0	35.0	
Total Split (%)	10.8%	36.7%		12.5%	38.3%		29.2%	29.2%		29.2%	29.2%	
Maximum Green (s)	7.0	38.0		9.0	40.0		29.0	29.0		29.0	29.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.5	0.5		0.5	0.5		0.5	0.5		0.5	0.5	
Total Lost Time (s)	6.5	6.5		6.5	6.5		6.5	6.5		6.5	6.5	
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)	52.9	46.5		56.8	48.5		24.9	24.9		24.9	24.9	
Actuated g/C Ratio	0.44	0.39		0.47	0.40		0.21	0.21		0.21	0.21	
v/c Ratio	0.49	0.74		0.63	0.78		0.82	0.83		0.23	0.86	
Control Delay	27.8	38.1		29.6	32.1		92.7	67.8		42.9	70.9	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	27.8	38.1		29.6	32.1		92.7	67.8		42.9	70.9	
LOS	C	D		C	C		F	E		D	E	
Approach Delay		37.1			31.8			74.1			68.4	
Approach LOS		D			C			E			E	
90th %ile Green (s)	7.0	38.0		9.0	40.0		29.0	29.0		29.0	29.0	
90th %ile Term Code	Max	Coord		Max	Coord		Max	Max		Max	Max	
70th %ile Green (s)	7.0	38.0		9.0	40.0		29.0	29.0		29.0	29.0	
70th %ile Term Code	Max	Coord		Max	Coord		Max	Max		Max	Max	
50th %ile Green (s)	7.0	40.0		9.0	42.0		27.0	27.0		27.0	27.0	
50th %ile Term Code	Max	Coord		Max	Coord		Hold	Hold		Gap	Gap	
30th %ile Green (s)	7.0	43.5		9.0	45.5		23.5	23.5		23.5	23.5	
30th %ile Term Code	Max	Coord		Max	Coord		Hold	Hold		Gap	Gap	
10th %ile Green (s)	6.4	75.5		8.2	77.3		18.3	18.3		18.3	18.3	
10th %ile Term Code	Gap	Coord		Gap	Coord		Hold	Hold		Gap	Gap	
Queue Length 50th (ft)	41	331		63	368		65	193		17	206	
Queue Length 95th (ft)	79	#465		m111	#502		#152	#302		45	#323	
Internal Link Dist (ft)		1205			1955			103			893	
Turn Bay Length (ft)	140			70			105			65		
Base Capacity (vph)	194	1170		225	1199		125	361		137	369	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.48	0.74		0.63	0.78		0.71	0.73		0.20	0.75	

Intersection Summary	
Area Type:	Other
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow, Master Intersection	

Lane Group	ø9
Minimum Split (s)	26.0
Total Split (s)	26.0
Total Split (%)	22%
Maximum Green (s)	24.0
Yellow Time (s)	2.0
All-Red Time (s)	0.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0
Recall Mode	None
Walk Time (s)	9.0
Flash Dont Walk (s)	15.0
Pedestrian Calls (#/hr)	45
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
90th %ile Green (s)	24.0
90th %ile Term Code	Max
70th %ile Green (s)	24.0
70th %ile Term Code	Max
50th %ile Green (s)	24.0
50th %ile Term Code	Max
30th %ile Green (s)	24.0
30th %ile Term Code	Max
10th %ile Green (s)	0.0
10th %ile Term Code	Skip
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	

Intersection Summary

Lanes, Volumes, Timings
27: S Ithan Ave/N Ithan Ave & Lancaster Ave

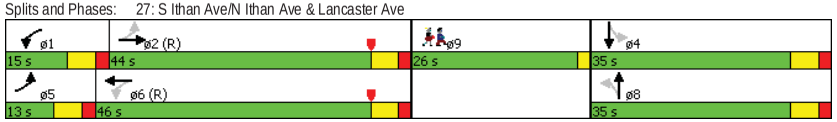
3/9/2015

Natural Cycle: 95	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.86	
Intersection Signal Delay: 43.3	Intersection LOS: D
Intersection Capacity Utilization 77.6%	ICU Level of Service D
Analysis Period (min) 15	

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 27: S Ithan Ave/N Ithan Ave & Lancaster Ave



HCM 2010 Signalized Intersection Summary
51: Lowrys Ln & Lancaster Ave

3/9/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	18	1035	19	16	1063	22	46	102	38	21	70	19
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	1748	1800	1773	1721	1773	1900	1845	1900	1881	1827	1881
Adj Flow Rate, veh/h	19	1113	20	17	1143	24	49	110	41	23	75	20
Adj No. of Lanes	0	2	0	0	2	0	0	1	0	0	1	0
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	74	2076	37	72	2047	43	120	160	53	100	191	45
Arrive On Green	1.00	1.00	1.00	0.65	0.65	0.65	0.15	0.15	0.15	0.15	0.15	0.15
Sat Flow, veh/h	19	3202	57	15	3156	66	297	1056	349	189	1263	296
Grp Volume(v), veh/h	597	0	555	616	0	568	200	0	0	118	0	0
Grp Sat Flow(s),veh/h/ln	1698	0	1580	1682	0	1555	1701	0	0	1748	0	0
Q Serve(g_s), s	0.0	0.0	0.0	0.0	0.0	12.1	3.1	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	0.0	0.0	0.0	11.8	0.0	12.1	6.7	0.0	0.0	3.6	0.0	0.0
Prop In Lane	0.03		0.04	0.03		0.04	0.24		0.20	0.19		0.17
Lane Grp Cap(c), veh/h	1163	0	1025	1153	0	1008	333	0	0	337	0	0
V/C Ratio(X)	0.51	0.00	0.54	0.53	0.00	0.56	0.60	0.00	0.00	0.35	0.00	0.00
Avail Cap(c_a), veh/h	1163	0	1025	1153	0	1008	672	0	0	676	0	0
HCM Platoon Ratio	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.62	0.00	0.62	1.00	0.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	0.0	0.0	0.0	5.8	0.0	5.8	24.4	0.0	0.0	23.1	0.0	0.0
Incr Delay (d2), s/veh	1.0	0.0	1.3	1.8	0.0	2.3	1.7	0.0	0.0	0.6	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(-26165%),veh/ln	0.3	0.0	0.4	6.0	0.0	5.7	3.3	0.0	0.0	1.8	0.0	0.0
LnGrp Delay(d),s/veh	1.0	0.0	1.3	7.6	0.0	8.1	26.1	0.0	0.0	23.8	0.0	0.0
LnGrp LOS	A		A	A		A	C			C		
Approach Vol, veh/h		1152			1184			200			118	
Approach Delay, s/veh		1.1			7.8			26.1			23.8	
Approach LOS		A			A			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		45.4		14.6		45.4		14.6
Change Period (Y+Rc), s		6.0		5.0		6.0		5.0
Max Green Setting (Gmax), s		27.0		22.0		27.0		22.0
Max Q Clear Time (g_c+I1), s		2.0		5.6		14.1		8.7
Green Ext Time (p_c), s		11.8		1.0		8.0		1.0

Intersection Summary		
HCM 2010 Ctrl Delay		7.0
HCM 2010 LOS		A

HCM 2010 Signalized Intersection Summary
16: Sproul Rd & Conestoga Rd 3/9/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (veh/h)	146	542	135	35	589	56	209	262	27	55	196	73
Number	7	4	14	3	8	18	1	6	16	5	2	12
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	1748	1748	1800	1791	1791	1845	1739	1739	1791	1809	1756	1809
Adj Flow Rate, veh/h	160	596	0	38	647	0	230	288	30	60	215	80
Adj No. of Lanes	1	1	0	1	1	0	1	1	0	0	1	0
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	200	847	0	261	630	0	336	600	62	95	253	88
Arrive On Green	0.07	0.48	0.00	0.35	0.35	0.00	0.07	0.39	0.39	0.25	0.25	0.25
Sat Flow, veh/h	1664	1748	0	831	1791	0	1656	1549	161	194	1018	353
Grp Volume(v), veh/h	160	596	0	38	647	0	230	0	318	355	0	0
Grp Sat Flow(s),veh/h/ln	1664	1748	0	831	1791	0	1656	0	1710	1564	0	0
Q Serve(g_s), s	5.3	24.0	0.0	3.4	31.6	0.0	6.5	0.0	12.6	14.2	0.0	0.0
Cycle Q Clear(g_c), s	5.3	24.0	0.0	15.4	31.6	0.0	6.5	0.0	12.6	19.8	0.0	0.0
Prop In Lane	1.00		0.00	1.00		0.00	1.00		0.09	0.17		0.23
Lane Grp Cap(c), veh/h	200	847	0	261	630	0	336	0	662	435	0	0
V/C Ratio(X)	0.80	0.70	0.00	0.15	1.03	0.00	0.68	0.00	0.48	0.82	0.00	0.00
Avail Cap(c_a), veh/h	200	847	0	261	630	0	336	0	722	489	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	21.6	18.1	0.0	28.8	29.2	0.0	24.4	0.0	20.7	32.6	0.0	0.0
Incr Delay (d2), s/veh	20.1	4.9	0.0	1.2	43.0	0.0	5.7	0.0	0.5	9.4	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(-26165%),veh/ln	3.5	12.6	0.0	0.9	23.1	0.0	2.9	0.0	6.0	9.7	0.0	0.0
LnGrp Delay(d),s/veh	41.6	23.0	0.0	30.0	72.2	0.0	30.1	0.0	21.3	42.0	0.0	0.0
LnGrp LOS	D	C		C	F		C		C	D		
Approach Vol, veh/h		756			685			548			355	
Approach Delay, s/veh		26.9			69.9			25.0			42.0	
Approach LOS		C			E			C			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4		6	7	8
Phs Duration (G+Y+Rc), s	12.5	28.4		49.1		40.9	12.0	37.1
Change Period (Y+Rc), s	5.5	5.5		5.0		5.5	5.0	5.0
Max Green Setting (Gmax), s	7.0	26.0		41.0		38.5	7.0	29.0
Max Q Clear Time (g_c+I1), s	8.5	21.8		26.0		14.6	7.3	33.6
Green Ext Time (p_c), s	0.0	1.1		7.2		2.4	0.0	0.0

Intersection Summary		
HCM 2010 Ctrl Delay		41.3
HCM 2010 LOS		D

HCM 2010 Signalized Intersection Summary
25: S Ithan Ave & Conestoga Rd 3/9/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	162	382	2	2	443	125	14	153	12	61	51	136
Number	1	6	16	5	2	12	7	4	14	3	8	18
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	1854	1783	1854	1764	1696	1764	1763	1695	1763	1844	1773	1844
Adj Flow Rate, veh/h	200	472	2	2	547	154	17	189	15	75	63	168
Adj No. of Lanes	0	1	0	0	1	0	0	1	0	0	1	0
Peak Hour Factor	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81
Percent Heavy Veh, %	4	4	4	4	4	4	4	4	4	4	4	4
Cap, veh/h	228	442	2	65	682	191	83	349	26	147	99	201
Arrive On Green	0.53	0.53	0.53	0.53	0.53	0.53	0.23	0.23	0.23	0.23	0.23	0.23
Sat Flow, veh/h	269	831	3	1	1282	360	55	1494	113	285	422	861
Grp Volume(v), veh/h	674	0	0	703	0	0	221	0	0	306	0	0
Grp Sat Flow(s),veh/h/ln	1103	0	0	1642	0	0	1663	0	0	1568	0	0
Q Serve(g_s), s	9.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.6	0.0	0.0
Cycle Q Clear(g_c), s	29.5	0.0	0.0	19.6	0.0	0.0	6.5	0.0	0.0	10.0	0.0	0.0
Prop In Lane	0.30		0.00	0.00		0.22	0.08		0.07	0.25		0.55
Lane Grp Cap(c), veh/h	671	0	0	939	0	0	458	0	0	447	0	0
V/C Ratio(X)	1.00	0.00	0.00	0.75	0.00	0.00	0.48	0.00	0.00	0.68	0.00	0.00
Avail Cap(c_a), veh/h	671	0	0	939	0	0	648	0	0	619	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	14.8	0.0	0.0	10.7	0.0	0.0	18.8	0.0	0.0	20.0	0.0	0.0
Incr Delay (d2), s/veh	35.7	0.0	0.0	3.4	0.0	0.0	0.8	0.0	0.0	1.9	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(-26165%),veh/ln	16.7	0.0	0.0	9.5	0.0	0.0	3.0	0.0	0.0	4.7	0.0	0.0
LnGrp Delay(d),s/veh	50.6	0.0	0.0	14.0	0.0	0.0	19.6	0.0	0.0	21.9	0.0	0.0
LnGrp LOS	F			B			B			C		
Approach Vol, veh/h		674			703			221			306	
Approach Delay, s/veh		50.6			14.0			19.6			21.9	
Approach LOS		D			B			B			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		36.0		19.4		36.0		19.4
Change Period (Y+Rc), s		6.0		6.0		6.0		6.0
Max Green Setting (Gmax), s		30.0		20.0		30.0		20.0
Max Q Clear Time (g_c+I1), s		21.6		8.5		31.5		12.0
Green Ext Time (p_c), s		4.4		1.7		0.0		1.4

Intersection Summary		
HCM 2010 Ctrl Delay		28.9
HCM 2010 LOS		C

HCM 2010 Signalized Intersection Summary
33: Williams Rd/Garrett Ave & Conestoga Rd

3/9/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (veh/h)	25	431	1	4	410	4	6	6	9	15	3	37
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	1872	1872	1872	1872	1872	1872	1800	1800	1800	1728	1728	1728
Adj Flow Rate, veh/h	28	490	1	5	466	5	7	7	10	17	3	42
Adj No. of Lanes	0	1	0	0	1	0	0	1	0	0	1	0
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Percent Heavy Veh, %	0	0	0	0	0	0	0	0	0	0	0	0
Cap, veh/h	98	1267	3	68	1306	14	103	37	40	101	8	57
Arrive On Green	0.71	0.71	0.71	0.71	0.71	0.71	0.06	0.06	0.06	0.06	0.06	0.06
Sat Flow, veh/h	42	1786	4	4	1841	20	340	640	700	335	143	1004
Grp Volume(v), veh/h	519	0	0	476	0	0	24	0	0	62	0	0
Grp Sat Flow(s),veh/h/ln	1832	0	0	1865	0	0	1680	0	0	1482	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	1.5	0.0	0.0
Cycle Q Clear(g_c), s	6.2	0.0	0.0	5.5	0.0	0.0	0.8	0.0	0.0	2.3	0.0	0.0
Prop In Lane	0.05		0.00	0.01		0.01	0.29		0.42	0.27		0.68
Lane Grp Cap(c), veh/h	1368	0	0	1388	0	0	179	0	0	167	0	0
V/C Ratio(X)	0.38	0.00	0.00	0.34	0.00	0.00	0.13	0.00	0.00	0.37	0.00	0.00
Avail Cap(c_a), veh/h	1368	0	0	1388	0	0	634	0	0	591	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	3.3	0.0	0.0	3.2	0.0	0.0	25.1	0.0	0.0	25.8	0.0	0.0
Incr Delay (d2), s/veh	0.8	0.0	0.0	0.7	0.0	0.0	0.5	0.0	0.0	1.9	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(-26165%),veh/ln	3.5	0.0	0.0	3.0	0.0	0.0	0.4	0.0	0.0	1.0	0.0	0.0
LnGrp Delay(d),s/veh	4.1	0.0	0.0	3.8	0.0	0.0	25.6	0.0	0.0	27.7	0.0	0.0
LnGrp LOS	A			A			C			C		
Approach Vol, veh/h		519			476			24			62	
Approach Delay, s/veh		4.1			3.8			25.6			27.7	
Approach LOS		A			A			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		46.0		9.7		46.0		9.7
Change Period (Y+Rc), s		6.0		6.0		6.0		6.0
Max Green Setting (Gmax), s		40.0		20.0		40.0		20.0
Max Q Clear Time (g_c+I1), s		8.2		4.3		7.5		2.8
Green Ext Time (p_c), s		4.4		0.3		4.4		0.3

Intersection Summary	
HCM 2010 Ctrl Delay	5.8
HCM 2010 LOS	A

HCM 2010 Signalized Intersection Summary
3: County Line Rd & Spring Mill Rd

3/9/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	34	274	59	61	260	76	40	245	44	32	322	52
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	1630	1800	1800	1731	1800	1800	1731	1800	1800	1731	1800
Adj Flow Rate, veh/h	36	288	62	64	274	80	42	258	46	34	339	55
Adj No. of Lanes	0	1	0	0	1	0	0	1	0	0	1	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	4	4	4	4	4	4	4	4	4	4	4	4
Cap, veh/h	100	606	123	144	555	150	98	371	62	84	403	63
Arrive On Green	0.50	0.50	0.50	0.50	0.50	0.50	0.29	0.29	0.29	0.29	0.29	0.29
Sat Flow, veh/h	73	1214	246	155	1111	300	112	1274	212	73	1383	215
Grp Volume(v), veh/h	386	0	0	418	0	0	346	0	0	428	0	0
Grp Sat Flow(s),veh/h/ln	1534	0	0	1566	0	0	1598	0	0	1671	0	0
Q Serve(g_s), s	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	3.1	0.0	0.0
Cycle Q Clear(g_c), s	10.0	0.0	0.0	10.3	0.0	0.0	11.9	0.0	0.0	15.0	0.0	0.0
Prop In Lane	0.09		0.16	0.15		0.19	0.12		0.13	0.08		0.13
Lane Grp Cap(c), veh/h	829	0	0	849	0	0	530	0	0	549	0	0
V/C Ratio(X)	0.47	0.00	0.00	0.49	0.00	0.00	0.65	0.00	0.00	0.78	0.00	0.00
Avail Cap(c_a), veh/h	829	0	0	849	0	0	916	0	0	951	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)	0.29	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	10.3	0.0	0.0	10.4	0.0	0.0	19.7	0.0	0.0	20.8	0.0	0.0
Incr Delay (d2), s/veh	0.6	0.0	0.0	2.0	0.0	0.0	0.5	0.0	0.0	0.9	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(-26165%),veh/ln	4.4	0.0	0.0	5.2	0.0	0.0	5.4	0.0	0.0	7.0	0.0	0.0
LnGrp Delay(d),s/veh	10.8	0.0	0.0	12.4	0.0	0.0	20.2	0.0	0.0	21.8	0.0	0.0
LnGrp LOS	B			B			C			C		
Approach Vol, veh/h		386			418			346			428	
Approach Delay, s/veh		10.8			12.4			20.2			21.8	
Approach LOS		B			B			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		37.5		24.5		37.5		24.5
Change Period (Y+Rc), s		6.0		6.0		6.0		6.0
Max Green Setting (Gmax), s		16.0		34.0		16.0		34.0
Max Q Clear Time (g_c+I1), s		12.0		17.0		12.3		13.9
Green Ext Time (p_c), s		1.4		1.6		1.3		1.6

Intersection Summary	
HCM 2010 Ctrl Delay	16.3
HCM 2010 LOS	B

Intersection	
Int Delay, s/veh	3.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	1070	24	19	1100	0	25
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, %	-3	-	-	3	0	-
Peak Hour Factor	67	67	67	67	67	67
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	1597	36	28	1642	0	37

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	1633	0	2493	816
Stage 1	-	-	-	-	1615	-
Stage 2	-	-	-	-	878	-
Critical Hdwy	-	-	4.1	-	6.8	6.9
Critical Hdwy Stg 1	-	-	-	-	5.8	-
Critical Hdwy Stg 2	-	-	-	-	5.8	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	403	-	25	324
Stage 1	-	-	-	-	151	-
Stage 2	-	-	-	-	372	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	403	-	5	324
Mov Cap-2 Maneuver	-	-	-	-	5	-
Stage 1	-	-	-	-	151	-
Stage 2	-	-	-	-	78	-

Approach	EB	WB	NB
HCM Control Delay, s	0	5.8	17.6
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	324	-	-	403	-
HCM Lane V/C Ratio	0.115	-	-	0.07	-
HCM Control Delay (s)	17.6	-	-	14.6	5.6
HCM Lane LOS	C	-	-	B	A
HCM 95th %tile Q(veh)	0.4	-	-	0.2	-

Intersection	
Int Delay, s/veh	0.2

Movement	EBL	EBT	WBT	WBR	SWL	SWR
Vol, veh/h	2	625	678	3	4	8
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	86	86	86	86	86	86
Heavy Vehicles, %	4	4	4	4	4	4
Mvmt Flow	2	727	788	3	5	9

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	792	0	-	0	1521	790
Stage 1	-	-	-	-	790	-
Stage 2	-	-	-	-	731	-
Critical Hdwy	4.14	-	-	-	6.44	6.24
Critical Hdwy Stg 1	-	-	-	-	5.44	-
Critical Hdwy Stg 2	-	-	-	-	5.44	-
Follow-up Hdwy	2.236	-	-	-	3.536	3.336
Pot Cap-1 Maneuver	820	-	-	-	129	387
Stage 1	-	-	-	-	444	-
Stage 2	-	-	-	-	473	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	820	-	-	-	128	387
Mov Cap-2 Maneuver	-	-	-	-	128	-
Stage 1	-	-	-	-	444	-
Stage 2	-	-	-	-	471	-

Approach	EB	WB	SW
HCM Control Delay, s	0	0	21.6
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SWLn1
Capacity (veh/h)	820	-	-	-	231
HCM Lane V/C Ratio	0.003	-	-	-	0.06
HCM Control Delay (s)	9.4	0	-	-	21.6
HCM Lane LOS	A	A	-	-	C
HCM 95th %tile Q(veh)	0	-	-	-	0.2

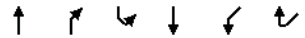
Intersection	
Int Delay, s/veh	3.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	46	415	14	9	447	5	13	14	12	2	15	81
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	80	80	80	80	80	80	80	80	80	80	80	80
Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	58	519	18	11	559	6	16	18	15	2	19	101

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	565	0	0	536	0	0	1287	1231	528	1243	1235	562
Stage 1	-	-	-	-	-	-	643	643	-	584	584	-
Stage 2	-	-	-	-	-	-	644	588	-	659	651	-
Critical Hdwy	4.13	-	-	4.13	-	-	7.13	6.53	6.23	7.13	6.53	6.23
Critical Hdwy Stg 1	-	-	-	-	-	-	6.13	5.53	-	6.13	5.53	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.13	5.53	-	6.13	5.53	-
Follow-up Hdwy	2.227	-	-	2.227	-	-	3.527	4.027	3.327	3.527	4.027	3.327
Pot Cap-1 Maneuver	1002	-	-	1027	-	-	140	177	548	151	176	525
Stage 1	-	-	-	-	-	-	460	467	-	496	496	-
Stage 2	-	-	-	-	-	-	460	494	-	451	463	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1002	-	-	1027	-	-	95	160	548	125	159	525
Mov Cap-2 Maneuver	-	-	-	-	-	-	95	160	-	125	159	-
Stage 1	-	-	-	-	-	-	422	428	-	455	488	-
Stage 2	-	-	-	-	-	-	351	486	-	386	425	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.9	0.2	37.6	19.5
HCM LOS			E	C

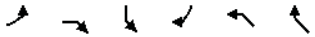
Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	158	1002	-	-	1027	-	-	370
HCM Lane V/C Ratio	0.309	0.057	-	-	0.011	-	-	0.331
HCM Control Delay (s)	37.6	8.8	0	-	8.5	0	-	19.5
HCM Lane LOS	E	A	A	-	A	A	-	C
HCM 95th %tile Q(veh)	1.2	0.2	-	-	0	-	-	1.4



Lane Group	NBT	NBR	SBL	SBT	SWL	SWR
Lane Configurations						
Volume (vph)	338	108	164	293	152	99
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.967				0.947	
Flt Protected				0.982	0.971	
Satd. Flow (prot)	1801	0	0	1829	1713	0
Flt Permitted				0.982	0.971	
Satd. Flow (perm)	1801	0	0	1829	1713	0
Link Speed (mph)	30			30	30	
Link Distance (ft)	295			1901	824	
Travel Time (s)	6.7			43.2	18.7	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	371	119	180	322	167	109
Shared Lane Traffic (%)						
Lane Group Flow (vph)	490	0	0	502	276	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	0			0	12	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	10			10	10	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)		9	15		15	9
Sign Control	Free			Stop	Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	73.3%	ICU Level of Service	D
Analysis Period (min)	15		

Lanes, Volumes, Timings
2: County Line Rd & N Ithan Ave 3/9/2015



Lane Group	EBL	EBR	SBL	SBR	NWL	NWR
Lane Configurations						
Volume (vph)	199	15	138	328	37	250
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.991		0.905		0.882	
Flt Protected	0.956		0.985		0.994	
Satd. Flow (prot)	1765	0	1660	0	1633	0
Flt Permitted	0.956		0.985		0.994	
Satd. Flow (perm)	1765	0	1660	0	1633	0
Link Speed (mph)	30		30		30	
Link Distance (ft)	973		295		2020	
Travel Time (s)	22.1		6.7		45.9	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	212	16	147	349	39	266
Shared Lane Traffic (%)						
Lane Group Flow (vph)	228	0	496	0	305	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Right
Median Width(ft)	22		12		12	
Link Offset(ft)	0		0		0	
Crosswalk Width(ft)	10		10		10	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9	15	9	15	9
Sign Control	Stop		Free		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	67.3%	ICU Level of Service	C
Analysis Period (min)	15		

HCM 2010 TWSC
53: County Line Rd & Lowrys Ln 3/9/2015

Intersection	
Int Delay, s/veh	3.7

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	60	79	57	233	147	30
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	87	87	87	87	87	87
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	69	91	66	268	169	34

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	585	186	203	0	-	0
Stage 1	186	-	-	-	-	-
Stage 2	399	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	477	861	1381	-	-	-
Stage 1	851	-	-	-	-	-
Stage 2	682	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	450	861	1381	-	-	-
Mov Cap-2 Maneuver	450	-	-	-	-	-
Stage 1	851	-	-	-	-	-
Stage 2	644	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	12.8	1.5	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1381	-	618	-	-
HCM Lane V/C Ratio	0.047	-	0.259	-	-
HCM Control Delay (s)	7.7	0	12.8	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0.1	-	1	-	-

Intersection	
Int Delay, s/veh	3.9

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	199	216	282	20	15	96
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	88	88	88	88	88	88
Heavy Vehicles, %	1	1	1	1	1	1
Mvmt Flow	226	245	320	23	17	109

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	343	0	-	0	1030	332
Stage 1	-	-	-	-	332	-
Stage 2	-	-	-	-	698	-
Critical Hdwy	4.11	-	-	-	6.41	6.21
Critical Hdwy Stg 1	-	-	-	-	5.41	-
Critical Hdwy Stg 2	-	-	-	-	5.41	-
Follow-up Hdwy	2.209	-	-	-	3.509	3.309
Pot Cap-1 Maneuver	1222	-	-	-	260	712
Stage 1	-	-	-	-	729	-
Stage 2	-	-	-	-	495	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1222	-	-	-	204	712
Mov Cap-2 Maneuver	-	-	-	-	204	-
Stage 1	-	-	-	-	729	-
Stage 2	-	-	-	-	389	-

Approach	EB	WB	SB
HCM Control Delay, s	4.1	0	13.8
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1222	-	-	-	533
HCM Lane V/C Ratio	0.185	-	-	-	0.237
HCM Control Delay (s)	8.6	0	-	-	13.8
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.7	-	-	-	0.9

Intersection	
Int Delay, s/veh	23.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	66	98	8	2	23	6	14	607	25	8	464	37
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	88	88	88	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	75	111	9	2	26	7	16	690	28	9	527	42

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	956	1316	285	1074	1324	359	569	0	0	718	0	0
Stage 1	566	566	-	736	736	-	-	-	-	-	-	-
Stage 2	390	750	-	338	588	-	-	-	-	-	-	-
Critical Hdwy	7.54	6.54	6.94	7.54	6.54	6.94	4.14	-	-	4.14	-	-
Critical Hdwy Stg 1	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Follow-up Hdwy	3.52	4.02	3.32	3.52	4.02	3.32	2.22	-	-	2.22	-	-
Pot Cap-1 Maneuver	213	156	712	174	155	638	999	-	-	879	-	-
Stage 1	476	506	-	377	423	-	-	-	-	-	-	-
Stage 2	606	417	-	650	494	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	177	150	712	66	149	638	999	-	-	879	-	-
Mov Cap-2 Maneuver	177	150	-	66	149	-	-	-	-	-	-	-
Stage 1	463	498	-	367	412	-	-	-	-	-	-	-
Stage 2	546	406	-	491	487	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	181	33.7	0.3	0.2
HCM LOS	F	D		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	999	-	-	166	160	879	-	-
HCM Lane V/C Ratio	0.016	-	-	1.177	0.22	0.01	-	-
HCM Control Delay (s)	8.7	0.1	-	181	33.7	9.1	0.1	-
HCM Lane LOS	A	A	-	F	D	A	A	-
HCM 95th %tile Q(veh)	0	-	-	10.6	0.8	0	-	-

HCM 2010 TWSC
61: Dwy/Aldwyn Ln & S Ithan Ave 3/9/2015

Intersection	
Int Delay, s/veh	2.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	9	351	9	16	189	13	7	1	12	16	0	59
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	81	81	81	81	81	81	81	81	81	81	81	81
Heavy Vehicles, %	4	4	4	4	4	4	4	4	4	4	4	4
Mvmt Flow	11	433	11	20	233	16	9	1	15	20	0	73

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	249	0	0	444	0	0	778	750	439	750	748	241
Stage 1	-	-	-	-	-	-	461	461	-	281	281	-
Stage 2	-	-	-	-	-	-	317	289	-	469	467	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.14	6.54	6.24	7.14	6.54	6.24
Critical Hdwy Stg 1	-	-	-	-	-	-	6.14	5.54	-	6.14	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.14	5.54	-	6.14	5.54	-
Follow-up Hdwy	2.236	-	-	2.236	-	-	3.536	4.036	3.336	3.536	4.036	3.336
Pot Cap-1 Maneuver	1305	-	-	1106	-	-	311	338	614	325	339	793
Stage 1	-	-	-	-	-	-	577	562	-	721	675	-
Stage 2	-	-	-	-	-	-	690	669	-	571	558	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1305	-	-	1106	-	-	276	327	614	309	328	793
Mov Cap-2 Maneuver	-	-	-	-	-	-	276	327	-	309	328	-
Stage 1	-	-	-	-	-	-	571	556	-	713	661	-
Stage 2	-	-	-	-	-	-	613	655	-	550	552	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.2	0.6	14.2	12.2
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	417	1305	-	-	1106	-	-	594
HCM Lane V/C Ratio	0.059	0.009	-	-	0.018	-	-	0.156
HCM Control Delay (s)	14.2	7.8	0	-	8.3	0	-	12.2
HCM Lane LOS	B	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	0.2	0	-	-	0.1	-	-	0.5

Lanes, Volumes, Timings
7: Sproul Rd/Spring Mill Rd & Aldwyn Ln/Kenilworth Rd & Lancaster Ave 3/10/2015

Lane Group	EBL2	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR2	NBL2	NBL	NBT
Lane Configurations												
Volume (vph)	4	244	965	30	276	2	22	835	32	7	51	0
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width (ft)	10	10	11	11	14	10	12	12	12	10	10	10
Grade (%)			3%					-2%				1%
Storage Length (ft)		300		0			75				0	
Storage Lanes		1		1			1				0	
Taper Length (ft)		25					25				25	
Lane Util. Factor	0.95	1.00	0.95	0.95	1.00	0.95	1.00	0.95	0.95	1.00	1.00	1.00
Frt			0.995		0.850			0.994				0.974
Flt Protected		0.950					0.950					0.961
Satd. Flow (prot)	0	1541	3177	0	1576	0	1693	3366	0	0	0	1534
Flt Permitted		0.109					0.199					0.754
Satd. Flow (perm)	0	177	3177	0	1576	0	355	3366	0	0	0	1204
Right Turn on Red					Yes				Yes			
Satd. Flow (RTOR)					196			196				
Link Speed (mph)			35					35				25
Link Distance (ft)			577					1609				492
Travel Time (s)			11.2					31.3				13.4
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
Adj. Flow (vph)	4	252	995	31	285	2	23	861	33	7	53	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	256	1026	0	285	0	25	894	0	0	0	74
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Right	Left	Left	Left	Right	Left	Left	Left
Median Width(ft)			12					12				0
Link Offset(ft)			0					0				0
Crosswalk Width(ft)			10					10				10
Two way Left Turn Lane												
Headway Factor	1.19	1.19	1.14	1.14	1.01	1.16	1.06	1.06	1.06	1.18	1.18	1.18
Turning Speed (mph)	15	15		9	9	15	15		9	15	15	
Number of Detectors	1	1	1		1	1	1	1		1	1	1
Detector Template	Left	Left	Thru		Right	Left	Left	Thru		Left	Left	Thru
Leading Detector (ft)	20	37	37		37	20	37	37		20	20	37
Trailing Detector (ft)	0	-3	-3		-3	0	-3	-3		0	0	-3
Detector 1 Position(ft)	0	-3	-3		-3	0	-3	-3		0	0	-3
Detector 1 Size(ft)	20	40	40		40	20	40	40		20	20	40
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0	0.0
Turn Type	pm+pt	pm+pt	NA		Perm	Perm	Perm	NA		Perm	Perm	NA
Protected Phases	5	5	2					6				10
Permitted Phases	2	2			2	6	6			10	10	
Detector Phase	5	5	2		2	6	6	6		10	10	10
Switch Phase												
Minimum Initial (s)	3.0	3.0	15.0		15.0	15.0	15.0	15.0		3.0	3.0	3.0
Minimum Split (s)	13.0	13.0	21.0		21.0	21.0	21.0	21.0		13.0	13.0	13.0

Lane Group	NBR	NBR2	SBL2	SBL	SBT	SBR	SBR2	NEL2	NEL	NET	NER	NER2
Lane Configurations												
Volume (vph)	4	10	1	1	0	3	14	187	0	110	20	1
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width (ft)	10	10	10	10	10	10	10	12	12	11	11	11
Grade (%)					-3%					3%		
Storage Length (ft)	0			0		0			200		0	
Storage Lanes	0			0		0			1		0	
Taper Length (ft)				25					25			
Lane Util. 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
Frt					0.879					0.976		
Flt Protected					0.995				0.950			
Satd. Flow (prot)	0	0	0	0	1462	0	0	0	1651	1640	0	0
Flt Permitted					0.992				0.170			
Satd. Flow (perm)	0	0	0	0	1458	0	0	0	295	1640	0	0
Right Turn on Red		No					No					No
Satd. Flow (RTOR)												
Link Speed (mph)					25					40		
Link Distance (ft)					597					1336		
Travel Time (s)					16.3					22.8		
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	4	10	1	1	0	3	14	193	0	113	21	1
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	19	0	0	0	193	135	0	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Right	Right	Left	Left	Left	Right	Right	Left	Left	Left	Right	Right
Median Width(ft)					0					12		
Link Offset(ft)					0					0		
Crosswalk Width(ft)					10					10		
Two way Left Turn Lane												
Headway Factor	1.18	1.18	1.15	1.15	1.15	1.15	1.15	1.09	1.09	1.14	1.14	1.14
Turning Speed (mph)	9	9	15	15		9	9	15	15		9	9
Number of Detectors			1	1	1			1	1	1		
Detector Template			Left	Left	Thru			Left	Left	Thru		
Leading Detector (ft)			20	20	37			20	37	37		
Trailing Detector (ft)			0	0	-3			0	-3	-3		
Detector 1 Position(ft)			0	0	-3			0	-3	-3		
Detector 1 Size(ft)			20	20	40			20	40	40		
Detector 1 Type			Cl+Ex	Cl+Ex	Cl+Ex			Cl+Ex	Cl+Ex	Cl+Ex		
Detector 1 Channel												
Detector 1 Extend (s)			0.0	0.0	0.0			0.0	0.0	0.0		
Detector 1 Queue (s)			0.0	0.0	0.0			0.0	0.0	0.0		
Detector 1 Delay (s)			0.0	0.0	0.0			0.0	0.0	0.0		
Turn Type			Perm	Perm	NA			pm+pt	pm+pt	NA		
Protected Phases					9			3	3	8		
Permitted Phases			9	9				8	8			
Detector Phase			9	9	9			3	3	8		
Switch Phase												
Minimum Initial (s)			3.0	3.0	3.0			3.0	3.0	3.0		
Minimum Split (s)			13.0	13.0	13.0			13.0	13.0	13.0		

Lane Group	SWL2	SWL	SWT	SWR	SWR2
Lane Configurations					
Volume (vph)	38	9	163	230	1
Ideal Flow (vphpl)	1800	1800	1800	1800	1800
Lane Width (ft)	10	10	10	10	10
Grade (%)			-7%		
Storage Length (ft)		150		0	
Storage Lanes		1		0	
Taper Length (ft)		25			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00
Frt			0.912		
Flt Protected		0.950			
Satd. Flow (prot)	0	1619	1555	0	0
Flt Permitted		0.671			
Satd. Flow (perm)	0	1144	1555	0	0
Right Turn on Red					No
Satd. Flow (RTOR)					
Link Speed (mph)			25		
Link Distance (ft)			3168		
Travel Time (s)			86.4		
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	39	9	168	237	1
Shared Lane Traffic (%)					
Lane Group Flow (vph)	0	48	406	0	0
Enter Blocked Intersection	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Right
Median Width(ft)			12		
Link Offset(ft)			0		
Crosswalk Width(ft)			10		
Two way Left Turn Lane					
Headway Factor	1.12	1.12	1.12	1.12	1.12
Turning Speed (mph)	15	15		9	9
Number of Detectors	1	1	1		
Detector Template	Left	Left	Thru		
Leading Detector (ft)	20	37	37		
Trailing Detector (ft)	0	-3	-3		
Detector 1 Position(ft)	0	-3	-3		
Detector 1 Size(ft)	20	40	40		
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex		
Detector 1 Channel					
Detector 1 Extend (s)	0.0	0.0	0.0		
Detector 1 Queue (s)	0.0	0.0	0.0		
Detector 1 Delay (s)	0.0	0.0	0.0		
Turn Type	Perm	Perm	NA		
Protected Phases			4		
Permitted Phases	4	4			
Detector Phase	4	4	4		
Switch Phase					
Minimum Initial (s)	3.0	3.0	3.0		
Minimum Split (s)	13.0	13.0	13.0		

Lane Group	EBL2	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR2	NBL2	NBL	NBT
Total Split (s)	14.0	14.0	50.0		50.0	36.0	36.0	36.0		32.0	32.0	32.0
Total Split (%)	9.3%	9.3%	33.3%		33.3%	24.0%	24.0%	24.0%		21.3%	21.3%	21.3%
Maximum Green (s)	8.0	8.0	44.0		44.0	30.0	30.0	30.0		26.0	26.0	26.0
Yellow Time (s)	3.0	3.0	3.0		3.0	3.0	3.0	3.0		3.0	3.0	3.0
All-Red Time (s)	3.0	3.0	3.0		3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lost Time Adjust (s)		0.5	0.5		0.5		0.5	0.5				0.5
Total Lost Time (s)		6.5	6.5		6.5		6.5	6.5				6.5
Lead/Lag	Lead	Lead				Lag	Lag	Lag		Lag	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0	3.0	3.0		3.0	3.0	3.0
Recall Mode	None	None	Max		Max	None	None	None		None	None	None
Walk Time (s)			7.0		7.0	7.0	7.0	7.0				
Flash Dont Walk (s)			20.0		20.0	20.0	20.0	20.0				
Pedestrian Calls (#/hr)			0		0	0	0	0				
Act Effct Green (s)		44.3	44.3		44.3		30.0	30.0				11.6
Actuated g/C Ratio		0.41	0.41		0.41		0.28	0.28				0.11
v/c Ratio		1.51	0.79		0.37		0.26	0.83				0.57
Control Delay		283.2	35.5		10.4		44.7	37.7				65.8
Queue Delay		0.0	0.0		0.0		0.0	0.0				0.0
Total Delay		283.2	35.5		10.4		44.7	37.7				65.8
LOS		F	D		B		D	D				E
Approach Delay			71.4					37.9				65.8
Approach LOS			E					D				E
Queue Length 50th (ft)		~193	300		36		13	231				47
Queue Length 95th (ft)		#447	#561		126		47	#443				108
Internal Link Dist (ft)			497					1529				412
Turn Bay Length (ft)		300					75					
Base Capacity (vph)		169	1306		763		98	1080				290
Starvation Cap Reductn		0	0		0		0	0				0
Spillback Cap Reductn		0	0		0		0	0				0
Storage Cap Reductn		0	0		0		0	0				0
Reduced v/c Ratio		1.51	0.79		0.37		0.26	0.83				0.26

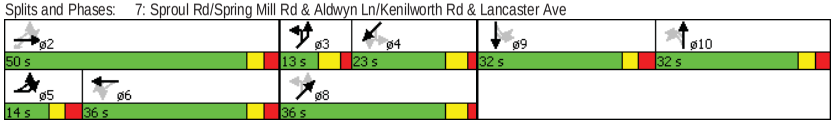
Intersection Summary			
Area Type:	Other		
Cycle Length: 150			
Actuated Cycle Length: 107.7			
Natural Cycle: 150			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 1.68			
Intersection Signal Delay: 99.2		Intersection LOS: F	
Intersection Capacity Utilization 114.6%		ICU Level of Service H	
Analysis Period (min) 15			

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Lanes, Volumes, Timings
7: Sproul Rd/Spring Mill Rd & Aldwyn Ln/Kenilworth Rd & Lancaster Ave 3/10/2015

Splits and Phases: 7: Sproul Rd/Spring Mill Rd & Aldwyn Ln/Kenilworth Rd & Lancaster Ave



Lane Group	NBR	NBR2	SBL2	SBL	SBT	SBR	SBR2	NEL2	NEL	NET	NER	NER2
Total Split (s)			32.0	32.0	32.0			13.0	13.0	36.0		
Total Split (%)			21.3%	21.3%	21.3%			8.7%	8.7%	24.0%		
Maximum Green (s)			26.0	26.0	26.0			7.0	7.0	30.0		
Yellow Time (s)			3.0	3.0	3.0			4.0	4.0	4.0		
All-Red Time (s)			3.0	3.0	3.0			2.0	2.0	2.0		
Lost Time Adjust (s)					0.5				0.5	0.5		
Total Lost Time (s)					6.5				6.5	6.5		
Lead/Lag			Lead	Lead	Lead			Lead	Lead			
Lead-Lag Optimize?												
Vehicle Extension (s)			3.0	3.0	3.0			3.0	3.0	3.0		
Recall Mode			None	None	None			None	None	None		
Walk Time (s)										7.0		
Flash Dont Walk (s)										25.0		
Pedestrian Calls (#/hr)										0		
Act Effct Green (s)					6.7				30.0	30.0		
Actuated g/C Ratio					0.06				0.28	0.28		
v/c Ratio					0.21				1.17	0.30		
Control Delay					58.7				157.9	36.7		
Queue Delay					0.0				0.0	0.0		
Total Delay					58.7				157.9	36.7		
LOS					E				F	D		
Approach Delay					58.7					108.0		
Approach LOS					E					F		
Queue Length 50th (ft)					12				~104	70		
Queue Length 95th (ft)					41				#316	154		
Internal Link Dist (ft)					517					1256		
Turn Bay Length (ft)									200			
Base Capacity (vph)					351				165	457		
Starvation Cap Reductn					0				0	0		
Spillback Cap Reductn					0				0	0		
Storage Cap Reductn					0				0	0		
Reduced v/c Ratio					0.05				1.17	0.30		

Intersection Summary

Lane Group	SWL2	SWL	SWT	SWR	SWR2
Total Split (s)	23.0	23.0	23.0		
Total Split (%)	15.3%	15.3%	15.3%		
Maximum Green (s)	17.0	17.0	17.0		
Yellow Time (s)	4.0	4.0	4.0		
All-Red Time (s)	2.0	2.0	2.0		
Lost Time Adjust (s)		0.5	0.5		
Total Lost Time (s)		6.5	6.5		
Lead/Lag	Lag	Lag	Lag		
Lead-Lag Optimize?					
Vehicle Extension (s)	3.0	3.0	3.0		
Recall Mode	None	None	None		
Walk Time (s)					
Flash Dont Walk (s)					
Pedestrian Calls (#/hr)					
Act Effct Green (s)		16.8	16.8		
Actuated g/C Ratio		0.16	0.16		
v/c Ratio		0.27	1.68		
Control Delay		50.0	351.7		
Queue Delay		0.0	0.0		
Total Delay		50.0	351.7		
LOS		D	F		
Approach Delay			319.8		
Approach LOS			F		
Queue Length 50th (ft)		28	~391		
Queue Length 95th (ft)		77	#719		
Internal Link Dist (ft)			3088		
Turn Bay Length (ft)		150			
Base Capacity (vph)		178	242		
Starvation Cap Reductn		0	0		
Spillback Cap Reductn		0	0		
Storage Cap Reductn		0	0		
Reduced v/c Ratio		0.27	1.68		

Intersection Summary

Queues
7: Sproul Rd/Spring Mill Rd & Aldwyn Ln/Kenilworth Rd & Lancaster Ave

3/10/2015

Lane Group	EBL	EBT	EBR2	WBL	WBT	NBT	SBT	NEL	NET	SWL	SWT
Lane Group Flow (vph)	256	1026	285	25	894	74	19	193	135	48	406
v/c Ratio	1.51	0.79	0.37	0.26	0.83	0.57	0.21	1.17	0.30	0.27	1.68
Control Delay	283.2	35.5	10.4	44.7	37.7	65.8	58.7	157.9	36.7	50.0	351.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	283.2	35.5	10.4	44.7	37.7	65.8	58.7	157.9	36.7	50.0	351.7
Queue Length 50th (ft)	~193	300	36	13	231	47	12	~104	70	28	~391
Queue Length 95th (ft)	#447	#561	126	47	#443	108	41	#316	154	77	#719
Internal Link Dist (ft)		497			1529	412	517		1256		3088
Turn Bay Length (ft)	300			75				200		150	
Base Capacity (vph)	169	1306	763	98	1080	290	351	165	457	178	242
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.51	0.79	0.37	0.26	0.83	0.26	0.05	1.17	0.30	0.27	1.68

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Lanes, Volumes, Timings
11: Chapel Dr & Lancaster Ave

3/10/2015

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	1089	122	20	800	85	19
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width (ft)	11	11	11	11	12	12
Lane Util. Factor	0.95	0.95	0.95	0.95	1.00	1.00
Frt	0.985				0.975	
Flt Protected				0.999	0.961	
Satd. Flow (prot)	3193	0	0	3238	1653	0
Flt Permitted				0.906	0.961	
Satd. Flow (perm)	3193	0	0	2937	1653	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	23				18	
Link Speed (mph)	35			35	25	
Link Distance (ft)	1609			1291	319	
Travel Time (s)	31.3			25.1	8.7	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1184	133	22	870	92	21
Shared Lane Traffic (%)						
Lane Group Flow (vph)	1317	0	0	892	113	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	12			12	12	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	10			10	10	
Two way Left Turn Lane						
Headway Factor	1.12	1.12	1.12	1.12	1.07	1.07
Turning Speed (mph)		9	15		15	9
Number of Detectors	1		1	1	1	
Detector Template	Thru		Left	Thru	Left	
Leading Detector (ft)	37		20	37	37	
Trailing Detector (ft)	-3		0	-3	-3	
Detector 1 Position(ft)	-3		0	-3	-3	
Detector 1 Size(ft)	40		20	40	40	
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	
Turn Type	NA		Perm	NA	Prot	
Protected Phases	2			6	8	
Permitted Phases			6			
Detector Phase	2		6	6	8	
Switch Phase						
Minimum Initial (s)	10.0		10.0	10.0	4.0	
Minimum Split (s)	21.0		21.0	21.0	28.0	
Total Split (s)	29.0		29.0	29.0	31.0	
Total Split (%)	48.3%		48.3%	48.3%	51.7%	
Maximum Green (s)	24.0		24.0	24.0	26.0	
Yellow Time (s)	3.0		3.0	3.0	3.0	

Lanes, Volumes, Timings
11: Chapel Dr & Lancaster Ave

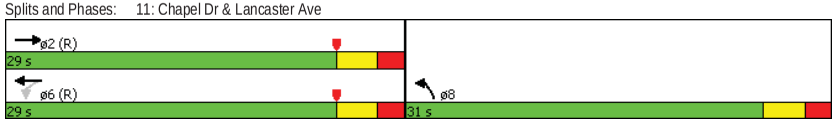
3/10/2015

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
All-Red Time (s)	2.0		2.0	2.0	2.0	
Lost Time Adjust (s)	0.5			0.5	0.5	
Total Lost Time (s)	5.5			5.5	5.5	
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Recall Mode	C-Max		C-Max	C-Max	None	
Walk Time (s)	10.0		10.0	10.0	7.0	
Flash Dont Walk (s)	0.0		0.0	0.0	16.0	
Pedestrian Calls (#/hr)	0		0	0	0	
Act Effct Green (s)	43.7			43.7	8.5	
Actuated g/C Ratio	0.73			0.73	0.14	
v/c Ratio	0.57			0.42	0.45	
Control Delay	6.6			2.1	25.2	
Queue Delay	0.0			0.0	0.0	
Total Delay	6.6			2.1	25.2	
LOS	A			A	C	
Approach Delay	6.6			2.1	25.2	
Approach LOS	A			A	C	
Queue Length 50th (ft)	107			1	32	
Queue Length 95th (ft)	199			m2	68	
Internal Link Dist (ft)	1529			1211	239	
Turn Bay Length (ft)						
Base Capacity (vph)	2330			2138	712	
Starvation Cap Reductn	0			0	0	
Spillback Cap Reductn	0			0	0	
Storage Cap Reductn	0			0	0	
Reduced v/c Ratio	0.57			0.42	0.16	

Intersection Summary			
Area Type:	Other		
Cycle Length: 60			
Actuated Cycle Length: 60			
Offset: 26 (43%), Referenced to phase 2:EBT and 6:WBTL, Start of Yellow			
Natural Cycle: 60			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.57			
Intersection Signal Delay: 5.8		Intersection LOS: A	
Intersection Capacity Utilization 53.8%		ICU Level of Service A	
Analysis Period (min) 15			

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 11: Chapel Dr & Lancaster Ave

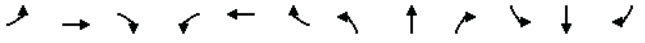


Queues
11: Chapel Dr & Lancaster Ave

3/10/2015

Lane Group	EBT	WBT	NBL
Lane Group Flow (vph)	1317	892	113
v/c Ratio	0.57	0.42	0.45
Control Delay	6.6	2.1	25.2
Queue Delay	0.0	0.0	0.0
Total Delay	6.6	2.1	25.2
Queue Length 50th (ft)	107	1	32
Queue Length 95th (ft)	199	m2	68
Internal Link Dist (ft)	1529	1211	239
Turn Bay Length (ft)			
Base Capacity (vph)	2330	2138	712
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.57	0.42	0.16

Intersection Summary
m Volume for 95th percentile queue is metered by upstream signal.



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	80	937	91	95	684	31	63	123	76	65	232	73
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width (ft)	10	10	10	10	10	10	10	10	10	10	10	10
Grade (%)		0%			3%			1%			0%	
Storage Length (ft)	140		0	70		0	105		0	65		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.987			0.993			0.943			0.964	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1565	3089	0	1541	3061	0	1557	1545	0	1565	1588	0
Flt Permitted	0.270			0.097			0.252			0.480		
Satd. Flow (perm)	445	3089	0	157	3061	0	413	1545	0	791	1588	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		35			35			25			25	
Link Distance (ft)		1291			2034			183			973	
Travel Time (s)		25.1			39.6			5.0			26.5	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	84	986	96	100	720	33	66	129	80	68	244	77
Shared Lane Traffic (%)												
Lane Group Flow (vph)	84	1082	0	100	753	0	66	209	0	68	321	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		10			10			10			10	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		10			10			10			10	
Two way Left Turn Lane												
Headway Factor	1.17	1.17	1.17	1.19	1.19	1.19	1.18	1.18	1.18	1.17	1.17	1.17
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	1		1	1		1	1		1	1	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (ft)	37	37		37	37		37	37		37	37	
Trailing Detector (ft)	-3	-3		-3	-3		-3	-3		-3	-3	
Detector 1 Position(ft)	-3	-3		-3	-3		-3	-3		-3	-3	
Detector 1 Size(ft)	40	40		40	40		40	40		40	40	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2			6			8			4		
Detector Phase	5	2		1	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	3.0	34.0		3.0	34.0		3.0	3.0		3.0	3.0	
Minimum Split (s)	13.0	40.0		13.0	40.0		13.0	13.0		13.0	13.0	

Lane Group	ø9
Lane Configurations	
Volume (vph)	
Ideal Flow (vphpl)	
Lane Width (ft)	
Grade (%)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Lane Util. Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Enter Blocked Intersection	
Lane Alignment	
Median Width(ft)	
Link Offset(ft)	
Crosswalk Width(ft)	
Two way Left Turn Lane	
Headway Factor	
Turning Speed (mph)	
Number of Detectors	
Detector Template	
Leading Detector (ft)	
Trailing Detector (ft)	
Detector 1 Position(ft)	
Detector 1 Size(ft)	
Detector 1 Type	
Detector 1 Channel	
Detector 1 Extend (s)	
Detector 1 Queue (s)	
Detector 1 Delay (s)	
Turn Type	
Protected Phases	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	24.0
Minimum Split (s)	26.0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Split (s)	15.0	46.0		16.0	47.0		32.0	32.0		32.0	32.0	
Total Split (%)	12.5%	38.3%		13.3%	39.2%		26.7%	26.7%		26.7%	26.7%	
Maximum Green (s)	9.0	40.0		10.0	41.0		26.0	26.0		26.0	26.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.5	0.5		0.5	0.5		0.5	0.5		0.5	0.5	
Total Lost Time (s)	6.5	6.5		6.5	6.5		6.5	6.5		6.5	6.5	
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)	53.6	45.9		56.5	49.1		25.3	25.3		25.3	25.3	
Actuated g/C Ratio	0.45	0.38		0.47	0.41		0.21	0.21		0.21	0.21	
v/c Ratio	0.31	0.92		0.58	0.60		0.77	0.64		0.41	0.96	
Control Delay	22.0	50.1		36.6	26.8		94.2	53.4		49.4	87.8	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	22.0	50.1		36.6	26.8		94.2	53.4		49.4	87.8	
LOS	C	D		D	C		F	D		D	F	
Approach Delay		48.1			27.9			63.2			81.1	
Approach LOS		D			C			E			F	
Queue Length 50th (ft)	35	~500		49	196		48	149		46	247	
Queue Length 95th (ft)	m63	#640		m105	258		#131	234		94	#428	
Internal Link Dist (ft)		1211			1954			103			893	
Turn Bay Length (ft)	140			70			105			65		
Base Capacity (vph)	281	1182		183	1253		87	328		168	337	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.30	0.92		0.55	0.60		0.76	0.64		0.40	0.95	

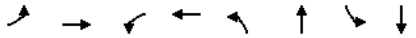
Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 120			
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow, Master Intersection			
Natural Cycle: 105			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.96			
Intersection Signal Delay: 48.0		Intersection LOS: D	
Intersection Capacity Utilization 78.9%		ICU Level of Service D	
Analysis Period (min) 15			

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 27: S Ithan Ave/N Ithan Ave & Lancaster Ave

Lane Group	ø9
Total Split (s)	26.0
Total Split (%)	22%
Maximum Green (s)	24.0
Yellow Time (s)	2.0
All-Red Time (s)	0.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0
Recall Mode	None
Walk Time (s)	9.0
Flash Dont Walk (s)	15.0
Pedestrian Calls (#/hr)	45
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	

Intersection Summary



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	84	1082	100	753	66	209	68	321
v/c Ratio	0.31	0.92	0.58	0.60	0.77	0.64	0.41	0.96
Control Delay	22.0	50.1	36.6	26.8	94.2	53.4	49.4	87.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	22.0	50.1	36.6	26.8	94.2	53.4	49.4	87.8
Queue Length 50th (ft)	35	~500	49	196	48	149	46	247
Queue Length 95th (ft)	m63	#640	m105	258	#131	234	94	#428
Internal Link Dist (ft)		1211		1954		103		893
Turn Bay Length (ft)	140		70		105		65	
Base Capacity (vph)	281	1182	183	1253	87	328	168	337
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.30	0.92	0.55	0.60	0.76	0.64	0.40	0.95

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

HCM 2010 Signalized Intersection Summary
51: Lowrys Ln & Lancaster Ave 3/10/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	2	1138	22	15	887	4	19	35	15	96	69	70
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	1782	1800	1773	1755	1773	1900	1881	1900	1881	1863	1881
Adj Flow Rate, veh/h	2	1237	24	16	964	4	21	38	16	104	75	76
Adj No. of Lanes	0	2	0	0	2	0	0	1	0	0	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	1	1	1	1	1	1	1	1	1	1	1	1
Cap, veh/h	61	2028	39	72	1993	8	134	206	71	191	109	92
Arrive On Green	0.81	0.81	0.81	0.61	0.61	0.61	0.19	0.19	0.19	0.19	0.19	0.19
Sat Flow, veh/h	1	3326	64	17	3269	13	299	1084	375	562	572	482
Grp Volume(v), veh/h	663	0	600	509	0	475	75	0	0	255	0	0
Grp Sat Flow(s),veh/h/ln	1781	0	1610	1704	0	1595	1758	0	0	1616	0	0
Q Serve(g_s), s	0.0	0.0	8.4	0.0	0.0	9.9	0.0	0.0	0.0	6.9	0.0	0.0
Cycle Q Clear(g_c), s	8.4	0.0	8.4	9.6	0.0	9.9	2.1	0.0	0.0	9.0	0.0	0.0
Prop In Lane	0.00		0.04	0.03		0.01	0.28		0.21	0.41		0.30
Lane Grp Cap(c), veh/h	1146	0	982	1101	0	972	411	0	0	392	0	0
V/C Ratio(X)	0.58	0.00	0.61	0.46	0.00	0.49	0.18	0.00	0.00	0.65	0.00	0.00
Avail Cap(c_a), veh/h	1146	0	982	1101	0	972	684	0	0	657	0	0
HCM Platoon Ratio	1.33	1.33	1.33	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.34	0.00	0.34	1.00	0.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	3.0	0.0	3.0	6.4	0.0	6.5	20.5	0.0	0.0	23.2	0.0	0.0
Incr Delay (d2), s/veh	0.7	0.0	1.0	1.4	0.0	1.8	0.2	0.0	0.0	1.8	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(-26165%),veh/ln	3.9	0.0	3.6	4.9	0.0	4.8	1.1	0.0	0.0	4.2	0.0	0.0
LnGrp Delay(d),s/veh	3.7	0.0	4.0	7.8	0.0	8.3	20.7	0.0	0.0	25.1	0.0	0.0
LnGrp LOS	A		A	A		A	C			C		
Approach Vol, veh/h		1263			984			75			255	
Approach Delay, s/veh		3.9			8.0			20.7			25.1	
Approach LOS		A			A			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		43.1		16.9		43.1		16.9
Change Period (Y+Rc), s		6.0		5.0		6.0		5.0
Max Green Setting (Gmax), s		27.0		22.0		27.0		22.0
Max Q Clear Time (g_c+I1), s		10.4		11.0		11.9		4.1
Green Ext Time (p_c), s		8.9		0.9		8.4		1.1

Intersection Summary		
HCM 2010 Ctrl Delay		8.0
HCM 2010 LOS		A

HCM 2010 Signalized Intersection Summary
16: Sproul Rd & Conestoga Rd 3/10/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (veh/h)	103	541	214	27	514	46	103	182	27	50	287	81
Number	7	4	14	3	8	18	1	6	16	5	2	12
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1782	1782	1800	1827	1827	1845	1773	1773	1791	1809	1791	1809
Adj Flow Rate, veh/h	108	569	0	28	541	0	108	192	28	53	302	85
Adj No. of Lanes	1	1	0	1	1	0	1	1	0	0	1	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	1	1	1	1	1	1	1	1	1	1	1	1
Cap, veh/h	241	832	0	279	632	0	297	589	86	86	308	82
Arrive On Green	0.05	0.47	0.00	0.35	0.35	0.00	0.06	0.39	0.39	0.26	0.26	0.26
Sat Flow, veh/h	1697	1782	0	869	1827	0	1689	1514	221	138	1203	321
Grp Volume(v), veh/h	108	569	0	28	541	0	108	0	220	440	0	0
Grp Sat Flow(s),veh/h/ln	1697	1782	0	869	1827	0	1689	0	1734	1662	0	0
Q Serve(g_s), s	3.1	20.0	0.0	2.1	22.0	0.0	3.6	0.0	7.1	14.4	0.0	0.0
Cycle Q Clear(g_c), s	3.1	20.0	0.0	12.4	22.0	0.0	3.6	0.0	7.1	20.5	0.0	0.0
Prop In Lane	1.00		0.00	1.00		0.00	1.00		0.13	0.12		0.19
Lane Grp Cap(c), veh/h	241	832	0	279	632	0	297	0	675	476	0	0
V/C Ratio(X)	0.45	0.68	0.00	0.10	0.86	0.00	0.36	0.00	0.33	0.92	0.00	0.00
Avail Cap(c_a), veh/h	289	832	0	279	632	0	336	0	715	476	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	18.3	16.7	0.0	25.3	24.3	0.0	18.7	0.0	17.1	30.0	0.0	0.0
Incr Delay (d2), s/veh	1.3	4.5	0.0	0.7	14.0	0.0	0.7	0.0	0.3	23.8	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(-26165%),veh/ln	1.5	10.8	0.0	0.6	13.6	0.0	1.7	0.0	3.4	12.8	0.0	0.0
LnGrp Delay(d),s/veh	19.6	21.2	0.0	26.1	38.3	0.0	19.4	0.0	17.4	53.8	0.0	0.0
LnGrp LOS	B	C		C	D		B		B	D		
Approach Vol, veh/h		677			569			328			440	
Approach Delay, s/veh		21.0			37.7			18.0			53.8	
Approach LOS		C			D			B			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4		6	7	8
Phs Duration (G+Y+Rc), s	10.6	26.5		42.9		37.1	9.7	33.2
Change Period (Y+Rc), s	5.5	5.5		5.0		5.5	5.0	5.0
Max Green Setting (Gmax), s	7.0	21.0		36.0		33.5	7.0	24.0
Max Q Clear Time (g_c+I1), s	5.6	22.5		22.0		9.1	5.1	24.0
Green Ext Time (p_c), s	0.0	0.0		6.0		2.4	0.0	0.0

Intersection Summary		
HCM 2010 Ctrl Delay		32.4
HCM 2010 LOS		C

HCM 2010 Signalized Intersection Summary
25: S Ithan Ave & Conestoga Rd 3/10/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	63	512	7	11	462	39	7	18	6	52	86	134
Number	1	6	16	5	2	12	7	4	14	3	8	18
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	1854	1836	1854	1764	1747	1764	1763	1745	1763	1844	1826	1844
Adj Flow Rate, veh/h	72	582	8	12	525	44	8	20	7	59	98	152
Adj No. of Lanes	0	1	0	0	1	0	0	1	0	0	1	0
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Percent Heavy Veh, %	1	1	1	1	1	1	1	1	1	1	1	1
Cap, veh/h	147	742	10	91	726	60	148	264	77	148	145	186
Arrive On Green	0.46	0.46	0.46	0.46	0.46	0.46	0.23	0.23	0.23	0.23	0.23	0.23
Sat Flow, veh/h	116	1606	21	11	1571	130	188	1134	331	206	621	800
Grp Volume(v), veh/h	662	0	0	581	0	0	35	0	0	309	0	0
Grp Sat Flow(s),veh/h/ln	1743	0	0	1712	0	0	1653	0	0	1627	0	0
Q Serve(g_s), s	1.8	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	13.4	0.0	0.0	11.7	0.0	0.0	0.7	0.0	0.0	7.6	0.0	0.0
Prop In Lane	0.11		0.01	0.02		0.08	0.23		0.20	0.19		0.49
Lane Grp Cap(c), veh/h	899	0	0	877	0	0	489	0	0	479	0	0
V/C Ratio(X)	0.74	0.00	0.00	0.66	0.00	0.00	0.07	0.00	0.00	0.64	0.00	0.00
Avail Cap(c_a), veh/h	1275	0	0	1264	0	0	825	0	0	839	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	9.7	0.0	0.0	9.3	0.0	0.0	12.8	0.0	0.0	15.4	0.0	0.0
Incr Delay (d2), s/veh	1.4	0.0	0.0	0.9	0.0	0.0	0.1	0.0	0.0	1.5	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(-26165%),veh/ln	6.8	0.0	0.0	5.7	0.0	0.0	0.3	0.0	0.0	3.6	0.0	0.0
LnGrp Delay(d),s/veh	11.0	0.0	0.0	10.2	0.0	0.0	12.9	0.0	0.0	16.9	0.0	0.0
LnGrp LOS	B			B			B			B		
Approach Vol, veh/h		662			581			35			309	
Approach Delay, s/veh		11.0			10.2			12.9			16.9	
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		26.2		16.4		26.2		16.4
Change Period (Y+Rc), s		6.0		6.0		6.0		6.0
Max Green Setting (Gmax), s		30.0		20.0		30.0		20.0
Max Q Clear Time (g_c+I1), s		13.7		2.7		15.4		9.6
Green Ext Time (p_c), s		5.0		1.2		4.8		1.0

Intersection Summary	
HCM 2010 Ctrl Delay	11.9
HCM 2010 LOS	B

HCM 2010 Signalized Intersection Summary
33: Williams Rd/Garrett Ave & Conestoga Rd 3/10/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (veh/h)	26	488	9	12	486	28	16	1	11	27	12	51
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	1872	1872	1872	1872	1872	1872	1800	1800	1800	1728	1728	1728
Adj Flow Rate, veh/h	28	530	10	13	528	30	17	1	12	29	13	55
Adj No. of Lanes	0	1	0	0	1	0	0	1	0	0	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	0	0	0	0	0	0	0	0	0	0	0	0
Cap, veh/h	93	1208	22	73	1193	67	155	27	56	110	26	71
Arrive On Green	0.69	0.69	0.69	0.69	0.69	0.69	0.08	0.08	0.08	0.08	0.08	0.08
Sat Flow, veh/h	39	1753	32	13	1732	97	675	317	661	335	310	845
Grp Volume(v), veh/h	568	0	0	571	0	0	30	0	0	97	0	0
Grp Sat Flow(s),veh/h/ln	1824	0	0	1841	0	0	1653	0	0	1490	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	2.5	0.0	0.0
Cycle Q Clear(g_c), s	7.8	0.0	0.0	7.9	0.0	0.0	1.0	0.0	0.0	3.6	0.0	0.0
Prop In Lane	0.05		0.02	0.02		0.05	0.57		0.40	0.30		0.57
Lane Grp Cap(c), veh/h	1323	0	0	1333	0	0	237	0	0	207	0	0
V/C Ratio(X)	0.43	0.00	0.00	0.43	0.00	0.00	0.13	0.00	0.00	0.47	0.00	0.00
Avail Cap(c_a), veh/h	1323	0	0	1333	0	0	604	0	0	582	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	4.0	0.0	0.0	4.0	0.0	0.0	24.5	0.0	0.0	25.7	0.0	0.0
Incr Delay (d2), s/veh	1.0	0.0	0.0	1.0	0.0	0.0	0.3	0.0	0.0	2.3	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(-26165%),veh/ln	4.3	0.0	0.0	4.3	0.0	0.0	0.5	0.0	0.0	1.6	0.0	0.0
LnGrp Delay(d),s/veh	5.0	0.0	0.0	5.0	0.0	0.0	24.8	0.0	0.0	28.0	0.0	0.0
LnGrp LOS	A			A			C			C		
Approach Vol, veh/h		568			571			30			97	
Approach Delay, s/veh		5.0			5.0			24.8			28.0	
Approach LOS		A			A			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		46.0		11.3		46.0		11.3
Change Period (Y+Rc), s		6.0		6.0		6.0		6.0
Max Green Setting (Gmax), s		40.0		20.0		40.0		20.0
Max Q Clear Time (g_c+I1), s		9.8		5.6		9.9		3.0
Green Ext Time (p_c), s		5.3		0.5		5.3		0.5

Intersection Summary	
HCM 2010 Ctrl Delay	7.2
HCM 2010 LOS	A

HCM 2010 Signalized Intersection Summary
3: County Line Rd & Spring Mill Rd 3/10/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	63	300	93	55	240	51	71	199	37	64	390	44
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	1789	1800	1800	1766	1800	1800	1800	1800	1800	1773	1800
Adj Flow Rate, veh/h	88	333	108	76	276	80	88	255	56	84	438	64
Adj No. of Lanes	0	1	0	0	1	0	0	1	0	0	1	0
Peak Hour Factor	0.72	0.90	0.86	0.72	0.87	0.64	0.81	0.78	0.66	0.76	0.89	0.69
Percent Heavy Veh, %	1	1	1	3	3	3	0	0	0	1	1	1
Cap, veh/h	144	416	126	139	405	108	155	390	77	134	507	70
Arrive On Green	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39
Sat Flow, veh/h	190	1069	323	175	1043	277	207	987	195	167	1286	178
Grp Volume(v), veh/h	529	0	0	432	0	0	399	0	0	586	0	0
Grp Sat Flow(s),veh/h/ln	1582	0	0	1495	0	0	1389	0	0	1631	0	0
Q Serve(g_s), s	3.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.5	0.0	0.0
Cycle Q Clear(g_c), s	18.3	0.0	0.0	14.4	0.0	0.0	13.7	0.0	0.0	20.3	0.0	0.0
Prop In Lane	0.17		0.20	0.18		0.19	0.22		0.14	0.14		0.11
Lane Grp Cap(c), veh/h	685	0	0	652	0	0	621	0	0	712	0	0
V/C Ratio(X)	0.77	0.00	0.00	0.66	0.00	0.00	0.64	0.00	0.00	0.82	0.00	0.00
Avail Cap(c_a), veh/h	685	0	0	652	0	0	811	0	0	920	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)	0.09	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	16.6	0.0	0.0	15.3	0.0	0.0	14.6	0.0	0.0	16.9	0.0	0.0
Incr Delay (d2), s/veh	0.8	0.0	0.0	5.2	0.0	0.0	0.4	0.0	0.0	3.7	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(-26165%),veh/ln	8.1	0.0	0.0	6.9	0.0	0.0	5.5	0.0	0.0	9.9	0.0	0.0
LnGrp Delay(d),s/veh	17.4	0.0	0.0	20.5	0.0	0.0	15.0	0.0	0.0	20.7	0.0	0.0
LnGrp LOS	B			C			B			C		
Approach Vol, veh/h		529			432			399			586	
Approach Delay, s/veh		17.4			20.5			15.0			20.7	
Approach LOS		B			C			B			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		29.8		30.2		29.8		30.2
Change Period (Y+Rc), s		6.0		6.0		6.0		6.0
Max Green Setting (Gmax), s		16.0		32.0		16.0		32.0
Max Q Clear Time (g_c+I1), s		20.3		22.3		16.4		15.7
Green Ext Time (p_c), s		0.0		1.9		0.0		2.2

Intersection Summary	
HCM 2010 Ctrl Delay	18.6
HCM 2010 LOS	B

HCM 2010 TWSC
79: Garrett Rd & Lancaster Ave 3/10/2015

Intersection	
Int Delay, s/veh	1.4

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	1203	46	47	900	0	37
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, %	-3	-	-	3	0	-
Peak Hour Factor	82	82	82	82	82	82
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	1467	56	57	1098	0	45

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	1523	0	2158	762
Stage 1	-	-	-	-	1495	-
Stage 2	-	-	-	-	663	-
Critical Hdwy	-	-	4.1	-	6.8	6.9
Critical Hdwy Stg 1	-	-	-	-	5.8	-
Critical Hdwy Stg 2	-	-	-	-	5.8	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	444	-	42	352
Stage 1	-	-	-	-	175	-
Stage 2	-	-	-	-	480	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	444	-	28	352
Mov Cap-2 Maneuver	-	-	-	-	28	-
Stage 1	-	-	-	-	175	-
Stage 2	-	-	-	-	322	-

Approach	EB	WB	NB
HCM Control Delay, s	0	2.7	16.7
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	352	-	-	444	-
HCM Lane V/C Ratio	0.128	-	-	0.129	-
HCM Control Delay (s)	16.7	-	-	14.3	2.1
HCM Lane LOS	C	-	-	B	A
HCM 95th %tile Q(veh)	0.4	-	-	0.4	-

Intersection	
Int Delay, s/veh	0.5

Movement	EBL	EBT	WBT	WBR	SWL	SWR
Vol, veh/h	10	646	607	3	17	9
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	96	96	96	96	96	96
Heavy Vehicles, %	1	1	1	1	1	1
Mvmt Flow	10	673	632	3	18	9

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	635	0	-	0	1328	634
Stage 1	-	-	-	-	634	-
Stage 2	-	-	-	-	694	-
Critical Hdwy	4.11	-	-	-	6.41	6.21
Critical Hdwy Stg 1	-	-	-	-	5.41	-
Critical Hdwy Stg 2	-	-	-	-	5.41	-
Follow-up Hdwy	2.209	-	-	-	3.509	3.309
Pot Cap-1 Maneuver	953	-	-	-	172	481
Stage 1	-	-	-	-	530	-
Stage 2	-	-	-	-	498	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	953	-	-	-	169	481
Mov Cap-2 Maneuver	-	-	-	-	169	-
Stage 1	-	-	-	-	530	-
Stage 2	-	-	-	-	490	-

Approach	EB	WB	SW
HCM Control Delay, s	0.1	0	23.8
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SWLn1
Capacity (veh/h)	953	-	-	-	218
HCM Lane V/C Ratio	0.011	-	-	-	0.124
HCM Control Delay (s)	8.8	0	-	-	23.8
HCM Lane LOS	A	A	-	-	C
HCM 95th %tile Q(veh)	0	-	-	-	0.4

Intersection	
Int Delay, s/veh	2.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	36	494	17	17	456	16	15	8	17	9	17	52
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	96	96	96	96	96	96	96	96	96	96	96	96
Heavy Vehicles, %	1	1	1	1	1	1	1	1	1	1	1	1
Mvmt Flow	38	515	18	18	475	17	16	8	18	9	18	54

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	492	0	0	532	0	0	1153	1125	523	1130	1126	483
Stage 1	-	-	-	-	-	-	598	598	-	519	519	-
Stage 2	-	-	-	-	-	-	555	527	-	611	607	-
Critical Hdwy	4.11	-	-	4.11	-	-	7.11	6.51	6.21	7.11	6.51	6.21
Critical Hdwy Stg 1	-	-	-	-	-	-	6.11	5.51	-	6.11	5.51	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.11	5.51	-	6.11	5.51	-
Follow-up Hdwy	2.209	-	-	2.209	-	-	3.509	4.009	3.309	3.509	4.009	3.309
Pot Cap-1 Maneuver	1077	-	-	1041	-	-	175	206	556	182	206	586
Stage 1	-	-	-	-	-	-	491	492	-	542	534	-
Stage 2	-	-	-	-	-	-	518	530	-	483	488	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1077	-	-	1041	-	-	139	191	556	161	191	586
Mov Cap-2 Maneuver	-	-	-	-	-	-	139	191	-	161	191	-
Stage 1	-	-	-	-	-	-	466	467	-	515	521	-
Stage 2	-	-	-	-	-	-	443	517	-	436	464	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.6	0.3	24.9	19.2
HCM LOS			C	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	222	1077	-	-	1041	-	-	334
HCM Lane V/C Ratio	0.188	0.035	-	-	0.017	-	-	0.243
HCM Control Delay (s)	24.9	8.5	0	-	8.5	0	-	19.2
HCM Lane LOS	C	A	A	-	A	A	-	C
HCM 95th %tile Q(veh)	0.7	0.1	-	-	0.1	-	-	0.9

Lanes, Volumes, Timings
38: County Line Rd & N Ithan Ave 3/10/2015

Lane Group	NBT	NBR	SBL	SBT	SWL	SWR
Lane Configurations						
Volume (vph)	264	115	179	483	112	61
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.959				0.952	
Flt Protected				0.987	0.969	
Satd. Flow (prot)	1804	0	0	1857	1735	0
Flt Permitted				0.987	0.969	
Satd. Flow (perm)	1804	0	0	1857	1735	0
Link Speed (mph)	30			30	30	
Link Distance (ft)	295			1901	824	
Travel Time (s)	6.7			43.2	18.7	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%
Adj. Flow (vph)	281	122	190	514	119	65
Shared Lane Traffic (%)						
Lane Group Flow (vph)	403	0	0	704	184	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	0			0	12	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	10			10	10	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)		9	15		15	9
Sign Control	Free			Stop	Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	76.2%	ICU Level of Service	D
Analysis Period (min)	15		

Lanes, Volumes, Timings
2: County Line Rd & N Ithan Ave 3/10/2015

Lane Group	EBL	EBR	SBL	SBR	NWL	NWR
Lane Configurations						
Volume (vph)	218	36	296	302	23	159
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.981		0.932		0.882	
Flt Protected	0.959		0.976		0.994	
Satd. Flow (prot)	1763	0	1711	0	1649	0
Flt Permitted	0.959		0.976		0.994	
Satd. Flow (perm)	1763	0	1711	0	1649	0
Link Speed (mph)	30		30		30	
Link Distance (ft)	973		295		2014	
Travel Time (s)	22.1		6.7		45.8	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%
Bus Blockages (#/hr)	1	0	0	0	0	0
Adj. Flow (vph)	232	38	315	321	24	169
Shared Lane Traffic (%)						
Lane Group Flow (vph)	270	0	636	0	193	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Right
Median Width(ft)	22		12		12	
Link Offset(ft)	0		0		0	
Crosswalk Width(ft)	10		10		10	
Two way Left Turn Lane						
Headway Factor	1.01	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9	15	9	15	9
Sign Control	Stop		Free		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	70.3%	ICU Level of Service	C
Analysis Period (min)	15		

Intersection	
Int Delay, s/veh	1.5

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	16	18	51	179	153	122
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	0	0	0	0
Mvmt Flow	17	19	53	186	159	127

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	516	223	286	0	-	0
Stage 1	223	-	-	-	-	-
Stage 2	293	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	523	822	1288	-	-	-
Stage 1	819	-	-	-	-	-
Stage 2	762	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	499	822	1288	-	-	-
Mov Cap-2 Maneuver	499	-	-	-	-	-
Stage 1	819	-	-	-	-	-
Stage 2	727	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	11.1	1.8	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1288	-	630	-	-
HCM Lane V/C Ratio	0.041	-	0.056	-	-
HCM Control Delay (s)	7.9	0	11.1	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0.1	-	0.2	-	-

Intersection	
Int Delay, s/veh	3.5

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	166	211	338	16	12	116
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	98	98	98	98	98	98
Heavy Vehicles, %	1	1	1	1	1	1
Mvmt Flow	169	215	345	16	12	118

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	361	0	-	0	907	353
Stage 1	-	-	-	-	353	-
Stage 2	-	-	-	-	554	-
Critical Hdwy	4.11	-	-	-	6.41	6.21
Critical Hdwy Stg 1	-	-	-	-	5.41	-
Critical Hdwy Stg 2	-	-	-	-	5.41	-
Follow-up Hdwy	2.209	-	-	-	3.509	3.309
Pot Cap-1 Maneuver	1203	-	-	-	307	693
Stage 1	-	-	-	-	713	-
Stage 2	-	-	-	-	577	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1203	-	-	-	258	693
Mov Cap-2 Maneuver	-	-	-	-	258	-
Stage 1	-	-	-	-	713	-
Stage 2	-	-	-	-	485	-

Approach	EB	WB	SB
HCM Control Delay, s	3.7	0	12.7
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1203	-	-	-	598
HCM Lane V/C Ratio	0.141	-	-	-	0.218
HCM Control Delay (s)	8.5	0	-	-	12.7
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.5	-	-	-	0.8

HCM 2010 TWSC
43: County Line Rd & Roberts Rd 3/10/2015

Intersection													
Int Delay, s/veh	3												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Vol, veh/h	36	25	1	9	25	11	4	501	28	11	641	59	
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0	
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free	
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None	
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-	
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-	
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-	
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95	
Heavy Vehicles, %	1	1	1	1	1	1	1	1	1	1	1	1	
Mvmt Flow	38	26	1	9	26	12	4	527	29	12	675	62	
Major/Minor	Minor2			Minor1			Major1			Major2			
Conflicting Flow All	1014	1294	368	925	1311	278	737	0	0	557	0	0	
Stage 1	729	729	-	551	551	-	-	-	-	-	-	-	
Stage 2	285	565	-	374	760	-	-	-	-	-	-	-	
Critical Hdwy	7.52	6.52	6.92	7.52	6.52	6.92	4.12	-	-	4.12	-	-	
Critical Hdwy Stg 1	6.52	5.52	-	6.52	5.52	-	-	-	-	-	-	-	
Critical Hdwy Stg 2	6.52	5.52	-	6.52	5.52	-	-	-	-	-	-	-	
Follow-up Hdwy	3.51	4.01	3.31	3.51	4.01	3.31	2.21	-	-	2.21	-	-	
Pot Cap-1 Maneuver	194	163	632	225	159	722	871	-	-	1017	-	-	
Stage 1	383	429	-	489	516	-	-	-	-	-	-	-	
Stage 2	701	509	-	622	415	-	-	-	-	-	-	-	
Platoon blocked, %								-	-		-	-	
Mov Cap-1 Maneuver	163	159	632	192	155	722	871	-	-	1017	-	-	
Mov Cap-2 Maneuver	163	159	-	192	155	-	-	-	-	-	-	-	
Stage 1	380	420	-	486	512	-	-	-	-	-	-	-	
Stage 2	650	505	-	570	407	-	-	-	-	-	-	-	

Approach	EB	WB	NB	SB
HCM Control Delay, s	41.1	28.3	0.1	0.2
HCM LOS	E	D		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	871	-	-	163	201	1017	-	-
HCM Lane V/C Ratio	0.005	-	-	0.4	0.236	0.011	-	-
HCM Control Delay (s)	9.2	0	-	41.1	28.3	8.6	0.1	-
HCM Lane LOS	A	A	-	E	D	A	A	-
HCM 95th %tile Q(veh)	0	-	-	1.8	0.9	0	-	-

HCM 2010 TWSC
61: Dwy/Aldwyn Ln & S Ithan Ave 3/10/2015

Intersection													
Int Delay, s/veh	2.4												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Vol, veh/h	34	130	5	51	267	21	8	3	37	4	0	13	
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0	
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop	
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None	
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-	
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-	
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-	
Peak Hour Factor	91	91	91	91	91	91	91	91	91	91	91	91	
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	
Mvmt Flow	37	143	5	56	293	23	9	3	41	4	0	14	
Major/Minor	Major1			Major2			Minor1			Minor2			
Conflicting Flow All	316	0	0	148	0	0	644	649	146	659	640	305	
Stage 1	-	-	-	-	-	-	220	220	-	417	417	-	
Stage 2	-	-	-	-	-	-	424	429	-	242	223	-	
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22	
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-	
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-	
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318	
Pot Cap-1 Maneuver	1244	-	-	1434	-	-	386	389	901	377	393	735	
Stage 1	-	-	-	-	-	-	782	721	-	613	591	-	
Stage 2	-	-	-	-	-	-	608	584	-	762	719	-	
Platoon blocked, %		-	-		-	-							
Mov Cap-1 Maneuver	1244	-	-	1434	-	-	356	358	901	336	362	735	
Mov Cap-2 Maneuver	-	-	-	-	-	-	356	358	-	336	362	-	
Stage 1	-	-	-	-	-	-	757	698	-	593	563	-	
Stage 2	-	-	-	-	-	-	568	556	-	701	696	-	

Approach	EB	WB	NB	SB
HCM Control Delay, s	1.6	1.1	10.9	11.5
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	667	1244	-	-	1434	-	-	574
HCM Lane V/C Ratio	0.079	0.03	-	-	0.039	-	-	0.033
HCM Control Delay (s)	10.9	8	0	-	7.6	0	-	11.5
HCM Lane LOS	B	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	0.3	0.1	-	-	0.1	-	-	0.1

Lane Group	EBL2	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR	WBR2	NBL2	NBL
Lane Configurations												
Volume (vph)	2	227	848	85	222	4	11	970	1	13	3	50
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width (ft)	10	10	11	11	14	10	12	12	12	12	10	10
Grade (%)			3%					-2%				
Storage Length (ft)		300		0			75		0			0
Storage Lanes		1		1			1		0			0
Taper Length (ft)		25					25					25
Lane Util. Factor	0.95	1.00	0.95	0.95	1.00	0.95	1.00	0.95	0.95	0.95	1.00	1.00
Frt			0.986		0.850			0.998				
Flt Protected		0.950					0.950					
Satd. Flow (prot)	0	1497	3058	0	1531	0	1645	3283	0	0	0	0
Flt Permitted		0.075					0.282					
Satd. Flow (perm)	0	118	3058	0	1531	0	488	3283	0	0	0	0
Right Turn on Red					Yes					Yes		
Satd. Flow (RTOR)					202			1				
Link Speed (mph)			35					35				
Link Distance (ft)			577					1609				
Travel Time (s)			11.2					31.3				
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Adj. Flow (vph)	2	236	883	89	231	4	11	1010	1	14	3	52
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	238	972	0	231	0	15	1025	0	0	0	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Right	Left	Left	Left	Right	Right	Left	Left
Median Width(ft)			12					12				
Link Offset(ft)			0					0				
Crosswalk Width(ft)			10					10				
Two way Left Turn Lane												
Headway Factor	1.19	1.19	1.14	1.14	1.01	1.16	1.06	1.06	1.06	1.06	1.18	1.18
Turning Speed (mph)	15	15		9	9	15	15		9	9	15	15
Number of Detectors	1	1	1		0	1	1	1			1	1
Detector Template	Left	Left	Thru		Right	Left	Left	Thru			Left	Left
Leading Detector (ft)	20	37	37		0	20	37	37			20	20
Trailing Detector (ft)	0	-3	-3		0	0	-3	-3			0	0
Detector 1 Position(ft)	0	-3	-3		0	0	-3	-3			0	0
Detector 1 Size(ft)	20	40	40		37	20	40	40			20	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex			Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0		0.0	0.0	0.0	0.0			0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0		0.0	0.0	0.0	0.0			0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0		0.0	0.0	0.0	0.0			0.0	0.0
Turn Type	pm+pt	pm+pt	NA		Perm	Perm	Perm	NA			Perm	Perm
Protected Phases	5	5	2					6				
Permitted Phases	2	2			2	6	6				10	10
Detector Phase	5	5	2		2	6	6	6			10	10
Switch Phase												
Minimum Initial (s)	3.0	3.0	15.0		15.0	15.0	15.0	15.0			3.0	3.0

Lanes, Volumes, Timings
7: Sproul Rd/Spring Mill Rd & Aldwyn Ln/Kenilworth Rd & Lancaster Ave 3/9/2015

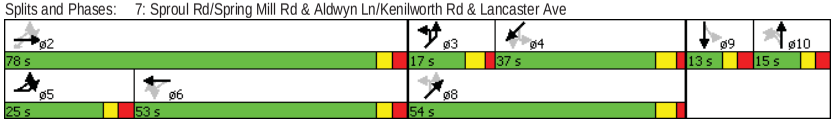
Lane Group	NBT	NBR	SBT	SBR	SBR2	NEL2	NEL	NET	NER	NER2	SWL2	SWL
Lane Configurations												
Volume (vph)	0	8	1	3	12	184	0	196	51	9	19	8
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width (ft)	10	10	10	10	10	12	12	11	11	11	10	10
Grade (%)	1%		-3%					3%				
Storage Length (ft)		0		0			200		0			150
Storage Lanes		0		0			1		0			1
Taper Length (ft)							25					25
Lane Util. 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
Frt	0.983		0.873					0.965				
Flt Protected	0.958						0.950					0.950
Satd. Flow (prot)	1499	0	1418	0	0	0	1604	1575	0	0	0	1573
Flt Permitted	0.742						0.179					0.595
Satd. Flow (perm)	1161	0	1418	0	0	0	302	1575	0	0	0	985
Right Turn on Red					No					No		
Satd. Flow (RTOR)												
Link Speed (mph)	25		25					40				
Link Distance (ft)	492		597					1336				
Travel Time (s)	13.4		16.3					22.8				
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Adj. Flow (vph)	0	8	1	3	12	192	0	204	53	9	20	8
Shared Lane Traffic (%)												
Lane Group Flow (vph)	63	0	16	0	0	0	192	266	0	0	0	28
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Right	Left	Left	Left	Right	Right	Left	Left
Median Width(ft)	0		0					12				
Link Offset(ft)	0		0					0				
Crosswalk Width(ft)	10		10					10				
Two way Left Turn Lane												
Headway Factor	1.18	1.18	1.15	1.15	1.15	1.09	1.09	1.14	1.14	1.14	1.12	1.12
Turning Speed (mph)		9		9	9	15	15		9	9	15	15
Number of Detectors	1		1			1	1	1			1	1
Detector Template	Thru		Thru			Left	Left	Thru			Left	Left
Leading Detector (ft)	37		37			20	37	37			20	37
Trailing Detector (ft)	-3		-3			0	-3	-3			0	-3
Detector 1 Position(ft)	-3		-3			0	-3	-3			0	-3
Detector 1 Size(ft)	40		40			20	40	40			20	40
Detector 1 Type	Cl+Ex		Cl+Ex			Cl+Ex	Cl+Ex	Cl+Ex			Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0		0.0			0.0	0.0	0.0			0.0	0.0
Detector 1 Queue (s)	0.0		0.0			0.0	0.0	0.0			0.0	0.0
Detector 1 Delay (s)	0.0		0.0			0.0	0.0	0.0			0.0	0.0
Turn Type	NA		NA			pm+pt	pm+pt	NA			Perm	Perm
Protected Phases	10		9			3	3	8				
Permitted Phases						8	8				4	4
Detector Phase	10		9			3	3	8			4	4
Switch Phase												
Minimum Initial (s)	3.0		3.0			3.0	3.0	3.0			3.0	3.0

Lane Group	SWT	SWR
Lane Configurations		
Volume (vph)	135	157
Ideal Flow (vphpl)	1800	1800
Lane Width (ft)	10	10
Grade (%)	-7%	
Storage Length (ft)		0
Storage Lanes		0
Taper Length (ft)		
Lane Util. Factor	1.00	1.00
Frt	0.919	
Flt Protected		
Satd. Flow (prot)	1522	0
Flt Permitted		
Satd. Flow (perm)	1522	0
Right Turn on Red		
Satd. Flow (RTOR)		
Link Speed (mph)	25	
Link Distance (ft)	3168	
Travel Time (s)	86.4	
Peak Hour Factor	0.96	0.96
Heavy Vehicles (%)	5%	5%
Adj. Flow (vph)	141	164
Shared Lane Traffic (%)		
Lane Group Flow (vph)	305	0
Enter Blocked Intersection	No	No
Lane Alignment	Left	Right
Median Width(ft)	12	
Link Offset(ft)	0	
Crosswalk Width(ft)	10	
Two way Left Turn Lane		
Headway Factor	1.12	1.12
Turning Speed (mph)		9
Number of Detectors	1	
Detector Template	Thru	
Leading Detector (ft)	37	
Trailing Detector (ft)	-3	
Detector 1 Position(ft)	-3	
Detector 1 Size(ft)	40	
Detector 1 Type	Cl+Ex	
Detector 1 Channel		
Detector 1 Extend (s)	0.0	
Detector 1 Queue (s)	0.0	
Detector 1 Delay (s)	0.0	
Turn Type	NA	
Protected Phases	4	
Permitted Phases		
Detector Phase	4	
Switch Phase		
Minimum Initial (s)	3.0	

Lane Group	EBL2	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR	WBR2	NBL2	NBL
Minimum Split (s)	13.0	13.0	21.0		21.0	21.0	21.0	21.0			13.0	13.0
Total Split (s)	25.0	25.0	78.0		78.0	53.0	53.0	53.0			15.0	15.0
Total Split (%)	15.6%	15.6%	48.8%		48.8%	33.1%	33.1%	33.1%			9.4%	9.4%
Maximum Green (s)	19.0	19.0	72.0		72.0	47.0	47.0	47.0			9.0	9.0
Yellow Time (s)	3.0	3.0	3.0		3.0	3.0	3.0	3.0			3.0	3.0
All-Red Time (s)	3.0	3.0	3.0		3.0	3.0	3.0	3.0			3.0	3.0
Lost Time Adjust (s)		0.5	0.5		0.5		0.5	0.5				
Total Lost Time (s)		6.5	6.5		6.5		6.5	6.5				
Lead/Lag	Lead	Lead				Lag	Lag	Lag			Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0	3.0	3.0			3.0	3.0
Recall Mode	None	None	Max		Max	None	None	None			None	None
Walk Time (s)			7.0		7.0	7.0	7.0	7.0				
Flash Dont Walk (s)			20.0		20.0	20.0	20.0	20.0				
Pedestrian Calls (#/hr)			0		0	0	0	0				
Act Effct Green (s)		71.6	71.6		71.6		46.6	46.6				
Actuated g/C Ratio		0.47	0.47		0.47		0.31	0.31				
v/c Ratio		1.07	0.68		0.28		0.10	1.02				
Control Delay		121.8	34.9		5.7		42.6	84.7				
Queue Delay		0.0	0.0		0.0		0.0	0.0				
Total Delay		121.8	34.9		5.7		42.6	84.7				
LOS		F	C		A		D	F				
Approach Delay			44.6					84.1				
Approach LOS			D					F				

Intersection Summary			
Area Type:	Other		
Cycle Length: 160			
Actuated Cycle Length: 152.2			
Natural Cycle: 150			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 1.07			
Intersection Signal Delay: 70.4		Intersection LOS: E	
Intersection Capacity Utilization 107.9%		ICU Level of Service G	
Analysis Period (min) 15			

Splits and Phases: 7: Sproul Rd/Spring Mill Rd & Aldwyn Ln/Kenilworth Rd & Lancaster Ave



Lane Group	NBT	NBR	SBT	SBR	SBR2	NEL2	NEL	NET	NER	NER2	SWL2	SWL
Minimum Split (s)	13.0		13.0			13.0	13.0	13.0			13.0	13.0
Total Split (s)	15.0		13.0			17.0	17.0	54.0			37.0	37.0
Total Split (%)	9.4%		8.1%			10.6%	10.6%	33.8%			23.1%	23.1%
Maximum Green (s)	9.0		7.0			11.0	11.0	48.0			31.0	31.0
Yellow Time (s)	3.0		3.0			4.0	4.0	4.0			4.0	4.0
All-Red Time (s)	3.0		3.0			2.0	2.0	2.0			2.0	2.0
Lost Time Adjust (s)	0.5		0.5				0.5	0.5				0.5
Total Lost Time (s)	6.5		6.5				6.5	6.5				6.5
Lead/Lag	Lag		Lead			Lead	Lead				Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0		3.0			3.0	3.0	3.0			3.0	3.0
Recall Mode	None		None			None	None	None			None	None
Walk Time (s)								7.0				
Flash Dont Walk (s)								25.0				
Pedestrian Calls (#/hr)								0				
Act Effct Green (s)	8.5		6.1				47.6	47.6				30.6
Actuated g/C Ratio	0.06		0.04				0.31	0.31				0.20
v/c Ratio	0.97		0.29				1.04	0.54				0.14
Control Delay	174.4		86.1				121.5	49.2				54.5
Queue Delay	0.0		0.0				0.0	0.0				0.0
Total Delay	174.4		86.1				121.5	49.2				54.5
LOS	F		F				F	D				D
Approach Delay	174.4		86.1					79.5				
Approach LOS	F		F					E				

Intersection Summary

Lane Group	SWT	SWR
Minimum Split (s)	13.0	
Total Split (s)	37.0	
Total Split (%)	23.1%	
Maximum Green (s)	31.0	
Yellow Time (s)	4.0	
All-Red Time (s)	2.0	
Lost Time Adjust (s)	0.5	
Total Lost Time (s)	6.5	
Lead/Lag	Lag	
Lead-Lag Optimize?		
Vehicle Extension (s)	3.0	
Recall Mode	None	
Walk Time (s)		
Flash Dont Walk (s)		
Pedestrian Calls (#/hr)		
Act Effct Green (s)	30.6	
Actuated g/C Ratio	0.20	
v/c Ratio	1.00	
Control Delay	111.2	
Queue Delay	0.0	
Total Delay	111.2	
LOS	F	
Approach Delay	106.5	
Approach LOS	F	

Intersection Summary

Queues
7: Sproul Rd/Spring Mill Rd & Aldwyn Ln/Kenilworth Rd & Lancaster Ave

3/9/2015

Lane Group	EBL	EBT	EBR2	WBL	WBT	NBT	SBT	NEL	NET	SWL	SWT
Lane Group Flow (vph)	238	972	231	15	1025	63	16	192	266	28	305
v/c Ratio	1.07	0.68	0.28	0.10	1.02	0.97	0.29	1.04	0.54	0.14	1.00
Control Delay	121.8	34.9	5.7	42.6	84.7	174.4	86.1	121.5	49.2	54.5	111.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	121.8	34.9	5.7	42.6	84.7	174.4	86.1	121.5	49.2	54.5	111.2
Queue Length 50th (ft)	~200	362	14	10	514	61	15	~143	208	22	293
Queue Length 95th (ft)	#428	513	71	33	#767	#178	44	#317	338	57	#546
Internal Link Dist (ft)		497			1529	412	517		1256		3088
Turn Bay Length (ft)	300			75				200		150	
Base Capacity (vph)	223	1439	827	149	1005	65	60	184	492	197	305
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.07	0.68	0.28	0.10	1.02	0.97	0.27	1.04	0.54	0.14	1.00

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Lanes, Volumes, Timings
11: Chapel Dr & Lancaster Ave

3/9/2015

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	929	95	11	991	9	4
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width (ft)	11	11	11	11	12	12
Lane Util. Factor	0.95	0.95	0.95	0.95	1.00	1.00
Frt	0.986				0.961	
Flt Protected				0.999	0.966	
Satd. Flow (prot)	3196	0	0	3238	1638	0
Flt Permitted				0.942	0.966	
Satd. Flow (perm)	3196	0	0	3053	1638	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	23				4	
Link Speed (mph)	35			35	25	
Link Distance (ft)	1609			1285	319	
Travel Time (s)	31.3			25.0	8.7	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1010	103	12	1077	10	4
Shared Lane Traffic (%)						
Lane Group Flow (vph)	1113	0	0	1089	14	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	12			12	12	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	10			10	10	
Two way Left Turn Lane						
Headway Factor	1.12	1.12	1.12	1.12	1.07	1.07
Turning Speed (mph)		9	15		15	9
Number of Detectors	1		1	1	1	
Detector Template	Thru		Left	Thru	Left	
Leading Detector (ft)	37		20	37	37	
Trailing Detector (ft)	-3		0	-3	-3	
Detector 1 Position(ft)	-3		0	-3	-3	
Detector 1 Size(ft)	40		20	40	40	
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	
Turn Type	NA		Perm	NA	Prot	
Protected Phases	2			6	8	
Permitted Phases			6			
Detector Phase	2		6	6	8	
Switch Phase						
Minimum Initial (s)	10.0		10.0	10.0	4.0	
Minimum Split (s)	21.0		21.0	21.0	28.0	
Total Split (s)	32.0		32.0	32.0	28.0	
Total Split (%)	53.3%		53.3%	53.3%	46.7%	
Maximum Green (s)	27.0		27.0	27.0	23.0	
Yellow Time (s)	3.0		3.0	3.0	3.0	

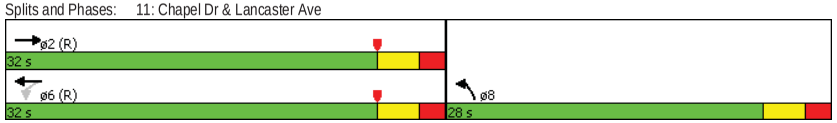
Lanes, Volumes, Timings
11: Chapel Dr & Lancaster Ave

3/9/2015

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
All-Red Time (s)	2.0		2.0	2.0	2.0	
Lost Time Adjust (s)	0.5			0.5	0.5	
Total Lost Time (s)	5.5			5.5	5.5	
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Recall Mode	C-Max		C-Max	C-Max	None	
Walk Time (s)	10.0		10.0	10.0	7.0	
Flash Dont Walk (s)	0.0		0.0	0.0	16.0	
Pedestrian Calls (#/hr)	0		0	0	0	
Act Effct Green (s)	56.5			56.5	5.6	
Actuated g/C Ratio	0.94			0.94	0.09	
v/c Ratio	0.37			0.38	0.09	
Control Delay	1.6			3.3	22.5	
Queue Delay	0.0			0.0	0.0	
Total Delay	1.6			3.3	22.5	
LOS	A			A	C	
Approach Delay	1.6			3.3	22.5	
Approach LOS	A			A	C	

Intersection Summary			
Area Type:	Other		
Cycle Length: 60			
Actuated Cycle Length: 60			
Offset: 55 (92%), Referenced to phase 2:EBT and 6:WBTL, Start of Yellow			
Natural Cycle: 60			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.38			
Intersection Signal Delay: 2.5		Intersection LOS: A	
Intersection Capacity Utilization 49.6%		ICU Level of Service A	
Analysis Period (min) 15			

Splits and Phases: 11: Chapel Dr & Lancaster Ave



Queues
11: Chapel Dr & Lancaster Ave

3/9/2015

Lane Group	EBT	WBT	NBL
Lane Group Flow (vph)	1113	1089	14
v/c Ratio	0.37	0.38	0.09
Control Delay	1.6	3.3	22.5
Queue Delay	0.0	0.0	0.0
Total Delay	1.6	3.3	22.5
Queue Length 50th (ft)	0	0	3
Queue Length 95th (ft)	102	m330	18
Internal Link Dist (ft)	1529	1205	239
Turn Bay Length (ft)			
Base Capacity (vph)	3009	2873	616
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.37	0.38	0.02

Intersection Summary
m Volume for 95th percentile queue is metered by upstream signal.

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	91	806	36	137	867	45	87	179	76	26	221	49
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width (ft)	10	10	10	10	10	10	10	10	10	10	10	10
Grade (%)		0%			3%			1%			0%	
Storage Length (ft)	140		0	70		0	105		0	65		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.994			0.993			0.955			0.973	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1520	3022	0	1497	2973	0	1512	1520	0	1520	1557	0
Flt Permitted	0.166			0.185			0.306			0.339		
Satd. Flow (perm)	266	3022	0	292	2973	0	487	1520	0	542	1557	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		35			35			25			25	
Link Distance (ft)		1285			2035			183			973	
Travel Time (s)		25.0			39.6			5.0			26.5	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Adj. Flow (vph)	97	857	38	146	922	48	93	190	81	28	235	52
Shared Lane Traffic (%)												
Lane Group Flow (vph)	97	895	0	146	970	0	93	271	0	28	287	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		10			10			10			10	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		10			10			10			10	
Two way Left Turn Lane												
Headway Factor	1.17	1.17	1.17	1.19	1.19	1.19	1.18	1.18	1.18	1.17	1.17	1.17
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	0		1	0		1	1		1	1	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (ft)	37	0		37	0		37	37		37	37	
Trailing Detector (ft)	-3	0		-3	0		-3	-3		-3	-3	
Detector 1 Position(ft)	-3	0		-3	0		-3	-3		-3	-3	
Detector 1 Size(ft)	40	6		40	6		40	40		40	40	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2			6			8			4		
Detector Phase	5	2		1	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	3.0	34.0		3.0	34.0		3.0	3.0		3.0	3.0	

Lanes, Volumes, Timings
27: S Ithan Ave/N Ithan Ave & Lancaster Ave 3/9/2015

Lane Group	ø9
Lane Configurations	
Volume (vph)	
Ideal Flow (vphpl)	
Lane Width (ft)	
Grade (%)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Lane Util. Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	
Heavy Vehicles (%)	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Enter Blocked Intersection	
Lane Alignment	
Median Width(ft)	
Link Offset(ft)	
Crosswalk Width(ft)	
Two way Left Turn Lane	
Headway Factor	
Turning Speed (mph)	
Number of Detectors	
Detector Template	
Leading Detector (ft)	
Trailing Detector (ft)	
Detector 1 Position(ft)	
Detector 1 Size(ft)	
Detector 1 Type	
Detector 1 Channel	
Detector 1 Extend (s)	
Detector 1 Queue (s)	
Detector 1 Delay (s)	
Turn Type	
Protected Phases	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	24.0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Split (s)	13.0	40.0		13.0	40.0		13.0	13.0		13.0	13.0	
Total Split (s)	13.0	48.0		14.0	49.0		32.0	32.0		32.0	32.0	
Total Split (%)	10.8%	40.0%		11.7%	40.8%		26.7%	26.7%		26.7%	26.7%	
Maximum Green (s)	7.0	42.0		8.0	43.0		26.0	26.0		26.0	26.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.5	0.5		0.5	0.5		0.5	0.5		0.5	0.5	
Total Lost Time (s)	6.5	6.5		6.5	6.5		6.5	6.5		6.5	6.5	
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)	54.2	47.8		56.4	48.9		24.4	24.4		24.4	24.4	
Actuated g/C Ratio	0.45	0.40		0.47	0.41		0.20	0.20		0.20	0.20	
v/c Ratio	0.52	0.74		0.69	0.80		0.95	0.88		0.25	0.91	
Control Delay	29.1	36.6		31.1	31.8		125.0	74.5		46.3	79.1	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	29.1	36.6		31.1	31.8		125.0	74.5		46.3	79.1	
LOS	C	D		C	C		F	E		D	E	
Approach Delay		35.9			31.7			87.4			76.2	
Approach LOS		D			C			F			E	

Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 120			
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow, Master Intersection			
Natural Cycle: 105			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.95			
Intersection Signal Delay: 45.5		Intersection LOS: D	
Intersection Capacity Utilization 78.5%		ICU Level of Service D	
Analysis Period (min) 15			

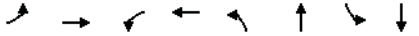
Splits and Phases: 27: S Ithan Ave/N Ithan Ave & Lancaster Ave

Lane Group	ø9
Minimum Split (s)	26.0
Total Split (s)	26.0
Total Split (%)	22%
Maximum Green (s)	24.0
Yellow Time (s)	2.0
All-Red Time (s)	0.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0
Recall Mode	None
Walk Time (s)	9.0
Flash Dont Walk (s)	15.0
Pedestrian Calls (#/hr)	45
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	

Intersection Summary

Queues
27: S Ithan Ave/N Ithan Ave & Lancaster Ave

3/9/2015



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	97	895	146	970	93	271	28	287
v/c Ratio	0.52	0.74	0.69	0.80	0.95	0.88	0.25	0.91
Control Delay	29.1	36.6	31.1	31.8	125.0	74.5	46.3	79.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	29.1	36.6	31.1	31.8	125.0	74.5	46.3	79.1
Queue Length 50th (ft)	42	336	65	368	71	203	18	216
Queue Length 95th (ft)	82	#415	m#105	#501	#178	#347	48	#372
Internal Link Dist (ft)		1205		1955		103		893
Turn Bay Length (ft)	140		70		105		65	
Base Capacity (vph)	188	1204	212	1212	103	323	115	330
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.52	0.74	0.69	0.80	0.90	0.84	0.24	0.87

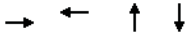
Intersection Summary

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Queues
51: Lowrys Ln & Lancaster Ave

3/9/2015



Lane Group	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	1191	1224	207	123
v/c Ratio	0.68	0.70	0.70	0.41
Control Delay	11.8	11.0	36.2	25.5
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	11.8	11.0	36.2	25.5
Queue Length 50th (ft)	144	145	69	38
Queue Length 95th (ft)	207	216	#143	81
Internal Link Dist (ft)	1955	302	2747	520
Turn Bay Length (ft)				
Base Capacity (vph)	1751	1739	334	335
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.68	0.70	0.62	0.37

Intersection Summary

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM 2010 Signalized Intersection Summary
51: Lowrys Ln & Lancaster Ave

3/9/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	19	1069	20	17	1098	23	48	105	39	22	72	20
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	1748	1800	1773	1721	1773	1900	1845	1900	1881	1827	1881
Adj Flow Rate, veh/h	20	1149	22	18	1181	25	52	113	42	24	77	22
Adj No. of Lanes	0	2	0	0	2	0	0	1	0	0	1	0
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	75	2080	39	72	2053	43	122	155	51	101	185	47
Arrive On Green	1.00	1.00	1.00	0.65	0.65	0.65	0.15	0.15	0.15	0.15	0.15	0.15
Sat Flow, veh/h	19	3193	61	16	3151	66	313	1045	346	195	1246	314
Grp Volume(v), veh/h	617	0	574	636	0	588	207	0	0	123	0	0
Grp Sat Flow(s),veh/h/ln	1693	0	1580	1678	0	1555	1705	0	0	1755	0	0
Q Serve(g_s), s	0.0	0.0	0.0	0.0	0.0	12.7	3.2	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	0.0	0.0	0.0	12.3	0.0	12.7	7.0	0.0	0.0	3.8	0.0	0.0
Prop In Lane	0.03		0.04	0.03		0.04	0.25		0.20	0.20		0.18
Lane Grp Cap(c), veh/h	1165	0	1029	1155	0	1013	328	0	0	332	0	0
V/C Ratio(X)	0.53	0.00	0.56	0.55	0.00	0.58	0.63	0.00	0.00	0.37	0.00	0.00
Avail Cap(c_a), veh/h	1165	0	1029	1155	0	1013	426	0	0	430	0	0
HCM Platoon Ratio	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.61	0.00	0.61	1.00	0.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	0.0	0.0	0.0	5.8	0.0	5.9	24.7	0.0	0.0	23.4	0.0	0.0
Incr Delay (d2), s/veh	1.1	0.0	1.3	1.9	0.0	2.4	2.0	0.0	0.0	0.7	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(-26165%),veh/ln	0.3	0.0	0.4	6.3	0.0	6.1	3.5	0.0	0.0	1.9	0.0	0.0
LnGrp Delay(d),s/veh	1.1	0.0	1.3	7.7	0.0	8.3	26.7	0.0	0.0	24.1	0.0	0.0
LnGrp LOS	A		A	A		A	C			C		
Approach Vol, veh/h		1191			1224			207			123	
Approach Delay, s/veh		1.2			8.0			26.7			24.1	
Approach LOS		A			A			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		45.6		14.4		45.6		14.4
Change Period (Y+Rc), s		6.0		5.0		6.0		5.0
Max Green Setting (Gmax), s		36.0		13.0		36.0		13.0
Max Q Clear Time (g_c+I1), s		2.0		5.8		14.7		9.0
Green Ext Time (p_c), s		14.1		0.7		11.4		0.5

Intersection Summary	
HCM 2010 Ctrl Delay	7.2
HCM 2010 LOS	A

Notes

User approved pedestrian interval to be less than phase max green.

Queues
16: Sproul Rd & Conestoga Rd

3/9/2015

Lane Group	EBL	EBT	WBL	WBT	NEL	NET	SWT
Lane Group Flow (vph)	166	768	40	732	237	329	367
v/c Ratio	0.90	0.96	0.34	1.12	0.91	0.53	1.14
Control Delay	64.6	46.1	30.5	103.0	63.6	25.4	129.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	64.6	46.1	30.5	103.0	63.6	25.4	129.0
Queue Length 50th (ft)	50	392	16	~485	98	140	~246
Queue Length 95th (ft)	#169	#655	48	#705	#231	224	#416
Internal Link Dist (ft)		601		178		715	1701
Turn Bay Length (ft)	50		65		90		
Base Capacity (vph)	184	801	118	652	260	621	321
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.90	0.96	0.34	1.12	0.91	0.53	1.14

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM 2010 Signalized Intersection Summary
16: Sproul Rd & Conestoga Rd

3/9/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (veh/h)	151	560	139	36	608	58	216	271	28	57	202	75
Number	7	4	14	3	8	18	1	6	16	5	2	12
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	1748	1748	1800	1791	1791	1845	1739	1739	1791	1809	1756	1809
Adj Flow Rate, veh/h	166	615	0	40	668	0	237	298	31	63	222	82
Adj No. of Lanes	1	1	0	1	1	0	1	1	0	0	1	0
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	200	874	0	267	657	0	309	577	60	94	235	81
Arrive On Green	0.07	0.50	0.00	0.37	0.37	0.00	0.07	0.37	0.37	0.23	0.23	0.23
Sat Flow, veh/h	1664	1748	0	816	1791	0	1656	1549	161	200	1009	348
Grp Volume(v), veh/h	166	615	0	40	668	0	237	0	329	367	0	0
Grp Sat Flow(s),veh/h/ln	1664	1748	0	816	1791	0	1656	0	1710	1557	0	0
Q Serve(g_s), s	5.4	24.4	0.0	3.6	33.0	0.0	6.5	0.0	13.5	16.2	0.0	0.0
Cycle Q Clear(g_c), s	5.4	24.4	0.0	16.0	33.0	0.0	6.5	0.0	13.5	21.0	0.0	0.0
Prop In Lane	1.00		0.00	1.00		0.00	1.00		0.09	0.17		0.22
Lane Grp Cap(c), veh/h	200	874	0	267	657	0	309	0	637	410	0	0
V/C Ratio(X)	0.83	0.70	0.00	0.15	1.02	0.00	0.77	0.00	0.52	0.89	0.00	0.00
Avail Cap(c_a), veh/h	200	874	0	267	657	0	309	0	637	410	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	21.3	17.4	0.0	28.2	28.5	0.0	26.5	0.0	22.0	34.4	0.0	0.0
Incr Delay (d2), s/veh	24.3	4.7	0.0	1.2	39.5	0.0	11.1	0.0	0.7	21.4	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(-26165%),veh/ln	3.7	12.8	0.0	0.9	23.4	0.0	3.9	0.0	6.4	11.5	0.0	0.0
LnGrp Delay(d),s/veh	45.6	22.1	0.0	29.4	68.0	0.0	37.6	0.0	22.7	55.8	0.0	0.0
LnGrp LOS	D	C		C	F		D		C	E		
Approach Vol, veh/h		781			708			566			367	
Approach Delay, s/veh		27.1			65.8			28.9			55.8	
Approach LOS		C			E			C			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4		6	7	8
Phs Duration (G+Y+Rc), s	12.5	27.0		50.5		39.5	12.0	38.5
Change Period (Y+Rc), s	5.5	5.5		5.0		5.5	5.0	5.0
Max Green Setting (Gmax), s	7.0	21.5		45.5		34.0	7.0	33.5
Max Q Clear Time (g_c+I1), s	8.5	23.0		26.4		15.5	7.4	35.0
Green Ext Time (p_c), s	0.0	0.0		8.5		2.4	0.0	0.0

Intersection Summary		
HCM 2010 Ctrl Delay		43.2
HCM 2010 LOS		D

Queues
25: S Ithan Ave & Conestoga Rd

3/9/2015

Lane Group	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	696	726	227	316
v/c Ratio	1.11	0.77	0.68	0.84
Control Delay	90.2	18.2	31.5	37.4
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	90.2	18.2	31.5	37.4
Queue Length 50th (ft)	~318	191	73	76
Queue Length 95th (ft)	#428	269	120	#157
Internal Link Dist (ft)	1194	2907	717	3163
Turn Bay Length (ft)				
Base Capacity (vph)	626	937	393	423
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	1.11	0.77	0.58	0.75

Intersection Summary
~ Volume exceeds capacity, queue is theoretically infinite. Queue shown is maximum after two cycles.
# 95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.

HCM 2010 Signalized Intersection Summary
25: S Ithan Ave & Conestoga Rd

3/9/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	167	395	2	2	458	129	14	158	12	63	53	140
Number	1	6	16	5	2	12	7	4	14	3	8	18
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	1854	1783	1854	1764	1696	1764	1763	1695	1763	1844	1773	1844
Adj Flow Rate, veh/h	206	488	2	2	565	159	17	195	15	78	65	173
Adj No. of Lanes	0	1	0	0	1	0	0	1	0	0	1	0
Peak Hour Factor	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81
Percent Heavy Veh, %	4	4	4	4	4	4	4	4	4	4	4	4
Cap, veh/h	225	445	2	60	714	200	77	341	25	142	94	195
Arrive On Green	0.56	0.56	0.56	0.56	0.56	0.56	0.23	0.23	0.23	0.23	0.23	0.23
Sat Flow, veh/h	265	800	3	1	1282	360	55	1502	110	296	414	858
Grp Volume(v), veh/h	696	0	0	726	0	0	227	0	0	316	0	0
Grp Sat Flow(s),veh/h/ln	1068	0	0	1642	0	0	1668	0	0	1567	0	0
Q Serve(g_s), s	12.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.3	0.0	0.0
Cycle Q Clear(g_c), s	33.5	0.0	0.0	21.3	0.0	0.0	7.3	0.0	0.0	11.5	0.0	0.0
Prop In Lane	0.30		0.00	0.00		0.22	0.07		0.07	0.25		0.55
Lane Grp Cap(c), veh/h	672	0	0	974	0	0	443	0	0	430	0	0
V/C Ratio(X)	1.04	0.00	0.00	0.75	0.00	0.00	0.51	0.00	0.00	0.73	0.00	0.00
Avail Cap(c_a), veh/h	672	0	0	974	0	0	492	0	0	475	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	15.5	0.0	0.0	10.6	0.0	0.0	20.8	0.0	0.0	22.3	0.0	0.0
Incr Delay (d2), s/veh	44.1	0.0	0.0	3.2	0.0	0.0	0.9	0.0	0.0	5.3	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(-26165%),veh/ln	19.3	0.0	0.0	10.3	0.0	0.0	3.5	0.0	0.0	5.6	0.0	0.0
LnGrp Delay(d),s/veh	59.6	0.0	0.0	13.8	0.0	0.0	21.7	0.0	0.0	27.6	0.0	0.0
LnGrp LOS	F			B			C			C		
Approach Vol, veh/h		696			726			227			316	
Approach Delay, s/veh		59.6			13.8			21.7			27.6	
Approach LOS		E			B			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		40.0		20.2		40.0		20.2
Change Period (Y+Rc), s		6.0		6.0		6.0		6.0
Max Green Setting (Gmax), s		34.0		16.0		34.0		16.0
Max Q Clear Time (g_c+I1), s		23.3		9.3		35.5		13.5
Green Ext Time (p_c), s		5.3		1.3		0.0		0.6

Intersection Summary		
HCM 2010 Ctrl Delay		33.2
HCM 2010 LOS		C

Queues
33: Williams Rd/Garrett Ave & Conestoga Rd

3/9/2015

Lane Group	EBT	WBT	NET	SWT
Lane Group Flow (vph)	537	492	24	63
v/c Ratio	0.35	0.31	0.14	0.41
Control Delay	4.4	4.1	29.9	37.1
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	4.4	4.1	29.9	37.1
Queue Length 50th (ft)	85	74	10	26
Queue Length 95th (ft)	130	114	29	59
Internal Link Dist (ft)	1396	1273	368	1816
Turn Bay Length (ft)				
Base Capacity (vph)	1547	1601	198	175
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.35	0.31	0.12	0.36

Intersection Summary

HCM 2010 Signalized Intersection Summary
33: Williams Rd/Garrett Ave & Conestoga Rd

3/9/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		✣			✣			✣			✣	
Volume (veh/h)	26	445	1	4	424	4	6	6	9	15	3	38
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	1872	1872	1872	1872	1872	1872	1800	1800	1800	1728	1728	1728
Adj Flow Rate, veh/h	30	506	1	5	482	5	7	7	10	17	3	43
Adj No. of Lanes	0	1	0	0	1	0	0	1	0	0	1	0
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Percent Heavy Veh, %	0	0	0	0	0	0	0	0	0	0	0	0
Cap, veh/h	93	1331	3	58	1382	14	88	35	37	86	8	54
Arrive On Green	0.75	0.75	0.75	0.75	0.75	0.75	0.05	0.05	0.05	0.05	0.05	0.05
Sat Flow, veh/h	48	1775	3	4	1842	19	333	655	706	325	147	1014
Grp Volume(v), veh/h	537	0	0	492	0	0	24	0	0	63	0	0
Grp Sat Flow(s),veh/h/ln	1826	0	0	1865	0	0	1695	0	0	1485	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	1.8	0.0	0.0
Cycle Q Clear(g_c), s	6.6	0.0	0.0	5.9	0.0	0.0	0.9	0.0	0.0	2.7	0.0	0.0
Prop In Lane	0.06		0.00	0.01		0.01	0.29		0.42	0.27		0.68
Lane Grp Cap(c), veh/h	1427	0	0	1454	0	0	160	0	0	148	0	0
V/C Ratio(X)	0.38	0.00	0.00	0.34	0.00	0.00	0.15	0.00	0.00	0.43	0.00	0.00
Avail Cap(c_a), veh/h	1427	0	0	1454	0	0	301	0	0	280	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	2.9	0.0	0.0	2.8	0.0	0.0	30.0	0.0	0.0	30.9	0.0	0.0
Incr Delay (d2), s/veh	0.8	0.0	0.0	0.6	0.0	0.0	0.6	0.0	0.0	2.8	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(-26165%),veh/ln	3.6	0.0	0.0	3.3	0.0	0.0	0.4	0.0	0.0	1.3	0.0	0.0
LnGrp Delay(d),s/veh	3.6	0.0	0.0	3.4	0.0	0.0	30.6	0.0	0.0	33.6	0.0	0.0
LnGrp LOS	A			A			C			C		
Approach Vol, veh/h		537			492			24			63	
Approach Delay, s/veh		3.6			3.4			30.6			33.6	
Approach LOS		A			A			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		56.0		10.0		56.0		10.0
Change Period (Y+Rc), s		6.0		6.0		6.0		6.0
Max Green Setting (Gmax), s		50.0		10.0		50.0		10.0
Max Q Clear Time (g_c+I1), s		8.6		4.7		7.9		2.9
Green Ext Time (p_c), s		4.7		0.1		4.7		0.2

Intersection Summary		
HCM 2010 Ctrl Delay		5.8
HCM 2010 LOS		A

Notes

User approved pedestrian interval to be less than phase max green.

Queues
3: County Line Rd & Spring Mill Rd

3/9/2015

Lane Group	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	399	432	356	443
v/c Ratio	0.57	0.66	0.74	0.87
Control Delay	16.9	20.3	27.5	37.8
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	16.9	20.3	27.5	37.8
Queue Length 50th (ft)	105	119	106	142
Queue Length 95th (ft)	196	#263	187	#276
Internal Link Dist (ft)	3088	1481	1821	1084
Turn Bay Length (ft)				
Base Capacity (vph)	694	650	547	581
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.57	0.66	0.65	0.76

Intersection Summary

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM 2010 Signalized Intersection Summary
3: County Line Rd & Spring Mill Rd 3/9/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	35	283	61	63	269	79	41	253	45	33	333	54
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	1630	1800	1800	1731	1800	1800	1731	1800	1800	1731	1800
Adj Flow Rate, veh/h	37	298	64	66	283	83	43	266	47	35	351	57
Adj No. of Lanes	0	1	0	0	1	0	0	1	0	0	1	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	4	4	4	4	4	4	4	4	4	4	4	4
Cap, veh/h	100	600	122	143	550	149	98	374	62	84	408	63
Arrive On Green	0.50	0.50	0.50	0.50	0.50	0.50	0.30	0.30	0.30	0.30	0.30	0.30
Sat Flow, veh/h	73	1213	246	154	1111	301	111	1266	209	73	1381	215
Grp Volume(v), veh/h	399	0	0	432	0	0	356	0	0	443	0	0
Grp Sat Flow(s),veh/h/ln	1532	0	0	1566	0	0	1586	0	0	1669	0	0
Q Serve(g_s), s	0.0	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.0	3.3	0.0	0.0
Cycle Q Clear(g_c), s	10.5	0.0	0.0	10.9	0.0	0.0	12.3	0.0	0.0	15.7	0.0	0.0
Prop In Lane	0.09		0.16	0.15		0.19	0.12		0.13	0.08		0.13
Lane Grp Cap(c), veh/h	822	0	0	842	0	0	533	0	0	555	0	0
V/C Ratio(X)	0.49	0.00	0.00	0.51	0.00	0.00	0.67	0.00	0.00	0.80	0.00	0.00
Avail Cap(c_a), veh/h	822	0	0	842	0	0	663	0	0	690	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)	0.52	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	10.6	0.0	0.0	10.7	0.0	0.0	19.6	0.0	0.0	20.9	0.0	0.0
Incr Delay (d2), s/veh	1.1	0.0	0.0	2.2	0.0	0.0	1.0	0.0	0.0	4.2	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(-26165%),veh/ln	4.8	0.0	0.0	5.4	0.0	0.0	5.6	0.0	0.0	7.8	0.0	0.0
LnGrp Delay(d),s/veh	11.6	0.0	0.0	12.9	0.0	0.0	20.6	0.0	0.0	25.0	0.0	0.0
LnGrp LOS	B			B			C			C		
Approach Vol, veh/h		399			432			356			443	
Approach Delay, s/veh		11.6			12.9			20.6			25.0	
Approach LOS		B			B			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		37.2		24.8		37.2		24.8
Change Period (Y+Rc), s		6.0		6.0		6.0		6.0
Max Green Setting (Gmax), s		26.0		24.0		26.0		24.0
Max Q Clear Time (g_c+I1), s		12.5		17.7		12.9		14.3
Green Ext Time (p_c), s		3.1		1.1		3.0		1.4

Intersection Summary	
HCM 2010 Ctrl Delay	17.6
HCM 2010 LOS	B

HCM 2010 TWSC
79: Garrett Rd & Lancaster Ave 3/9/2015

Intersection	
Int Delay, s/veh	3.9

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	1105	25	20	1136	0	26
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, %	-3	-	-	3	0	-
Peak Hour Factor	67	67	67	67	67	67
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	1649	37	30	1696	0	39

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	1687	0	2575	843
Stage 1	-	-	-	-	1668	-
Stage 2	-	-	-	-	907	-
Critical Hdwy	-	-	4.1	-	6.8	6.9
Critical Hdwy Stg 1	-	-	-	-	5.8	-
Critical Hdwy Stg 2	-	-	-	-	5.8	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	384	-	22	311
Stage 1	-	-	-	-	141	-
Stage 2	-	-	-	-	359	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	384	-	22	311
Mov Cap-2 Maneuver	-	-	-	-	22	-
Stage 1	-	-	-	-	141	-
Stage 2	-	-	-	-	359	-

Approach	EB	WB	NB
HCM Control Delay, s	0	7.4	18.2
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	311	-	-	384	-
HCM Lane V/C Ratio	0.125	-	-	0.078	-
HCM Control Delay (s)	18.2	-	-	15.2	7.3
HCM Lane LOS	C	-	-	C	A
HCM 95th %tile Q(veh)	0.4	-	-	0.3	-

Intersection	
Int Delay, s/veh	0.2

Movement	EBL	EBT	WBT	WBR	SWL	SWR
Vol, veh/h	2	646	700	3	4	8
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	86	86	86	86	86	86
Heavy Vehicles, %	4	4	4	4	4	4
Mvmt Flow	2	751	814	3	5	9

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	817	0	-	0	1572	816
Stage 1	-	-	-	-	816	-
Stage 2	-	-	-	-	756	-
Critical Hdwy	4.14	-	-	-	6.44	6.24
Critical Hdwy Stg 1	-	-	-	-	5.44	-
Critical Hdwy Stg 2	-	-	-	-	5.44	-
Follow-up Hdwy	2.236	-	-	-	3.536	3.336
Pot Cap-1 Maneuver	802	-	-	-	120	374
Stage 1	-	-	-	-	431	-
Stage 2	-	-	-	-	460	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	802	-	-	-	120	374
Mov Cap-2 Maneuver	-	-	-	-	120	-
Stage 1	-	-	-	-	431	-
Stage 2	-	-	-	-	458	-

Approach	EB	WB	SW
HCM Control Delay, s	0	0	22.6
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SWLn1
Capacity (veh/h)	802	-	-	-	219
HCM Lane V/C Ratio	0.003	-	-	-	0.064
HCM Control Delay (s)	9.5	0	-	-	22.6
HCM Lane LOS	A	A	-	-	C
HCM 95th %tile Q(veh)	0	-	-	-	0.2

Intersection	
Int Delay, s/veh	3.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	48	429	14	9	462	5	13	14	12	2	15	84
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	80	80	80	80	80	80	80	80	80	80	80	80
Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	60	536	18	11	578	6	16	18	15	2	19	105

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	584	0	0	554	0	0	1330	1271	545	1284	1277	581
Stage 1	-	-	-	-	-	-	665	665	-	603	603	-
Stage 2	-	-	-	-	-	-	665	606	-	681	674	-
Critical Hdwy	4.13	-	-	4.13	-	-	7.13	6.53	6.23	7.13	6.53	6.23
Critical Hdwy Stg 1	-	-	-	-	-	-	6.13	5.53	-	6.13	5.53	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.13	5.53	-	6.13	5.53	-
Follow-up Hdwy	2.227	-	-	2.227	-	-	3.527	4.027	3.327	3.527	4.027	3.327
Pot Cap-1 Maneuver	986	-	-	1011	-	-	131	167	536	141	166	512
Stage 1	-	-	-	-	-	-	448	456	-	484	487	-
Stage 2	-	-	-	-	-	-	448	485	-	439	452	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	986	-	-	1011	-	-	87	150	536	115	149	512
Mov Cap-2 Maneuver	-	-	-	-	-	-	87	150	-	115	149	-
Stage 1	-	-	-	-	-	-	409	416	-	441	479	-
Stage 2	-	-	-	-	-	-	337	477	-	373	412	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.9	0.2	41.2	20.4
HCM LOS			E	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	147	986	-	-	1011	-	-	358
HCM Lane V/C Ratio	0.332	0.061	-	-	0.011	-	-	0.353
HCM Control Delay (s)	41.2	8.9	0	-	8.6	0	-	20.4
HCM Lane LOS	E	A	A	-	A	A	-	C
HCM 95th %tile Q(veh)	1.3	0.2	-	-	0	-	-	1.6

Lanes, Volumes, Timings
38: County Line Rd & N Ithan Ave 3/9/2015

Lane Group	NBT	NBR	SBL	SBT	SWL	SWR
Lane Configurations						
Volume (vph)	349	112	169	303	157	102
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.967				0.947	
Flt Protected				0.982	0.971	
Satd. Flow (prot)	1801	0	0	1829	1713	0
Flt Permitted				0.982	0.971	
Satd. Flow (perm)	1801	0	0	1829	1713	0
Link Speed (mph)	30			30	30	
Link Distance (ft)	295			1901	824	
Travel Time (s)	6.7			43.2	18.7	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	384	123	186	333	173	112
Shared Lane Traffic (%)						
Lane Group Flow (vph)	507	0	0	519	285	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	0			0	12	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	10			10	10	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)		9	15		15	9
Sign Control	Free			Stop	Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	75.4%	ICU Level of Service	D
Analysis Period (min)	15		

Lanes, Volumes, Timings
2: County Line Rd & N Ithan Ave 3/9/2015

Lane Group	EBL	EBR	SBL	SBR	NWL	NWR
Lane Configurations						
Volume (vph)	206	15	143	339	38	258
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.991		0.905		0.882	
Flt Protected	0.955		0.985		0.994	
Satd. Flow (prot)	1763	0	1660	0	1633	0
Flt Permitted	0.955		0.985		0.994	
Satd. Flow (perm)	1763	0	1660	0	1633	0
Link Speed (mph)	30		30		30	
Link Distance (ft)	973		295		2020	
Travel Time (s)	22.1		6.7		45.9	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	219	16	152	361	40	274
Shared Lane Traffic (%)						
Lane Group Flow (vph)	235	0	513	0	314	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Right
Median Width(ft)	22		12		12	
Link Offset(ft)	0		0		0	
Crosswalk Width(ft)	10		10		10	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9	15	9	15	9
Sign Control	Stop		Free		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	69.2%	ICU Level of Service	C
Analysis Period (min)	15		

Intersection	
Int Delay, s/veh	3.7

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	62	82	59	241	152	31
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	87	87	87	87	87	87
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	71	94	68	277	175	36

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	606	193	210	0	-	0
Stage 1	193	-	-	-	-	-
Stage 2	413	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	463	854	1373	-	-	-
Stage 1	845	-	-	-	-	-
Stage 2	672	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	436	854	1373	-	-	-
Mov Cap-2 Maneuver	436	-	-	-	-	-
Stage 1	845	-	-	-	-	-
Stage 2	632	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	13.2	1.5	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1373	-	604	-	-
HCM Lane V/C Ratio	0.049	-	0.274	-	-
HCM Control Delay (s)	7.8	0	13.2	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0.2	-	1.1	-	-

Intersection	
Int Delay, s/veh	4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	206	223	291	21	15	99
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	88	88	88	88	88	88
Heavy Vehicles, %	1	1	1	1	1	1
Mvmt Flow	234	253	331	24	17	112

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	355	0	-	0	1065	343
Stage 1	-	-	-	-	343	-
Stage 2	-	-	-	-	722	-
Critical Hdwy	4.11	-	-	-	6.41	6.21
Critical Hdwy Stg 1	-	-	-	-	5.41	-
Critical Hdwy Stg 2	-	-	-	-	5.41	-
Follow-up Hdwy	2.209	-	-	-	3.509	3.309
Pot Cap-1 Maneuver	1209	-	-	-	248	702
Stage 1	-	-	-	-	721	-
Stage 2	-	-	-	-	483	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1209	-	-	-	192	702
Mov Cap-2 Maneuver	-	-	-	-	192	-
Stage 1	-	-	-	-	721	-
Stage 2	-	-	-	-	374	-

Approach	EB	WB	SB
HCM Control Delay, s	4.2	0	14.2
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1209	-	-	-	520
HCM Lane V/C Ratio	0.194	-	-	-	0.249
HCM Control Delay (s)	8.7	0	-	-	14.2
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.7	-	-	-	1

HCM 2010 TWSC
43: County Line Rd & Roberts Rd 3/9/2015

Intersection													
Int Delay, s/veh	29.6												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	68	101	8	2	24	6	14	627	25	8	479	38
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	88	88	88	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	77	115	9	2	27	7	16	712	28	9	544	43
Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	986	1357	294	1107	1365	370	588	0	0	741	0	0
Stage 1	584	584	-	759	759	-	-	-	-	-	-	-
Stage 2	402	773	-	348	606	-	-	-	-	-	-	-
Critical Hdwy	7.54	6.54	6.94	7.54	6.54	6.94	4.14	-	-	4.14	-	-
Critical Hdwy Stg 1	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Follow-up Hdwy	3.52	4.02	3.32	3.52	4.02	3.32	2.22	-	-	2.22	-	-
Pot Cap-1 Maneuver	202	148	702	165	146	627	983	-	-	862	-	-
Stage 1	465	496	-	365	413	-	-	-	-	-	-	-
Stage 2	596	407	-	641	485	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	164	142	702	52	140	627	983	-	-	862	-	-
Mov Cap-2 Maneuver	164	142	-	52	140	-	-	-	-	-	-	-
Stage 1	452	488	-	355	401	-	-	-	-	-	-	-
Stage 2	534	396	-	476	477	-	-	-	-	-	-	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	225.9			37.6			0.3			0.2		
HCM LOS	F			E								
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR				
Capacity (veh/h)	983	-	-	156	146	862	-	-				
HCM Lane V/C Ratio	0.016	-	-	1.289	0.249	0.011	-	-				
HCM Control Delay (s)	8.7	0.1	-	225.9	37.6	9.2	0.1	-				
HCM Lane LOS	A	A	-	F	E	A	A	-				
HCM 95th %tile Q(veh)	0	-	-	12	0.9	0	-	-				

HCM 2010 TWSC
61: Dwy/Aldwyn Ln & S Ithan Ave 3/9/2015

Intersection													
Int Delay, s/veh	2.1												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	9	363	9	16	195	13	7	1	12	17	0	61
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	81	81	81	81	81	81	81	81	81	81	81	81
Heavy Vehicles, %	4	4	4	4	4	4	4	4	4	4	4	4
Mvmt Flow	11	448	11	20	241	16	9	1	15	21	0	75
Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	257	0	0	459	0	0	802	772	454	772	769	249
Stage 1	-	-	-	-	-	-	476	476	-	288	288	-
Stage 2	-	-	-	-	-	-	326	296	-	484	481	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.14	6.54	6.24	7.14	6.54	6.24
Critical Hdwy Stg 1	-	-	-	-	-	-	6.14	5.54	-	6.14	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.14	5.54	-	6.14	5.54	-
Follow-up Hdwy	2.236	-	-	2.236	-	-	3.536	4.036	3.336	3.536	4.036	3.336
Pot Cap-1 Maneuver	1296	-	-	1092	-	-	300	328	602	314	329	785
Stage 1	-	-	-	-	-	-	566	553	-	715	670	-
Stage 2	-	-	-	-	-	-	682	665	-	560	550	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1296	-	-	1092	-	-	265	318	602	298	319	785
Mov Cap-2 Maneuver	-	-	-	-	-	-	265	318	-	298	319	-
Stage 1	-	-	-	-	-	-	560	547	-	707	656	-
Stage 2	-	-	-	-	-	-	604	651	-	539	544	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.2			0.6			14.5			12.5		
HCM LOS							B			B		
Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1				
Capacity (veh/h)	404	1296	-	-	1092	-	-	579				
HCM Lane V/C Ratio	0.061	0.009	-	-	0.018	-	-	0.166				
HCM Control Delay (s)	14.5	7.8	0	-	8.4	0	-	12.5				
HCM Lane LOS	B	A	A	-	A	A	-	B				
HCM 95th %tile Q(veh)	0.2	0	-	-	0.1	-	-	0.6				

Lane Group	EBL2	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR2	NBL2	NBL	NBT
Lane Configurations												
Volume (vph)	4	252	997	31	285	2	23	863	33	7	53	0
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width (ft)	10	10	11	11	14	10	12	12	12	10	10	10
Grade (%)			3%					-2%				1%
Storage Length (ft)		300		0			75				0	
Storage Lanes		1		1			1				0	
Taper Length (ft)		25					25				25	
Lane Util. Factor	0.95	1.00	0.95	0.95	1.00	0.95	1.00	0.95	0.95	1.00	1.00	1.00
Frt			0.995		0.850			0.994				0.975
Flt Protected		0.950					0.950					0.961
Satd. Flow (prot)	0	1541	3177	0	1576	0	1693	3366	0	0	0	1536
Flt Permitted		0.105					0.179					0.752
Satd. Flow (perm)	0	170	3177	0	1576	0	319	3366	0	0	0	1202
Right Turn on Red					Yes				Yes			
Satd. Flow (RTOR)					221			196				
Link Speed (mph)			35					35				25
Link Distance (ft)			577					1609				492
Travel Time (s)			11.2					31.3				13.4
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
Adj. Flow (vph)	4	260	1028	32	294	2	24	890	34	7	55	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	264	1060	0	294	0	26	924	0	0	0	76
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Right	Left	Left	Left	Right	Left	Left	Left
Median Width(ft)			12					12				0
Link Offset(ft)			0					0				0
Crosswalk Width(ft)			10					10				10
Two way Left Turn Lane												
Headway Factor	1.19	1.19	1.14	1.14	1.01	1.16	1.06	1.06	1.06	1.18	1.18	1.18
Turning Speed (mph)	15	15		9	9	15	15		9	15	15	
Number of Detectors	1	1	1		1	1	1	1		1	1	1
Detector Template	Left	Left	Thru		Right	Left	Left	Thru		Left	Left	Thru
Leading Detector (ft)	20	37	37		37	20	37	37		20	20	37
Trailing Detector (ft)	0	-3	-3		-3	0	-3	-3		0	0	-3
Detector 1 Position(ft)	0	-3	-3		-3	0	-3	-3		0	0	-3
Detector 1 Size(ft)	20	40	40		40	20	40	40		20	20	40
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0	0.0
Turn Type	pm+pt	pm+pt	NA		Perm	Perm	Perm	NA		Perm	Perm	NA
Protected Phases	5	5	2					6				10
Permitted Phases	2	2			2	6	6			10	10	
Detector Phase	5	5	2		2	6	6	6		10	10	10
Switch Phase												
Minimum Initial (s)	3.0	3.0	15.0		15.0	15.0	15.0	15.0		3.0	3.0	3.0
Minimum Split (s)	13.0	13.0	21.0		21.0	21.0	21.0	21.0		13.0	13.0	13.0

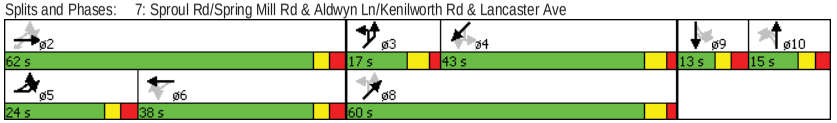
Lane Group	NBR	NBR2	SBL2	SBL	SBT	SBR	SBR2	NEL2	NEL	NET	NER	NER2
Lane Configurations												
Volume (vph)	4	10	1	1	0	3	14	193	0	114	20	1
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width (ft)	10	10	10	10	10	10	10	12	12	11	11	11
Grade (%)					-3%					3%		
Storage Length (ft)	0			0		0			200		0	
Storage Lanes	0			0		0			1		0	
Taper Length (ft)				25					25			
Lane Util. 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
Frt					0.879					0.976		
Flt Protected					0.995				0.950			
Satd. Flow (prot)	0	0	0	0	1462	0	0	0	1651	1640	0	0
Flt Permitted					0.983				0.114			
Satd. Flow (perm)	0	0	0	0	1444	0	0	0	198	1640	0	0
Right Turn on Red		No					No					No
Satd. Flow (RTOR)												
Link Speed (mph)					25					40		
Link Distance (ft)					597					1336		
Travel Time (s)					16.3					22.8		
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	4	10	1	1	0	3	14	199	0	118	21	1
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	19	0	0	0	199	140	0	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Right	Right	Left	Left	Left	Right	Right	Left	Left	Left	Right	Right
Median Width(ft)					0					12		
Link Offset(ft)					0					0		
Crosswalk Width(ft)					10					10		
Two way Left Turn Lane												
Headway Factor	1.18	1.18	1.15	1.15	1.15	1.15	1.15	1.09	1.09	1.14	1.14	1.14
Turning Speed (mph)	9	9	15	15		9	9	15	15		9	9
Number of Detectors			1	1	1			1	1	1		
Detector Template			Left	Left	Thru			Left	Left	Thru		
Leading Detector (ft)			20	20	37			20	37	37		
Trailing Detector (ft)			0	0	-3			0	-3	-3		
Detector 1 Position(ft)			0	0	-3			0	-3	-3		
Detector 1 Size(ft)			20	20	40			20	40	40		
Detector 1 Type			Cl+Ex	Cl+Ex	Cl+Ex			Cl+Ex	Cl+Ex	Cl+Ex		
Detector 1 Channel												
Detector 1 Extend (s)			0.0	0.0	0.0			0.0	0.0	0.0		
Detector 1 Queue (s)			0.0	0.0	0.0			0.0	0.0	0.0		
Detector 1 Delay (s)			0.0	0.0	0.0			0.0	0.0	0.0		
Turn Type			Perm	Perm	NA			pm+pt	pm+pt	NA		
Protected Phases					9			3	3	8		
Permitted Phases			9	9				8	8			
Detector Phase			9	9	9			3	3	8		
Switch Phase												
Minimum Initial (s)			3.0	3.0	3.0			3.0	3.0	3.0		
Minimum Split (s)			13.0	13.0	13.0			13.0	13.0	13.0		

Lane Group	SWL2	SWL	SWT	SWR	SWR2
Lane Configurations					
Volume (vph)	39	9	168	238	1
Ideal Flow (vphpl)	1800	1800	1800	1800	1800
Lane Width (ft)	10	10	10	10	10
Grade (%)			-7%		
Storage Length (ft)		150		0	
Storage Lanes		1		0	
Taper Length (ft)		25			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00
Frt			0.912		
Flt Protected		0.950			
Satd. Flow (prot)	0	1619	1555	0	0
Flt Permitted		0.668			
Satd. Flow (perm)	0	1139	1555	0	0
Right Turn on Red					No
Satd. Flow (RTOR)					
Link Speed (mph)			25		
Link Distance (ft)			3168		
Travel Time (s)			86.4		
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	40	9	173	245	1
Shared Lane Traffic (%)					
Lane Group Flow (vph)	0	49	419	0	0
Enter Blocked Intersection	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Right
Median Width(ft)			12		
Link Offset(ft)			0		
Crosswalk Width(ft)			10		
Two way Left Turn Lane					
Headway Factor	1.12	1.12	1.12	1.12	1.12
Turning Speed (mph)	15	15		9	9
Number of Detectors	1	1	1		
Detector Template	Left	Left	Thru		
Leading Detector (ft)	20	37	37		
Trailing Detector (ft)	0	-3	-3		
Detector 1 Position(ft)	0	-3	-3		
Detector 1 Size(ft)	20	40	40		
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex		
Detector 1 Channel					
Detector 1 Extend (s)	0.0	0.0	0.0		
Detector 1 Queue (s)	0.0	0.0	0.0		
Detector 1 Delay (s)	0.0	0.0	0.0		
Turn Type	Perm	Perm	NA		
Protected Phases			4		
Permitted Phases	4	4			
Detector Phase	4	4	4		
Switch Phase					
Minimum Initial (s)	3.0	3.0	3.0		
Minimum Split (s)	13.0	13.0	13.0		

Lane Group	EBL2	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR2	NBL2	NBL	NBT
Total Split (s)	24.0	24.0	62.0		62.0	38.0	38.0	38.0		15.0	15.0	15.0
Total Split (%)	16.0%	16.0%	41.3%		41.3%	25.3%	25.3%	25.3%		10.0%	10.0%	10.0%
Maximum Green (s)	18.0	18.0	56.0		56.0	32.0	32.0	32.0		9.0	9.0	9.0
Yellow Time (s)	3.0	3.0	3.0		3.0	3.0	3.0	3.0		3.0	3.0	3.0
All-Red Time (s)	3.0	3.0	3.0		3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lost Time Adjust (s)		0.5	0.5		0.5		0.5	0.5				0.5
Total Lost Time (s)		6.5	6.5		6.5		6.5	6.5				6.5
Lead/Lag	Lead	Lead				Lag	Lag	Lag		Lag	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0	3.0	3.0		3.0	3.0	3.0
Recall Mode	None	None	Max		Max	None	None	None		None	None	None
Walk Time (s)			7.0		7.0	7.0	7.0	7.0				
Flash Dont Walk (s)			20.0		20.0	20.0	20.0	20.0				
Pedestrian Calls (#/hr)			0		0	0	0	0				
Act Effct Green (s)		55.6	55.6		55.6		31.6	31.6				8.5
Actuated g/C Ratio		0.38	0.38		0.38		0.22	0.22				0.06
v/c Ratio		1.15	0.87		0.40		0.38	1.04				1.09
Control Delay		141.9	50.8		10.5		68.6	84.5				192.2
Queue Delay		0.0	0.0		0.0		0.0	0.0				0.0
Total Delay		141.9	50.8		10.5		68.6	84.5				192.2
LOS		F	D		B		E	F				F
Approach Delay			58.3					84.0				192.2
Approach LOS			E					F				F

Intersection Summary			
Area Type:	Other		
Cycle Length: 150			
Actuated Cycle Length: 144.8			
Natural Cycle: 150			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 1.15			
Intersection Signal Delay: 78.6		Intersection LOS: E	
Intersection Capacity Utilization 116.9%		ICU Level of Service H	
Analysis Period (min) 15			

Splits and Phases: 7: Sproul Rd/Spring Mill Rd & Aldwyn Ln/Kenilworth Rd & Lancaster Ave



Lane Group	NBR	NBR2	SBL2	SBL	SBT	SBR	SBR2	NEL2	NEL	NET	NER	NER2
Total Split (s)			13.0	13.0	13.0			17.0	17.0	60.0		
Total Split (%)			8.7%	8.7%	8.7%			11.3%	11.3%	40.0%		
Maximum Green (s)			7.0	7.0	7.0			11.0	11.0	54.0		
Yellow Time (s)			3.0	3.0	3.0			4.0	4.0	4.0		
All-Red Time (s)			3.0	3.0	3.0			2.0	2.0	2.0		
Lost Time Adjust (s)					0.5				0.5	0.5		
Total Lost Time (s)					6.5				6.5	6.5		
Lead/Lag			Lead	Lead	Lead			Lead	Lead			
Lead-Lag Optimize?												
Vehicle Extension (s)			3.0	3.0	3.0			3.0	3.0	3.0		
Recall Mode			None	None	None			None	None	None		
Walk Time (s)										7.0		
Flash Dont Walk (s)										25.0		
Pedestrian Calls (#/hr)										0		
Act Effct Green (s)					6.1				53.6	53.6		
Actuated g/C Ratio					0.04				0.37	0.37		
v/c Ratio					0.32				1.12	0.23		
Control Delay					83.2				136.3	33.8		
Queue Delay					0.0				0.0	0.0		
Total Delay					83.2				136.3	33.8		
LOS					F				F	C		
Approach Delay					83.2					94.0		
Approach LOS					F					F		

Intersection Summary

Lane Group	SWL2	SWL	SWT	SWR	SWR2
Total Split (s)	43.0	43.0	43.0		
Total Split (%)	28.7%	28.7%	28.7%		
Maximum Green (s)	37.0	37.0	37.0		
Yellow Time (s)	4.0	4.0	4.0		
All-Red Time (s)	2.0	2.0	2.0		
Lost Time Adjust (s)		0.5	0.5		
Total Lost Time (s)		6.5	6.5		
Lead/Lag	Lag	Lag	Lag		
Lead-Lag Optimize?					
Vehicle Extension (s)	3.0	3.0	3.0		
Recall Mode	None	None	None		
Walk Time (s)					
Flash Dont Walk (s)					
Pedestrian Calls (#/hr)					
Act Effct Green (s)		36.6	36.6		
Actuated g/C Ratio		0.25	0.25		
v/c Ratio		0.17	1.07		
Control Delay		46.1	115.3		
Queue Delay		0.0	0.0		
Total Delay		46.1	115.3		
LOS		D	F		
Approach Delay			108.0		
Approach LOS			F		

Intersection Summary

Queues
7: Sproul Rd/Spring Mill Rd & Aldwyn Ln/Kenilworth Rd & Lancaster Ave

3/10/2015

Lane Group	EBL	EBT	EBR2	WBL	WBT	NBT	SBT	NEL	NET	SWL	SWT
Lane Group Flow (vph)	264	1060	294	26	924	76	19	199	140	49	419
v/c Ratio	1.15	0.87	0.40	0.38	1.04	1.09	0.32	1.12	0.23	0.17	1.07
Control Delay	141.9	50.8	10.5	68.6	84.5	192.2	83.2	136.3	33.8	46.1	115.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	141.9	50.8	10.5	68.6	84.5	192.2	83.2	136.3	33.8	46.1	115.3
Queue Length 50th (ft)	~266	514	47	22	~442	~85	18	~171	96	38	~466
Queue Length 95th (ft)	#455	#627	125	58	#581	#197	48	#341	153	77	#683
Internal Link Dist (ft)		497			1529	412	517		1256		3088
Turn Bay Length (ft)	300			75				200		150	
Base Capacity (vph)	230	1220	741	69	886	70	64	178	606	287	392
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.15	0.87	0.40	0.38	1.04	1.09	0.30	1.12	0.23	0.17	1.07

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Lanes, Volumes, Timings
11: Chapel Dr & Lancaster Ave

3/10/2015

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	1125	122	20	826	85	19
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width (ft)	11	11	11	11	12	12
Lane Util. Factor	0.95	0.95	0.95	0.95	1.00	1.00
Frt	0.985				0.975	
Flt Protected				0.999	0.961	
Satd. Flow (prot)	3193	0	0	3238	1653	0
Flt Permitted				0.906	0.961	
Satd. Flow (perm)	3193	0	0	2937	1653	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	25				21	
Link Speed (mph)	35			35	25	
Link Distance (ft)	1609			1291	319	
Travel Time (s)	31.3			25.1	8.7	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1223	133	22	898	92	21
Shared Lane Traffic (%)						
Lane Group Flow (vph)	1356	0	0	920	113	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	12			12	12	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	10			10	10	
Two way Left Turn Lane						
Headway Factor	1.12	1.12	1.12	1.12	1.07	1.07
Turning Speed (mph)		9	15		15	9
Number of Detectors	1		1	1	1	
Detector Template	Thru		Left	Thru	Left	
Leading Detector (ft)	37		20	37	37	
Trailing Detector (ft)	-3		0	-3	-3	
Detector 1 Position(ft)	-3		0	-3	-3	
Detector 1 Size(ft)	40		20	40	40	
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	
Turn Type	NA		Perm	NA	Prot	
Protected Phases	2			6	8	
Permitted Phases			6			
Detector Phase	2		6	6	8	
Switch Phase						
Minimum Initial (s)	10.0		10.0	10.0	4.0	
Minimum Split (s)	21.0		21.0	21.0	28.0	
Total Split (s)	32.0		32.0	32.0	28.0	
Total Split (%)	53.3%		53.3%	53.3%	46.7%	
Maximum Green (s)	27.0		27.0	27.0	23.0	
Yellow Time (s)	3.0		3.0	3.0	3.0	

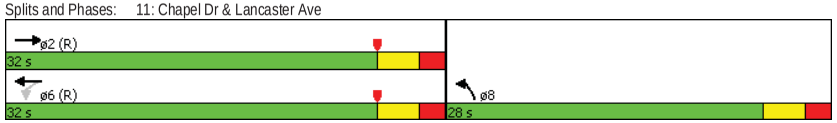
Lanes, Volumes, Timings
11: Chapel Dr & Lancaster Ave

3/10/2015

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
All-Red Time (s)	2.0		2.0	2.0	2.0	
Lost Time Adjust (s)	0.5			0.5	0.5	
Total Lost Time (s)	5.5			5.5	5.5	
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Recall Mode	C-Max		C-Max	C-Max	None	
Walk Time (s)	10.0		10.0	10.0	7.0	
Flash Dont Walk (s)	0.0		0.0	0.0	16.0	
Pedestrian Calls (#/hr)	0		0	0	0	
Act Effct Green (s)	43.8			43.8	8.5	
Actuated g/C Ratio	0.73			0.73	0.14	
v/c Ratio	0.58			0.43	0.45	
Control Delay	6.7			3.4	24.8	
Queue Delay	0.0			0.0	0.0	
Total Delay	6.7			3.4	24.8	
LOS	A			A	C	
Approach Delay	6.7			3.4	24.8	
Approach LOS	A			A	C	

Intersection Summary			
Area Type:	Other		
Cycle Length: 60			
Actuated Cycle Length: 60			
Offset: 26 (43%), Referenced to phase 2:EBT and 6:WBTL, Start of Yellow			
Natural Cycle: 60			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.58			
Intersection Signal Delay: 6.3		Intersection LOS: A	
Intersection Capacity Utilization 54.6%		ICU Level of Service A	
Analysis Period (min) 15			

Splits and Phases: 11: Chapel Dr & Lancaster Ave



Queues
11: Chapel Dr & Lancaster Ave

3/10/2015

Lane Group	EBT	WBT	NBL
Lane Group Flow (vph)	1356	920	113
v/c Ratio	0.58	0.43	0.45
Control Delay	6.7	3.4	24.8
Queue Delay	0.0	0.0	0.0
Total Delay	6.7	3.4	24.8
Queue Length 50th (ft)	111	1	31
Queue Length 95th (ft)	208	m109	67
Internal Link Dist (ft)	1529	1211	239
Turn Bay Length (ft)			
Base Capacity (vph)	2335	2142	633
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.58	0.43	0.18

Intersection Summary
m Volume for 95th percentile queue is metered by upstream signal.

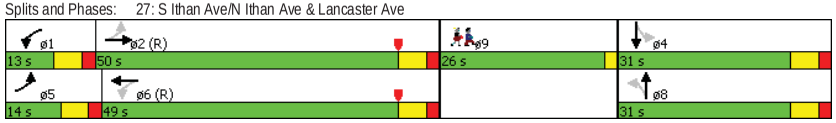
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	83	968	94	98	707	32	65	127	78	67	240	75
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width (ft)	10	10	10	10	10	10	10	10	10	10	10	10
Grade (%)		0%			3%			1%			0%	
Storage Length (ft)	140		0	70		0	105		0	65		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.987			0.993			0.943			0.964	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1565	3089	0	1541	3061	0	1557	1545	0	1565	1588	0
Flt Permitted	0.243			0.107			0.215			0.457		
Satd. Flow (perm)	400	3089	0	174	3061	0	352	1545	0	753	1588	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		35			35			25			25	
Link Distance (ft)		1291			2034			183			973	
Travel Time (s)		25.1			39.6			5.0			26.5	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	87	1019	99	103	744	34	68	134	82	71	253	79
Shared Lane Traffic (%)												
Lane Group Flow (vph)	87	1118	0	103	778	0	68	216	0	71	332	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		10			10			10			10	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		10			10			10			10	
Two way Left Turn Lane												
Headway Factor	1.17	1.17	1.17	1.19	1.19	1.19	1.18	1.18	1.18	1.17	1.17	1.17
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	1		1	1		1	1		1	1	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (ft)	37	37		37	37		37	37		37	37	
Trailing Detector (ft)	-3	-3		-3	-3		-3	-3		-3	-3	
Detector 1 Position(ft)	-3	-3		-3	-3		-3	-3		-3	-3	
Detector 1 Size(ft)	40	40		40	40		40	40		40	40	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2			6			8			4		
Detector Phase	5	2		1	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	3.0	34.0		3.0	34.0		3.0	3.0		3.0	3.0	
Minimum Split (s)	13.0	40.0		13.0	40.0		13.0	13.0		13.0	13.0	

Lane Group	ø9
Lane Configurations	
Volume (vph)	
Ideal Flow (vphpl)	
Lane Width (ft)	
Grade (%)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Lane Util. Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Enter Blocked Intersection	
Lane Alignment	
Median Width(ft)	
Link Offset(ft)	
Crosswalk Width(ft)	
Two way Left Turn Lane	
Headway Factor	
Turning Speed (mph)	
Number of Detectors	
Detector Template	
Leading Detector (ft)	
Trailing Detector (ft)	
Detector 1 Position(ft)	
Detector 1 Size(ft)	
Detector 1 Type	
Detector 1 Channel	
Detector 1 Extend (s)	
Detector 1 Queue (s)	
Detector 1 Delay (s)	
Turn Type	
Protected Phases	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	24.0
Minimum Split (s)	26.0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Split (s)	14.0	50.0		13.0	49.0		31.0	31.0		31.0	31.0	
Total Split (%)	11.7%	41.7%		10.8%	40.8%		25.8%	25.8%		25.8%	25.8%	
Maximum Green (s)	8.0	44.0		7.0	43.0		25.0	25.0		25.0	25.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.5	0.5		0.5	0.5		0.5	0.5		0.5	0.5	
Total Lost Time (s)	6.5	6.5		6.5	6.5		6.5	6.5		6.5	6.5	
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)	55.8	48.7		54.6	48.1		24.5	24.5		24.5	24.5	
Actuated g/C Ratio	0.46	0.41		0.46	0.40		0.20	0.20		0.20	0.20	
v/c Ratio	0.34	0.89		0.67	0.63		0.96	0.69		0.46	1.02	
Control Delay	21.4	45.5		40.8	26.6		144.9	56.6		53.3	103.7	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	21.4	45.5		40.8	26.6		144.9	56.6		53.3	103.7	
LOS	C	D		D	C		F	E		D	F	
Approach Delay		43.7			28.3			77.7			94.9	
Approach LOS		D			C			E			F	

Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 120			
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow, Master Intersection			
Natural Cycle: 115			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 1.02			
Intersection Signal Delay: 49.7		Intersection LOS: D	
Intersection Capacity Utilization 80.8%		ICU Level of Service D	
Analysis Period (min) 15			

Splits and Phases: 27: S Ithan Ave/N Ithan Ave & Lancaster Ave

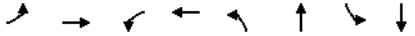


Lane Group	ø9
Total Split (s)	26.0
Total Split (%)	22%
Maximum Green (s)	24.0
Yellow Time (s)	2.0
All-Red Time (s)	0.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0
Recall Mode	None
Walk Time (s)	9.0
Flash Dont Walk (s)	15.0
Pedestrian Calls (#/hr)	45
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	

Intersection Summary

Queues
27: S Ithan Ave/N Ithan Ave & Lancaster Ave

3/10/2015



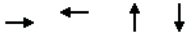
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	87	1118	103	778	68	216	71	332
v/c Ratio	0.34	0.89	0.67	0.63	0.96	0.69	0.46	1.02
Control Delay	21.4	45.5	40.8	26.6	144.9	56.6	53.3	103.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	21.4	45.5	40.8	26.6	144.9	56.6	53.3	103.7
Queue Length 50th (ft)	36	487	46	203	52	156	49	~274
Queue Length 95th (ft)	m63	#627	m#105	244	#148	244	99	#458
Internal Link Dist (ft)		1211		1954		103		893
Turn Bay Length (ft)	140		70		105		65	
Base Capacity (vph)	259	1253	153	1226	71	315	153	324
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.34	0.89	0.67	0.63	0.96	0.69	0.46	1.02

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Queues
51: Lowrys Ln & Lancaster Ave

3/10/2015



Lane Group	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	1305	1016	77	263
v/c Ratio	0.75	0.61	0.22	0.80
Control Delay	12.0	10.6	20.1	42.3
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	12.0	10.6	20.1	42.3
Queue Length 50th (ft)	144	118	22	88
Queue Length 95th (ft)	m212	173	52	#190
Internal Link Dist (ft)	1954	302	2747	520
Turn Bay Length (ft)				
Base Capacity (vph)	1739	1659	386	357
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.75	0.61	0.20	0.74

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

HCM 2010 Signalized Intersection Summary
51: Lowrys Ln & Lancaster Ave

3/10/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	2	1176	23	15	916	4	20	36	15	99	71	72
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	1782	1800	1773	1755	1773	1900	1881	1900	1881	1863	1881
Adj Flow Rate, veh/h	2	1278	25	16	996	4	22	39	16	108	77	78
Adj No. of Lanes	0	2	0	0	2	0	0	1	0	0	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	1	1	1	1	1	1	1	1	1	1	1	1
Cap, veh/h	61	2033	40	72	1999	8	134	204	68	193	106	90
Arrive On Green	1.00	1.00	1.00	0.61	0.61	0.61	0.19	0.19	0.19	0.19	0.19	0.19
Sat Flow, veh/h	1	3326	65	16	3269	13	304	1079	363	574	564	480
Grp Volume(v), veh/h	685	0	620	525	0	491	77	0	0	263	0	0
Grp Sat Flow(s),veh/h/ln	1781	0	1610	1703	0	1595	1746	0	0	1618	0	0
Q Serve(g_s), s	0.0	0.0	0.0	0.0	0.0	10.4	0.0	0.0	0.0	7.2	0.0	0.0
Cycle Q Clear(g_c), s	0.0	0.0	0.0	10.0	0.0	10.4	2.2	0.0	0.0	9.4	0.0	0.0
Prop In Lane	0.00		0.04	0.03		0.01	0.29		0.21	0.41		0.30
Lane Grp Cap(c), veh/h	1149	0	985	1103	0	975	406	0	0	390	0	0
V/C Ratio(X)	0.60	0.00	0.63	0.48	0.00	0.50	0.19	0.00	0.00	0.67	0.00	0.00
Avail Cap(c_a), veh/h	1149	0	985	1103	0	975	492	0	0	473	0	0
HCM Platoon Ratio	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.38	0.00	0.38	1.00	0.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	0.0	0.0	0.0	6.5	0.0	6.5	20.6	0.0	0.0	23.5	0.0	0.0
Incr Delay (d2), s/veh	0.9	0.0	1.2	1.5	0.0	1.9	0.2	0.0	0.0	2.9	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(-26165%),veh/ln	0.3	0.0	0.3	5.1	0.0	5.0	1.1	0.0	0.0	4.5	0.0	0.0
LnGrp Delay(d),s/veh	0.9	0.0	1.2	7.9	0.0	8.4	20.9	0.0	0.0	26.3	0.0	0.0
LnGrp LOS	A		A	A		A	C			C		
Approach Vol, veh/h		1305			1016			77			263	
Approach Delay, s/veh		1.0			8.2			20.9			26.3	
Approach LOS		A			A			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		43.2		16.8		43.2		16.8
Change Period (Y+Rc), s		6.0		5.0		6.0		5.0
Max Green Setting (Gmax), s		34.0		15.0		34.0		15.0
Max Q Clear Time (g_c+I1), s		2.0		11.4		12.4		4.2
Green Ext Time (p_c), s		12.6		0.5		10.7		1.0

Intersection Summary	
HCM 2010 Ctrl Delay	6.8
HCM 2010 LOS	A

Notes

User approved pedestrian interval to be less than phase max green.

Queues
16: Sproul Rd & Conestoga Rd

3/10/2015

Lane Group	EBL	EBT	WBL	WBT	NEL	NET	SWT
Lane Group Flow (vph)	112	821	29	610	112	227	454
v/c Ratio	0.54	1.08	0.32	0.97	0.44	0.34	1.15
Control Delay	23.5	79.4	34.8	59.6	20.6	17.3	121.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	23.5	79.4	34.8	59.6	20.6	17.3	121.9
Queue Length 50th (ft)	33	~483	12	~368	34	70	~270
Queue Length 95th (ft)	#65	#702	#43	#569	66	122	#446
Internal Link Dist (ft)		601		178		715	1701
Turn Bay Length (ft)	50		65		90		
Base Capacity (vph)	211	763	91	632	257	710	396
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.53	1.08	0.32	0.97	0.44	0.32	1.15

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM 2010 Signalized Intersection Summary
16: Sproul Rd & Conestoga Rd

3/10/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (veh/h)	106	559	221	28	531	48	106	188	28	51	296	84
Number	7	4	14	3	8	18	1	6	16	5	2	12
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1782	1782	1800	1827	1827	1845	1773	1773	1791	1809	1791	1809
Adj Flow Rate, veh/h	112	588	0	29	559	0	112	198	29	54	312	88
Adj No. of Lanes	1	1	0	1	1	0	1	1	0	0	1	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	1	1	1	1	1	1	1	1	1	1	1	1
Cap, veh/h	220	818	0	255	613	0	300	601	88	86	316	85
Arrive On Green	0.06	0.46	0.00	0.34	0.34	0.00	0.06	0.40	0.40	0.26	0.26	0.26
Sat Flow, veh/h	1697	1782	0	854	1827	0	1689	1513	222	137	1202	322
Grp Volume(v), veh/h	112	588	0	29	559	0	112	0	227	454	0	0
Grp Sat Flow(s),veh/h/ln	1697	1782	0	854	1827	0	1689	0	1734	1661	0	0
Q Serve(g_s), s	3.3	21.3	0.0	2.3	23.4	0.0	3.7	0.0	7.3	14.8	0.0	0.0
Cycle Q Clear(g_c), s	3.3	21.3	0.0	13.7	23.4	0.0	3.7	0.0	7.3	21.0	0.0	0.0
Prop In Lane	1.00		0.00	1.00		0.00	1.00		0.13	0.12		0.19
Lane Grp Cap(c), veh/h	220	818	0	255	613	0	300	0	689	486	0	0
V/C Ratio(X)	0.51	0.72	0.00	0.11	0.91	0.00	0.37	0.00	0.33	0.93	0.00	0.00
Avail Cap(c_a), veh/h	264	818	0	255	613	0	337	0	726	486	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	19.3	17.5	0.0	27.0	25.5	0.0	18.3	0.0	16.7	29.8	0.0	0.0
Incr Delay (d2), s/veh	1.8	5.4	0.0	0.9	20.2	0.0	0.8	0.0	0.3	25.2	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(-26165%),veh/ln	1.6	11.7	0.0	0.6	15.2	0.0	1.7	0.0	3.5	13.4	0.0	0.0
LnGrp Delay(d),s/veh	21.1	22.8	0.0	27.9	45.7	0.0	19.0	0.0	17.0	55.0	0.0	0.0
LnGrp LOS	C	C		C	D		B		B	E		
Approach Vol, veh/h		700			588			339			454	
Approach Delay, s/veh		22.6			44.8			17.7			55.0	
Approach LOS		C			D			B			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4		6	7	8
Phs Duration (G+Y+Rc), s	10.8	27.0		42.2		37.8	9.9	32.3
Change Period (Y+Rc), s	5.5	5.5		5.0		5.5	5.0	5.0
Max Green Setting (Gmax), s	7.0	21.5		35.5		34.0	7.0	23.5
Max Q Clear Time (g_c+I1), s	5.7	23.0		23.3		9.3	5.3	25.4
Green Ext Time (p_c), s	0.0	0.0		5.7		2.5	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	35.1
HCM 2010 LOS	D

Queues
25: S Ithan Ave & Conestoga Rd

3/10/2015

Lane Group	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	683	599	37	319
v/c Ratio	0.85	0.71	0.10	0.74
Control Delay	23.1	15.3	16.1	27.4
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	23.1	15.3	16.1	27.4
Queue Length 50th (ft)	174	134	8	73
Queue Length 95th (ft)	#315	231	28	#182
Internal Link Dist (ft)	1193	2911	717	3163
Turn Bay Length (ft)				
Base Capacity (vph)	1111	1162	462	544
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.61	0.52	0.08	0.59

Intersection Summary
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM 2010 Signalized Intersection Summary
25: S Ithan Ave & Conestoga Rd

3/10/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	65	529	7	11	477	40	7	19	6	54	89	138
Number	1	6	16	5	2	12	7	4	14	3	8	18
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	1854	1836	1854	1764	1747	1764	1763	1745	1763	1844	1826	1844
Adj Flow Rate, veh/h	74	601	8	12	542	45	8	22	7	61	101	157
Adj No. of Lanes	0	1	0	0	1	0	0	1	0	0	1	0
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Percent Heavy Veh, %	1	1	1	1	1	1	1	1	1	1	1	1
Cap, veh/h	145	763	10	87	751	61	139	273	73	144	143	186
Arrive On Green	0.48	0.48	0.48	0.48	0.48	0.48	0.23	0.23	0.23	0.23	0.23	0.23
Sat Flow, veh/h	117	1598	20	10	1573	129	177	1172	315	209	616	800
Grp Volume(v), veh/h	683	0	0	599	0	0	37	0	0	319	0	0
Grp Sat Flow(s),veh/h/ln	1735	0	0	1712	0	0	1664	0	0	1625	0	0
Q Serve(g_s), s	2.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.1	0.0	0.0
Cycle Q Clear(g_c), s	14.5	0.0	0.0	12.5	0.0	0.0	0.8	0.0	0.0	8.4	0.0	0.0
Prop In Lane	0.11		0.01	0.02		0.08	0.22		0.19	0.19		0.49
Lane Grp Cap(c), veh/h	917	0	0	899	0	0	485	0	0	474	0	0
V/C Ratio(X)	0.74	0.00	0.00	0.67	0.00	0.00	0.08	0.00	0.00	0.67	0.00	0.00
Avail Cap(c_a), veh/h	1357	0	0	1353	0	0	655	0	0	654	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	9.8	0.0	0.0	9.4	0.0	0.0	13.5	0.0	0.0	16.4	0.0	0.0
Incr Delay (d2), s/veh	1.3	0.0	0.0	0.9	0.0	0.0	0.1	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(-26165%),veh/ln	7.3	0.0	0.0	6.0	0.0	0.0	0.4	0.0	0.0	3.9	0.0	0.0
LnGrp Delay(d),s/veh	11.1	0.0	0.0	10.2	0.0	0.0	13.6	0.0	0.0	18.0	0.0	0.0
LnGrp LOS	B			B			B			B		
Approach Vol, veh/h		683			599			37			319	
Approach Delay, s/veh		11.1			10.2			13.6			18.0	
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		27.9		16.9		27.9		16.9
Change Period (Y+Rc), s		6.0		6.0		6.0		6.0
Max Green Setting (Gmax), s		34.0		16.0		34.0		16.0
Max Q Clear Time (g_c+I1), s		14.5		2.8		16.5		10.4
Green Ext Time (p_c), s		5.6		1.2		5.4		0.7

Intersection Summary	
HCM 2010 Ctrl Delay	12.2
HCM 2010 LOS	B

Queues
33: Williams Rd/Garrett Ave & Conestoga Rd

3/10/2015

Lane Group	EBT	WBT	NET	SWT
Lane Group Flow (vph)	587	591	31	101
v/c Ratio	0.43	0.42	0.15	0.50
Control Delay	7.1	7.0	26.6	35.8
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	7.1	7.0	26.6	35.8
Queue Length 50th (ft)	106	107	12	40
Queue Length 95th (ft)	189	189	33	84
Internal Link Dist (ft)	1390	1278	368	1821
Turn Bay Length (ft)				
Base Capacity (vph)	1364	1394	273	258
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.43	0.42	0.11	0.39

Intersection Summary

HCM 2010 Signalized Intersection Summary
33: Williams Rd/Garrett Ave & Conestoga Rd

3/10/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		✣			✣			✣			✣	
Volume (veh/h)	27	504	9	12	502	29	17	1	11	28	12	53
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	1872	1872	1872	1872	1872	1872	1800	1800	1800	1728	1728	1728
Adj Flow Rate, veh/h	29	548	10	13	546	32	18	1	12	30	13	58
Adj No. of Lanes	0	1	0	0	1	0	0	1	0	0	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	0	0	0	0	0	0	0	0	0	0	0	0
Cap, veh/h	88	1244	22	67	1229	71	151	25	55	101	26	73
Arrive On Green	0.71	0.71	0.71	0.71	0.71	0.71	0.09	0.09	0.09	0.09	0.09	0.09
Sat Flow, veh/h	41	1748	31	13	1728	100	730	289	643	329	306	856
Grp Volume(v), veh/h	587	0	0	591	0	0	31	0	0	101	0	0
Grp Sat Flow(s),veh/h/ln	1820	0	0	1840	0	0	1662	0	0	1490	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	2.9	0.0	0.0
Cycle Q Clear(g_c), s	8.5	0.0	0.0	8.6	0.0	0.0	1.1	0.0	0.0	4.2	0.0	0.0
Prop In Lane	0.05		0.02	0.02		0.05	0.58		0.39	0.30		0.57
Lane Grp Cap(c), veh/h	1355	0	0	1367	0	0	230	0	0	200	0	0
V/C Ratio(X)	0.43	0.00	0.00	0.43	0.00	0.00	0.13	0.00	0.00	0.51	0.00	0.00
Avail Cap(c_a), veh/h	1355	0	0	1367	0	0	410	0	0	384	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	3.9	0.0	0.0	3.9	0.0	0.0	27.3	0.0	0.0	28.7	0.0	0.0
Incr Delay (d2), s/veh	1.0	0.0	0.0	1.0	0.0	0.0	0.4	0.0	0.0	2.8	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(-26165%),veh/ln	4.6	0.0	0.0	4.6	0.0	0.0	0.5	0.0	0.0	1.9	0.0	0.0
LnGrp Delay(d),s/veh	4.9	0.0	0.0	4.9	0.0	0.0	27.6	0.0	0.0	31.5	0.0	0.0
LnGrp LOS	A			A			C			C		
Approach Vol, veh/h		587			591			31			101	
Approach Delay, s/veh		4.9			4.9			27.6			31.5	
Approach LOS		A			A			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		52.0		11.9		52.0		11.9
Change Period (Y+Rc), s		6.0		6.0		6.0		6.0
Max Green Setting (Gmax), s		46.0		14.0		46.0		14.0
Max Q Clear Time (g_c+I1), s		10.5		6.2		10.6		3.1
Green Ext Time (p_c), s		5.7		0.3		5.7		0.4

Intersection Summary	
HCM 2010 Ctrl Delay	7.5
HCM 2010 LOS	A

Notes

User approved pedestrian interval to be less than phase max green.

Queues
3: County Line Rd & Spring Mill Rd

3/10/2015

Lane Group	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	546	447	412	605
v/c Ratio	0.98	0.91	0.81	1.02
Control Delay	54.8	44.1	31.2	63.7
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	54.8	44.1	31.2	63.7
Queue Length 50th (ft)	181	142	122	~218
Queue Length 95th (ft)	#373	#292	#193	#408
Internal Link Dist (ft)	3088	1481	1821	1084
Turn Bay Length (ft)				
Base Capacity (vph)	558	491	506	593
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.98	0.91	0.81	1.02

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM 2010 Signalized Intersection Summary
3: County Line Rd & Spring Mill Rd 3/10/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✣			✣			✣			✣	
Volume (veh/h)	65	310	96	57	248	53	73	206	38	66	403	45
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	1789	1800	1800	1766	1800	1800	1800	1800	1800	1773	1800
Adj Flow Rate, veh/h	90	344	112	79	285	83	90	264	58	87	453	65
Adj No. of Lanes	0	1	0	0	1	0	0	1	0	0	1	0
Peak Hour Factor	0.72	0.90	0.86	0.72	0.87	0.64	0.81	0.78	0.66	0.76	0.89	0.69
Percent Heavy Veh, %	1	1	1	3	3	3	0	0	0	1	1	1
Cap, veh/h	141	406	123	137	390	104	151	379	75	134	503	68
Arrive On Green	0.39	0.39	0.39	0.39	0.39	0.39	0.40	0.40	0.40	0.40	0.40	0.40
Sat Flow, veh/h	184	1048	318	171	1008	269	197	958	189	166	1270	173
Grp Volume(v), veh/h	546	0	0	447	0	0	412	0	0	605	0	0
Grp Sat Flow(s),veh/h/ln	1550	0	0	1448	0	0	1344	0	0	1609	0	0
Q Serve(g_s), s	4.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.8	0.0	0.0
Cycle Q Clear(g_c), s	20.0	0.0	0.0	16.0	0.0	0.0	15.0	0.0	0.0	21.8	0.0	0.0
Prop In Lane	0.16		0.21	0.18		0.19	0.22		0.14	0.14		0.11
Lane Grp Cap(c), veh/h	670	0	0	631	0	0	605	0	0	706	0	0
V/C Ratio(X)	0.81	0.00	0.00	0.71	0.00	0.00	0.68	0.00	0.00	0.86	0.00	0.00
Avail Cap(c_a), veh/h	670	0	0	631	0	0	623	0	0	725	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)	0.45	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	17.1	0.0	0.0	15.7	0.0	0.0	14.8	0.0	0.0	17.3	0.0	0.0
Incr Delay (d2), s/veh	5.0	0.0	0.0	6.6	0.0	0.0	2.4	0.0	0.0	9.3	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(-26165%),veh/ln	9.4	0.0	0.0	7.6	0.0	0.0	6.1	0.0	0.0	11.4	0.0	0.0
LnGrp Delay(d),s/veh	22.1	0.0	0.0	22.3	0.0	0.0	17.2	0.0	0.0	26.7	0.0	0.0
LnGrp LOS	C			C			B			C		
Approach Vol, veh/h		546			447			412			605	
Approach Delay, s/veh		22.1			22.3			17.2			26.7	
Approach LOS		C			C			B			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		29.7		30.3		29.7		30.3
Change Period (Y+Rc), s		6.0		6.0		6.0		6.0
Max Green Setting (Gmax), s		23.0		25.0		23.0		25.0
Max Q Clear Time (g_c+I1), s		22.0		23.8		18.0		17.0
Green Ext Time (p_c), s		0.5		0.4		2.1		1.8

Intersection Summary		
HCM 2010 Ctrl Delay		22.5
HCM 2010 LOS		C

HCM 2010 TWSC
79: Garrett Rd & Lancaster Ave 3/10/2015

Intersection	
Int Delay, s/veh	1.6

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	1243	48	49	930	0	38
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, %	-3	-	-	3	0	-
Peak Hour Factor	82	82	82	82	82	82
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	1516	59	60	1134	0	46

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	1574	0	2232	787
Stage 1	-	-	-	-	1545	-
Stage 2	-	-	-	-	687	-
Critical Hdwy	-	-	4.1	-	6.8	6.9
Critical Hdwy Stg 1	-	-	-	-	5.8	-
Critical Hdwy Stg 2	-	-	-	-	5.8	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	424	-	37	339
Stage 1	-	-	-	-	165	-
Stage 2	-	-	-	-	466	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	424	-	23	339
Mov Cap-2 Maneuver	-	-	-	-	23	-
Stage 1	-	-	-	-	165	-
Stage 2	-	-	-	-	288	-

Approach	EB	WB	NB
HCM Control Delay, s	0	3.2	17.3
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	339	-	-	424	-
HCM Lane V/C Ratio	0.137	-	-	0.141	-
HCM Control Delay (s)	17.3	-	-	14.9	2.6
HCM Lane LOS	C	-	-	B	A
HCM 95th %tile Q(veh)	0.5	-	-	0.5	-

Intersection	
Int Delay, s/veh	0.6

Movement	EBL	EBT	WBT	WBR	SWL	SWR
Vol, veh/h	10	667	627	3	18	9
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	96	96	96	96	96	96
Heavy Vehicles, %	1	1	1	1	1	1
Mvmt Flow	10	695	653	3	19	9

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	656	0	-	0	1371	655
Stage 1	-	-	-	-	655	-
Stage 2	-	-	-	-	716	-
Critical Hdwy	4.11	-	-	-	6.41	6.21
Critical Hdwy Stg 1	-	-	-	-	5.41	-
Critical Hdwy Stg 2	-	-	-	-	5.41	-
Follow-up Hdwy	2.209	-	-	-	3.509	3.309
Pot Cap-1 Maneuver	936	-	-	-	162	468
Stage 1	-	-	-	-	519	-
Stage 2	-	-	-	-	486	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	936	-	-	-	159	468
Mov Cap-2 Maneuver	-	-	-	-	159	-
Stage 1	-	-	-	-	519	-
Stage 2	-	-	-	-	478	-

Approach	EB	WB	SW
HCM Control Delay, s	0.1	0	25.4
HCM LOS			D

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SWLn1
Capacity (veh/h)	936	-	-	-	204
HCM Lane V/C Ratio	0.011	-	-	-	0.138
HCM Control Delay (s)	8.9	0	-	-	25.4
HCM Lane LOS	A	A	-	-	D
HCM 95th %tile Q(veh)	0	-	-	-	0.5

Intersection	
Int Delay, s/veh	2.7

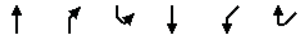
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	37	510	18	18	471	17	15	8	18	9	18	54
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	96	96	96	96	96	96	96	96	96	96	96	96
Heavy Vehicles, %	1	1	1	1	1	1	1	1	1	1	1	1
Mvmt Flow	39	531	19	19	491	18	16	8	19	9	19	56

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	508	0	0	550	0	0	1192	1164	541	1168	1164	499
Stage 1	-	-	-	-	-	-	618	618	-	537	537	-
Stage 2	-	-	-	-	-	-	574	546	-	631	627	-
Critical Hdwy	4.11	-	-	4.11	-	-	7.11	6.51	6.21	7.11	6.51	6.21
Critical Hdwy Stg 1	-	-	-	-	-	-	6.11	5.51	-	6.11	5.51	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.11	5.51	-	6.11	5.51	-
Follow-up Hdwy	2.209	-	-	2.209	-	-	3.509	4.009	3.309	3.509	4.009	3.309
Pot Cap-1 Maneuver	1062	-	-	1025	-	-	165	195	543	171	195	574
Stage 1	-	-	-	-	-	-	478	482	-	530	524	-
Stage 2	-	-	-	-	-	-	506	520	-	471	478	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1062	-	-	1025	-	-	129	180	543	150	180	574
Mov Cap-2 Maneuver	-	-	-	-	-	-	129	180	-	150	180	-
Stage 1	-	-	-	-	-	-	453	456	-	502	510	-
Stage 2	-	-	-	-	-	-	428	506	-	423	453	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.6	0.3	26.3	20.3
HCM LOS			D	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	211	1062	-	-	1025	-	-	319
HCM Lane V/C Ratio	0.202	0.036	-	-	0.018	-	-	0.264
HCM Control Delay (s)	26.3	8.5	0	-	8.6	0	-	20.3
HCM Lane LOS	D	A	A	-	A	A	-	C
HCM 95th %tile Q(veh)	0.7	0.1	-	-	0.1	-	-	1

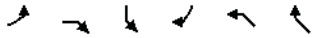
Lanes, Volumes, Timings
38: County Line Rd & N Ithan Ave 3/10/2015



Lane Group	NBT	NBR	SBL	SBT	SWL	SWR
Lane Configurations						
Volume (vph)	273	119	185	499	116	63
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.959				0.952	
Flt Protected				0.987	0.969	
Satd. Flow (prot)	1804	0	0	1857	1735	0
Flt Permitted				0.987	0.969	
Satd. Flow (perm)	1804	0	0	1857	1735	0
Link Speed (mph)	30			30	30	
Link Distance (ft)	295			1901	824	
Travel Time (s)	6.7			43.2	18.7	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%
Adj. Flow (vph)	290	127	197	531	123	67
Shared Lane Traffic (%)						
Lane Group Flow (vph)	417	0	0	728	190	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	0			0	12	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	10			10	10	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)		9	15		15	9
Sign Control	Free			Stop	Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	78.4%	ICU Level of Service	D
Analysis Period (min)	15		

Lanes, Volumes, Timings
2: County Line Rd & N Ithan Ave 3/10/2015



Lane Group	EBL	EBR	SBL	SBR	NWL	NWR
Lane Configurations						
Volume (vph)	225	37	306	312	24	164
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.981		0.932		0.883	
Flt Protected	0.959		0.976		0.994	
Satd. Flow (prot)	1763	0	1711	0	1651	0
Flt Permitted	0.959		0.976		0.994	
Satd. Flow (perm)	1763	0	1711	0	1651	0
Link Speed (mph)	30		30		30	
Link Distance (ft)	973		295		2014	
Travel Time (s)	22.1		6.7		45.8	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%
Bus Blockages (#/hr)	1	0	0	0	0	0
Adj. Flow (vph)	239	39	326	332	26	174
Shared Lane Traffic (%)						
Lane Group Flow (vph)	278	0	658	0	200	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Right
Median Width(ft)	22		12		12	
Link Offset(ft)	0		0		0	
Crosswalk Width(ft)	10		10		10	
Two way Left Turn Lane						
Headway Factor	1.01	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9	15	9	15	9
Sign Control	Stop		Free		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	72.3%	ICU Level of Service	C
Analysis Period (min)	15		

Intersection	
Int Delay, s/veh	1.5

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	17	19	53	185	158	126
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	0	0	0	0
Mvmt Flow	18	20	55	193	165	131

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	533	230	296	0	-	0
Stage 1	230	-	-	-	-	-
Stage 2	303	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	511	814	1277	-	-	-
Stage 1	813	-	-	-	-	-
Stage 2	754	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	486	814	1277	-	-	-
Mov Cap-2 Maneuver	486	-	-	-	-	-
Stage 1	813	-	-	-	-	-
Stage 2	718	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	11.2	1.8	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1277	-	617	-	-
HCM Lane V/C Ratio	0.043	-	0.061	-	-
HCM Control Delay (s)	7.9	0	11.2	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0.1	-	0.2	-	-

Intersection	
Int Delay, s/veh	3.6

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	171	218	349	17	12	120
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	98	98	98	98	98	98
Heavy Vehicles, %	1	1	1	1	1	1
Mvmt Flow	174	222	356	17	12	122

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	373	0	-	0	936	365
Stage 1	-	-	-	-	365	-
Stage 2	-	-	-	-	571	-
Critical Hdwy	4.11	-	-	-	6.41	6.21
Critical Hdwy Stg 1	-	-	-	-	5.41	-
Critical Hdwy Stg 2	-	-	-	-	5.41	-
Follow-up Hdwy	2.209	-	-	-	3.509	3.309
Pot Cap-1 Maneuver	1191	-	-	-	295	682
Stage 1	-	-	-	-	704	-
Stage 2	-	-	-	-	567	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1191	-	-	-	246	682
Mov Cap-2 Maneuver	-	-	-	-	246	-
Stage 1	-	-	-	-	704	-
Stage 2	-	-	-	-	472	-

Approach	EB	WB	SB
HCM Control Delay, s	3.8	0	13
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1191	-	-	-	587
HCM Lane V/C Ratio	0.147	-	-	-	0.229
HCM Control Delay (s)	8.5	0	-	-	13
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.5	-	-	-	0.9

Intersection	
Int Delay, s/veh	3.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	37	26	1	9	26	11	4	518	29	11	662	61
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	1	1	1	1	1	1	1	1	1	1	1	1
Mvmt Flow	39	27	1	9	27	12	4	545	31	12	697	64

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1047	1336	381	954	1353	288	761	0	0	576	0	0
Stage 1	752	752	-	569	569	-	-	-	-	-	-	-
Stage 2	295	584	-	385	784	-	-	-	-	-	-	-
Critical Hdwy	7.52	6.52	6.92	7.52	6.52	6.92	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.52	5.52	-	6.52	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.52	5.52	-	6.52	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.51	4.01	3.31	3.51	4.01	3.31	2.21	-	-	2.21	-	-
Pot Cap-1 Maneuver	184	154	620	215	150	712	853	-	-	1000	-	-
Stage 1	371	418	-	477	507	-	-	-	-	-	-	-
Stage 2	692	499	-	613	405	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	152	150	620	181	146	712	853	-	-	1000	-	-
Mov Cap-2 Maneuver	152	150	-	181	146	-	-	-	-	-	-	-
Stage 1	368	409	-	474	503	-	-	-	-	-	-	-
Stage 2	639	496	-	559	396	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	45.8	30.5	0.1	0.2
HCM LOS	E	D		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	853	-	-	153	189	1000	-	-
HCM Lane V/C Ratio	0.005	-	-	0.44	0.256	0.012	-	-
HCM Control Delay (s)	9.2	0	-	45.8	30.5	8.6	0.1	-
HCM Lane LOS	A	A	-	E	D	A	A	-
HCM 95th %tile Q(veh)	0	-	-	2	1	0	-	-

Intersection	
Int Delay, s/veh	2.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	35	134	5	51	278	22	8	3	37	4	0	13
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	91	91	91	91	91	91	91	91	91	91	91	91
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	38	147	5	56	305	24	9	3	41	4	0	14

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	330	0	0	153	0	0	664	669	150	679	660	318
Stage 1	-	-	-	-	-	-	227	227	-	430	430	-
Stage 2	-	-	-	-	-	-	437	442	-	249	230	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1229	-	-	1428	-	-	374	379	896	366	383	723
Stage 1	-	-	-	-	-	-	776	716	-	603	583	-
Stage 2	-	-	-	-	-	-	598	576	-	755	714	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1229	-	-	1428	-	-	344	349	896	326	352	723
Mov Cap-2 Maneuver	-	-	-	-	-	-	344	349	-	326	352	-
Stage 1	-	-	-	-	-	-	750	692	-	582	555	-
Stage 2	-	-	-	-	-	-	558	548	-	693	690	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	1.6	1.1	11	11.6
HCM LOS			B	B

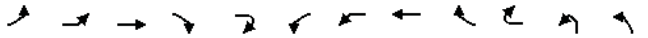
Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	656	1229	-	-	1428	-	-	562
HCM Lane V/C Ratio	0.08	0.031	-	-	0.039	-	-	0.033
HCM Control Delay (s)	11	8	0	-	7.6	0	-	11.6
HCM Lane LOS	B	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	0.3	0.1	-	-	0.1	-	-	0.1

Lane Group	EBL2	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR	WBR2	NBL2	NBL
Lane Configurations												
Volume (vph)	2	224	838	84	219	4	11	958	1	13	3	49
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width (ft)	10	10	11	11	14	10	12	12	12	12	10	10
Grade (%)			3%					-2%				
Storage Length (ft)		300		0			75		0			0
Storage Lanes		1		1			1		0			0
Taper Length (ft)		25					25					25
Lane Util. Factor	0.95	1.00	0.95	0.95	1.00	0.95	1.00	0.95	0.95	0.95	1.00	1.00
Frt			0.986		0.850			0.998				
Flt Protected		0.950					0.950					
Satd. Flow (prot)	0	1497	3058	0	1531	0	1645	3283	0	0	0	0
Flt Permitted		0.074					0.291					
Satd. Flow (perm)	0	117	3058	0	1531	0	504	3283	0	0	0	0
Right Turn on Red					Yes					Yes		
Satd. Flow (RTOR)					204			1				
Link Speed (mph)			35					35				
Link Distance (ft)			577					1609				
Travel Time (s)			11.2					31.3				
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Adj. Flow (vph)	2	233	873	88	228	4	11	998	1	14	3	51
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	235	961	0	228	0	15	1013	0	0	0	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Right	Left	Left	Left	Right	Right	Left	Left
Median Width(ft)			12					12				
Link Offset(ft)			0					0				
Crosswalk Width(ft)			10					10				
Two way Left Turn Lane												
Headway Factor	1.19	1.19	1.14	1.14	1.01	1.16	1.06	1.06	1.06	1.06	1.18	1.18
Turning Speed (mph)	15	15		9	9	15	15		9	9	15	15
Number of Detectors	1	1	1		0	1	1	1			1	1
Detector Template	Left	Left	Thru		Right	Left	Left	Thru			Left	Left
Leading Detector (ft)	20	37	37		0	20	37	37			20	20
Trailing Detector (ft)	0	-3	-3		0	0	-3	-3			0	0
Detector 1 Position(ft)	0	-3	-3		0	0	-3	-3			0	0
Detector 1 Size(ft)	20	40	40		37	20	40	40			20	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex			Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0		0.0	0.0	0.0	0.0			0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0		0.0	0.0	0.0	0.0			0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0		0.0	0.0	0.0	0.0			0.0	0.0
Turn Type	pm+pt	pm+pt	NA		Perm	Perm	Perm	NA			Perm	Perm
Protected Phases	5	5	2					6				
Permitted Phases	2	2			2	6	6				10	10
Detector Phase	5	5	2		2	6	6	6			10	10
Switch Phase												
Minimum Initial (s)	3.0	3.0	15.0		15.0	15.0	15.0	15.0			3.0	3.0

Lanes, Volumes, Timings
7: Sproul Rd/Spring Mill Rd & Aldwyn Ln/Kenilworth Rd & Lancaster Ave 3/9/2015

Lane Group	NBT	NBR	SBT	SBR	SBR2	NEL2	NEL	NET	NER	NER2	SWL2	SWL
Lane Configurations												
Volume (vph)	0	8	1	3	12	182	0	194	50	9	19	8
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width (ft)	10	10	10	10	10	12	12	11	11	11	10	10
Grade (%)	1%		-3%					3%				
Storage Length (ft)		0		0			200		0			150
Storage Lanes		0		0			1		0			1
Taper Length (ft)							25					25
Lane Util. 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
Frt	0.983		0.873					0.965				
Flt Protected	0.958						0.950					0.950
Satd. Flow (prot)	1499	0	1418	0	0	0	1604	1575	0	0	0	1573
Flt Permitted	0.742						0.171					0.597
Satd. Flow (perm)	1161	0	1418	0	0	0	289	1575	0	0	0	989
Right Turn on Red					No					No		
Satd. Flow (RTOR)												
Link Speed (mph)	25		25					40				
Link Distance (ft)	492		597					1336				
Travel Time (s)	13.4		16.3					22.8				
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Adj. Flow (vph)	0	8	1	3	12	190	0	202	52	9	20	8
Shared Lane Traffic (%)												
Lane Group Flow (vph)	62	0	16	0	0	0	190	263	0	0	0	28
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Right	Left	Left	Left	Right	Right	Left	Left
Median Width(ft)	0		0					12				
Link Offset(ft)	0		0					0				
Crosswalk Width(ft)	10		10					10				
Two way Left Turn Lane												
Headway Factor	1.18	1.18	1.15	1.15	1.15	1.09	1.09	1.14	1.14	1.14	1.12	1.12
Turning Speed (mph)		9		9	9	15	15		9	9	15	15
Number of Detectors	1		1			1	1	1			1	1
Detector Template	Thru		Thru			Left	Left	Thru			Left	Left
Leading Detector (ft)	37		37			20	37	37			20	37
Trailing Detector (ft)	-3		-3			0	-3	-3			0	-3
Detector 1 Position(ft)	-3		-3			0	-3	-3			0	-3
Detector 1 Size(ft)	40		40			20	40	40			20	40
Detector 1 Type	Cl+Ex		Cl+Ex			Cl+Ex	Cl+Ex	Cl+Ex			Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0		0.0			0.0	0.0	0.0			0.0	0.0
Detector 1 Queue (s)	0.0		0.0			0.0	0.0	0.0			0.0	0.0
Detector 1 Delay (s)	0.0		0.0			0.0	0.0	0.0			0.0	0.0
Turn Type	NA		NA			pm+pt	pm+pt	NA			Perm	Perm
Protected Phases	10		9			3	3	8				
Permitted Phases						8	8				4	4
Detector Phase	10		9			3	3	8			4	4
Switch Phase												
Minimum Initial (s)	3.0		3.0			3.0	3.0	3.0			3.0	3.0

Lane Group	SWT	SWR
Lane Configurations		
Volume (vph)	134	155
Ideal Flow (vphpl)	1800	1800
Lane Width (ft)	10	10
Grade (%)	-7%	
Storage Length (ft)		0
Storage Lanes		0
Taper Length (ft)		
Lane Util. Factor	1.00	1.00
Frt	0.920	
Flt Protected		
Satd. Flow (prot)	1524	0
Flt Permitted		
Satd. Flow (perm)	1524	0
Right Turn on Red		
Satd. Flow (RTOR)		
Link Speed (mph)	25	
Link Distance (ft)	3168	
Travel Time (s)	86.4	
Peak Hour Factor	0.96	0.96
Heavy Vehicles (%)	5%	5%
Adj. Flow (vph)	140	161
Shared Lane Traffic (%)		
Lane Group Flow (vph)	301	0
Enter Blocked Intersection	No	No
Lane Alignment	Left	Right
Median Width(ft)	12	
Link Offset(ft)	0	
Crosswalk Width(ft)	10	
Two way Left Turn Lane		
Headway Factor	1.12	1.12
Turning Speed (mph)		9
Number of Detectors	1	
Detector Template	Thru	
Leading Detector (ft)	37	
Trailing Detector (ft)	-3	
Detector 1 Position(ft)	-3	
Detector 1 Size(ft)	40	
Detector 1 Type	Cl+Ex	
Detector 1 Channel		
Detector 1 Extend (s)	0.0	
Detector 1 Queue (s)	0.0	
Detector 1 Delay (s)	0.0	
Turn Type	NA	
Protected Phases	4	
Permitted Phases		
Detector Phase	4	
Switch Phase		
Minimum Initial (s)	3.0	

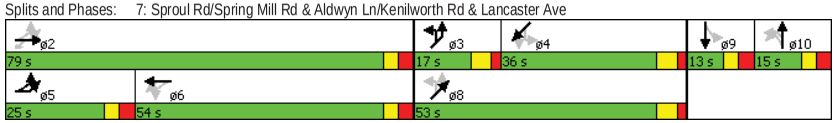


Lane Group	EBL2	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR	WBR2	NBL2	NBL
Minimum Split (s)	13.0	13.0	21.0		21.0	21.0	21.0	21.0			13.0	13.0
Total Split (s)	25.0	25.0	79.0		79.0	54.0	54.0	54.0			15.0	15.0
Total Split (%)	15.6%	15.6%	49.4%		49.4%	33.8%	33.8%	33.8%			9.4%	9.4%
Maximum Green (s)	19.0	19.0	73.0		73.0	48.0	48.0	48.0			9.0	9.0
Yellow Time (s)	3.0	3.0	3.0		3.0	3.0	3.0	3.0			3.0	3.0
All-Red Time (s)	3.0	3.0	3.0		3.0	3.0	3.0	3.0			3.0	3.0
Lost Time Adjust (s)		0.5	0.5		0.5		0.5	0.5				
Total Lost Time (s)		6.5	6.5		6.5		6.5	6.5				
Lead/Lag	Lead	Lead				Lag	Lag	Lag			Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0	3.0	3.0			3.0	3.0
Recall Mode	None	None	Max		Max	None	None	None			None	None
Walk Time (s)			7.0		7.0	7.0	7.0	7.0				
Flash Dont Walk (s)			20.0		20.0	20.0	20.0	20.0				
Pedestrian Calls (#/hr)			0		0	0	0	0				
Act Effct Green (s)		72.6	72.6		72.6		47.6	47.6				
Actuated g/C Ratio		0.48	0.48		0.48		0.31	0.31				
v/c Ratio		1.05	0.66		0.27		0.10	0.99				
Control Delay		117.1	33.8		5.3		41.7	76.4				
Queue Delay		0.0	0.0		0.0		0.0	0.0				
Total Delay		117.1	33.8		5.3		41.7	76.4				
LOS		F	C		A		D	E				
Approach Delay			43.0					75.9				
Approach LOS			D					E				
Queue Length 50th (ft)		~193	351		12		10	500				
Queue Length 95th (ft)		#422	499		65		33	#740				
Internal Link Dist (ft)			497					1529				
Turn Bay Length (ft)		300					75					
Base Capacity (vph)		223	1459		837		157	1027				
Starvation Cap Reductn		0	0		0		0	0				
Spillback Cap Reductn		0	0		0		0	0				
Storage Cap Reductn		0	0		0		0	0				
Reduced v/c Ratio		1.05	0.66		0.27		0.10	0.99				

Intersection Summary			
Area Type:	Other		
Cycle Length: 160			
Actuated Cycle Length: 152.2			
Natural Cycle: 150			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 1.06			
Intersection Signal Delay: 68.0		Intersection LOS: E	
Intersection Capacity Utilization 107.0%		ICU Level of Service G	
Analysis Period (min) 15			

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 7: Sproul Rd/Spring Mill Rd & Aldwyn Ln/Kenilworth Rd & Lancaster Ave



Lane Group	NBT	NBR	SBT	SBR	SBR2	NEL2	NEL	NET	NER	NER2	SWL2	SWL
Minimum Split (s)	13.0		13.0			13.0	13.0	13.0			13.0	13.0
Total Split (s)	15.0		13.0			17.0	17.0	53.0			36.0	36.0
Total Split (%)	9.4%		8.1%			10.6%	10.6%	33.1%			22.5%	22.5%
Maximum Green (s)	9.0		7.0			11.0	11.0	47.0			30.0	30.0
Yellow Time (s)	3.0		3.0			4.0	4.0	4.0			4.0	4.0
All-Red Time (s)	3.0		3.0			2.0	2.0	2.0			2.0	2.0
Lost Time Adjust (s)	0.5		0.5				0.5	0.5				0.5
Total Lost Time (s)	6.5		6.5				6.5	6.5				6.5
Lead/Lag	Lag		Lead			Lead	Lead				Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0		3.0			3.0	3.0	3.0			3.0	3.0
Recall Mode	None		None			None	None	None			None	None
Walk Time (s)								7.0				
Flash Dont Walk (s)								25.0				
Pedestrian Calls (#/hr)								0				
Act Effct Green (s)	8.5		6.1				46.6	46.6				29.6
Actuated g/C Ratio	0.06		0.04				0.31	0.31				0.19
v/c Ratio	0.95		0.29				1.06	0.55				0.15
Control Delay	170.3		86.1				127.5	50.1				55.4
Queue Delay	0.0		0.0				0.0	0.0				0.0
Total Delay	170.3		86.1				127.5	50.1				55.4
LOS	F		F				F	D				E
Approach Delay	170.3		86.1					82.6				
Approach LOS	F		F					F				
Queue Length 50th (ft)	60		15				~147	207				22
Queue Length 95th (ft)	#174		44				#323	337				57
Internal Link Dist (ft)	412		517					1256				
Turn Bay Length (ft)							200					150
Base Capacity (vph)	65		60				179	482				192
Starvation Cap Reductn	0		0				0	0				0
Spillback Cap Reductn	0		0				0	0				0
Storage Cap Reductn	0		0				0	0				0
Reduced v/c Ratio	0.95		0.27				1.06	0.55				0.15

Intersection Summary

Lane Group	SWT	SWR
Minimum Split (s)	13.0	
Total Split (s)	36.0	
Total Split (%)	22.5%	
Maximum Green (s)	30.0	
Yellow Time (s)	4.0	
All-Red Time (s)	2.0	
Lost Time Adjust (s)	0.5	
Total Lost Time (s)	6.5	
Lead/Lag	Lag	
Lead-Lag Optimize?		
Vehicle Extension (s)	3.0	
Recall Mode	None	
Walk Time (s)		
Flash Dont Walk (s)		
Pedestrian Calls (#/hr)		
Act Effct Green (s)	29.6	
Actuated g/C Ratio	0.19	
v/c Ratio	1.02	
Control Delay	116.7	
Queue Delay	0.0	
Total Delay	116.7	
LOS	F	
Approach Delay	111.5	
Approach LOS	F	
Queue Length 50th (ft)	290	
Queue Length 95th (ft)	#545	
Internal Link Dist (ft)	3088	
Turn Bay Length (ft)		
Base Capacity (vph)	295	
Starvation Cap Reductn	0	
Spillback Cap Reductn	0	
Storage Cap Reductn	0	
Reduced v/c Ratio	1.02	

Intersection Summary

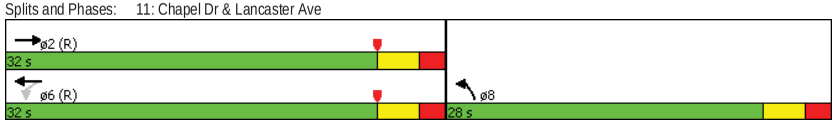
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	917	95	11	978	9	4
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width (ft)	11	11	11	11	12	12
Lane Util. Factor	0.95	0.95	0.95	0.95	1.00	1.00
Frt	0.986				0.961	
Flt Protected				0.999	0.966	
Satd. Flow (prot)	3196	0	0	3238	1638	0
Flt Permitted				0.942	0.966	
Satd. Flow (perm)	3196	0	0	3053	1638	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	23				4	
Link Speed (mph)	35			35	25	
Link Distance (ft)	1609			1285	319	
Travel Time (s)	31.3			25.0	8.7	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	997	103	12	1063	10	4
Shared Lane Traffic (%)						
Lane Group Flow (vph)	1100	0	0	1075	14	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	12			12	12	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	10			10	10	
Two way Left Turn Lane						
Headway Factor	1.12	1.12	1.12	1.12	1.07	1.07
Turning Speed (mph)		9	15		15	9
Number of Detectors	1		1	1	1	
Detector Template	Thru		Left	Thru	Left	
Leading Detector (ft)	37		20	37	37	
Trailing Detector (ft)	-3		0	-3	-3	
Detector 1 Position(ft)	-3		0	-3	-3	
Detector 1 Size(ft)	40		20	40	40	
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	
Turn Type	NA		Perm	NA	Prot	
Protected Phases	2			6	8	
Permitted Phases			6			
Detector Phase	2		6	6	8	
Switch Phase						
Minimum Initial (s)	10.0		10.0	10.0	4.0	
Minimum Split (s)	21.0		21.0	21.0	28.0	
Total Split (s)	32.0		32.0	32.0	28.0	
Total Split (%)	53.3%		53.3%	53.3%	46.7%	
Maximum Green (s)	27.0		27.0	27.0	23.0	
Yellow Time (s)	3.0		3.0	3.0	3.0	

Lanes, Volumes, Timings
11: Chapel Dr & Lancaster Ave 3/9/2015

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
All-Red Time (s)	2.0		2.0	2.0	2.0	
Lost Time Adjust (s)	0.5			0.5	0.5	
Total Lost Time (s)	5.5			5.5	5.5	
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Recall Mode	C-Max		C-Max	C-Max	None	
Walk Time (s)	10.0		10.0	10.0	7.0	
Flash Dont Walk (s)	0.0		0.0	0.0	16.0	
Pedestrian Calls (#/hr)	0		0	0	0	
Act Effct Green (s)	56.5			56.5	5.6	
Actuated g/C Ratio	0.94			0.94	0.09	
v/c Ratio	0.37			0.37	0.09	
Control Delay	1.5			3.2	22.5	
Queue Delay	0.0			0.0	0.0	
Total Delay	1.5			3.2	22.5	
LOS	A			A	C	
Approach Delay	1.5			3.2	22.5	
Approach LOS	A			A	C	
Queue Length 50th (ft)	0			0	3	
Queue Length 95th (ft)	100			326	18	
Internal Link Dist (ft)	1529			1205	239	
Turn Bay Length (ft)						
Base Capacity (vph)	3009			2873	616	
Starvation Cap Reductn	0			0	0	
Spillback Cap Reductn	0			0	0	
Storage Cap Reductn	0			0	0	
Reduced v/c Ratio	0.37			0.37	0.02	

Intersection Summary			
Area Type:	Other		
Cycle Length: 60			
Actuated Cycle Length: 60			
Offset: 55 (92%), Referenced to phase 2:EBT and 6:WBTL, Start of Yellow			
Natural Cycle: 60			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.37			
Intersection Signal Delay: 2.5		Intersection LOS: A	
Intersection Capacity Utilization 49.2%		ICU Level of Service A	
Analysis Period (min) 15			

Splits and Phases: 11: Chapel Dr & Lancaster Ave



Lanes, Volumes, Timings
27: S Ithan Ave/N Ithan Ave & Lancaster Ave 3/9/2015

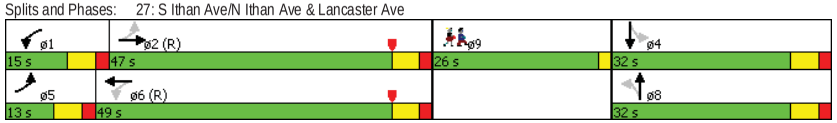
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	90	796	36	136	856	45	86	176	75	26	218	48
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width (ft)	10	10	10	10	10	10	10	10	10	10	10	10
Grade (%)		0%			3%			1%			0%	
Storage Length (ft)	140		0	70		0	105		0	65		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.994			0.992			0.955			0.973	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1520	3022	0	1497	2970	0	1512	1520	0	1520	1557	0
Flt Permitted	0.175			0.184			0.309			0.343		
Satd. Flow (perm)	280	3022	0	290	2970	0	492	1520	0	549	1557	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		35			35			25			25	
Link Distance (ft)		1285			2035			183			973	
Travel Time (s)		25.0			39.6			5.0			26.5	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Adj. Flow (vph)	96	847	38	145	911	48	91	187	80	28	232	51
Shared Lane Traffic (%)												
Lane Group Flow (vph)	96	885	0	145	959	0	91	267	0	28	283	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		10			10			10			10	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		10			10			10			10	
Two way Left Turn Lane												
Headway Factor	1.17	1.17	1.17	1.19	1.19	1.19	1.18	1.18	1.18	1.17	1.17	1.17
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	0		1	0		1	1		1	1	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (ft)	37	0		37	0		37	37		37	37	
Trailing Detector (ft)	-3	0		-3	0		-3	-3		-3	-3	
Detector 1 Position(ft)	-3	0		-3	0		-3	-3		-3	-3	
Detector 1 Size(ft)	40	6		40	6		40	40		40	40	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2			6			8			4		
Detector Phase	5	2		1	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	3.0	34.0		3.0	34.0		3.0	3.0		3.0	3.0	

Lane Group	ø9
Lane Configurations	
Volume (vph)	
Ideal Flow (vphpl)	
Lane Width (ft)	
Grade (%)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Lane Util. Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	
Heavy Vehicles (%)	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Enter Blocked Intersection	
Lane Alignment	
Median Width(ft)	
Link Offset(ft)	
Crosswalk Width(ft)	
Two way Left Turn Lane	
Headway Factor	
Turning Speed (mph)	
Number of Detectors	
Detector Template	
Leading Detector (ft)	
Trailing Detector (ft)	
Detector 1 Position(ft)	
Detector 1 Size(ft)	
Detector 1 Type	
Detector 1 Channel	
Detector 1 Extend (s)	
Detector 1 Queue (s)	
Detector 1 Delay (s)	
Turn Type	
Protected Phases	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	24.0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Split (s)	13.0	40.0		13.0	40.0		13.0	13.0		13.0	13.0	
Total Split (s)	13.0	47.0		15.0	49.0		32.0	32.0		32.0	32.0	
Total Split (%)	10.8%	39.2%		12.5%	40.8%		26.7%	26.7%		26.7%	26.7%	
Maximum Green (s)	7.0	41.0		9.0	43.0		26.0	26.0		26.0	26.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.5	0.5		0.5	0.5		0.5	0.5		0.5	0.5	
Total Lost Time (s)	6.5	6.5		6.5	6.5		6.5	6.5		6.5	6.5	
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)	53.7	47.3		57.5	49.2		24.1	24.1		24.1	24.1	
Actuated g/C Ratio	0.45	0.39		0.48	0.41		0.20	0.20		0.20	0.20	
v/c Ratio	0.51	0.74		0.65	0.79		0.93	0.88		0.25	0.91	
Control Delay	27.8	37.1		29.1	31.2		120.6	74.5		46.3	79.0	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	27.8	37.1		29.1	31.2		120.6	74.5		46.3	79.0	
LOS	C	D		C	C		F	E		D	E	
Approach Delay		36.2			30.9			86.2			76.1	
Approach LOS		D			C			F			E	
Queue Length 50th (ft)	42	336		65	359		69	199		18	213	
Queue Length 95th (ft)	79	#448		m#110	#493		#172	#341		48	#365	
Internal Link Dist (ft)		1205			1955			103			893	
Turn Bay Length (ft)	140			70			105			65		
Base Capacity (vph)	192	1191		224	1218		104	323		116	330	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.50	0.74		0.65	0.79		0.88	0.83		0.24	0.86	

Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 120			
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow, Master Intersection			
Natural Cycle: 95			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.93			
Intersection Signal Delay: 45.1		Intersection LOS: D	
Intersection Capacity Utilization 78.2%		ICU Level of Service D	
Analysis Period (min) 15			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			
m Volume for 95th percentile queue is metered by upstream signal.			

Splits and Phases: 27: S Ithan Ave/N Ithan Ave & Lancaster Ave



Lane Group	ø9
Minimum Split (s)	26.0
Total Split (s)	26.0
Total Split (%)	22%
Maximum Green (s)	24.0
Yellow Time (s)	2.0
All-Red Time (s)	0.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0
Recall Mode	None
Walk Time (s)	9.0
Flash Dont Walk (s)	15.0
Pedestrian Calls (#/hr)	45
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	

Intersection Summary

HCM 2010 Signalized Intersection Summary
51: Lowrys Ln & Lancaster Ave 3/9/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	18	1056	19	16	1084	22	47	104	39	22	71	19
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	1748	1800	1773	1721	1773	1900	1845	1900	1881	1827	1881
Adj Flow Rate, veh/h	19	1135	20	17	1166	24	51	112	42	24	76	20
Adj No. of Lanes	0	2	0	0	2	0	0	1	0	0	1	0
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	74	2091	36	71	2061	42	120	154	51	102	186	43
Arrive On Green	1.00	1.00	1.00	0.65	0.65	0.65	0.15	0.15	0.15	0.15	0.15	0.15
Sat Flow, veh/h	18	3203	56	15	3158	64	309	1046	349	200	1263	293
Grp Volume(v), veh/h	609	0	565	628	0	579	205	0	0	120	0	0
Grp Sat Flow(s),veh/h/ln	1697	0	1580	1682	0	1555	1704	0	0	1756	0	0
Q Serve(g_s), s	0.0	0.0	0.0	0.0	0.0	12.4	3.2	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	0.0	0.0	0.0	12.0	0.0	12.4	6.9	0.0	0.0	3.7	0.0	0.0
Prop In Lane	0.03		0.04	0.03		0.04	0.25		0.20	0.20		0.17
Lane Grp Cap(c), veh/h	1170	0	1032	1159	0	1015	326	0	0	331	0	0
V/C Ratio(X)	0.52	0.00	0.55	0.54	0.00	0.57	0.63	0.00	0.00	0.36	0.00	0.00
Avail Cap(c_a), veh/h	1170	0	1032	1159	0	1015	426	0	0	431	0	0
HCM Platoon Ratio	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.61	0.00	0.61	1.00	0.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	0.0	0.0	0.0	5.7	0.0	5.8	24.7	0.0	0.0	23.4	0.0	0.0
Incr Delay (d2), s/veh	1.0	0.0	1.3	1.8	0.0	2.3	2.0	0.0	0.0	0.7	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(-26165%),veh/ln	0.3	0.0	0.4	6.2	0.0	5.8	3.4	0.0	0.0	1.9	0.0	0.0
LnGrp Delay(d),s/veh	1.0	0.0	1.3	7.5	0.0	8.1	26.7	0.0	0.0	24.1	0.0	0.0
LnGrp LOS	A		A	A		A	C			C		
Approach Vol, veh/h		1174			1207			205			120	
Approach Delay, s/veh		1.1			7.8			26.7			24.1	
Approach LOS		A			A			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		45.7		14.3		45.7		14.3
Change Period (Y+Rc), s		6.0		5.0		6.0		5.0
Max Green Setting (Gmax), s		36.0		13.0		36.0		13.0
Max Q Clear Time (g_c+I1), s		2.0		5.7		14.4		8.9
Green Ext Time (p_c), s		13.7		0.7		11.2		0.5

Intersection Summary	
HCM 2010 Ctrl Delay	7.1
HCM 2010 LOS	A

Notes

User approved pedestrian interval to be less than phase max green.

HCM 2010 Signalized Intersection Summary
16: Sproul Rd & Conestoga Rd 3/9/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (veh/h)	149	553	138	36	601	57	213	267	28	56	200	74
Number	7	4	14	3	8	18	1	6	16	5	2	12
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	1748	1748	1800	1791	1791	1845	1739	1739	1791	1809	1756	1809
Adj Flow Rate, veh/h	164	608	0	40	660	0	234	293	31	62	220	81
Adj No. of Lanes	1	1	0	1	1	0	1	1	0	0	1	0
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	200	874	0	272	657	0	309	576	61	93	236	81
Arrive On Green	0.07	0.50	0.00	0.37	0.37	0.00	0.07	0.37	0.37	0.23	0.23	0.23
Sat Flow, veh/h	1664	1748	0	822	1791	0	1656	1546	164	199	1013	348
Grp Volume(v), veh/h	164	608	0	40	660	0	234	0	324	363	0	0
Grp Sat Flow(s),veh/h/ln	1664	1748	0	822	1791	0	1656	0	1710	1560	0	0
Q Serve(g_s), s	5.3	24.0	0.0	3.5	33.0	0.0	6.5	0.0	13.2	16.0	0.0	0.0
Cycle Q Clear(g_c), s	5.3	24.0	0.0	15.5	33.0	0.0	6.5	0.0	13.2	20.9	0.0	0.0
Prop In Lane	1.00		0.00	1.00		0.00	1.00		0.10	0.17		0.22
Lane Grp Cap(c), veh/h	200	874	0	272	657	0	309	0	636	411	0	0
V/C Ratio(X)	0.82	0.70	0.00	0.15	1.00	0.00	0.76	0.00	0.51	0.88	0.00	0.00
Avail Cap(c_a), veh/h	200	874	0	272	657	0	309	0	636	411	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	21.3	17.3	0.0	27.8	28.5	0.0	26.2	0.0	21.9	34.3	0.0	0.0
Incr Delay (d2), s/veh	22.8	4.6	0.0	1.1	36.3	0.0	10.3	0.0	0.7	19.7	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(-26165%),veh/ln	3.6	12.6	0.0	0.9	22.9	0.0	3.7	0.0	6.3	11.2	0.0	0.0
LnGrp Delay(d),s/veh	44.1	21.8	0.0	29.0	64.8	0.0	36.5	0.0	22.6	54.0	0.0	0.0
LnGrp LOS	D	C		C	F		D		C	D		
Approach Vol, veh/h		772			700			558			363	
Approach Delay, s/veh		26.5			62.8			28.4			54.0	
Approach LOS		C			E			C			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4		6	7	8
Phs Duration (G+Y+Rc), s	12.5	27.0		50.5		39.5	12.0	38.5
Change Period (Y+Rc), s	5.5	5.5		5.0		5.5	5.0	5.0
Max Green Setting (Gmax), s	7.0	21.5		45.5		34.0	7.0	33.5
Max Q Clear Time (g_c+I1), s	8.5	22.9		26.0		15.2	7.3	35.0
Green Ext Time (p_c), s	0.0	0.0		8.5		2.4	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	41.7
HCM 2010 LOS	D

HCM 2010 Signalized Intersection Summary
25: S Ithan Ave & Conestoga Rd

3/9/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	165	390	2	2	452	128	14	156	12	62	52	139
Number	1	6	16	5	2	12	7	4	14	3	8	18
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	1854	1783	1854	1764	1696	1764	1763	1695	1763	1844	1773	1844
Adj Flow Rate, veh/h	204	481	2	2	558	158	17	193	15	77	64	172
Adj No. of Lanes	0	1	0	0	1	0	0	1	0	0	1	0
Peak Hour Factor	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81
Percent Heavy Veh, %	4	4	4	4	4	4	4	4	4	4	4	4
Cap, veh/h	229	454	2	61	714	202	77	338	25	141	93	194
Arrive On Green	0.56	0.56	0.56	0.56	0.56	0.56	0.23	0.23	0.23	0.23	0.23	0.23
Sat Flow, veh/h	271	813	3	1	1280	361	56	1501	111	294	413	863
Grp Volume(v), veh/h	687	0	0	718	0	0	225	0	0	313	0	0
Grp Sat Flow(s),veh/h/ln	1087	0	0	1642	0	0	1668	0	0	1570	0	0
Q Serve(g_s), s	12.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.2	0.0	0.0
Cycle Q Clear(g_c), s	33.5	0.0	0.0	20.8	0.0	0.0	7.2	0.0	0.0	11.4	0.0	0.0
Prop In Lane	0.30		0.00	0.00		0.22	0.08		0.07	0.25		0.55
Lane Grp Cap(c), veh/h	685	0	0	977	0	0	440	0	0	428	0	0
V/C Ratio(X)	1.00	0.00	0.00	0.74	0.00	0.00	0.51	0.00	0.00	0.73	0.00	0.00
Avail Cap(c_a), veh/h	685	0	0	977	0	0	493	0	0	476	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	15.4	0.0	0.0	10.5	0.0	0.0	20.8	0.0	0.0	22.3	0.0	0.0
Incr Delay (d2), s/veh	35.2	0.0	0.0	2.9	0.0	0.0	0.9	0.0	0.0	5.1	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(-26165%),veh/ln	17.9	0.0	0.0	10.0	0.0	0.0	3.4	0.0	0.0	5.6	0.0	0.0
LnGrp Delay(d),s/veh	50.6	0.0	0.0	13.4	0.0	0.0	21.7	0.0	0.0	27.3	0.0	0.0
LnGrp LOS	F			B			C			C		
Approach Vol, veh/h		687			718			225			313	
Approach Delay, s/veh		50.6			13.4			21.7			27.3	
Approach LOS		D			B			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		40.0		20.0		40.0		20.0
Change Period (Y+Rc), s		6.0		6.0		6.0		6.0
Max Green Setting (Gmax), s		34.0		16.0		34.0		16.0
Max Q Clear Time (g_c+I1), s		22.8		9.2		35.5		13.4
Green Ext Time (p_c), s		5.4		1.3		0.0		0.6

Intersection Summary	
HCM 2010 Ctrl Delay	29.8
HCM 2010 LOS	C

HCM 2010 Signalized Intersection Summary
33: Williams Rd/Garrett Ave & Conestoga Rd

3/9/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (veh/h)	26	440	1	4	418	4	6	6	9	15	3	38
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	1872	1872	1872	1872	1872	1872	1800	1800	1800	1728	1728	1728
Adj Flow Rate, veh/h	30	500	1	5	475	5	7	7	10	17	3	43
Adj No. of Lanes	0	1	0	0	1	0	0	1	0	0	1	0
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Percent Heavy Veh, %	0	0	0	0	0	0	0	0	0	0	0	0
Cap, veh/h	94	1330	3	58	1382	14	88	35	37	86	8	54
Arrive On Green	0.75	0.75	0.75	0.75	0.75	0.75	0.05	0.05	0.05	0.05	0.05	0.05
Sat Flow, veh/h	49	1774	3	4	1842	19	333	655	706	325	147	1014
Grp Volume(v), veh/h	531	0	0	485	0	0	24	0	0	63	0	0
Grp Sat Flow(s),veh/h/ln	1826	0	0	1865	0	0	1695	0	0	1485	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	1.8	0.0	0.0
Cycle Q Clear(g_c), s	6.5	0.0	0.0	5.8	0.0	0.0	0.9	0.0	0.0	2.7	0.0	0.0
Prop In Lane	0.06		0.00	0.01		0.01	0.29		0.42	0.27		0.68
Lane Grp Cap(c), veh/h	1427	0	0	1454	0	0	160	0	0	148	0	0
V/C Ratio(X)	0.37	0.00	0.00	0.33	0.00	0.00	0.15	0.00	0.00	0.43	0.00	0.00
Avail Cap(c_a), veh/h	1427	0	0	1454	0	0	301	0	0	280	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	2.9	0.0	0.0	2.8	0.0	0.0	30.0	0.0	0.0	30.9	0.0	0.0
Incr Delay (d2), s/veh	0.7	0.0	0.0	0.6	0.0	0.0	0.6	0.0	0.0	2.8	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(-26165%),veh/ln	3.5	0.0	0.0	3.1	0.0	0.0	0.4	0.0	0.0	1.3	0.0	0.0
LnGrp Delay(d),s/veh	3.6	0.0	0.0	3.4	0.0	0.0	30.6	0.0	0.0	33.6	0.0	0.0
LnGrp LOS	A			A			C			C		
Approach Vol, veh/h		531			485			24			63	
Approach Delay, s/veh		3.6			3.4			30.6			33.6	
Approach LOS		A			A			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		56.0		10.0		56.0		10.0
Change Period (Y+Rc), s		6.0		6.0		6.0		6.0
Max Green Setting (Gmax), s		50.0		10.0		50.0		10.0
Max Q Clear Time (g_c+I1), s		8.5		4.7		7.8		2.9
Green Ext Time (p_c), s		4.6		0.1		4.6		0.2

Intersection Summary	
HCM 2010 Ctrl Delay	5.8
HCM 2010 LOS	A

Notes

User approved pedestrian interval to be less than phase max green.

HCM 2010 Signalized Intersection Summary
3: County Line Rd & Spring Mill Rd 3/9/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✣			✣			✣			✣	
Volume (veh/h)	35	280	60	62	265	78	41	250	45	33	328	53
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	1631	1800	1800	1731	1800	1800	1731	1800	1800	1731	1800
Adj Flow Rate, veh/h	37	295	63	65	279	82	43	263	47	35	345	56
Adj No. of Lanes	0	1	0	0	1	0	0	1	0	0	1	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	4	4	4	4	4	4	4	4	4	4	4	4
Cap, veh/h	101	606	122	144	554	150	98	368	62	84	402	62
Arrive On Green	0.50	0.50	0.50	0.50	0.50	0.50	0.29	0.29	0.29	0.29	0.29	0.29
Sat Flow, veh/h	74	1214	244	154	1110	301	112	1264	211	74	1380	214
Grp Volume(v), veh/h	395	0	0	426	0	0	353	0	0	436	0	0
Grp Sat Flow(s),veh/h/ln	1533	0	0	1565	0	0	1587	0	0	1669	0	0
Q Serve(g_s), s	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	3.1	0.0	0.0
Cycle Q Clear(g_c), s	10.3	0.0	0.0	10.6	0.0	0.0	12.3	0.0	0.0	15.4	0.0	0.0
Prop In Lane	0.09		0.16	0.15		0.19	0.12		0.13	0.08		0.13
Lane Grp Cap(c), veh/h	828	0	0	848	0	0	528	0	0	549	0	0
V/C Ratio(X)	0.48	0.00	0.00	0.50	0.00	0.00	0.67	0.00	0.00	0.79	0.00	0.00
Avail Cap(c_a), veh/h	828	0	0	848	0	0	663	0	0	690	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)	0.53	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	10.4	0.0	0.0	10.4	0.0	0.0	19.8	0.0	0.0	21.0	0.0	0.0
Incr Delay (d2), s/veh	1.1	0.0	0.0	2.1	0.0	0.0	1.0	0.0	0.0	3.9	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(-26165%),veh/ln	4.7	0.0	0.0	5.4	0.0	0.0	5.5	0.0	0.0	7.7	0.0	0.0
LnGrp Delay(d),s/veh	11.4	0.0	0.0	12.6	0.0	0.0	20.7	0.0	0.0	24.9	0.0	0.0
LnGrp LOS	B			B			C			C		
Approach Vol, veh/h		395			426			353			436	
Approach Delay, s/veh		11.4			12.6			20.7			24.9	
Approach LOS		B			B			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		37.4		24.6		37.4		24.6
Change Period (Y+Rc), s		6.0		6.0		6.0		6.0
Max Green Setting (Gmax), s		26.0		24.0		26.0		24.0
Max Q Clear Time (g_c+I1), s		12.3		17.4		12.6		14.3
Green Ext Time (p_c), s		3.0		1.2		3.0		1.4

Intersection Summary	
HCM 2010 Ctrl Delay	17.4
HCM 2010 LOS	B

HCM 2010 TWSC
79: Garrett Rd & Lancaster Ave 3/9/2015

Intersection	
Int Delay, s/veh	3.9

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	1092	24	19	1122	0	26
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, %	-3	-	-	3	0	-
Peak Hour Factor	67	67	67	67	67	67
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	1630	36	28	1675	0	39

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	1666	0	2542	833
Stage 1	-	-	-	-	1648	-
Stage 2	-	-	-	-	894	-
Critical Hdwy	-	-	4.1	-	6.8	6.9
Critical Hdwy Stg 1	-	-	-	-	5.8	-
Critical Hdwy Stg 2	-	-	-	-	5.8	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	391	-	23	316
Stage 1	-	-	-	-	145	-
Stage 2	-	-	-	-	365	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	391	-	23	316
Mov Cap-2 Maneuver	-	-	-	-	23	-
Stage 1	-	-	-	-	145	-
Stage 2	-	-	-	-	365	-

Approach	EB	WB	NB
HCM Control Delay, s	0	7.3	18
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	316	-	-	391	-
HCM Lane V/C Ratio	0.123	-	-	0.073	-
HCM Control Delay (s)	18	-	-	14.9	7.2
HCM Lane LOS	C	-	-	B	A
HCM 95th %tile Q(veh)	0.4	-	-	0.2	-

HCM 2010 TWSC
15: Conestoga Rd & Spring Mill Rd 3/9/2015

Intersection	
Int Delay, s/veh	0.2

Movement	EBL	EBT	WBT	WBR	SWL	SWR
Vol, veh/h	2	638	692	3	4	8
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	86	86	86	86	86	86
Heavy Vehicles, %	4	4	4	4	4	4
Mvmt Flow	2	742	805	3	5	9

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	808	0	-	0	1553	806
Stage 1	-	-	-	-	806	-
Stage 2	-	-	-	-	747	-
Critical Hdwy	4.14	-	-	-	6.44	6.24
Critical Hdwy Stg 1	-	-	-	-	5.44	-
Critical Hdwy Stg 2	-	-	-	-	5.44	-
Follow-up Hdwy	2.236	-	-	-	3.536	3.336
Pot Cap-1 Maneuver	809	-	-	-	123	379
Stage 1	-	-	-	-	436	-
Stage 2	-	-	-	-	465	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	809	-	-	-	123	379
Mov Cap-2 Maneuver	-	-	-	-	123	-
Stage 1	-	-	-	-	436	-
Stage 2	-	-	-	-	463	-

Approach	EB	WB	SW
HCM Control Delay, s	0	0	22.1
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SWLn1
Capacity (veh/h)	809	-	-	-	224
HCM Lane V/C Ratio	0.003	-	-	-	0.062
HCM Control Delay (s)	9.5	0	-	-	22.1
HCM Lane LOS	A	A	-	-	C
HCM 95th %tile Q(veh)	0	-	-	-	0.2

HCM 2010 TWSC
29: Strathmore Dr/Lowrys Ln & Conestoga Rd 3/9/2015

Intersection	
Int Delay, s/veh	3.7

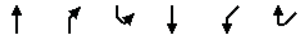
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	47	423	14	9	456	5	13	14	12	2	15	83
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	80	80	80	80	80	80	80	80	80	80	80	80
Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	59	529	18	11	570	6	16	18	15	2	19	104

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	576	0	0	546	0	0	1312	1254	538	1267	1260	573
Stage 1	-	-	-	-	-	-	655	655	-	596	596	-
Stage 2	-	-	-	-	-	-	657	599	-	671	664	-
Critical Hdwy	4.13	-	-	4.13	-	-	7.13	6.53	6.23	7.13	6.53	6.23
Critical Hdwy Stg 1	-	-	-	-	-	-	6.13	5.53	-	6.13	5.53	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.13	5.53	-	6.13	5.53	-
Follow-up Hdwy	2.227	-	-	2.227	-	-	3.527	4.027	3.327	3.527	4.027	3.327
Pot Cap-1 Maneuver	992	-	-	1018	-	-	135	171	541	145	170	517
Stage 1	-	-	-	-	-	-	453	461	-	488	490	-
Stage 2	-	-	-	-	-	-	452	489	-	444	457	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	992	-	-	1018	-	-	90	154	541	119	153	517
Mov Cap-2 Maneuver	-	-	-	-	-	-	90	154	-	119	153	-
Stage 1	-	-	-	-	-	-	414	421	-	446	482	-
Stage 2	-	-	-	-	-	-	342	481	-	378	418	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.9	0.2	39.8	20
HCM LOS			E	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	151	992	-	-	1018	-	-	363
HCM Lane V/C Ratio	0.323	0.059	-	-	0.011	-	-	0.344
HCM Control Delay (s)	39.8	8.9	0	-	8.6	0	-	20
HCM Lane LOS	E	A	A	-	A	A	-	C
HCM 95th %tile Q(veh)	1.3	0.2	-	-	0	-	-	1.5

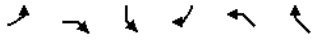
Lanes, Volumes, Timings
38: County Line Rd & N Ithan Ave 3/9/2015



Lane Group	NBT	NBR	SBL	SBT	SWL	SWR
Lane Configurations						
Volume (vph)	345	110	167	299	155	101
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.967				0.947	
Flt Protected				0.982	0.971	
Satd. Flow (prot)	1801	0	0	1829	1713	0
Flt Permitted				0.982	0.971	
Satd. Flow (perm)	1801	0	0	1829	1713	0
Link Speed (mph)	30			30	30	
Link Distance (ft)	295			1901	824	
Travel Time (s)	6.7			43.2	18.7	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	379	121	184	329	170	111
Shared Lane Traffic (%)						
Lane Group Flow (vph)	500	0	0	513	281	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	0			0	12	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	10			10	10	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)		9	15		15	9
Sign Control	Free			Stop	Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	74.6%	ICU Level of Service	D
Analysis Period (min)	15		

Lanes, Volumes, Timings
2: County Line Rd & N Ithan Ave 3/9/2015



Lane Group	EBL	EBR	SBL	SBR	NWL	NWR
Lane Configurations						
Volume (vph)	203	15	141	335	38	255
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.991		0.905		0.882	
Flt Protected	0.956		0.985		0.994	
Satd. Flow (prot)	1765	0	1660	0	1633	0
Flt Permitted	0.956		0.985		0.994	
Satd. Flow (perm)	1765	0	1660	0	1633	0
Link Speed (mph)	30		30		30	
Link Distance (ft)	973		295		2020	
Travel Time (s)	22.1		6.7		45.9	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	216	16	150	356	40	271
Shared Lane Traffic (%)						
Lane Group Flow (vph)	232	0	506	0	311	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Right
Median Width(ft)	22		12		12	
Link Offset(ft)	0		0		0	
Crosswalk Width(ft)	10		10		10	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9	15	9	15	9
Sign Control	Stop		Free		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	68.4%	ICU Level of Service	C
Analysis Period (min)	15		

Intersection	
Int Delay, s/veh	3.7

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	61	81	58	238	150	30
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	87	87	87	87	87	87
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	70	93	67	274	172	34

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	597	190	207	0	-	0
Stage 1	190	-	-	-	-	-
Stage 2	407	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	469	857	1376	-	-	-
Stage 1	847	-	-	-	-	-
Stage 2	676	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	442	857	1376	-	-	-
Mov Cap-2 Maneuver	442	-	-	-	-	-
Stage 1	847	-	-	-	-	-
Stage 2	637	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	13	1.5	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1376	-	611	-	-
HCM Lane V/C Ratio	0.048	-	0.267	-	-
HCM Control Delay (s)	7.7	0	13	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0.2	-	1.1	-	-

Intersection	
Int Delay, s/veh	4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	203	220	288	20	15	98
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	88	88	88	88	88	88
Heavy Vehicles, %	1	1	1	1	1	1
Mvmt Flow	231	250	327	23	17	111

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	350	0	-	0	1050	339
Stage 1	-	-	-	-	339	-
Stage 2	-	-	-	-	711	-
Critical Hdwy	4.11	-	-	-	6.41	6.21
Critical Hdwy Stg 1	-	-	-	-	5.41	-
Critical Hdwy Stg 2	-	-	-	-	5.41	-
Follow-up Hdwy	2.209	-	-	-	3.509	3.309
Pot Cap-1 Maneuver	1214	-	-	-	253	706
Stage 1	-	-	-	-	724	-
Stage 2	-	-	-	-	489	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1214	-	-	-	197	706
Mov Cap-2 Maneuver	-	-	-	-	197	-
Stage 1	-	-	-	-	724	-
Stage 2	-	-	-	-	381	-

Approach	EB	WB	SB
HCM Control Delay, s	4.2	0	14
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1214	-	-	-	526
HCM Lane V/C Ratio	0.19	-	-	-	0.244
HCM Control Delay (s)	8.7	0	-	-	14
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.7	-	-	-	1

HCM 2010 TWSC
43: County Line Rd & Roberts Rd 3/9/2015

Intersection													
Int Delay, s/veh	27.2												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Vol, veh/h	67	100	8	2	23	6	14	619	26	8	473	38	
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0	
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free	
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None	
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-	
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-	
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-	
Peak Hour Factor	88	88	88	88	88	88	88	88	88	88	88	88	
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2	
Mvmt Flow	76	114	9	2	26	7	16	703	30	9	538	43	
Major/Minor	Minor2			Minor1			Major1			Major2			
Conflicting Flow All	974	1342	290	1094	1349	366	581	0	0	733	0	0	
Stage 1	577	577	-	750	750	-	-	-	-	-	-	-	
Stage 2	397	765	-	344	599	-	-	-	-	-	-	-	
Critical Hdwy	7.54	6.54	6.94	7.54	6.54	6.94	4.14	-	-	4.14	-	-	
Critical Hdwy Stg 1	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-	
Critical Hdwy Stg 2	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-	
Follow-up Hdwy	3.52	4.02	3.32	3.52	4.02	3.32	2.22	-	-	2.22	-	-	
Pot Cap-1 Maneuver	206	151	707	168	149	631	989	-	-	868	-	-	
Stage 1	469	500	-	369	417	-	-	-	-	-	-	-	
Stage 2	600	410	-	645	489	-	-	-	-	-	-	-	
Platoon blocked, %								-	-		-	-	
Mov Cap-1 Maneuver	170	145	707	57	143	631	989	-	-	868	-	-	
Mov Cap-2 Maneuver	170	145	-	57	143	-	-	-	-	-	-	-	
Stage 1	456	493	-	359	406	-	-	-	-	-	-	-	
Stage 2	540	399	-	483	482	-	-	-	-	-	-	-	

Approach	EB	WB	NB	SB
HCM Control Delay, s	206.9	35.9	0.3	0.2
HCM LOS	F	E		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	989	-	-	160	151	868	-	-
HCM Lane V/C Ratio	0.016	-	-	1.243	0.233	0.01	-	-
HCM Control Delay (s)	8.7	0.1	-	206.9	35.9	9.2	0.1	-
HCM Lane LOS	A	A	-	F	E	A	A	-
HCM 95th %tile Q(veh)	0	-	-	11.4	0.9	0	-	-

HCM 2010 TWSC
61: Dwy/Aldwyn Ln & S Ithan Ave 3/9/2015

Intersection													
Int Delay, s/veh	2.1												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Vol, veh/h	9	358	9	16	193	13	7	1	12	16	0	60	
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0	
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop	
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None	
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-	
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-	
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-	
Peak Hour Factor	81	81	81	81	81	81	81	81	81	81	81	81	
Heavy Vehicles, %	4	4	4	4	4	4	4	4	4	4	4	4	
Mvmt Flow	11	442	11	20	238	16	9	1	15	20	0	74	
Major/Minor	Major1			Major2			Minor1			Minor2			
Conflicting Flow All	254	0	0	453	0	0	793	764	448	764	761	246	
Stage 1	-	-	-	-	-	-	470	470	-	286	286	-	
Stage 2	-	-	-	-	-	-	323	294	-	478	475	-	
Critical Hdwy	4.14	-	-	4.14	-	-	7.14	6.54	6.24	7.14	6.54	6.24	
Critical Hdwy Stg 1	-	-	-	-	-	-	6.14	5.54	-	6.14	5.54	-	
Critical Hdwy Stg 2	-	-	-	-	-	-	6.14	5.54	-	6.14	5.54	-	
Follow-up Hdwy	2.236	-	-	2.236	-	-	3.536	4.036	3.336	3.536	4.036	3.336	
Pot Cap-1 Maneuver	1300	-	-	1097	-	-	304	331	607	318	333	788	
Stage 1	-	-	-	-	-	-	570	557	-	717	671	-	
Stage 2	-	-	-	-	-	-	685	666	-	565	554	-	
Platoon blocked, %		-	-		-	-							
Mov Cap-1 Maneuver	1300	-	-	1097	-	-	269	320	607	302	322	788	
Mov Cap-2 Maneuver	-	-	-	-	-	-	269	320	-	302	322	-	
Stage 1	-	-	-	-	-	-	564	551	-	709	657	-	
Stage 2	-	-	-	-	-	-	608	652	-	544	548	-	

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.2	0.6	14.4	12.3
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	409	1300	-	-	1097	-	-	589
HCM Lane V/C Ratio	0.06	0.009	-	-	0.018	-	-	0.159
HCM Control Delay (s)	14.4	7.8	0	-	8.3	0	-	12.3
HCM Lane LOS	B	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	0.2	0	-	-	0.1	-	-	0.6

Lane Group	EBL2	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR2	NBL2	NBL	NBT
Lane Configurations												
Volume (vph)	4	249	984	30	282	2	22	852	33	7	52	0
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width (ft)	10	10	11	11	14	10	12	12	12	10	10	10
Grade (%)			3%					-2%				1%
Storage Length (ft)		300		0			75				0	
Storage Lanes		1		1			1				0	
Taper Length (ft)		25					25				25	
Lane Util. Factor	0.95	1.00	0.95	0.95	1.00	0.95	1.00	0.95	0.95	1.00	1.00	1.00
Frt			0.996		0.850			0.994				0.975
Flt Protected		0.950					0.950					0.961
Satd. Flow (prot)	0	1541	3180	0	1576	0	1693	3366	0	0	0	1536
Flt Permitted		0.105					0.189					0.753
Satd. Flow (perm)	0	170	3180	0	1576	0	337	3366	0	0	0	1203
Right Turn on Red					Yes				Yes			
Satd. Flow (RTOR)					222			196				
Link Speed (mph)			35					35				25
Link Distance (ft)			577					1609				492
Travel Time (s)			11.2					31.3				13.4
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
Adj. Flow (vph)	4	257	1014	31	291	2	23	878	34	7	54	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	261	1045	0	291	0	25	912	0	0	0	75
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Right	Left	Left	Left	Right	Left	Left	Left
Median Width(ft)			12					12				0
Link Offset(ft)			0					0				0
Crosswalk Width(ft)			10					10				10
Two way Left Turn Lane												
Headway Factor	1.19	1.19	1.14	1.14	1.01	1.16	1.06	1.06	1.06	1.18	1.18	1.18
Turning Speed (mph)	15	15		9	9	15	15		9	15	15	
Number of Detectors	1	1	1		1	1	1	1		1	1	1
Detector Template	Left	Left	Thru		Right	Left	Left	Thru		Left	Left	Thru
Leading Detector (ft)	20	37	37		37	20	37	37		20	20	37
Trailing Detector (ft)	0	-3	-3		-3	0	-3	-3		0	0	-3
Detector 1 Position(ft)	0	-3	-3		-3	0	-3	-3		0	0	-3
Detector 1 Size(ft)	20	40	40		40	20	40	40		20	20	40
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0	0.0
Turn Type	pm+pt	pm+pt	NA		Perm	Perm	Perm	NA		Perm	Perm	NA
Protected Phases	5	5	2					6				10
Permitted Phases	2	2			2	6	6			10	10	
Detector Phase	5	5	2		2	6	6	6		10	10	10
Switch Phase												
Minimum Initial (s)	3.0	3.0	15.0		15.0	15.0	15.0	15.0		3.0	3.0	3.0
Minimum Split (s)	13.0	13.0	21.0		21.0	21.0	21.0	21.0		13.0	13.0	13.0

Lane Group	NBR	NBR2	SBL2	SBL	SBT	SBR	SBR2	NEL2	NEL	NET	NER	NER2
Lane Configurations												
Volume (vph)	4	10	1	1	0	3	14	191	0	112	20	1
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width (ft)	10	10	10	10	10	10	10	12	12	11	11	11
Grade (%)					-3%					3%		
Storage Length (ft)	0			0		0			200		0	
Storage Lanes	0			0		0			1		0	
Taper Length (ft)				25					25			
Lane Util. 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
Frt					0.879					0.976		
Flt Protected					0.995				0.950			
Satd. Flow (prot)	0	0	0	0	1462	0	0	0	1651	1640	0	0
Flt Permitted					0.982				0.121			
Satd. Flow (perm)	0	0	0	0	1443	0	0	0	210	1640	0	0
Right Turn on Red		No					No					No
Satd. Flow (RTOR)												
Link Speed (mph)					25					40		
Link Distance (ft)					597					1336		
Travel Time (s)					16.3					22.8		
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	4	10	1	1	0	3	14	197	0	115	21	1
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	19	0	0	0	197	137	0	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Right	Right	Left	Left	Left	Right	Right	Left	Left	Left	Right	Right
Median Width(ft)					0					12		
Link Offset(ft)					0					0		
Crosswalk Width(ft)					10					10		
Two way Left Turn Lane												
Headway Factor	1.18	1.18	1.15	1.15	1.15	1.15	1.15	1.09	1.09	1.14	1.14	1.14
Turning Speed (mph)	9	9	15	15		9	9	15	15		9	9
Number of Detectors			1	1	1			1	1	1		
Detector Template			Left	Left	Thru			Left	Left	Thru		
Leading Detector (ft)			20	20	37			20	37	37		
Trailing Detector (ft)			0	0	-3			0	-3	-3		
Detector 1 Position(ft)			0	0	-3			0	-3	-3		
Detector 1 Size(ft)			20	20	40			20	40	40		
Detector 1 Type			Cl+Ex	Cl+Ex	Cl+Ex			Cl+Ex	Cl+Ex	Cl+Ex		
Detector 1 Channel												
Detector 1 Extend (s)			0.0	0.0	0.0			0.0	0.0	0.0		
Detector 1 Queue (s)			0.0	0.0	0.0			0.0	0.0	0.0		
Detector 1 Delay (s)			0.0	0.0	0.0			0.0	0.0	0.0		
Turn Type			Perm	Perm	NA			pm+pt	pm+pt	NA		
Protected Phases					9			3	3	8		
Permitted Phases			9	9				8	8			
Detector Phase			9	9	9			3	3	8		
Switch Phase												
Minimum Initial (s)			3.0	3.0	3.0			3.0	3.0	3.0		
Minimum Split (s)			13.0	13.0	13.0			13.0	13.0	13.0		

Lane Group	SWL2	SWL	SWT	SWR	SWR2
Lane Configurations					
Volume (vph)	39	9	166	235	1
Ideal Flow (vphpl)	1800	1800	1800	1800	1800
Lane Width (ft)	10	10	10	10	10
Grade (%)			-7%		
Storage Length (ft)		150		0	
Storage Lanes		1		0	
Taper Length (ft)		25			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00
Frt			0.912		
Flt Protected		0.950			
Satd. Flow (prot)	0	1619	1555	0	0
Flt Permitted		0.669			
Satd. Flow (perm)	0	1140	1555	0	0
Right Turn on Red					No
Satd. Flow (RTOR)					
Link Speed (mph)			25		
Link Distance (ft)			3168		
Travel Time (s)			86.4		
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	40	9	171	242	1
Shared Lane Traffic (%)					
Lane Group Flow (vph)	0	49	414	0	0
Enter Blocked Intersection	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Right
Median Width(ft)			12		
Link Offset(ft)			0		
Crosswalk Width(ft)			10		
Two way Left Turn Lane					
Headway Factor	1.12	1.12	1.12	1.12	1.12
Turning Speed (mph)	15	15		9	9
Number of Detectors	1	1	1		
Detector Template	Left	Left	Thru		
Leading Detector (ft)	20	37	37		
Trailing Detector (ft)	0	-3	-3		
Detector 1 Position(ft)	0	-3	-3		
Detector 1 Size(ft)	20	40	40		
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex		
Detector 1 Channel					
Detector 1 Extend (s)	0.0	0.0	0.0		
Detector 1 Queue (s)	0.0	0.0	0.0		
Detector 1 Delay (s)	0.0	0.0	0.0		
Turn Type	Perm	Perm	NA		
Protected Phases			4		
Permitted Phases	4	4			
Detector Phase	4	4	4		
Switch Phase					
Minimum Initial (s)	3.0	3.0	3.0		
Minimum Split (s)	13.0	13.0	13.0		

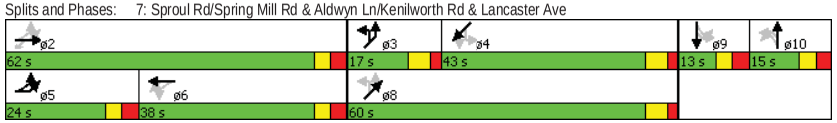
Lane Group	EBL2	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR2	NBL2	NBL	NBT
Total Split (s)	24.0	24.0	62.0		62.0	38.0	38.0	38.0		15.0	15.0	15.0
Total Split (%)	16.0%	16.0%	41.3%		41.3%	25.3%	25.3%	25.3%		10.0%	10.0%	10.0%
Maximum Green (s)	18.0	18.0	56.0		56.0	32.0	32.0	32.0		9.0	9.0	9.0
Yellow Time (s)	3.0	3.0	3.0		3.0	3.0	3.0	3.0		3.0	3.0	3.0
All-Red Time (s)	3.0	3.0	3.0		3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lost Time Adjust (s)		0.5	0.5		0.5		0.5	0.5				0.5
Total Lost Time (s)		6.5	6.5		6.5		6.5	6.5				6.5
Lead/Lag	Lead	Lead				Lag	Lag	Lag		Lag	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0	3.0	3.0		3.0	3.0	3.0
Recall Mode	None	None	Max		Max	None	None	None		None	None	None
Walk Time (s)			7.0		7.0	7.0	7.0	7.0				
Flash Dont Walk (s)			20.0		20.0	20.0	20.0	20.0				
Pedestrian Calls (#/hr)			0		0	0	0	0				
Act Effct Green (s)		55.6	55.6		55.6		31.6	31.6				8.5
Actuated g/C Ratio		0.38	0.38		0.38		0.22	0.22				0.06
v/c Ratio		1.13	0.86		0.39		0.34	1.03				1.07
Control Delay		137.6	49.8		10.1		65.2	80.8				188.7
Queue Delay		0.0	0.0		0.0		0.0	0.0				0.0
Total Delay		137.6	49.8		10.1		65.2	80.8				188.7
LOS		F	D		B		E	F				F
Approach Delay			56.9					80.4				188.7
Approach LOS			E					F				F
Queue Length 50th (ft)		~260	503		44		21	~429				~83
Queue Length 95th (ft)		#447	602		120		56	#567				#197
Internal Link Dist (ft)			497					1529				412
Turn Bay Length (ft)		300					75					
Base Capacity (vph)		230	1221		741		73	886				70
Starvation Cap Reductn		0	0		0		0	0				0
Spillback Cap Reductn		0	0		0		0	0				0
Storage Cap Reductn		0	0		0		0	0				0
Reduced v/c Ratio		1.13	0.86		0.39		0.34	1.03				1.07

Intersection Summary			
Area Type:	Other		
Cycle Length: 150			
Actuated Cycle Length: 144.8			
Natural Cycle: 150			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 1.13			
Intersection Signal Delay: 75.9		Intersection LOS: E	
Intersection Capacity Utilization 116.0%		ICU Level of Service H	
Analysis Period (min) 15			

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 7: Sproul Rd/Spring Mill Rd & Aldwyn Ln/Kenilworth Rd & Lancaster Ave



Lanes, Volumes, Timings
7: Sproul Rd/Spring Mill Rd & Aldwyn Ln/Kenilworth Rd & Lancaster Ave 3/10/2015

Lane Group	NBR	NBR2	SBL2	SBL	SBT	SBR	SBR2	NEL2	NEL	NET	NER	NER2
Total Split (s)			13.0	13.0	13.0			17.0	17.0	60.0		
Total Split (%)			8.7%	8.7%	8.7%			11.3%	11.3%	40.0%		
Maximum Green (s)			7.0	7.0	7.0			11.0	11.0	54.0		
Yellow Time (s)			3.0	3.0	3.0			4.0	4.0	4.0		
All-Red Time (s)			3.0	3.0	3.0			2.0	2.0	2.0		
Lost Time Adjust (s)					0.5				0.5	0.5		
Total Lost Time (s)					6.5				6.5	6.5		
Lead/Lag			Lead	Lead	Lead			Lead	Lead			
Lead-Lag Optimize?												
Vehicle Extension (s)			3.0	3.0	3.0			3.0	3.0	3.0		
Recall Mode			None	None	None			None	None	None		
Walk Time (s)										7.0		
Flash Dont Walk (s)										25.0		
Pedestrian Calls (#/hr)										0		
Act Effct Green (s)					6.1				53.6	53.6		
Actuated g/C Ratio					0.04				0.37	0.37		
v/c Ratio					0.32				1.08	0.23		
Control Delay					83.2				126.1	33.7		
Queue Delay					0.0				0.0	0.0		
Total Delay					83.2				126.1	33.7		
LOS					F				F	C		
Approach Delay					83.2					88.2		
Approach LOS					F					F		
Queue Length 50th (ft)					18				~159	94		
Queue Length 95th (ft)					48				#328	150		
Internal Link Dist (ft)					517					1256		
Turn Bay Length (ft)									200			
Base Capacity (vph)					64				182	606		
Starvation Cap Reductn					0				0	0		
Spillback Cap Reductn					0				0	0		
Storage Cap Reductn					0				0	0		
Reduced v/c Ratio					0.30				1.08	0.23		

Intersection Summary

Lane Group	SWL2	SWL	SWT	SWR	SWR2
Total Split (s)	43.0	43.0	43.0		
Total Split (%)	28.7%	28.7%	28.7%		
Maximum Green (s)	37.0	37.0	37.0		
Yellow Time (s)	4.0	4.0	4.0		
All-Red Time (s)	2.0	2.0	2.0		
Lost Time Adjust (s)		0.5	0.5		
Total Lost Time (s)		6.5	6.5		
Lead/Lag	Lag	Lag	Lag		
Lead-Lag Optimize?					
Vehicle Extension (s)	3.0	3.0	3.0		
Recall Mode	None	None	None		
Walk Time (s)					
Flash Dont Walk (s)					
Pedestrian Calls (#/hr)					
Act Effct Green (s)		36.6	36.6		
Actuated g/C Ratio		0.25	0.25		
v/c Ratio		0.17	1.06		
Control Delay		46.1	111.9		
Queue Delay		0.0	0.0		
Total Delay		46.1	111.9		
LOS		D	F		
Approach Delay			104.9		
Approach LOS			F		
Queue Length 50th (ft)		38	~456		
Queue Length 95th (ft)		77	#671		
Internal Link Dist (ft)			3088		
Turn Bay Length (ft)		150			
Base Capacity (vph)		287	392		
Starvation Cap Reductn		0	0		
Spillback Cap Reductn		0	0		
Storage Cap Reductn		0	0		
Reduced v/c Ratio		0.17	1.06		

Intersection Summary

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	1111	122	20	816	85	19
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width (ft)	11	11	11	11	12	12
Lane Util. Factor	0.95	0.95	0.95	0.95	1.00	1.00
Frt	0.985				0.975	
Flt Protected				0.999	0.961	
Satd. Flow (prot)	3193	0	0	3238	1653	0
Flt Permitted				0.906	0.961	
Satd. Flow (perm)	3193	0	0	2937	1653	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	25				21	
Link Speed (mph)	35			35	25	
Link Distance (ft)	1609			1291	319	
Travel Time (s)	31.3			25.1	8.7	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1208	133	22	887	92	21
Shared Lane Traffic (%)						
Lane Group Flow (vph)	1341	0	0	909	113	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	12			12	12	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	10			10	10	
Two way Left Turn Lane						
Headway Factor	1.12	1.12	1.12	1.12	1.07	1.07
Turning Speed (mph)		9	15		15	9
Number of Detectors	1		1	1	1	
Detector Template	Thru		Left	Thru	Left	
Leading Detector (ft)	37		20	37	37	
Trailing Detector (ft)	-3		0	-3	-3	
Detector 1 Position(ft)	-3		0	-3	-3	
Detector 1 Size(ft)	40		20	40	40	
Detector 1 Type	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel						
Detector 1 Extend (s)	0.0		0.0	0.0	0.0	
Detector 1 Queue (s)	0.0		0.0	0.0	0.0	
Detector 1 Delay (s)	0.0		0.0	0.0	0.0	
Turn Type	NA		Perm	NA	Prot	
Protected Phases	2			6	8	
Permitted Phases			6			
Detector Phase	2		6	6	8	
Switch Phase						
Minimum Initial (s)	10.0		10.0	10.0	4.0	
Minimum Split (s)	21.0		21.0	21.0	28.0	
Total Split (s)	32.0		32.0	32.0	28.0	
Total Split (%)	53.3%		53.3%	53.3%	46.7%	
Maximum Green (s)	27.0		27.0	27.0	23.0	
Yellow Time (s)	3.0		3.0	3.0	3.0	

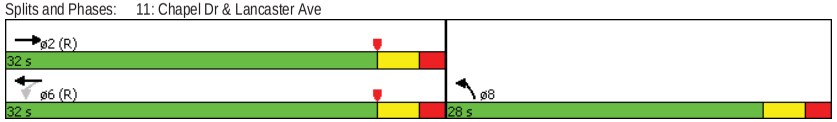
Lanes, Volumes, Timings
11: Chapel Dr & Lancaster Ave 3/10/2015

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
All-Red Time (s)	2.0		2.0	2.0	2.0	
Lost Time Adjust (s)	0.5			0.5	0.5	
Total Lost Time (s)	5.5			5.5	5.5	
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Recall Mode	C-Max		C-Max	C-Max	None	
Walk Time (s)	10.0		10.0	10.0	7.0	
Flash Dont Walk (s)	0.0		0.0	0.0	16.0	
Pedestrian Calls (#/hr)	0		0	0	0	
Act Effct Green (s)	43.8			43.8	8.5	
Actuated g/C Ratio	0.73			0.73	0.14	
v/c Ratio	0.57			0.42	0.45	
Control Delay	6.7			3.4	24.8	
Queue Delay	0.0			0.0	0.0	
Total Delay	6.7			3.4	24.8	
LOS	A			A	C	
Approach Delay	6.7			3.4	24.8	
Approach LOS	A			A	C	
Queue Length 50th (ft)	110			1	31	
Queue Length 95th (ft)	205			m130	67	
Internal Link Dist (ft)	1529			1211	239	
Turn Bay Length (ft)						
Base Capacity (vph)	2335			2142	633	
Starvation Cap Reductn	0			0	0	
Spillback Cap Reductn	0			0	0	
Storage Cap Reductn	0			0	0	
Reduced v/c Ratio	0.57			0.42	0.18	

Intersection Summary			
Area Type:	Other		
Cycle Length: 60			
Actuated Cycle Length: 60			
Offset: 26 (43%), Referenced to phase 2:EBT and 6:WBTL, Start of Yellow			
Natural Cycle: 60			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.57			
Intersection Signal Delay: 6.3		Intersection LOS: A	
Intersection Capacity Utilization 54.3%		ICU Level of Service A	
Analysis Period (min) 15			

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 11: Chapel Dr & Lancaster Ave



Lanes, Volumes, Timings
27: S Ithan Ave/N Ithan Ave & Lancaster Ave 3/10/2015

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	82	956	93	97	698	32	64	125	78	66	237	74
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width (ft)	10	10	10	10	10	10	10	10	10	10	10	10
Grade (%)		0%			3%			1%			0%	
Storage Length (ft)	140		0	70		0	105		0	65		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.987			0.993			0.943			0.964	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1565	3089	0	1541	3061	0	1557	1545	0	1565	1588	0
Flt Permitted	0.259			0.109			0.225			0.461		
Satd. Flow (perm)	427	3089	0	177	3061	0	369	1545	0	759	1588	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		35			35			25			25	
Link Distance (ft)		1291			2034			183			973	
Travel Time (s)		25.1			39.6			5.0			26.5	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	86	1006	98	102	735	34	67	132	82	69	249	78
Shared Lane Traffic (%)												
Lane Group Flow (vph)	86	1104	0	102	769	0	67	214	0	69	327	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		10			10			10			10	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		10			10			10			10	
Two way Left Turn Lane												
Headway Factor	1.17	1.17	1.17	1.19	1.19	1.19	1.18	1.18	1.18	1.17	1.17	1.17
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	1		1	1		1	1		1	1	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (ft)	37	37		37	37		37	37		37	37	
Trailing Detector (ft)	-3	-3		-3	-3		-3	-3		-3	-3	
Detector 1 Position(ft)	-3	-3		-3	-3		-3	-3		-3	-3	
Detector 1 Size(ft)	40	40		40	40		40	40		40	40	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2			6			8			4		
Detector Phase	5	2		1	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	3.0	34.0		3.0	34.0		3.0	3.0		3.0	3.0	
Minimum Split (s)	13.0	40.0		13.0	40.0		13.0	13.0		13.0	13.0	

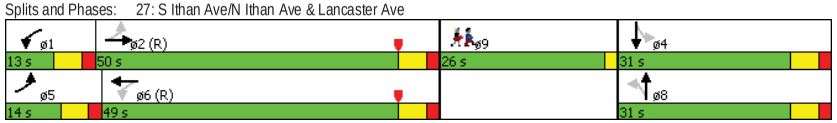
Lane Group	ø9
Lane Configurations	
Volume (vph)	
Ideal Flow (vphpl)	
Lane Width (ft)	
Grade (%)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Lane Util. Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Enter Blocked Intersection	
Lane Alignment	
Median Width(ft)	
Link Offset(ft)	
Crosswalk Width(ft)	
Two way Left Turn Lane	
Headway Factor	
Turning Speed (mph)	
Number of Detectors	
Detector Template	
Leading Detector (ft)	
Trailing Detector (ft)	
Detector 1 Position(ft)	
Detector 1 Size(ft)	
Detector 1 Type	
Detector 1 Channel	
Detector 1 Extend (s)	
Detector 1 Queue (s)	
Detector 1 Delay (s)	
Turn Type	
Protected Phases	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	24.0
Minimum Split (s)	26.0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Split (s)	14.0	50.0		13.0	49.0		31.0	31.0		31.0	31.0	
Total Split (%)	11.7%	41.7%		10.8%	40.8%		25.8%	25.8%		25.8%	25.8%	
Maximum Green (s)	8.0	44.0		7.0	43.0		25.0	25.0		25.0	25.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.5	0.5		0.5	0.5		0.5	0.5		0.5	0.5	
Total Lost Time (s)	6.5	6.5		6.5	6.5		6.5	6.5		6.5	6.5	
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)	55.8	48.7		55.7	50.5		24.5	24.5		24.5	24.5	
Actuated g/C Ratio	0.46	0.41		0.46	0.42		0.20	0.20		0.20	0.20	
v/c Ratio	0.32	0.88		0.65	0.60		0.89	0.68		0.45	1.01	
Control Delay	21.1	44.7		39.1	25.4		126.1	56.2		52.5	100.2	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	21.1	44.7		39.1	25.4		126.1	56.2		52.5	100.2	
LOS	C	D		D	C		F	E		D	F	
Approach Delay		43.0			27.0			72.9			91.9	
Approach LOS		D			C			E			F	
Queue Length 50th (ft)	36	481		45	201		51	155		47	~259	
Queue Length 95th (ft)	m63	#614		m#106	240		#144	242		98	#450	
Internal Link Dist (ft)		1211			1954			103			893	
Turn Bay Length (ft)	140			70			105			65		
Base Capacity (vph)	271	1253		156	1288		75	315		154	324	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.32	0.88		0.65	0.60		0.89	0.68		0.45	1.01	

Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 120			
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow, Master Intersection			
Natural Cycle: 115			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 1.01			
Intersection Signal Delay: 48.0		Intersection LOS: D	
Intersection Capacity Utilization 80.0%		ICU Level of Service D	
Analysis Period (min) 15			

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 27: S Ithan Ave/N Ithan Ave & Lancaster Ave



Lane Group	ø9
Total Split (s)	26.0
Total Split (%)	22%
Maximum Green (s)	24.0
Yellow Time (s)	2.0
All-Red Time (s)	0.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0
Recall Mode	None
Walk Time (s)	9.0
Flash Dont Walk (s)	15.0
Pedestrian Calls (#/hr)	45
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	

Intersection Summary

HCM 2010 Signalized Intersection Summary
51: Lowrys Ln & Lancaster Ave

3/10/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	2	1161	22	15	905	4	19	36	15	98	70	71
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	1782	1800	1773	1755	1773	1900	1881	1900	1881	1863	1881
Adj Flow Rate, veh/h	2	1262	24	16	984	4	21	39	16	107	76	77
Adj No. of Lanes	0	2	0	0	2	0	0	1	0	0	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	1	1	1	1	1	1	1	1	1	1	1	1
Cap, veh/h	61	2041	39	72	2005	8	131	205	69	192	105	89
Arrive On Green	1.00	1.00	1.00	0.61	0.61	0.61	0.19	0.19	0.19	0.19	0.19	0.19
Sat Flow, veh/h	1	3328	63	17	3269	13	290	1098	370	575	564	479
Grp Volume(v), veh/h	676	0	612	519	0	485	76	0	0	260	0	0
Grp Sat Flow(s),veh/h/ln	1781	0	1611	1704	0	1595	1758	0	0	1617	0	0
Q Serve(g_s), s	0.0	0.0	0.0	0.0	0.0	10.1	0.0	0.0	0.0	7.2	0.0	0.0
Cycle Q Clear(g_c), s	0.0	0.0	0.0	9.7	0.0	10.1	2.1	0.0	0.0	9.3	0.0	0.0
Prop In Lane	0.00		0.04	0.03		0.01	0.28		0.21	0.41		0.30
Lane Grp Cap(c), veh/h	1152	0	988	1107	0	978	405	0	0	387	0	0
V/C Ratio(X)	0.59	0.00	0.62	0.47	0.00	0.50	0.19	0.00	0.00	0.67	0.00	0.00
Avail Cap(c_a), veh/h	1152	0	988	1107	0	978	494	0	0	473	0	0
HCM Platoon Ratio	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.40	0.00	0.40	1.00	0.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	0.0	0.0	0.0	6.4	0.0	6.4	20.7	0.0	0.0	23.5	0.0	0.0
Incr Delay (d2), s/veh	0.9	0.0	1.2	1.4	0.0	1.8	0.2	0.0	0.0	2.7	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(-26165%),veh/ln	0.3	0.0	0.3	5.1	0.0	4.9	1.1	0.0	0.0	4.4	0.0	0.0
LnGrp Delay(d),s/veh	0.9	0.0	1.2	7.8	0.0	8.2	20.9	0.0	0.0	26.3	0.0	0.0
LnGrp LOS	A		A	A		A	C			C		
Approach Vol, veh/h		1288			1004			76			260	
Approach Delay, s/veh		1.0			8.0			20.9			26.3	
Approach LOS		A			A			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		43.3		16.7		43.3		16.7
Change Period (Y+Rc), s		6.0		5.0		6.0		5.0
Max Green Setting (Gmax), s		34.0		15.0		34.0		15.0
Max Q Clear Time (g_c+I1), s		2.0		11.3		12.1		4.1
Green Ext Time (p_c), s		12.4		0.5		10.6		1.0

Intersection Summary		
HCM 2010 Ctrl Delay		6.8
HCM 2010 LOS		A

Notes

User approved pedestrian interval to be less than phase max green.

HCM 2010 Signalized Intersection Summary
16: Sproul Rd & Conestoga Rd

3/10/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (veh/h)	105	552	218	27	524	47	105	186	27	51	293	83
Number	7	4	14	3	8	18	1	6	16	5	2	12
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1782	1782	1800	1827	1827	1845	1773	1773	1791	1809	1791	1809
Adj Flow Rate, veh/h	111	581	0	28	552	0	111	196	28	54	308	87
Adj No. of Lanes	1	1	0	1	1	0	1	1	0	0	1	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	1	1	1	1	1	1	1	1	1	1	1	1
Cap, veh/h	225	819	0	260	615	0	299	602	86	87	315	84
Arrive On Green	0.05	0.46	0.00	0.34	0.34	0.00	0.06	0.40	0.40	0.26	0.26	0.26
Sat Flow, veh/h	1697	1782	0	859	1827	0	1689	1518	217	138	1201	322
Grp Volume(v), veh/h	111	581	0	28	552	0	111	0	224	449	0	0
Grp Sat Flow(s),veh/h/ln	1697	1782	0	859	1827	0	1689	0	1735	1661	0	0
Q Serve(g_s), s	3.3	20.9	0.0	2.2	23.0	0.0	3.7	0.0	7.2	14.8	0.0	0.0
Cycle Q Clear(g_c), s	3.3	20.9	0.0	13.2	23.0	0.0	3.7	0.0	7.2	21.0	0.0	0.0
Prop In Lane	1.00		0.00	1.00		0.00	1.00		0.13	0.12		0.19
Lane Grp Cap(c), veh/h	225	819	0	260	615	0	299	0	688	486	0	0
V/C Ratio(X)	0.49	0.71	0.00	0.11	0.90	0.00	0.37	0.00	0.33	0.92	0.00	0.00
Avail Cap(c_a), veh/h	270	819	0	260	615	0	337	0	727	486	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	19.1	17.3	0.0	26.6	25.2	0.0	18.3	0.0	16.7	29.7	0.0	0.0
Incr Delay (d2), s/veh	1.7	5.2	0.0	0.8	18.4	0.0	0.8	0.0	0.3	23.3	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(-26165%),veh/ln	1.6	11.3	0.0	0.6	14.6	0.0	1.7	0.0	3.5	13.0	0.0	0.0
LnGrp Delay(d),s/veh	20.8	22.5	0.0	27.4	43.7	0.0	19.0	0.0	17.0	53.0	0.0	0.0
LnGrp LOS	C	C		C	D		B		B	D		
Approach Vol, veh/h		692			580			335			449	
Approach Delay, s/veh		22.2			42.9			17.7			53.0	
Approach LOS		C			D			B			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4		6	7	8
Phs Duration (G+Y+Rc), s	10.7	27.0		42.3		37.7	9.9	32.4
Change Period (Y+Rc), s	5.5	5.5		5.0		5.5	5.0	5.0
Max Green Setting (Gmax), s	7.0	21.5		35.5		34.0	7.0	23.5
Max Q Clear Time (g_c+I1), s	5.7	23.0		22.9		9.2	5.3	25.0
Green Ext Time (p_c), s	0.0	0.0		5.7		2.4	0.0	0.0

Intersection Summary		
HCM 2010 Ctrl Delay		34.0
HCM 2010 LOS		C

HCM 2010 Signalized Intersection Summary
25: S Ithan Ave & Conestoga Rd 3/10/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	64	522	7	11	471	40	7	18	6	53	88	137
Number	1	6	16	5	2	12	7	4	14	3	8	18
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	1854	1836	1854	1764	1747	1764	1763	1745	1763	1844	1826	1844
Adj Flow Rate, veh/h	73	593	8	12	535	45	8	20	7	60	100	156
Adj No. of Lanes	0	1	0	0	1	0	0	1	0	0	1	0
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Percent Heavy Veh, %	1	1	1	1	1	1	1	1	1	1	1	1
Cap, veh/h	146	758	10	88	744	62	145	263	77	145	143	186
Arrive On Green	0.47	0.47	0.47	0.47	0.47	0.47	0.23	0.23	0.23	0.23	0.23	0.23
Sat Flow, veh/h	116	1602	21	10	1571	130	192	1135	332	207	617	803
Grp Volume(v), veh/h	674	0	0	592	0	0	35	0	0	316	0	0
Grp Sat Flow(s),veh/h/ln	1739	0	0	1711	0	0	1659	0	0	1626	0	0
Q Serve(g_s), s	1.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.9	0.0	0.0
Cycle Q Clear(g_c), s	14.0	0.0	0.0	12.1	0.0	0.0	0.7	0.0	0.0	8.1	0.0	0.0
Prop In Lane	0.11		0.01	0.02		0.08	0.23		0.20	0.19		0.49
Lane Grp Cap(c), veh/h	914	0	0	893	0	0	484	0	0	474	0	0
V/C Ratio(X)	0.74	0.00	0.00	0.66	0.00	0.00	0.07	0.00	0.00	0.67	0.00	0.00
Avail Cap(c_a), veh/h	1384	0	0	1378	0	0	665	0	0	667	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	9.7	0.0	0.0	9.3	0.0	0.0	13.3	0.0	0.0	16.1	0.0	0.0
Incr Delay (d2), s/veh	1.2	0.0	0.0	0.8	0.0	0.0	0.1	0.0	0.0	1.6	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(-26165%),veh/ln	7.0	0.0	0.0	5.8	0.0	0.0	0.3	0.0	0.0	3.8	0.0	0.0
LnGrp Delay(d),s/veh	10.9	0.0	0.0	10.2	0.0	0.0	13.3	0.0	0.0	17.7	0.0	0.0
LnGrp LOS	B			B			B			B		
Approach Vol, veh/h		674			592			35			316	
Approach Delay, s/veh		10.9			10.2			13.3			17.7	
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		27.3		16.7		27.3		16.7
Change Period (Y+Rc), s		6.0		6.0		6.0		6.0
Max Green Setting (Gmax), s		34.0		16.0		34.0		16.0
Max Q Clear Time (g_c+I1), s		14.1		2.7		16.0		10.1
Green Ext Time (p_c), s		5.5		1.1		5.3		0.7

Intersection Summary	
HCM 2010 Ctrl Delay	12.0
HCM 2010 LOS	B

HCM 2010 Signalized Intersection Summary
33: Williams Rd/Garrett Ave & Conestoga Rd 3/10/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (veh/h)	27	498	9	12	496	29	16	1	11	28	12	52
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	1872	1872	1872	1872	1872	1872	1800	1800	1800	1728	1728	1728
Adj Flow Rate, veh/h	29	541	10	13	539	32	17	1	12	30	13	57
Adj No. of Lanes	0	1	0	0	1	0	0	1	0	0	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	0	0	0	0	0	0	0	0	0	0	0	0
Cap, veh/h	89	1245	22	67	1230	72	147	25	56	101	26	71
Arrive On Green	0.71	0.71	0.71	0.71	0.71	0.71	0.08	0.08	0.08	0.08	0.08	0.08
Sat Flow, veh/h	42	1747	31	13	1726	101	699	298	665	334	307	849
Grp Volume(v), veh/h	580	0	0	584	0	0	30	0	0	100	0	0
Grp Sat Flow(s),veh/h/ln	1820	0	0	1840	0	0	1662	0	0	1490	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	2.9	0.0	0.0
Cycle Q Clear(g_c), s	8.3	0.0	0.0	8.4	0.0	0.0	1.1	0.0	0.0	4.2	0.0	0.0
Prop In Lane	0.05		0.02	0.02		0.05	0.57		0.40	0.30		0.57
Lane Grp Cap(c), veh/h	1356	0	0	1368	0	0	228	0	0	199	0	0
V/C Ratio(X)	0.43	0.00	0.00	0.43	0.00	0.00	0.13	0.00	0.00	0.50	0.00	0.00
Avail Cap(c_a), veh/h	1356	0	0	1368	0	0	410	0	0	385	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	3.8	0.0	0.0	3.9	0.0	0.0	27.3	0.0	0.0	28.7	0.0	0.0
Incr Delay (d2), s/veh	1.0	0.0	0.0	1.0	0.0	0.0	0.4	0.0	0.0	2.8	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(-26165%),veh/ln	4.6	0.0	0.0	4.6	0.0	0.0	0.5	0.0	0.0	1.9	0.0	0.0
LnGrp Delay(d),s/veh	4.8	0.0	0.0	4.8	0.0	0.0	27.6	0.0	0.0	31.5	0.0	0.0
LnGrp LOS	A			A			C			C		
Approach Vol, veh/h		580			584			30			100	
Approach Delay, s/veh		4.8			4.8			27.6			31.5	
Approach LOS		A			A			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		52.0		11.9		52.0		11.9
Change Period (Y+Rc), s		6.0		6.0		6.0		6.0
Max Green Setting (Gmax), s		46.0		14.0		46.0		14.0
Max Q Clear Time (g_c+I1), s		10.3		6.2		10.4		3.1
Green Ext Time (p_c), s		5.6		0.3		5.6		0.4

Intersection Summary	
HCM 2010 Ctrl Delay	7.4
HCM 2010 LOS	A

Notes
User approved pedestrian interval to be less than phase max green.

HCM 2010 Signalized Intersection Summary
3: County Line Rd & Spring Mill Rd 3/10/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	64	306	95	56	245	52	72	203	38	65	398	45
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	1789	1800	1800	1766	1800	1800	1800	1800	1800	1773	1800
Adj Flow Rate, veh/h	89	340	110	78	282	81	89	260	58	86	447	65
Adj No. of Lanes	0	1	0	0	1	0	0	1	0	0	1	0
Peak Hour Factor	0.72	0.90	0.86	0.72	0.87	0.64	0.81	0.78	0.66	0.76	0.89	0.69
Percent Heavy Veh, %	1	1	1	3	3	3	0	0	0	1	1	1
Cap, veh/h	143	416	125	139	403	106	151	377	75	134	498	69
Arrive On Green	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39
Sat Flow, veh/h	187	1063	320	175	1030	271	198	961	193	166	1271	175
Grp Volume(v), veh/h	539	0	0	441	0	0	407	0	0	598	0	0
Grp Sat Flow(s),veh/h/ln	1570	0	0	1475	0	0	1352	0	0	1613	0	0
Q Serve(g_s), s	3.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.7	0.0	0.0
Cycle Q Clear(g_c), s	19.0	0.0	0.0	15.1	0.0	0.0	14.7	0.0	0.0	21.5	0.0	0.0
Prop In Lane	0.17		0.20	0.18		0.18	0.22		0.14	0.14		0.11
Lane Grp Cap(c), veh/h	685	0	0	648	0	0	603	0	0	701	0	0
V/C Ratio(X)	0.79	0.00	0.00	0.68	0.00	0.00	0.68	0.00	0.00	0.85	0.00	0.00
Avail Cap(c_a), veh/h	685	0	0	648	0	0	627	0	0	727	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)	0.46	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	16.6	0.0	0.0	15.3	0.0	0.0	15.0	0.0	0.0	17.4	0.0	0.0
Incr Delay (d2), s/veh	4.3	0.0	0.0	5.7	0.0	0.0	2.2	0.0	0.0	8.9	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(-26165%),veh/ln	9.1	0.0	0.0	7.3	0.0	0.0	6.0	0.0	0.0	11.2	0.0	0.0
LnGrp Delay(d),s/veh	21.0	0.0	0.0	21.0	0.0	0.0	17.1	0.0	0.0	26.3	0.0	0.0
LnGrp LOS	C			C			B			C		
Approach Vol, veh/h		539			441			407			598	
Approach Delay, s/veh		21.0			21.0			17.1			26.3	
Approach LOS		C			C			B			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		30.0		30.0		30.0		30.0
Change Period (Y+Rc), s		6.0		6.0		6.0		6.0
Max Green Setting (Gmax), s		23.0		25.0		23.0		25.0
Max Q Clear Time (g_c+I1), s		21.0		23.5		17.1		16.7
Green Ext Time (p_c), s		1.0		0.6		2.4		1.8

Intersection Summary	
HCM 2010 Ctrl Delay	21.8
HCM 2010 LOS	C

HCM 2010 TWSC
79: Garrett Rd & Lancaster Ave 3/10/2015

Intersection	
Int Delay, s/veh	1.6

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	1227	47	48	918	0	38
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, %	-3	-	-	3	0	-
Peak Hour Factor	82	82	82	82	82	82
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	1496	57	59	1120	0	46

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	1554	0	2202	777
Stage 1	-	-	-	-	1525	-
Stage 2	-	-	-	-	677	-
Critical Hdwy	-	-	4.1	-	6.8	6.9
Critical Hdwy Stg 1	-	-	-	-	5.8	-
Critical Hdwy Stg 2	-	-	-	-	5.8	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	432	-	39	344
Stage 1	-	-	-	-	169	-
Stage 2	-	-	-	-	472	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	432	-	25	344
Mov Cap-2 Maneuver	-	-	-	-	25	-
Stage 1	-	-	-	-	169	-
Stage 2	-	-	-	-	302	-

Approach	EB	WB	NB
HCM Control Delay, s	0	3	17.1
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	344	-	-	432	-
HCM Lane V/C Ratio	0.135	-	-	0.136	-
HCM Control Delay (s)	17.1	-	-	14.6	2.4
HCM Lane LOS	C	-	-	B	A
HCM 95th %tile Q(veh)	0.5	-	-	0.5	-

HCM 2010 TWSC
15: Conestoga Rd & Spring Mill Rd 3/10/2015

Intersection	
Int Delay, s/veh	0.5

Movement	EBL	EBT	WBT	WBR	SWL	SWR
Vol, veh/h	10	659	619	3	17	9
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	96	96	96	96	96	96
Heavy Vehicles, %	1	1	1	1	1	1
Mvmt Flow	10	686	645	3	18	9

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	648	0	-	0	1353	646
Stage 1	-	-	-	-	646	-
Stage 2	-	-	-	-	707	-
Critical Hdwy	4.11	-	-	-	6.41	6.21
Critical Hdwy Stg 1	-	-	-	-	5.41	-
Critical Hdwy Stg 2	-	-	-	-	5.41	-
Follow-up Hdwy	2.209	-	-	-	3.509	3.309
Pot Cap-1 Maneuver	943	-	-	-	166	473
Stage 1	-	-	-	-	524	-
Stage 2	-	-	-	-	491	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	943	-	-	-	163	473
Mov Cap-2 Maneuver	-	-	-	-	163	-
Stage 1	-	-	-	-	524	-
Stage 2	-	-	-	-	483	-

Approach	EB	WB	SW
HCM Control Delay, s	0.1	0	24.6
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SWLn1
Capacity (veh/h)	943	-	-	-	211
HCM Lane V/C Ratio	0.011	-	-	-	0.128
HCM Control Delay (s)	8.9	0	-	-	24.6
HCM Lane LOS	A	A	-	-	C
HCM 95th %tile Q(veh)	0	-	-	-	0.4

HCM 2010 TWSC
29: Strathmore Dr/Lowrys Ln & Conestoga Rd 3/10/2015

Intersection	
Int Delay, s/veh	2.6

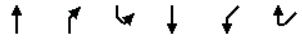
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	37	504	17	17	465	16	15	8	17	9	17	53
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	96	96	96	96	96	96	96	96	96	96	96	96
Heavy Vehicles, %	1	1	1	1	1	1	1	1	1	1	1	1
Mvmt Flow	39	525	18	18	484	17	16	8	18	9	18	55

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	501	0	0	543	0	0	1176	1147	534	1152	1148	493
Stage 1	-	-	-	-	-	-	611	611	-	528	528	-
Stage 2	-	-	-	-	-	-	565	536	-	624	620	-
Critical Hdwy	4.11	-	-	4.11	-	-	7.11	6.51	6.21	7.11	6.51	6.21
Critical Hdwy Stg 1	-	-	-	-	-	-	6.11	5.51	-	6.11	5.51	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.11	5.51	-	6.11	5.51	-
Follow-up Hdwy	2.209	-	-	2.209	-	-	3.509	4.009	3.309	3.509	4.009	3.309
Pot Cap-1 Maneuver	1068	-	-	1031	-	-	169	200	548	175	200	578
Stage 1	-	-	-	-	-	-	483	486	-	536	529	-
Stage 2	-	-	-	-	-	-	511	525	-	475	481	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1068	-	-	1031	-	-	134	185	548	154	185	578
Mov Cap-2 Maneuver	-	-	-	-	-	-	134	185	-	154	185	-
Stage 1	-	-	-	-	-	-	458	461	-	508	516	-
Stage 2	-	-	-	-	-	-	436	512	-	428	456	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.6	0.3	25.7	19.7
HCM LOS			D	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	215	1068	-	-	1031	-	-	326
HCM Lane V/C Ratio	0.194	0.036	-	-	0.017	-	-	0.252
HCM Control Delay (s)	25.7	8.5	0	-	8.6	0	-	19.7
HCM Lane LOS	D	A	A	-	A	A	-	C
HCM 95th %tile Q(veh)	0.7	0.1	-	-	0.1	-	-	1

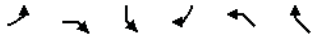
Lanes, Volumes, Timings
38: County Line Rd & N Ithan Ave 3/10/2015



Lane Group	NBT	NBR	SBL	SBT	SWL	SWR
Lane Configurations						
Volume (vph)	269	117	183	493	114	62
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.959				0.952	
Flt Protected				0.987	0.969	
Satd. Flow (prot)	1804	0	0	1857	1735	0
Flt Permitted				0.987	0.969	
Satd. Flow (perm)	1804	0	0	1857	1735	0
Link Speed (mph)	30			30	30	
Link Distance (ft)	295			1901	824	
Travel Time (s)	6.7			43.2	18.7	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%
Adj. Flow (vph)	286	124	195	524	121	66
Shared Lane Traffic (%)						
Lane Group Flow (vph)	410	0	0	719	187	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	0			0	12	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	10			10	10	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)		9	15		15	9
Sign Control	Free			Stop	Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	77.5%	ICU Level of Service	D
Analysis Period (min)	15		

Lanes, Volumes, Timings
2: County Line Rd & N Ithan Ave 3/10/2015



Lane Group	EBL	EBR	SBL	SBR	NWL	NWR
Lane Configurations						
Volume (vph)	222	37	302	308	23	162
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.981		0.932		0.882	
Flt Protected	0.959		0.976		0.994	
Satd. Flow (prot)	1763	0	1711	0	1649	0
Flt Permitted	0.959		0.976		0.994	
Satd. Flow (perm)	1763	0	1711	0	1649	0
Link Speed (mph)	30		30		30	
Link Distance (ft)	973		295		2014	
Travel Time (s)	22.1		6.7		45.8	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%
Bus Blockages (#/hr)	1	0	0	0	0	0
Adj. Flow (vph)	236	39	321	328	24	172
Shared Lane Traffic (%)						
Lane Group Flow (vph)	275	0	649	0	196	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Right
Median Width(ft)	22		12		12	
Link Offset(ft)	0		0		0	
Crosswalk Width(ft)	10		10		10	
Two way Left Turn Lane						
Headway Factor	1.01	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9	15	9	15	9
Sign Control	Stop		Free		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	71.5%	ICU Level of Service	C
Analysis Period (min)	15		

Intersection	
Int Delay, s/veh	1.5

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	16	18	52	183	156	124
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	17	19	54	191	162	129

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	526	227	292	0	-	0
Stage 1	227	-	-	-	-	-
Stage 2	299	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	516	817	1281	-	-	-
Stage 1	815	-	-	-	-	-
Stage 2	757	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	492	817	1281	-	-	-
Mov Cap-2 Maneuver	492	-	-	-	-	-
Stage 1	815	-	-	-	-	-
Stage 2	721	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	11.1	1.8	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1281	-	623	-	-
HCM Lane V/C Ratio	0.042	-	0.057	-	-
HCM Control Delay (s)	7.9	0	11.1	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0.1	-	0.2	-	-

Intersection	
Int Delay, s/veh	3.5

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	169	215	345	16	12	118
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	98	98	98	98	98	98
Heavy Vehicles, %	1	1	1	1	1	1
Mvmt Flow	172	219	352	16	12	120

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	368	0	-	0	924	360
Stage 1	-	-	-	-	360	-
Stage 2	-	-	-	-	564	-
Critical Hdwy	4.11	-	-	-	6.41	6.21
Critical Hdwy Stg 1	-	-	-	-	5.41	-
Critical Hdwy Stg 2	-	-	-	-	5.41	-
Follow-up Hdwy	2.209	-	-	-	3.509	3.309
Pot Cap-1 Maneuver	1196	-	-	-	300	687
Stage 1	-	-	-	-	708	-
Stage 2	-	-	-	-	571	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1196	-	-	-	251	687
Mov Cap-2 Maneuver	-	-	-	-	251	-
Stage 1	-	-	-	-	708	-
Stage 2	-	-	-	-	477	-

Approach	EB	WB	SB
HCM Control Delay, s	3.7	0	12.8
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1196	-	-	-	592
HCM Lane V/C Ratio	0.144	-	-	-	0.224
HCM Control Delay (s)	8.5	0	-	-	12.8
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.5	-	-	-	0.9

Intersection	
Int Delay, s/veh	3.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	37	26	1	9	26	11	4	511	29	11	654	60
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	1	1	1	1	1	1	1	1	1	1	1	1
Mvmt Flow	39	27	1	9	27	12	4	538	31	12	688	63

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1034	1320	376	943	1337	284	752	0	0	568	0	0
Stage 1	743	743	-	562	562	-	-	-	-	-	-	-
Stage 2	291	577	-	381	775	-	-	-	-	-	-	-
Critical Hdwy	7.52	6.52	6.92	7.52	6.52	6.92	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.52	5.52	-	6.52	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.52	5.52	-	6.52	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.51	4.01	3.31	3.51	4.01	3.31	2.21	-	-	2.21	-	-
Pot Cap-1 Maneuver	188	157	624	219	153	716	860	-	-	1007	-	-
Stage 1	375	422	-	481	510	-	-	-	-	-	-	-
Stage 2	695	502	-	616	408	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	156	153	624	185	149	716	860	-	-	1007	-	-
Mov Cap-2 Maneuver	156	153	-	185	149	-	-	-	-	-	-	-
Stage 1	372	413	-	478	506	-	-	-	-	-	-	-
Stage 2	642	498	-	562	399	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	44.1	29.8	0.1	0.2
HCM LOS	E	D		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	860	-	-	157	193	1007	-	-
HCM Lane V/C Ratio	0.005	-	-	0.429	0.251	0.011	-	-
HCM Control Delay (s)	9.2	0	-	44.1	29.8	8.6	0.1	-
HCM Lane LOS	A	A	-	E	D	A	A	-
HCM 95th %tile Q(veh)	0	-	-	1.9	1	0	-	-

Intersection	
Int Delay, s/veh	2.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	35	133	5	51	272	21	8	3	37	4	0	13
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	91	91	91	91	91	91	91	91	91	91	91	91
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	38	146	5	56	299	23	9	3	41	4	0	14

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	322	0	0	152	0	0	656	660	149	671	652	310
Stage 1	-	-	-	-	-	-	226	226	-	423	423	-
Stage 2	-	-	-	-	-	-	430	434	-	248	229	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1238	-	-	1429	-	-	379	383	898	370	387	730
Stage 1	-	-	-	-	-	-	777	717	-	609	588	-
Stage 2	-	-	-	-	-	-	603	581	-	756	715	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1238	-	-	1429	-	-	349	352	898	329	356	730
Mov Cap-2 Maneuver	-	-	-	-	-	-	349	352	-	329	356	-
Stage 1	-	-	-	-	-	-	751	693	-	588	560	-
Stage 2	-	-	-	-	-	-	563	553	-	694	691	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	1.6	1.1	10.9	11.6
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	661	1238	-	-	1429	-	-	567
HCM Lane V/C Ratio	0.08	0.031	-	-	0.039	-	-	0.033
HCM Control Delay (s)	10.9	8	0	-	7.6	0	-	11.6
HCM Lane LOS	B	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	0.3	0.1	-	-	0.1	-	-	0.1

Lane Group	EBL2	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR	WBR2	NBL2	NBL
Lane Configurations												
Volume (vph)	2	227	860	85	222	4	11	986	1	13	3	50
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width (ft)	10	10	11	11	14	10	12	12	12	12	10	10
Grade (%)			3%					-2%				
Storage Length (ft)		300		0			75		0			0
Storage Lanes		1		1			1		0			0
Taper Length (ft)		25					25					25
Lane Util. Factor	0.95	1.00	0.95	0.95	1.00	0.95	1.00	0.95	0.95	0.95	1.00	1.00
Frt			0.986		0.850			0.998				
Flt Protected		0.950					0.950					
Satd. Flow (prot)	0	1497	3058	0	1531	0	1645	3283	0	0	0	0
Flt Permitted		0.075					0.275					
Satd. Flow (perm)	0	118	3058	0	1531	0	476	3283	0	0	0	0
Right Turn on Red					Yes					Yes		
Satd. Flow (RTOR)					200			1				
Link Speed (mph)			35					35				
Link Distance (ft)			577					903				
Travel Time (s)			11.2					17.6				
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Adj. Flow (vph)	2	236	896	89	231	4	11	1027	1	14	3	52
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	238	985	0	231	0	15	1042	0	0	0	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Right	Left	Left	Left	Right	Right	Left	Left
Median Width(ft)			12					12				
Link Offset(ft)			0					0				
Crosswalk Width(ft)			10					10				
Two way Left Turn Lane												
Headway Factor	1.19	1.19	1.14	1.14	1.01	1.16	1.06	1.06	1.06	1.06	1.18	1.18
Turning Speed (mph)	15	15		9	9	15	15		9	9	15	15
Number of Detectors	1	1	1		0	1	1	1			1	1
Detector Template	Left	Left	Thru		Right	Left	Left	Thru			Left	Left
Leading Detector (ft)	20	37	37		0	20	37	37			20	20
Trailing Detector (ft)	0	-3	-3		0	0	-3	-3			0	0
Detector 1 Position(ft)	0	-3	-3		0	0	-3	-3			0	0
Detector 1 Size(ft)	20	40	40		37	20	40	40			20	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex			Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0		0.0	0.0	0.0	0.0			0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0		0.0	0.0	0.0	0.0			0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0		0.0	0.0	0.0	0.0			0.0	0.0
Turn Type	pm+pt	pm+pt	NA		Perm	Perm	Perm	NA			Perm	Perm
Protected Phases	5	5	2					6				
Permitted Phases	2	2			2	6	6				10	10
Detector Phase	5	5	2		2	6	6	6			10	10
Switch Phase												
Minimum Initial (s)	3.0	3.0	15.0		15.0	15.0	15.0	15.0			3.0	3.0

Lanes, Volumes, Timings
7: Sproul Rd/Spring Mill Rd & Aldwyn Ln/Kenilworth Rd & Lancaster Ave 3/9/2015

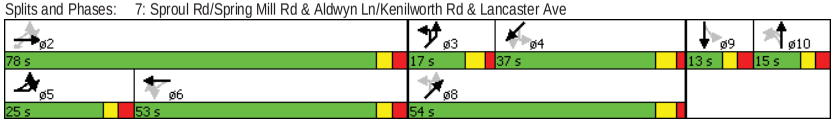
Lane Group	NBT	NBR	SBT	SBR	SBR2	NEL2	NEL	NET	NER	NER2	SWL2	SWL
Lane Configurations												
Volume (vph)	0	8	1	3	12	184	0	196	51	9	20	8
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width (ft)	10	10	10	10	10	12	12	11	11	11	10	10
Grade (%)	1%		-3%					3%				
Storage Length (ft)		0		0			200		0			150
Storage Lanes		0		0			1		0			1
Taper Length (ft)							25					25
Lane Util. 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
Frt	0.983		0.873					0.965				
Flt Protected	0.958						0.950					0.950
Satd. Flow (prot)	1499	0	1418	0	0	0	1604	1575	0	0	0	1573
Flt Permitted	0.742						0.179					0.595
Satd. Flow (perm)	1161	0	1418	0	0	0	302	1575	0	0	0	985
Right Turn on Red					No					No		
Satd. Flow (RTOR)												
Link Speed (mph)	25		25					40				
Link Distance (ft)	492		597					1336				
Travel Time (s)	13.4		16.3					22.8				
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Adj. Flow (vph)	0	8	1	3	12	192	0	204	53	9	21	8
Shared Lane Traffic (%)												
Lane Group Flow (vph)	63	0	16	0	0	0	192	266	0	0	0	29
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Right	Left	Left	Left	Right	Right	Left	Left
Median Width(ft)	0		0					12				
Link Offset(ft)	0		0					0				
Crosswalk Width(ft)	10		10					10				
Two way Left Turn Lane												
Headway Factor	1.18	1.18	1.15	1.15	1.15	1.09	1.09	1.14	1.14	1.14	1.12	1.12
Turning Speed (mph)		9		9	9	15	15		9	9	15	15
Number of Detectors	1		1			1	1	1			1	1
Detector Template	Thru		Thru			Left	Left	Thru			Left	Left
Leading Detector (ft)	37		37			20	37	37			20	37
Trailing Detector (ft)	-3		-3			0	-3	-3			0	-3
Detector 1 Position(ft)	-3		-3			0	-3	-3			0	-3
Detector 1 Size(ft)	40		40			20	40	40			20	40
Detector 1 Type	Cl+Ex		Cl+Ex			Cl+Ex	Cl+Ex	Cl+Ex			Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0		0.0			0.0	0.0	0.0			0.0	0.0
Detector 1 Queue (s)	0.0		0.0			0.0	0.0	0.0			0.0	0.0
Detector 1 Delay (s)	0.0		0.0			0.0	0.0	0.0			0.0	0.0
Turn Type	NA		NA			pm+pt	pm+pt	NA			Perm	Perm
Protected Phases	10		9			3	3	8				
Permitted Phases						8	8				4	4
Detector Phase	10		9			3	3	8			4	4
Switch Phase												
Minimum Initial (s)	3.0		3.0			3.0	3.0	3.0			3.0	3.0

Lane Group	SWT	SWR
Lane Configurations		
Volume (vph)	135	157
Ideal Flow (vphpl)	1800	1800
Lane Width (ft)	10	10
Grade (%)	-7%	
Storage Length (ft)		0
Storage Lanes		0
Taper Length (ft)		
Lane Util. Factor	1.00	1.00
Frt	0.919	
Flt Protected		
Satd. Flow (prot)	1522	0
Flt Permitted		
Satd. Flow (perm)	1522	0
Right Turn on Red		
Satd. Flow (RTOR)		
Link Speed (mph)	25	
Link Distance (ft)	3168	
Travel Time (s)	86.4	
Peak Hour Factor	0.96	0.96
Heavy Vehicles (%)	5%	5%
Adj. Flow (vph)	141	164
Shared Lane Traffic (%)		
Lane Group Flow (vph)	305	0
Enter Blocked Intersection	No	No
Lane Alignment	Left	Right
Median Width(ft)	12	
Link Offset(ft)	0	
Crosswalk Width(ft)	10	
Two way Left Turn Lane		
Headway Factor	1.12	1.12
Turning Speed (mph)		9
Number of Detectors	1	
Detector Template	Thru	
Leading Detector (ft)	37	
Trailing Detector (ft)	-3	
Detector 1 Position(ft)	-3	
Detector 1 Size(ft)	40	
Detector 1 Type	Cl+Ex	
Detector 1 Channel		
Detector 1 Extend (s)	0.0	
Detector 1 Queue (s)	0.0	
Detector 1 Delay (s)	0.0	
Turn Type	NA	
Protected Phases	4	
Permitted Phases		
Detector Phase	4	
Switch Phase		
Minimum Initial (s)	3.0	

Lane Group	EBL2	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR	WBR2	NBL2	NBL
Minimum Split (s)	13.0	13.0	21.0		21.0	21.0	21.0	21.0			13.0	13.0
Total Split (s)	25.0	25.0	78.0		78.0	53.0	53.0	53.0			15.0	15.0
Total Split (%)	15.6%	15.6%	48.8%		48.8%	33.1%	33.1%	33.1%			9.4%	9.4%
Maximum Green (s)	19.0	19.0	72.0		72.0	47.0	47.0	47.0			9.0	9.0
Yellow Time (s)	3.0	3.0	3.0		3.0	3.0	3.0	3.0			3.0	3.0
All-Red Time (s)	3.0	3.0	3.0		3.0	3.0	3.0	3.0			3.0	3.0
Lost Time Adjust (s)		0.5	0.5		0.5		0.5	0.5				
Total Lost Time (s)		6.5	6.5		6.5		6.5	6.5				
Lead/Lag	Lead	Lead				Lag	Lag	Lag			Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0	3.0	3.0			3.0	3.0
Recall Mode	None	None	Max		Max	None	None	None			None	None
Walk Time (s)			7.0		7.0	7.0	7.0	7.0				
Flash Dont Walk (s)			20.0		20.0	20.0	20.0	20.0				
Pedestrian Calls (#/hr)			0		0	0	0	0				
Act Effct Green (s)		71.6	71.6		71.6		46.6	46.6				
Actuated g/C Ratio		0.47	0.47		0.47		0.31	0.31				
v/c Ratio		1.07	0.68		0.28		0.10	1.04				
Control Delay		121.8	35.3		5.8		42.8	88.9				
Queue Delay		0.0	0.0		0.0		0.0	0.0				
Total Delay		121.8	35.3		5.8		42.8	88.9				
LOS		F	D		A		D	F				
Approach Delay			44.7					88.3				
Approach LOS			D					F				

Intersection Summary			
Area Type:	Other		
Cycle Length: 160			
Actuated Cycle Length: 152.2			
Natural Cycle: 150			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 1.07			
Intersection Signal Delay: 71.7		Intersection LOS: E	
Intersection Capacity Utilization 108.4%		ICU Level of Service G	
Analysis Period (min) 15			

Splits and Phases: 7: Sproul Rd/Spring Mill Rd & Aldwyn Ln/Kenilworth Rd & Lancaster Ave



Lane Group	NBT	NBR	SBT	SBR	SBR2	NEL2	NEL	NET	NER	NER2	SWL2	SWL
Minimum Split (s)	13.0		13.0			13.0	13.0	13.0			13.0	13.0
Total Split (s)	15.0		13.0			17.0	17.0	54.0			37.0	37.0
Total Split (%)	9.4%		8.1%			10.6%	10.6%	33.8%			23.1%	23.1%
Maximum Green (s)	9.0		7.0			11.0	11.0	48.0			31.0	31.0
Yellow Time (s)	3.0		3.0			4.0	4.0	4.0			4.0	4.0
All-Red Time (s)	3.0		3.0			2.0	2.0	2.0			2.0	2.0
Lost Time Adjust (s)	0.5		0.5				0.5	0.5				0.5
Total Lost Time (s)	6.5		6.5				6.5	6.5				6.5
Lead/Lag	Lag		Lead			Lead	Lead				Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0		3.0			3.0	3.0	3.0			3.0	3.0
Recall Mode	None		None			None	None	None			None	None
Walk Time (s)								7.0				
Flash Dont Walk (s)								25.0				
Pedestrian Calls (#/hr)								0				
Act Effct Green (s)	8.5		6.1				47.6	47.6				30.6
Actuated g/C Ratio	0.06		0.04				0.31	0.31				0.20
v/c Ratio	0.97		0.29				1.04	0.54				0.15
Control Delay	174.4		86.1				121.5	49.2				54.6
Queue Delay	0.0		0.0				0.0	0.0				0.0
Total Delay	174.4		86.1				121.5	49.2				54.6
LOS	F		F				F	D				D
Approach Delay	174.4		86.1					79.5				
Approach LOS	F		F					E				

Intersection Summary

Lane Group	SWT	SWR
Minimum Split (s)	13.0	
Total Split (s)	37.0	
Total Split (%)	23.1%	
Maximum Green (s)	31.0	
Yellow Time (s)	4.0	
All-Red Time (s)	2.0	
Lost Time Adjust (s)	0.5	
Total Lost Time (s)	6.5	
Lead/Lag	Lag	
Lead-Lag Optimize?		
Vehicle Extension (s)	3.0	
Recall Mode	None	
Walk Time (s)		
Flash Dont Walk (s)		
Pedestrian Calls (#/hr)		
Act Effct Green (s)	30.6	
Actuated g/C Ratio	0.20	
v/c Ratio	1.00	
Control Delay	111.2	
Queue Delay	0.0	
Total Delay	111.2	
LOS	F	
Approach Delay	106.3	
Approach LOS	F	

Intersection Summary

Queues
7: Sproul Rd/Spring Mill Rd & Aldwyn Ln/Kenilworth Rd & Lancaster Ave

3/9/2015

Lane Group	EBL	EBT	EBR2	WBL	WBT	NBT	SBT	NEL	NET	SWL	SWT
Lane Group Flow (vph)	238	985	231	15	1042	63	16	192	266	29	305
v/c Ratio	1.07	0.68	0.28	0.10	1.04	0.97	0.29	1.04	0.54	0.15	1.00
Control Delay	121.8	35.3	5.8	42.8	88.9	174.4	86.1	121.5	49.2	54.6	111.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	121.8	35.3	5.8	42.8	88.9	174.4	86.1	121.5	49.2	54.6	111.2
Queue Length 50th (ft)	~200	369	15	10	~528	61	15	~143	208	23	293
Queue Length 95th (ft)	#428	523	73	34	#786	#178	44	#317	338	59	#546
Internal Link Dist (ft)		497			823	412	517		1256		3088
Turn Bay Length (ft)	300			75				200		150	
Base Capacity (vph)	223	1439	826	145	1005	65	60	184	492	197	305
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.07	0.68	0.28	0.10	1.04	0.97	0.27	1.04	0.54	0.15	1.00

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Lanes, Volumes, Timings
11: Chapel Dr & Lancaster Ave

3/10/2015

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	947	28	44	999	17	2
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width (ft)	11	11	11	11	12	12
Storage Length (ft)		125	125		0	0
Storage Lanes		1	1		2	0
Taper Length (ft)			25		25	
Lane Util. Factor	0.95	1.00	1.00	0.95	0.97	0.95
Frt		0.850			0.985	
Flt Protected			0.950		0.957	
Satd. Flow (prot)	3241	1450	1621	3241	3227	0
Flt Permitted			0.278		0.957	
Satd. Flow (perm)	3241	1450	474	3241	3227	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		30			2	
Link Speed (mph)	35			35	25	
Link Distance (ft)	706			1285	319	
Travel Time (s)	13.8			25.0	8.7	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1029	30	48	1086	18	2
Shared Lane Traffic (%)						
Lane Group Flow (vph)	1029	30	48	1086	20	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	11			11	24	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	10			10	10	
Two way Left Turn Lane						
Headway Factor	1.12	1.12	1.12	1.12	1.07	1.07
Turning Speed (mph)		9	15		15	9
Number of Detectors	1	1	1	1	1	
Detector Template	Thru	Right	Left	Thru	Left	
Leading Detector (ft)	37	20	20	37	37	
Trailing Detector (ft)	-3	0	0	-3	-3	
Detector 1 Position(ft)	-3	0	0	-3	-3	
Detector 1 Size(ft)	40	20	20	40	40	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	
Turn Type	NA	Perm	Perm	NA	Prot	
Protected Phases	2			6	8	
Permitted Phases		2	6			
Detector Phase	2	2	6	6	8	
Switch Phase						
Minimum Initial (s)	10.0	10.0	10.0	10.0	4.0	
Minimum Split (s)	21.0	21.0	21.0	21.0	28.0	
Total Split (s)	32.0	32.0	32.0	32.0	28.0	

Lanes, Volumes, Timings
11: Chapel Dr & Lancaster Ave

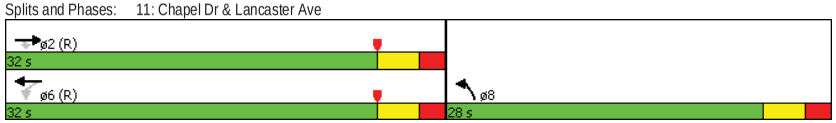
3/10/2015

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Total Split (%)	53.3%	53.3%	53.3%	53.3%	46.7%	
Maximum Green (s)	27.0	27.0	27.0	27.0	23.0	
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	0.5	0.5	0.5	0.5	0.5	
Total Lost Time (s)	5.5	5.5	5.5	5.5	5.5	
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Recall Mode	C-Max	C-Max	C-Max	C-Max	None	
Walk Time (s)	10.0	10.0	10.0	10.0	7.0	
Flash Dont Walk (s)	0.0	0.0	0.0	0.0	16.0	
Pedestrian Calls (#/hr)	0	0	0	0	0	
Act Effct Green (s)	56.6	56.6	56.6	56.6	5.5	
Actuated g/C Ratio	0.94	0.94	0.94	0.94	0.09	
v/c Ratio	0.34	0.02	0.11	0.36	0.07	
Control Delay	1.4	0.8	2.8	2.7	23.6	
Queue Delay	0.0	0.0	0.0	0.0	0.0	
Total Delay	1.4	0.8	2.8	2.7	23.6	
LOS	A	A	A	A	C	
Approach Delay	1.4			2.7	23.6	
Approach LOS	A			A	C	

Intersection Summary

Area Type: Other
Cycle Length: 60
Actuated Cycle Length: 60
Offset: 55 (92%), Referenced to phase 2:EBT and 6:WBTL, Start of Yellow
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.36
Intersection Signal Delay: 2.3 Intersection LOS: A
Intersection Capacity Utilization 51.1% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 11: Chapel Dr & Lancaster Ave



Queues
11: Chapel Dr & Lancaster Ave

3/10/2015

Lane Group	EBT	EBR	WBL	WBT	NBL
Lane Group Flow (vph)	1029	30	48	1086	20
v/c Ratio	0.34	0.02	0.11	0.36	0.07
Control Delay	1.4	0.8	2.8	2.7	23.6
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	1.4	0.8	2.8	2.7	23.6
Queue Length 50th (ft)	0	0	0	0	3
Queue Length 95th (ft)	88	5	m17	317	11
Internal Link Dist (ft)	626			1205	239
Turn Bay Length (ft)		125	125		
Base Capacity (vph)	3055	1368	447	3055	1211
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.34	0.02	0.11	0.36	0.02

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

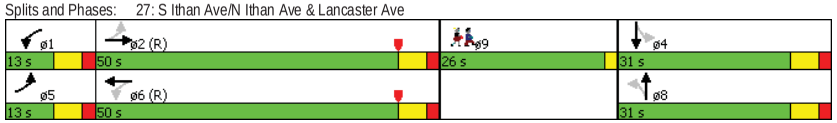
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	107	819	23	56	874	57	94	190	76	78	144	77
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width (ft)	10	10	10	10	10	10	10	10	10	10	10	10
Grade (%)		0%			3%			1%			0%	
Storage Length (ft)	200		0	250		0	190		0	65		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.996			0.991			0.957			0.948	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1520	3028	0	1497	2967	0	1512	1524	0	1520	1517	0
Flt Permitted	0.152			0.209			0.408			0.304		
Satd. Flow (perm)	243	3028	0	329	2967	0	650	1524	0	486	1517	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		35			35			25			25	
Link Distance (ft)		1285			311			344			973	
Travel Time (s)		25.0			6.1			9.4			26.5	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Adj. Flow (vph)	114	871	24	60	930	61	100	202	81	83	153	82
Shared Lane Traffic (%)												
Lane Group Flow (vph)	114	895	0	60	991	0	100	283	0	83	235	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		11			11			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		10			10			10			10	
Two way Left Turn Lane												
Headway Factor	1.17	1.17	1.17	1.19	1.19	1.19	1.18	1.18	1.18	1.17	1.17	1.17
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	0		1	0		1	1		1	1	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (ft)	37	0		37	0		37	37		37	37	
Trailing Detector (ft)	-3	0		-3	0		-3	-3		-3	-3	
Detector 1 Position(ft)	-3	0		-3	0		-3	-3		-3	-3	
Detector 1 Size(ft)	40	6		40	6		40	40		40	40	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2			6			8			4		
Detector Phase	5	2		1	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	3.0	34.0		3.0	34.0		3.0	3.0		3.0	3.0	

Lane Group	ø9
Lane Configurations	
Volume (vph)	
Ideal Flow (vphpl)	
Lane Width (ft)	
Grade (%)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Lane Util. Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	
Heavy Vehicles (%)	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Enter Blocked Intersection	
Lane Alignment	
Median Width(ft)	
Link Offset(ft)	
Crosswalk Width(ft)	
Two way Left Turn Lane	
Headway Factor	
Turning Speed (mph)	
Number of Detectors	
Detector Template	
Leading Detector (ft)	
Trailing Detector (ft)	
Detector 1 Position(ft)	
Detector 1 Size(ft)	
Detector 1 Type	
Detector 1 Channel	
Detector 1 Extend (s)	
Detector 1 Queue (s)	
Detector 1 Delay (s)	
Turn Type	
Protected Phases	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	24.0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Split (s)	13.0	40.0		13.0	40.0		13.0	13.0		13.0	13.0	
Total Split (s)	13.0	50.0		13.0	50.0		31.0	31.0		31.0	31.0	
Total Split (%)	10.8%	41.7%		10.8%	41.7%		25.8%	25.8%		25.8%	25.8%	
Maximum Green (s)	7.0	44.0		7.0	44.0		25.0	25.0		25.0	25.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.5	0.5		0.5	0.5		0.5	0.5		0.5	0.5	
Total Lost Time (s)	6.5	6.5		6.5	6.5		6.5	6.5		6.5	6.5	
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)	57.2	52.0		55.6	49.4		23.8	23.8		23.8	23.8	
Actuated g/C Ratio	0.48	0.43		0.46	0.41		0.20	0.20		0.20	0.20	
v/c Ratio	0.62	0.68		0.28	0.81		0.78	0.94		0.86	0.78	
Control Delay	35.4	33.0		15.9	31.5		83.4	85.7		107.9	64.4	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	35.4	33.0		15.9	31.5		83.4	85.7		107.9	64.4	
LOS	D	C		B	C		F	F		F	E	
Approach Delay		33.3			30.6			85.1			75.8	
Approach LOS		C			C			F			E	

Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 120			
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow, Master Intersection			
Natural Cycle: 105			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.94			
Intersection Signal Delay: 44.3		Intersection LOS: D	
Intersection Capacity Utilization 76.3%		ICU Level of Service D	
Analysis Period (min) 15			

Splits and Phases: 27: S Ithan Ave/N Ithan Ave & Lancaster Ave



Lane Group	ø9
Minimum Split (s)	26.0
Total Split (s)	26.0
Total Split (%)	22%
Maximum Green (s)	24.0
Yellow Time (s)	2.0
All-Red Time (s)	0.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0
Recall Mode	None
Walk Time (s)	9.0
Flash Dont Walk (s)	15.0
Pedestrian Calls (#/hr)	45
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	

Intersection Summary

Queues
27: S Ithan Ave/N Ithan Ave & Lancaster Ave

3/10/2015

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	114	895	60	991	100	283	83	235
v/c Ratio	0.62	0.68	0.28	0.81	0.78	0.94	0.86	0.78
Control Delay	35.4	33.0	15.9	31.5	83.4	85.7	107.9	64.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	35.4	33.0	15.9	31.5	83.4	85.7	107.9	64.4
Queue Length 50th (ft)	49	327	25	345	73	216	62	173
Queue Length 95th (ft)	#104	365	m35	#508	#169	#381	#160	#292
Internal Link Dist (ft)		1205		231		264		893
Turn Bay Length (ft)	200		250		190		65	
Base Capacity (vph)	185	1312	216	1221	132	311	99	309
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.62	0.68	0.28	0.81	0.76	0.91	0.84	0.76

Intersection Summary

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Lanes, Volumes, Timings
27: S Ithan Ave/N Ithan Ave & Lancaster Ave

3/10/2015

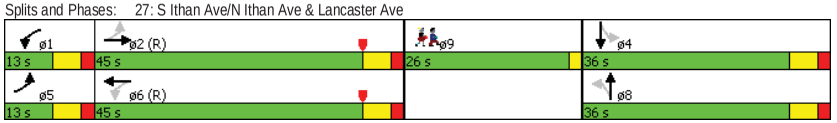
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	107	819	23	56	874	57	94	190	76	78	144	77
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width (ft)	10	10	10	10	10	10	10	10	10	10	10	10
Grade (%)		0%			3%			1%			0%	
Storage Length (ft)	200		0	250		0	190		0	65		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.996			0.991			0.957			0.948	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1520	3028	0	1497	2967	0	1512	1524	0	1520	1517	0
Flt Permitted	0.142			0.200			0.430			0.333		
Satd. Flow (perm)	227	3028	0	315	2967	0	685	1524	0	533	1517	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		35			35			25			25	
Link Distance (ft)		1285			311			344			973	
Travel Time (s)		25.0			6.1			9.4			26.5	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Adj. Flow (vph)	114	871	24	60	930	61	100	202	81	83	153	82
Shared Lane Traffic (%)												
Lane Group Flow (vph)	114	895	0	60	991	0	100	283	0	83	235	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		11			11			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		10			10			10			10	
Two way Left Turn Lane												
Headway Factor	1.17	1.17	1.17	1.19	1.19	1.19	1.18	1.18	1.18	1.17	1.17	1.17
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	0		1	0		1	1		1	1	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (ft)	37	0		37	0		37	37		37	37	
Trailing Detector (ft)	-3	0		-3	0		-3	-3		-3	-3	
Detector 1 Position(ft)	-3	0		-3	0		-3	-3		-3	-3	
Detector 1 Size(ft)	40	6		40	6		40	40		40	40	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2			6			8			4		
Detector Phase	5	2		1	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	3.0	34.0		3.0	34.0		3.0	3.0		3.0	3.0	

Lane Group	ø9
Lane Configurations	
Volume (vph)	
Ideal Flow (vphpl)	
Lane Width (ft)	
Grade (%)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Lane Util. Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	
Heavy Vehicles (%)	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Enter Blocked Intersection	
Lane Alignment	
Median Width(ft)	
Link Offset(ft)	
Crosswalk Width(ft)	
Two way Left Turn Lane	
Headway Factor	
Turning Speed (mph)	
Number of Detectors	
Detector Template	
Leading Detector (ft)	
Trailing Detector (ft)	
Detector 1 Position(ft)	
Detector 1 Size(ft)	
Detector 1 Type	
Detector 1 Channel	
Detector 1 Extend (s)	
Detector 1 Queue (s)	
Detector 1 Delay (s)	
Turn Type	
Protected Phases	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	24.0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Split (s)	13.0	40.0		13.0	40.0		13.0	13.0		13.0	13.0	
Total Split (s)	13.0	45.0		13.0	45.0		36.0	36.0		36.0	36.0	
Total Split (%)	10.8%	37.5%		10.8%	37.5%		30.0%	30.0%		30.0%	30.0%	
Maximum Green (s)	7.0	39.0		7.0	39.0		30.0	30.0		30.0	30.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.5	0.5		0.5	0.5		0.5	0.5		0.5	0.5	
Total Lost Time (s)	6.5	6.5		6.5	6.5		6.5	6.5		6.5	6.5	
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)	55.3	50.1		53.7	47.5		25.7	25.7		25.7	25.7	
Actuated g/C Ratio	0.46	0.42		0.45	0.40		0.21	0.21		0.21	0.21	
v/c Ratio	0.66	0.71		0.30	0.84		0.68	0.87		0.73	0.73	
Control Delay	40.9	36.1		18.3	35.3		66.3	70.7		77.7	56.7	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	40.9	36.1		18.3	35.3		66.3	70.7		77.7	56.7	
LOS	D	D		B	D		E	E		E	E	
Approach Delay		36.7			34.3			69.5			62.2	
Approach LOS		D			C			E			E	

Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 120			
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow, Master Intersection			
Natural Cycle: 105			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.87			
Intersection Signal Delay: 43.3		Intersection LOS: D	
Intersection Capacity Utilization 76.3%		ICU Level of Service D	
Analysis Period (min) 15			

Splits and Phases: 27: S Ithan Ave/N Ithan Ave & Lancaster Ave

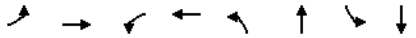


Lanes, Volumes, Timings
27: S Ithan Ave/N Ithan Ave & Lancaster Ave 3/10/2015

Lane Group	ø9
Minimum Split (s)	26.0
Total Split (s)	26.0
Total Split (%)	22%
Maximum Green (s)	24.0
Yellow Time (s)	2.0
All-Red Time (s)	0.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0
Recall Mode	None
Walk Time (s)	9.0
Flash Dont Walk (s)	15.0
Pedestrian Calls (#/hr)	45
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	

Intersection Summary

Queues
27: S Ithan Ave/N Ithan Ave & Lancaster Ave 3/10/2015



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	114	895	60	991	100	283	83	235
v/c Ratio	0.66	0.71	0.30	0.84	0.68	0.87	0.73	0.73
Control Delay	40.9	36.1	18.3	35.3	66.3	70.7	77.7	56.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	40.9	36.1	18.3	35.3	66.3	70.7	77.7	56.7
Queue Length 50th (ft)	52	341	26	402	70	209	59	167
Queue Length 95th (ft)	#119	#479	m38	#563	#137	#330	#135	253
Internal Link Dist (ft)		1205		231		264		893
Turn Bay Length (ft)	200		250		190		65	
Base Capacity (vph)	174	1263	205	1173	168	374	131	372
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.66	0.71	0.29	0.84	0.60	0.76	0.63	0.63

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Queues
51: Lowrys Ln & Lancaster Ave

3/10/2015

Lane Group	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	1203	1249	207	123
v/c Ratio	0.69	0.72	0.70	0.41
Control Delay	9.0	11.4	36.2	25.5
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	9.0	11.4	36.2	25.5
Queue Length 50th (ft)	109	150	69	38
Queue Length 95th (ft)	m170	224	#143	81
Internal Link Dist (ft)	1645	302	2747	520
Turn Bay Length (ft)				
Base Capacity (vph)	1751	1738	334	335
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.69	0.72	0.62	0.37

Intersection Summary

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

HCM 2010 Signalized Intersection Summary
51: Lowrys Ln & Lancaster Ave

3/10/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	19	1080	20	17	1112	33	48	105	39	22	72	20
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	1748	1800	1773	1721	1773	1900	1845	1900	1881	1827	1881
Adj Flow Rate, veh/h	20	1161	22	18	1196	35	52	113	42	24	77	22
Adj No. of Lanes	0	2	0	0	2	0	0	1	0	0	1	0
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	74	2080	39	72	2035	59	122	155	51	101	185	47
Arrive On Green	0.65	0.65	0.65	0.65	0.65	0.65	0.15	0.15	0.15	0.15	0.15	0.15
Sat Flow, veh/h	19	3192	60	16	3123	91	313	1045	346	195	1246	314
Grp Volume(v), veh/h	623	0	580	650	0	599	207	0	0	123	0	0
Grp Sat Flow(s),veh/h/ln	1692	0	1580	1679	0	1550	1705	0	0	1755	0	0
Q Serve(g_s), s	0.0	0.0	12.1	0.0	0.0	13.2	3.2	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	11.6	0.0	12.1	12.7	0.0	13.2	7.0	0.0	0.0	3.8	0.0	0.0
Prop In Lane	0.03		0.04	0.03		0.06	0.25		0.20	0.20		0.18
Lane Grp Cap(c), veh/h	1164	0	1029	1155	0	1010	328	0	0	332	0	0
V/C Ratio(X)	0.54	0.00	0.56	0.56	0.00	0.59	0.63	0.00	0.00	0.37	0.00	0.00
Avail Cap(c_a), veh/h	1164	0	1029	1155	0	1010	426	0	0	430	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	1.00	1.00	0.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	5.7	0.0	5.8	5.9	0.0	5.9	24.7	0.0	0.0	23.4	0.0	0.0
Incr Delay (d2), s/veh	1.8	0.0	2.2	2.0	0.0	2.6	2.0	0.0	0.0	0.7	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(-26165%),veh/ln	6.1	0.0	5.8	6.6	0.0	6.2	3.5	0.0	0.0	1.9	0.0	0.0
LnGrp Delay(d),s/veh	7.4	0.0	8.0	7.8	0.0	8.5	26.7	0.0	0.0	24.1	0.0	0.0
LnGrp LOS	A		A	A		A	C			C		
Approach Vol, veh/h		1203			1249			207			123	
Approach Delay, s/veh		7.7			8.2			26.7			24.1	
Approach LOS		A			A			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		45.6		14.4		45.6		14.4
Change Period (Y+Rc), s		6.0		5.0		6.0		5.0
Max Green Setting (Gmax), s		36.0		13.0		36.0		13.0
Max Q Clear Time (g_c+I1), s		14.1		5.8		15.2		9.0
Green Ext Time (p_c), s		11.8		0.7		11.5		0.5

Intersection Summary

HCM 2010 Ctrl Delay	10.0
HCM 2010 LOS	B

Notes

User approved pedestrian interval to be less than phase max green.

Queues
16: Sproul Rd & Conestoga Rd

3/10/2015

Lane Group	EBL	EBT	WBL	WBT	NEL	NET	SWT
Lane Group Flow (vph)	166	771	40	731	237	329	367
v/c Ratio	0.99	0.96	0.34	1.09	0.91	0.53	1.14
Control Delay	89.0	46.9	30.3	90.4	63.6	25.4	129.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	89.0	46.9	30.3	90.4	63.6	25.4	129.0
Queue Length 50th (ft)	51	395	16	~472	98	140	~246
Queue Length 95th (ft)	#180	#660	48	#692	#231	224	#416
Internal Link Dist (ft)		601		178		715	1701
Turn Bay Length (ft)	50		65		90		
Base Capacity (vph)	167	801	116	671	260	621	321
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.99	0.96	0.34	1.09	0.91	0.53	1.14

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM 2010 Signalized Intersection Summary
16: Sproul Rd & Conestoga Rd

3/10/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (veh/h)	151	562	139	36	607	58	216	271	28	57	202	75
Number	7	4	14	3	8	18	1	6	16	5	2	12
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	1748	1748	1800	1791	1791	1845	1739	1739	1791	1809	1756	1809
Adj Flow Rate, veh/h	166	618	0	40	667	0	237	298	31	63	222	82
Adj No. of Lanes	1	1	0	1	1	0	1	1	0	0	1	0
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	188	874	0	264	677	0	309	577	60	94	235	81
Arrive On Green	0.06	0.50	0.00	0.38	0.38	0.00	0.07	0.37	0.37	0.23	0.23	0.23
Sat Flow, veh/h	1664	1748	0	814	1791	0	1656	1549	161	200	1009	348
Grp Volume(v), veh/h	166	618	0	40	667	0	237	0	329	367	0	0
Grp Sat Flow(s),veh/h/ln	1664	1748	0	814	1791	0	1656	0	1710	1557	0	0
Q Serve(g_s), s	5.4	24.6	0.0	3.6	33.2	0.0	6.5	0.0	13.5	16.2	0.0	0.0
Cycle Q Clear(g_c), s	5.4	24.6	0.0	17.2	33.2	0.0	6.5	0.0	13.5	21.0	0.0	0.0
Prop In Lane	1.00		0.00	1.00		0.00	1.00		0.09	0.17		0.22
Lane Grp Cap(c), veh/h	188	874	0	264	677	0	309	0	637	410	0	0
V/C Ratio(X)	0.88	0.71	0.00	0.15	0.99	0.00	0.77	0.00	0.52	0.89	0.00	0.00
Avail Cap(c_a), veh/h	188	874	0	264	677	0	309	0	637	410	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	21.7	17.4	0.0	28.3	27.8	0.0	26.5	0.0	22.0	34.4	0.0	0.0
Incr Delay (d2), s/veh	35.0	4.8	0.0	1.2	31.3	0.0	11.1	0.0	0.7	21.4	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(-26165%),veh/ln	4.2	13.0	0.0	0.9	22.2	0.0	3.9	0.0	6.4	11.5	0.0	0.0
LnGrp Delay(d),s/veh	56.7	22.2	0.0	29.5	59.0	0.0	37.6	0.0	22.7	55.8	0.0	0.0
LnGrp LOS	E	C		C	E		D		C	E		
Approach Vol, veh/h		784			707			566			367	
Approach Delay, s/veh		29.5			57.4			28.9			55.8	
Approach LOS		C			E			C			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4		6	7	8
Phs Duration (G+Y+Rc), s	12.5	27.0		50.5		39.5	11.0	39.5
Change Period (Y+Rc), s	5.5	5.5		5.0		5.5	5.0	5.0
Max Green Setting (Gmax), s	7.0	21.5		45.5		34.0	6.0	34.5
Max Q Clear Time (g_c+I1), s	8.5	23.0		26.6		15.5	7.4	35.2
Green Ext Time (p_c), s	0.0	0.0		8.5		2.4	0.0	0.0

Intersection Summary

HCM 2010 Ctrl Delay		41.5	
HCM 2010 LOS		D	

Queues
25: S Ithan Ave & Conestoga Rd

3/10/2015

Lane Group	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	699	732	231	323
v/c Ratio	1.12	0.77	0.69	0.88
Control Delay	91.6	17.5	33.8	44.5
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	91.6	17.5	33.8	44.5
Queue Length 50th (ft)	~315	185	77	85
Queue Length 95th (ft)	#424	260	126	#177
Internal Link Dist (ft)	1194	2907	717	3163
Turn Bay Length (ft)				
Base Capacity (vph)	625	946	359	388
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	1.12	0.77	0.64	0.83

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM 2010 Signalized Intersection Summary
25: S Ithan Ave & Conestoga Rd

3/10/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	169	395	2	2	458	134	14	161	12	64	58	139
Number	1	6	16	5	2	12	7	4	14	3	8	18
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	1854	1783	1854	1764	1696	1764	1763	1695	1763	1844	1773	1844
Adj Flow Rate, veh/h	209	488	2	2	565	165	17	199	15	79	72	172
Adj No. of Lanes	0	1	0	0	1	0	0	1	0	0	1	0
Peak Hour Factor	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81
Percent Heavy Veh, %	4	4	4	4	4	4	4	4	4	4	4	4
Cap, veh/h	225	438	2	59	713	208	75	341	25	140	99	189
Arrive On Green	0.56	0.56	0.56	0.56	0.56	0.56	0.23	0.23	0.23	0.23	0.23	0.23
Sat Flow, veh/h	264	780	3	1	1270	370	54	1503	108	294	437	832
Grp Volume(v), veh/h	699	0	0	732	0	0	231	0	0	323	0	0
Grp Sat Flow(s),veh/h/ln	1048	0	0	1640	0	0	1665	0	0	1562	0	0
Q Serve(g_s), s	12.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.6	0.0	0.0
Cycle Q Clear(g_c), s	34.5	0.0	0.0	21.9	0.0	0.0	7.6	0.0	0.0	12.2	0.0	0.0
Prop In Lane	0.30		0.00	0.00		0.23	0.07		0.06	0.24		0.53
Lane Grp Cap(c), veh/h	664	0	0	980	0	0	441	0	0	427	0	0
V/C Ratio(X)	1.05	0.00	0.00	0.75	0.00	0.00	0.52	0.00	0.00	0.76	0.00	0.00
Avail Cap(c_a), veh/h	664	0	0	980	0	0	455	0	0	441	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	15.8	0.0	0.0	10.7	0.0	0.0	21.3	0.0	0.0	22.9	0.0	0.0
Incr Delay (d2), s/veh	49.4	0.0	0.0	3.2	0.0	0.0	1.0	0.0	0.0	7.1	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(-26165%),veh/ln	20.2	0.0	0.0	10.6	0.0	0.0	3.6	0.0	0.0	6.1	0.0	0.0
LnGrp Delay(d),s/veh	65.1	0.0	0.0	13.9	0.0	0.0	22.3	0.0	0.0	30.0	0.0	0.0
LnGrp LOS	F			B			C			C		
Approach Vol, veh/h		699			732			231			323	
Approach Delay, s/veh		65.1			13.9			22.3			30.0	
Approach LOS		E			B			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		41.0		20.4		41.0		20.4
Change Period (Y+Rc), s		6.0		6.0		6.0		6.0
Max Green Setting (Gmax), s		35.0		15.0		35.0		15.0
Max Q Clear Time (g_c+I1), s		23.9		9.6		36.5		14.2
Green Ext Time (p_c), s		5.5		1.2		0.0		0.2

Intersection Summary

HCM 2010 Ctrl Delay		35.6
HCM 2010 LOS		D

Queues
33: Williams Rd/Garrett Ave & Conestoga Rd 3/10/2015

Lane Group	EBT	WBT	NET	SWT
Lane Group Flow (vph)	538	498	24	63
v/c Ratio	0.35	0.31	0.14	0.41
Control Delay	4.4	4.1	29.9	37.1
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	4.4	4.1	29.9	37.1
Queue Length 50th (ft)	85	76	10	26
Queue Length 95th (ft)	131	116	29	59
Internal Link Dist (ft)	1396	1273	368	1816
Turn Bay Length (ft)				
Base Capacity (vph)	1547	1601	198	175
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.35	0.31	0.12	0.36
Intersection Summary				

HCM 2010 Signalized Intersection Summary
33: Williams Rd/Garrett Ave & Conestoga Rd 3/10/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (veh/h)	26	446	1	4	429	4	6	6	9	15	3	38
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	1872	1872	1872	1872	1872	1872	1800	1800	1800	1728	1728	1728
Adj Flow Rate, veh/h	30	507	1	5	488	5	7	7	10	17	3	43
Adj No. of Lanes	0	1	0	0	1	0	0	1	0	0	1	0
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Percent Heavy Veh, %	0	0	0	0	0	0	0	0	0	0	0	0
Cap, veh/h	93	1331	3	58	1382	14	88	35	37	86	8	54
Arrive On Green	0.75	0.75	0.75	0.75	0.75	0.75	0.05	0.05	0.05	0.05	0.05	0.05
Sat Flow, veh/h	48	1775	3	4	1842	19	333	655	706	325	147	1014
Grp Volume(v), veh/h	538	0	0	498	0	0	24	0	0	63	0	0
Grp Sat Flow(s),veh/h/ln	1826	0	0	1865	0	0	1695	0	0	1485	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	1.8	0.0	0.0
Cycle Q Clear(g_c), s	6.7	0.0	0.0	6.0	0.0	0.0	0.9	0.0	0.0	2.7	0.0	0.0
Prop In Lane	0.06		0.00	0.01		0.01	0.29		0.42	0.27		0.68
Lane Grp Cap(c), veh/h	1427	0	0	1454	0	0	160	0	0	148	0	0
V/C Ratio(X)	0.38	0.00	0.00	0.34	0.00	0.00	0.15	0.00	0.00	0.43	0.00	0.00
Avail Cap(c_a), veh/h	1427	0	0	1454	0	0	301	0	0	280	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	2.9	0.0	0.0	2.8	0.0	0.0	30.0	0.0	0.0	30.9	0.0	0.0
Incr Delay (d2), s/veh	0.8	0.0	0.0	0.6	0.0	0.0	0.6	0.0	0.0	2.8	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(-26165%),veh/ln	3.6	0.0	0.0	3.3	0.0	0.0	0.4	0.0	0.0	1.3	0.0	0.0
LnGrp Delay(d),s/veh	3.7	0.0	0.0	3.5	0.0	0.0	30.6	0.0	0.0	33.6	0.0	0.0
LnGrp LOS	A			A			C			C		
Approach Vol, veh/h		538			498			24			63	
Approach Delay, s/veh		3.7			3.5			30.6			33.6	
Approach LOS		A			A			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		56.0		10.0		56.0		10.0
Change Period (Y+Rc), s		6.0		6.0		6.0		6.0
Max Green Setting (Gmax), s		50.0		10.0		50.0		10.0
Max Q Clear Time (g_c+I1), s		8.7		4.7		8.0		2.9
Green Ext Time (p_c), s		4.7		0.1		4.7		0.2

Intersection Summary		
HCM 2010 Ctrl Delay		5.8
HCM 2010 LOS		A

Notes
User approved pedestrian interval to be less than phase max green.

Queues
3: County Line Rd & Spring Mill Rd

3/10/2015

Lane Group	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	410	439	358	436
v/c Ratio	0.59	0.68	0.76	0.87
Control Delay	17.2	20.9	28.6	37.5
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	17.2	20.9	28.6	37.5
Queue Length 50th (ft)	107	122	108	139
Queue Length 95th (ft)	204	#272	189	#270
Internal Link Dist (ft)	3088	1481	1821	1084
Turn Bay Length (ft)				
Base Capacity (vph)	692	648	543	579
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.59	0.68	0.66	0.75

Intersection Summary

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM 2010 Signalized Intersection Summary
3: County Line Rd & Spring Mill Rd

3/10/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	35	283	71	69	269	79	43	253	45	33	327	54
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	1617	1800	1800	1731	1800	1800	1731	1800	1800	1731	1800
Adj Flow Rate, veh/h	37	298	75	73	283	83	45	266	47	35	344	57
Adj No. of Lanes	0	1	0	0	1	0	0	1	0	0	1	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	4	4	4	4	4	4	4	4	4	4	4	4
Cap, veh/h	99	582	138	155	544	147	99	366	60	84	401	64
Arrive On Green	0.50	0.50	0.50	0.50	0.50	0.50	0.29	0.29	0.29	0.29	0.29	0.29
Sat Flow, veh/h	71	1167	277	175	1091	295	117	1255	207	74	1375	218
Grp Volume(v), veh/h	410	0	0	439	0	0	358	0	0	436	0	0
Grp Sat Flow(s),veh/h/ln	1515	0	0	1560	0	0	1579	0	0	1667	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	2.8	0.0	0.0
Cycle Q Clear(g_c), s	11.0	0.0	0.0	11.0	0.0	0.0	12.6	0.0	0.0	15.4	0.0	0.0
Prop In Lane	0.09		0.18	0.17		0.19	0.13		0.13	0.08		0.13
Lane Grp Cap(c), veh/h	819	0	0	846	0	0	526	0	0	549	0	0
V/C Ratio(X)	0.50	0.00	0.00	0.52	0.00	0.00	0.68	0.00	0.00	0.79	0.00	0.00
Avail Cap(c_a), veh/h	819	0	0	846	0	0	660	0	0	689	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)	0.52	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	10.6	0.0	0.0	10.6	0.0	0.0	19.8	0.0	0.0	21.0	0.0	0.0
Incr Delay (d2), s/veh	1.1	0.0	0.0	2.3	0.0	0.0	1.1	0.0	0.0	3.9	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(-26165%),veh/ln	4.9	0.0	0.0	5.5	0.0	0.0	5.7	0.0	0.0	7.7	0.0	0.0
LnGrp Delay(d),s/veh	11.7	0.0	0.0	12.8	0.0	0.0	21.0	0.0	0.0	24.9	0.0	0.0
LnGrp LOS	B			B			C			C		
Approach Vol, veh/h		410			439			358			436	
Approach Delay, s/veh		11.7			12.8			21.0			24.9	
Approach LOS		B			B			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		37.4		24.6		37.4		24.6
Change Period (Y+Rc), s		6.0		6.0		6.0		6.0
Max Green Setting (Gmax), s		26.0		24.0		26.0		24.0
Max Q Clear Time (g_c+I1), s		13.0		17.4		13.0		14.6
Green Ext Time (p_c), s		3.1		1.2		3.1		1.4

Intersection Summary

HCM 2010 Ctrl Delay	17.5	
HCM 2010 LOS	B	

Intersection	
Int Delay, s/veh	4

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	1116	25	20	1150	0	26
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, %	-3	-	-	3	0	-
Peak Hour Factor	67	67	67	67	67	67
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	1666	37	30	1716	0	39

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	1703	0	2602	851
Stage 1	-	-	-	-	1684	-
Stage 2	-	-	-	-	918	-
Critical Hdwy	-	-	4.1	-	6.8	6.9
Critical Hdwy Stg 1	-	-	-	-	5.8	-
Critical Hdwy Stg 2	-	-	-	-	5.8	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	379	-	21	308
Stage 1	-	-	-	-	139	-
Stage 2	-	-	-	-	354	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	379	-	21	308
Mov Cap-2 Maneuver	-	-	-	-	21	-
Stage 1	-	-	-	-	139	-
Stage 2	-	-	-	-	354	-

Approach	EB	WB	NB
HCM Control Delay, s	0	7.5	18.4
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	308	-	-	379	-
HCM Lane V/C Ratio	0.126	-	-	0.079	-
HCM Control Delay (s)	18.4	-	-	15.3	7.4
HCM Lane LOS	C	-	-	C	A
HCM 95th %tile Q(veh)	0.4	-	-	0.3	-

Intersection	
Int Delay, s/veh	0.2

Movement	EBL	EBT	WBT	WBR	SWL	SWR
Vol, veh/h	2	648	699	3	4	8
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	86	86	86	86	86	86
Heavy Vehicles, %	4	4	4	4	4	4
Mvmt Flow	2	753	813	3	5	9

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	816	0	-	0	1573	815
Stage 1	-	-	-	-	815	-
Stage 2	-	-	-	-	758	-
Critical Hdwy	4.14	-	-	-	6.44	6.24
Critical Hdwy Stg 1	-	-	-	-	5.44	-
Critical Hdwy Stg 2	-	-	-	-	5.44	-
Follow-up Hdwy	2.236	-	-	-	3.536	3.336
Pot Cap-1 Maneuver	803	-	-	-	120	374
Stage 1	-	-	-	-	432	-
Stage 2	-	-	-	-	459	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	803	-	-	-	120	374
Mov Cap-2 Maneuver	-	-	-	-	120	-
Stage 1	-	-	-	-	432	-
Stage 2	-	-	-	-	457	-

Approach	EB	WB	SW
HCM Control Delay, s	0	0	22.6
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SWLn1
Capacity (veh/h)	803	-	-	-	219
HCM Lane V/C Ratio	0.003	-	-	-	0.064
HCM Control Delay (s)	9.5	0	-	-	22.6
HCM Lane LOS	A	A	-	-	C
HCM 95th %tile Q(veh)	0	-	-	-	0.2

HCM 2010 TWSC
29: Strathmore Dr/Lowrys Ln & Conestoga Rd 3/10/2015

Intersection	
Int Delay, s/veh	3.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	48	430	14	9	473	5	13	14	12	2	15	84
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	80	80	80	80	80	80	80	80	80	80	80	80
Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	60	538	18	11	591	6	16	18	15	2	19	105

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	598	0	0	555	0	0	1345	1286	546	1300	1292	594
Stage 1	-	-	-	-	-	-	666	666	-	617	617	-
Stage 2	-	-	-	-	-	-	679	620	-	683	675	-
Critical Hdwy	4.13	-	-	4.13	-	-	7.13	6.53	6.23	7.13	6.53	6.23
Critical Hdwy Stg 1	-	-	-	-	-	-	6.13	5.53	-	6.13	5.53	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.13	5.53	-	6.13	5.53	-
Follow-up Hdwy	2.227	-	-	2.227	-	-	3.527	4.027	3.327	3.527	4.027	3.327
Pot Cap-1 Maneuver	974	-	-	1010	-	-	128	164	536	138	162	503
Stage 1	-	-	-	-	-	-	447	456	-	476	480	-
Stage 2	-	-	-	-	-	-	440	478	-	438	452	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	974	-	-	1010	-	-	84	147	536	112	145	503
Mov Cap-2 Maneuver	-	-	-	-	-	-	84	147	-	112	145	-
Stage 1	-	-	-	-	-	-	407	415	-	434	472	-
Stage 2	-	-	-	-	-	-	329	470	-	371	412	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.9	0.2	42.7	21
HCM LOS			E	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	143	974	-	-	1010	-	-	350
HCM Lane V/C Ratio	0.341	0.062	-	-	0.011	-	-	0.361
HCM Control Delay (s)	42.7	8.9	0	-	8.6	0	-	21
HCM Lane LOS	E	A	A	-	A	A	-	C
HCM 95th %tile Q(veh)	1.4	0.2	-	-	0	-	-	1.6

Lanes, Volumes, Timings
38: County Line Rd & N Ithan Ave 3/10/2015

Lane Group	NBT	NBR	SBL	SBT	SWL	SWR
Lane Configurations						
Volume (vph)	351	115	169	313	161	102
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.967				0.948	
Flt Protected				0.983	0.970	
Satd. Flow (prot)	1801	0	0	1831	1713	0
Flt Permitted				0.983	0.970	
Satd. Flow (perm)	1801	0	0	1831	1713	0
Link Speed (mph)	30			30	30	
Link Distance (ft)	295			1901	824	
Travel Time (s)	6.7			43.2	18.7	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	386	126	186	344	177	112
Shared Lane Traffic (%)						
Lane Group Flow (vph)	512	0	0	530	289	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	0			0	12	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	10			10	10	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)		9	15		15	9
Sign Control	Free			Stop	Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	76.5%	ICU Level of Service	D
Analysis Period (min)	15		

Lanes, Volumes, Timings
2: County Line Rd & N Ithan Ave 3/10/2015

Lane Group	EBL	EBR	SBL	SBR	NWL	NWR
Lane Configurations						
Volume (vph)	211	15	143	353	38	258
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.991		0.904		0.882	
Flt Protected	0.955		0.986		0.994	
Satd. Flow (prot)	1763	0	1660	0	1633	0
Flt Permitted	0.955		0.986		0.994	
Satd. Flow (perm)	1763	0	1660	0	1633	0
Link Speed (mph)	30		30		30	
Link Distance (ft)	973		295		2020	
Travel Time (s)	22.1		6.7		45.9	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	224	16	152	376	40	274
Shared Lane Traffic (%)						
Lane Group Flow (vph)	240	0	528	0	314	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Right
Median Width(ft)	22		12		12	
Link Offset(ft)	0		0		0	
Crosswalk Width(ft)	10		10		10	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9	15	9	15	9
Sign Control	Stop		Free		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	70.3%	ICU Level of Service	C
Analysis Period (min)	15		

HCM 2010 TWSC
53: County Line Rd & Lowrys Ln 3/10/2015

Intersection	
Int Delay, s/veh	3.7

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	62	82	59	241	152	31
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	87	87	87	87	87	87
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	71	94	68	277	175	36

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	606	193	210	0	-	0
Stage 1	193	-	-	-	-	-
Stage 2	413	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	463	854	1373	-	-	-
Stage 1	845	-	-	-	-	-
Stage 2	672	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	436	854	1373	-	-	-
Mov Cap-2 Maneuver	436	-	-	-	-	-
Stage 1	845	-	-	-	-	-
Stage 2	632	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	13.2	1.5	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1373	-	604	-	-
HCM Lane V/C Ratio	0.049	-	0.274	-	-
HCM Control Delay (s)	7.8	0	13.2	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0.2	-	1.1	-	-

Intersection	
Int Delay, s/veh	4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	206	223	291	21	15	99
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	88	88	88	88	88	88
Heavy Vehicles, %	1	1	1	1	1	1
Mvmt Flow	234	253	331	24	17	112

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	355	0	-	0	1065	343
Stage 1	-	-	-	-	343	-
Stage 2	-	-	-	-	722	-
Critical Hdwy	4.11	-	-	-	6.41	6.21
Critical Hdwy Stg 1	-	-	-	-	5.41	-
Critical Hdwy Stg 2	-	-	-	-	5.41	-
Follow-up Hdwy	2.209	-	-	-	3.509	3.309
Pot Cap-1 Maneuver	1209	-	-	-	248	702
Stage 1	-	-	-	-	721	-
Stage 2	-	-	-	-	483	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1209	-	-	-	192	702
Mov Cap-2 Maneuver	-	-	-	-	192	-
Stage 1	-	-	-	-	721	-
Stage 2	-	-	-	-	374	-

Approach	EB	WB	SB
HCM Control Delay, s	4.2	0	14.2
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1209	-	-	-	520
HCM Lane V/C Ratio	0.194	-	-	-	0.249
HCM Control Delay (s)	8.7	0	-	-	14.2
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.7	-	-	-	1

Intersection	
Int Delay, s/veh	29.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	68	101	8	2	24	6	14	627	26	8	479	38
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	88	88	88	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	77	115	9	2	27	7	16	712	30	9	544	43

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	986	1358	294	1107	1365	371	588	0	0	742	0	0
Stage 1	584	584	-	759	759	-	-	-	-	-	-	-
Stage 2	402	774	-	348	606	-	-	-	-	-	-	-
Critical Hdwy	7.54	6.54	6.94	7.54	6.54	6.94	4.14	-	-	4.14	-	-
Critical Hdwy Stg 1	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Follow-up Hdwy	3.52	4.02	3.32	3.52	4.02	3.32	2.22	-	-	2.22	-	-
Pot Cap-1 Maneuver	202	148	702	165	146	626	983	-	-	861	-	-
Stage 1	465	496	-	365	413	-	-	-	-	-	-	-
Stage 2	596	406	-	641	485	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	164	142	702	52	140	626	983	-	-	861	-	-
Mov Cap-2 Maneuver	164	142	-	52	140	-	-	-	-	-	-	-
Stage 1	452	488	-	355	401	-	-	-	-	-	-	-
Stage 2	534	395	-	476	477	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	225.9	37.6	0.3	0.2
HCM LOS	F	E		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	983	-	-	156	146	861	-	-
HCM Lane V/C Ratio	0.016	-	-	1.289	0.249	0.011	-	-
HCM Control Delay (s)	8.7	0.1	-	225.9	37.6	9.2	0.1	-
HCM Lane LOS	A	A	-	F	E	A	A	-
HCM 95th %tile Q(veh)	0	-	-	12	0.9	0	-	-

Intersection	
Int Delay, s/veh	2.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	9	373	9	16	200	13	7	1	12	16	0	61
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	81	81	81	81	81	81	81	81	81	81	81	81
Heavy Vehicles, %	4	4	4	4	4	4	4	4	4	4	4	4
Mvmt Flow	11	460	11	20	247	16	9	1	15	20	0	75

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	263	0	0	472	0	0	820	790	466	790	788	255
Stage 1	-	-	-	-	-	-	488	488	-	294	294	-
Stage 2	-	-	-	-	-	-	332	302	-	496	494	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.14	6.54	6.24	7.14	6.54	6.24
Critical Hdwy Stg 1	-	-	-	-	-	-	6.14	5.54	-	6.14	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.14	5.54	-	6.14	5.54	-
Follow-up Hdwy	2.236	-	-	2.236	-	-	3.536	4.036	3.336	3.536	4.036	3.336
Pot Cap-1 Maneuver	1290	-	-	1079	-	-	292	320	592	305	321	779
Stage 1	-	-	-	-	-	-	558	547	-	710	666	-
Stage 2	-	-	-	-	-	-	677	661	-	552	543	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1290	-	-	1079	-	-	257	309	592	289	310	779
Mov Cap-2 Maneuver	-	-	-	-	-	-	257	309	-	289	310	-
Stage 1	-	-	-	-	-	-	551	540	-	701	651	-
Stage 2	-	-	-	-	-	-	598	646	-	531	536	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.2	0.6	14.7	12.5
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	394	1290	-	-	1079	-	-	576
HCM Lane V/C Ratio	0.063	0.009	-	-	0.018	-	-	0.165
HCM Control Delay (s)	14.7	7.8	0	-	8.4	0	-	12.5
HCM Lane LOS	B	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	0.2	0	-	-	0.1	-	-	0.6

Intersection	
Int Delay, s/veh	0

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	972	64	0	1016	0	3
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	125	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	-2	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	1057	70	0	1104	0	3

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	1057	0	1609	528
Stage 1	-	-	-	-	1057	-
Stage 2	-	-	-	-	552	-
Critical Hdwy	-	-	4.14	-	6.84	6.94
Critical Hdwy Stg 1	-	-	-	-	5.84	-
Critical Hdwy Stg 2	-	-	-	-	5.84	-
Follow-up Hdwy	-	-	2.22	-	3.52	3.32
Pot Cap-1 Maneuver	-	-	655	-	95	495
Stage 1	-	-	-	-	295	-
Stage 2	-	-	-	-	541	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	655	-	95	495
Mov Cap-2 Maneuver	-	-	-	-	95	-
Stage 1	-	-	-	-	295	-
Stage 2	-	-	-	-	541	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	12.3
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	495	-	-	655	-
HCM Lane V/C Ratio	0.007	-	-	-	-
HCM Control Delay (s)	12.3	-	-	0	-
HCM Lane LOS	B	-	-	A	-
HCM 95th %tile Q(veh)	0	-	-	0	-

Intersection	
Int Delay, s/veh	0.6

Movement	SET	SER	NWL	NWT	NEL	NER
Vol, veh/h	910	63	76	988	0	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	-	-	75	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	3	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	989	68	83	1074	0	32

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	1058	0	1725	529
Stage 1	-	-	-	-	1023	-
Stage 2	-	-	-	-	702	-
Critical Hdwy	-	-	4.14	-	6.84	6.94
Critical Hdwy Stg 1	-	-	-	-	5.84	-
Critical Hdwy Stg 2	-	-	-	-	5.84	-
Follow-up Hdwy	-	-	2.22	-	3.52	3.32
Pot Cap-1 Maneuver	-	-	654	-	80	494
Stage 1	-	-	-	-	308	-
Stage 2	-	-	-	-	453	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	654	-	70	494
Mov Cap-2 Maneuver	-	-	-	-	70	-
Stage 1	-	-	-	-	308	-
Stage 2	-	-	-	-	396	-

Approach	SE	NW	NE
HCM Control Delay, s	0	0.8	12.8
HCM LOS			B

Minor Lane/Major Mvmt	NELn1	NWL	NWT	SET	SER
Capacity (veh/h)	494	654	-	-	-
HCM Lane V/C Ratio	0.064	0.126	-	-	-
HCM Control Delay (s)	12.8	11.3	-	-	-
HCM Lane LOS	B	B	-	-	-
HCM 95th %tile Q(veh)	0.2	0.4	-	-	-

Intersection	
Int Delay, s/veh	3.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	SBL	SBR	NWU	NWL	NWR
Vol, veh/h	16	350	36	60	195	2	66	2	6	8	13
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	None	-	-	-
Storage Length	-	-	-	50	-	-	0	-	-	0	-
Veh in Median Storage, #	-	0	-	-	0	-	0	-	-	0	-
Grade, %	-	1	-	-	-1	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	17	380	39	65	212	2	72	2	7	9	14

Major/Minor	Major1			Major2			Minor2		Minor1		
Conflicting Flow All	214	0	0	420	0	0	785	213	0	815	400
Stage 1	-	-	-	-	-	-	343	-	0	435	-
Stage 2	-	-	-	-	-	-	442	-	0	380	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.22	-	7.12	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	-	-	6.12	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	-	-	6.12	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	3.318	-	3.518	3.318
Pot Cap-1 Maneuver	1356	-	-	1139	-	-	310	827	0	296	650
Stage 1	-	-	-	-	-	-	672	-	0	600	-
Stage 2	-	-	-	-	-	-	594	-	0	642	-
Platoon blocked, %		-	-		-	-			-		
Mov Cap-1 Maneuver	1356	-	-	1139	-	-	283	827	0	227	650
Mov Cap-2 Maneuver	-	-	-	-	-	-	283	-	0	227	-
Stage 1	-	-	-	-	-	-	661	-	0	590	-
Stage 2	-	-	-	-	-	-	570	-	0	532	-

Approach	EB	WB	SB	NW
HCM Control Delay, s	0.3	2	20.9	21.5
HCM LOS			C	C

Minor Lane/Major Mvmt	NWLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	227	1356	-	-	1139	-	-	301
HCM Lane V/C Ratio	0.038	0.013	-	-	0.057	-	-	0.249
HCM Control Delay (s)	21.5	7.7	0	-	8.4	-	-	20.9
HCM Lane LOS	C	A	A	-	A	-	-	C
HCM 95th %tile Q(veh)	0.1	0	-	-	0.2	-	-	1

Lane Group	EBL2	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR2	NBL2	NBL	NBT
Lane Configurations												
Volume (vph)	4	252	1020	31	285	2	23	904	33	7	53	0
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width (ft)	10	10	11	11	14	10	12	12	12	10	10	10
Grade (%)			3%					-2%				1%
Storage Length (ft)		300		0			75				0	
Storage Lanes		1		1			1				0	
Taper Length (ft)		25					25				25	
Lane Util. Factor	0.95	1.00	0.95	0.95	1.00	0.95	1.00	0.95	0.95	1.00	1.00	1.00
Frt			0.996		0.850			0.995				0.975
Flt Protected		0.950					0.950					0.961
Satd. Flow (prot)	0	1541	3180	0	1576	0	1693	3370	0	0	0	1536
Flt Permitted		0.093					0.193					0.752
Satd. Flow (perm)	0	151	3180	0	1576	0	344	3370	0	0	0	1202
Right Turn on Red					Yes				Yes			
Satd. Flow (RTOR)					228			196				
Link Speed (mph)			35					35				25
Link Distance (ft)			577					864				492
Travel Time (s)			11.2					16.8				13.4
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
Adj. Flow (vph)	4	260	1052	32	294	2	24	932	34	7	55	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	264	1084	0	294	0	26	966	0	0	0	76
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Right	Left	Left	Left	Right	Left	Left	Left
Median Width(ft)			12					12				0
Link Offset(ft)			0					0				0
Crosswalk Width(ft)			10					10				10
Two way Left Turn Lane												
Headway Factor	1.19	1.19	1.14	1.14	1.01	1.16	1.06	1.06	1.06	1.18	1.18	1.18
Turning Speed (mph)	15	15		9	9	15	15		9	15	15	
Number of Detectors	1	1	1		1	1	1	1		1	1	1
Detector Template	Left	Left	Thru		Right	Left	Left	Thru		Left	Left	Thru
Leading Detector (ft)	20	37	37		37	20	37	37		20	20	37
Trailing Detector (ft)	0	-3	-3		-3	0	-3	-3		0	0	-3
Detector 1 Position(ft)	0	-3	-3		-3	0	-3	-3		0	0	-3
Detector 1 Size(ft)	20	40	40		40	20	40	40		20	20	40
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0	0.0
Turn Type	pm+pt	pm+pt	NA		Perm	Perm	Perm	NA		Perm	Perm	NA
Protected Phases	5	5	2					6				10
Permitted Phases	2	2			2	6	6			10	10	
Detector Phase	5	5	2		2	6	6	6		10	10	10
Switch Phase												
Minimum Initial (s)	3.0	3.0	15.0		15.0	15.0	15.0	15.0		3.0	3.0	3.0
Minimum Split (s)	13.0	13.0	21.0		21.0	21.0	21.0	21.0		13.0	13.0	13.0

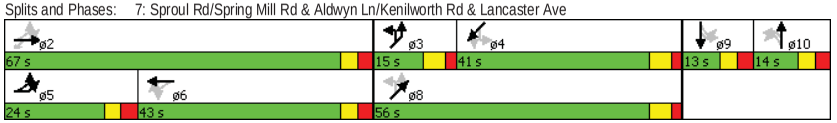
Lane Group	NBR	NBR2	SBL2	SBL	SBT	SBR	SBR2	NEL2	NEL	NET	NER	NER2
Lane Configurations												
Volume (vph)	4	10	1	1	0	3	14	193	0	114	20	1
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width (ft)	10	10	10	10	10	10	10	12	12	11	11	11
Grade (%)					-3%					3%		
Storage Length (ft)	0			0		0			200		0	
Storage Lanes	0			0		0			1		0	
Taper Length (ft)				25					25			
Lane Util. 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
Frt					0.879					0.976		
Flt Protected					0.995				0.950			
Satd. Flow (prot)	0	0	0	0	1462	0	0	0	1651	1640	0	0
Flt Permitted					0.983				0.097			
Satd. Flow (perm)	0	0	0	0	1444	0	0	0	169	1640	0	0
Right Turn on Red		No					No					No
Satd. Flow (RTOR)												
Link Speed (mph)					25					40		
Link Distance (ft)					597					1336		
Travel Time (s)					16.3					22.8		
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	4	10	1	1	0	3	14	199	0	118	21	1
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	19	0	0	0	199	140	0	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Right	Right	Left	Left	Left	Right	Right	Left	Left	Left	Right	Right
Median Width(ft)					0					12		
Link Offset(ft)					0					0		
Crosswalk Width(ft)					10					10		
Two way Left Turn Lane												
Headway Factor	1.18	1.18	1.15	1.15	1.15	1.15	1.15	1.09	1.09	1.14	1.14	1.14
Turning Speed (mph)	9	9	15	15		9	9	15	15		9	9
Number of Detectors			1	1	1			1	1	1		
Detector Template			Left	Left	Thru			Left	Left	Thru		
Leading Detector (ft)			20	20	37			20	37	37		
Trailing Detector (ft)			0	0	-3			0	-3	-3		
Detector 1 Position(ft)			0	0	-3			0	-3	-3		
Detector 1 Size(ft)			20	20	40			20	40	40		
Detector 1 Type			Cl+Ex	Cl+Ex	Cl+Ex			Cl+Ex	Cl+Ex	Cl+Ex		
Detector 1 Channel												
Detector 1 Extend (s)			0.0	0.0	0.0			0.0	0.0	0.0		
Detector 1 Queue (s)			0.0	0.0	0.0			0.0	0.0	0.0		
Detector 1 Delay (s)			0.0	0.0	0.0			0.0	0.0	0.0		
Turn Type			Perm	Perm	NA			pm+pt	pm+pt	NA		
Protected Phases					9			3	3	8		
Permitted Phases			9	9				8	8			
Detector Phase			9	9	9			3	3	8		
Switch Phase												
Minimum Initial (s)			3.0	3.0	3.0			3.0	3.0	3.0		
Minimum Split (s)			13.0	13.0	13.0			13.0	13.0	13.0		

Lane Group	SWL2	SWL	SWT	SWR	SWR2
Lane Configurations					
Volume (vph)	39	9	168	238	1
Ideal Flow (vphpl)	1800	1800	1800	1800	1800
Lane Width (ft)	10	10	10	10	10
Grade (%)			-7%		
Storage Length (ft)		150		0	
Storage Lanes		1		0	
Taper Length (ft)		25			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00
Frt			0.912		
Flt Protected		0.950			
Satd. Flow (prot)	0	1619	1555	0	0
Flt Permitted		0.668			
Satd. Flow (perm)	0	1139	1555	0	0
Right Turn on Red					No
Satd. Flow (RTOR)					
Link Speed (mph)			25		
Link Distance (ft)			3168		
Travel Time (s)			86.4		
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	40	9	173	245	1
Shared Lane Traffic (%)					
Lane Group Flow (vph)	0	49	419	0	0
Enter Blocked Intersection	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Right
Median Width(ft)			12		
Link Offset(ft)			0		
Crosswalk Width(ft)			10		
Two way Left Turn Lane					
Headway Factor	1.12	1.12	1.12	1.12	1.12
Turning Speed (mph)	15	15		9	9
Number of Detectors	1	1	1		
Detector Template	Left	Left	Thru		
Leading Detector (ft)	20	37	37		
Trailing Detector (ft)	0	-3	-3		
Detector 1 Position(ft)	0	-3	-3		
Detector 1 Size(ft)	20	40	40		
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex		
Detector 1 Channel					
Detector 1 Extend (s)	0.0	0.0	0.0		
Detector 1 Queue (s)	0.0	0.0	0.0		
Detector 1 Delay (s)	0.0	0.0	0.0		
Turn Type	Perm	Perm	NA		
Protected Phases			4		
Permitted Phases	4	4			
Detector Phase	4	4	4		
Switch Phase					
Minimum Initial (s)	3.0	3.0	3.0		
Minimum Split (s)	13.0	13.0	13.0		

Lane Group	EBL2	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR2	NBL2	NBL	NBT
Total Split (s)	24.0	24.0	67.0		67.0	43.0	43.0	43.0		14.0	14.0	14.0
Total Split (%)	16.0%	16.0%	44.7%		44.7%	28.7%	28.7%	28.7%		9.3%	9.3%	9.3%
Maximum Green (s)	18.0	18.0	61.0		61.0	37.0	37.0	37.0		8.0	8.0	8.0
Yellow Time (s)	3.0	3.0	3.0		3.0	3.0	3.0	3.0		3.0	3.0	3.0
All-Red Time (s)	3.0	3.0	3.0		3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lost Time Adjust (s)		0.5	0.5		0.5		0.5	0.5				0.5
Total Lost Time (s)		6.5	6.5		6.5		6.5	6.5				6.5
Lead/Lag	Lead	Lead				Lag	Lag	Lag		Lag	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0	3.0	3.0		3.0	3.0	3.0
Recall Mode	None	None	Max		Max	None	None	None		None	None	None
Walk Time (s)			7.0		7.0	7.0	7.0	7.0				
Flash Dont Walk (s)			20.0		20.0	20.0	20.0	20.0				
Pedestrian Calls (#/hr)			0		0	0	0	0				
Act Effct Green (s)		60.6	60.6		60.6		36.6	36.6				7.5
Actuated g/C Ratio		0.42	0.42		0.42		0.25	0.25				0.05
v/c Ratio		1.14	0.81		0.37		0.30	0.97				1.23
Control Delay		140.2	43.9		8.7		57.3	64.5				241.0
Queue Delay		0.0	0.0		0.0		0.0	0.0				0.0
Total Delay		140.2	43.9		8.7		57.3	64.5				241.0
LOS		F	D		A		E	E				F
Approach Delay			53.1					64.3				241.0
Approach LOS			D					E				F

Intersection Summary			
Area Type:	Other		
Cycle Length: 150			
Actuated Cycle Length: 144.8			
Natural Cycle: 150			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 1.37			
Intersection Signal Delay: 80.0		Intersection LOS: E	
Intersection Capacity Utilization 117.5%		ICU Level of Service H	
Analysis Period (min) 15			

Splits and Phases: 7: Sproul Rd/Spring Mill Rd & Aldwyn Ln/Kenilworth Rd & Lancaster Ave



Lane Group	NBR	NBR2	SBL2	SBL	SBT	SBR	SBR2	NEL2	NEL	NET	NER	NER2
Total Split (s)			13.0	13.0	13.0			15.0	15.0	56.0		
Total Split (%)			8.7%	8.7%	8.7%			10.0%	10.0%	37.3%		
Maximum Green (s)			7.0	7.0	7.0			9.0	9.0	50.0		
Yellow Time (s)			3.0	3.0	3.0			4.0	4.0	4.0		
All-Red Time (s)			3.0	3.0	3.0			2.0	2.0	2.0		
Lost Time Adjust (s)					0.5				0.5	0.5		
Total Lost Time (s)					6.5				6.5	6.5		
Lead/Lag			Lead	Lead	Lead			Lead	Lead			
Lead-Lag Optimize?												
Vehicle Extension (s)			3.0	3.0	3.0			3.0	3.0	3.0		
Recall Mode			None	None	None			None	None	None		
Walk Time (s)										7.0		
Flash Dont Walk (s)										25.0		
Pedestrian Calls (#/hr)										0		
Act Effct Green (s)					6.1				49.6	49.6		
Actuated g/C Ratio					0.04				0.34	0.34		
v/c Ratio					0.32				1.37	0.25		
Control Delay					83.2				237.8	36.9		
Queue Delay					0.0				0.0	0.0		
Total Delay					83.2				237.8	36.9		
LOS					F				F	D		
Approach Delay					83.2					154.8		
Approach LOS					F					F		

Intersection Summary

Lane Group	SWL2	SWL	SWT	SWR	SWR2
Total Split (s)	41.0	41.0	41.0		
Total Split (%)	27.3%	27.3%	27.3%		
Maximum Green (s)	35.0	35.0	35.0		
Yellow Time (s)	4.0	4.0	4.0		
All-Red Time (s)	2.0	2.0	2.0		
Lost Time Adjust (s)		0.5	0.5		
Total Lost Time (s)		6.5	6.5		
Lead/Lag	Lag	Lag	Lag		
Lead-Lag Optimize?					
Vehicle Extension (s)	3.0	3.0	3.0		
Recall Mode	None	None	None		
Walk Time (s)					
Flash Dont Walk (s)					
Pedestrian Calls (#/hr)					
Act Effct Green (s)		34.6	34.6		
Actuated g/C Ratio		0.24	0.24		
v/c Ratio		0.18	1.13		
Control Delay		47.9	136.1		
Queue Delay		0.0	0.0		
Total Delay		47.9	136.1		
LOS		D	F		
Approach Delay			126.8		
Approach LOS			F		

Intersection Summary

Queues
7: Sproul Rd/Spring Mill Rd & Aldwyn Ln/Kenilworth Rd & Lancaster Ave

3/10/2015

Lane Group	EBL	EBT	EBR2	WBL	WBT	NBT	SBT	NEL	NET	SWL	SWT
Lane Group Flow (vph)	264	1084	294	26	966	76	19	199	140	49	419
v/c Ratio	1.14	0.81	0.37	0.30	0.97	1.23	0.32	1.37	0.25	0.18	1.13
Control Delay	140.2	43.9	8.7	57.3	64.5	241.0	83.2	237.8	36.9	47.9	136.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	140.2	43.9	8.7	57.3	64.5	241.0	83.2	237.8	36.9	47.9	136.1
Queue Length 50th (ft)	~265	501	40	21	417	~93	18	~215	100	39	~487
Queue Length 95th (ft)	#454	599	112	54	#571	#205	48	#386	160	79	#704
Internal Link Dist (ft)		497			784	412	517		1256		3088
Turn Bay Length (ft)	300			75				200		150	
Base Capacity (vph)	231	1331	792	86	997	62	64	145	561	271	371
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.14	0.81	0.37	0.30	0.97	1.23	0.30	1.37	0.25	0.18	1.13

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Lanes, Volumes, Timings
7: Sproul Rd/Spring Mill Rd & Aldwyn Ln/Kenilworth Rd & Lancaster Ave

3/10/2015

Lane Group	EBL2	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR2	NBL2	NBL	NBT
Lane Configurations												
Volume (vph)	4	252	1020	31	285	2	23	904	33	7	53	0
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width (ft)	10	10	11	11	14	10	12	12	12	10	10	10
Grade (%)			3%					-2%				1%
Storage Length (ft)		300		0			75				0	
Storage Lanes		1		1			1				0	
Taper Length (ft)		25					25				25	
Lane Util. Factor	0.95	1.00	0.95	0.95	1.00	0.95	1.00	0.95	0.95	1.00	1.00	1.00
Frt			0.996		0.850			0.995				0.975
Flt Protected		0.950					0.950					0.961
Satd. Flow (prot)	0	1541	3180	0	1576	0	1693	3370	0	0	0	1536
Flt Permitted		0.097					0.182					0.752
Satd. Flow (perm)	0	157	3180	0	1576	0	324	3370	0	0	0	1202
Right Turn on Red					Yes				Yes			
Satd. Flow (RTOR)					223			196				
Link Speed (mph)			35					35				25
Link Distance (ft)			577					864				492
Travel Time (s)			11.2					16.8				13.4
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
Adj. Flow (vph)	4	260	1052	32	294	2	24	932	34	7	55	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	264	1084	0	294	0	26	966	0	0	0	76
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Right	Left	Left	Left	Right	Left	Left	Left
Median Width(ft)			12					12				0
Link Offset(ft)			0					0				0
Crosswalk Width(ft)			10					10				10
Two way Left Turn Lane												
Headway Factor	1.19	1.19	1.14	1.14	1.01	1.16	1.06	1.06	1.06	1.18	1.18	1.18
Turning Speed (mph)	15	15		9	9	15	15		9	15	15	
Number of Detectors	1	1	1		1	1	1	1		1	1	1
Detector Template	Left	Left	Thru		Right	Left	Left	Thru		Left	Left	Thru
Leading Detector (ft)	20	37	37		37	20	37	37		20	20	37
Trailing Detector (ft)	0	-3	-3		-3	0	-3	-3		0	0	-3
Detector 1 Position(ft)	0	-3	-3		-3	0	-3	-3		0	0	-3
Detector 1 Size(ft)	20	40	40		40	20	40	40		20	20	40
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0	0.0
Turn Type	pm+pt	pm+pt	NA		Perm	Perm	Perm	NA		Perm	Perm	NA
Protected Phases	5	5	2					6				10
Permitted Phases	2	2			2	6	6			10	10	
Detector Phase	5	5	2		2	6	6	6		10	10	10
Switch Phase												
Minimum Initial (s)	3.0	3.0	15.0		15.0	15.0	15.0	15.0		3.0	3.0	3.0
Minimum Split (s)	13.0	13.0	21.0		21.0	21.0	21.0	21.0		13.0	13.0	13.0

Lane Group	NBR	NBR2	SBL2	SBL	SBT	SBR	SBR2	NEL2	NEL	NET	NER	NER2
Lane Configurations												
Volume (vph)	4	10	1	1	0	3	14	193	0	114	20	1
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width (ft)	10	10	10	10	10	10	10	12	12	11	11	11
Grade (%)					-3%					3%		
Storage Length (ft)	0			0		0			200		0	
Storage Lanes	0			0		0			1		0	
Taper Length (ft)				25					25			
Lane Util. 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
Frt					0.879					0.976		
Flt Protected					0.995				0.950			
Satd. Flow (prot)	0	0	0	0	1462	0	0	0	1651	1640	0	0
Flt Permitted					0.983				0.097			
Satd. Flow (perm)	0	0	0	0	1444	0	0	0	169	1640	0	0
Right Turn on Red		No					No					No
Satd. Flow (RTOR)												
Link Speed (mph)					25					40		
Link Distance (ft)					597					1336		
Travel Time (s)					16.3					22.8		
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	4	10	1	1	0	3	14	199	0	118	21	1
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	19	0	0	0	199	140	0	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Right	Right	Left	Left	Left	Right	Right	Left	Left	Left	Right	Right
Median Width(ft)					0					12		
Link Offset(ft)					0					0		
Crosswalk Width(ft)					10					10		
Two way Left Turn Lane												
Headway Factor	1.18	1.18	1.15	1.15	1.15	1.15	1.15	1.09	1.09	1.14	1.14	1.14
Turning Speed (mph)	9	9	15	15		9	9	15	15		9	9
Number of Detectors			1	1	1			1	1	1		
Detector Template			Left	Left	Thru			Left	Left	Thru		
Leading Detector (ft)			20	20	37			20	37	37		
Trailing Detector (ft)			0	0	-3			0	-3	-3		
Detector 1 Position(ft)			0	0	-3			0	-3	-3		
Detector 1 Size(ft)			20	20	40			20	40	40		
Detector 1 Type			Cl+Ex	Cl+Ex	Cl+Ex			Cl+Ex	Cl+Ex	Cl+Ex		
Detector 1 Channel												
Detector 1 Extend (s)			0.0	0.0	0.0			0.0	0.0	0.0		
Detector 1 Queue (s)			0.0	0.0	0.0			0.0	0.0	0.0		
Detector 1 Delay (s)			0.0	0.0	0.0			0.0	0.0	0.0		
Turn Type			Perm	Perm	NA			pm+pt	pm+pt	NA		
Protected Phases					9			3	3	8		
Permitted Phases			9	9				8	8			
Detector Phase			9	9	9			3	3	8		
Switch Phase												
Minimum Initial (s)			3.0	3.0	3.0			3.0	3.0	3.0		
Minimum Split (s)			13.0	13.0	13.0			13.0	13.0	13.0		

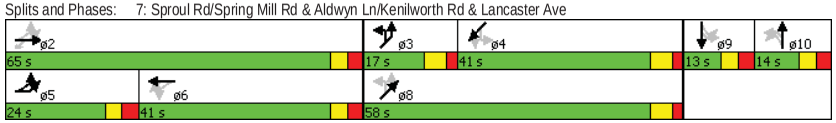
Lane Group	SWL2	SWL	SWT	SWR	SWR2
Lane Configurations					
Volume (vph)	39	9	168	238	1
Ideal Flow (vphpl)	1800	1800	1800	1800	1800
Lane Width (ft)	10	10	10	10	10
Grade (%)			-7%		
Storage Length (ft)		150		0	
Storage Lanes		1		0	
Taper Length (ft)		25			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00
Frt			0.912		
Flt Protected		0.950			
Satd. Flow (prot)	0	1619	1555	0	0
Flt Permitted		0.668			
Satd. Flow (perm)	0	1139	1555	0	0
Right Turn on Red					No
Satd. Flow (RTOR)					
Link Speed (mph)			25		
Link Distance (ft)			3168		
Travel Time (s)			86.4		
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	40	9	173	245	1
Shared Lane Traffic (%)					
Lane Group Flow (vph)	0	49	419	0	0
Enter Blocked Intersection	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Right
Median Width(ft)			12		
Link Offset(ft)			0		
Crosswalk Width(ft)			10		
Two way Left Turn Lane					
Headway Factor	1.12	1.12	1.12	1.12	1.12
Turning Speed (mph)	15	15		9	9
Number of Detectors	1	1	1		
Detector Template	Left	Left	Thru		
Leading Detector (ft)	20	37	37		
Trailing Detector (ft)	0	-3	-3		
Detector 1 Position(ft)	0	-3	-3		
Detector 1 Size(ft)	20	40	40		
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex		
Detector 1 Channel					
Detector 1 Extend (s)	0.0	0.0	0.0		
Detector 1 Queue (s)	0.0	0.0	0.0		
Detector 1 Delay (s)	0.0	0.0	0.0		
Turn Type	Perm	Perm	NA		
Protected Phases			4		
Permitted Phases	4	4			
Detector Phase	4	4	4		
Switch Phase					
Minimum Initial (s)	3.0	3.0	3.0		
Minimum Split (s)	13.0	13.0	13.0		

Lane Group	EBL2	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR2	NBL2	NBL	NBT
Total Split (s)	24.0	24.0	65.0		65.0	41.0	41.0	41.0		14.0	14.0	14.0
Total Split (%)	16.0%	16.0%	43.3%		43.3%	27.3%	27.3%	27.3%		9.3%	9.3%	9.3%
Maximum Green (s)	18.0	18.0	59.0		59.0	35.0	35.0	35.0		8.0	8.0	8.0
Yellow Time (s)	3.0	3.0	3.0		3.0	3.0	3.0	3.0		3.0	3.0	3.0
All-Red Time (s)	3.0	3.0	3.0		3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lost Time Adjust (s)		0.5	0.5		0.5		0.5	0.5				0.5
Total Lost Time (s)		6.5	6.5		6.5		6.5	6.5				6.5
Lead/Lag	Lead	Lead				Lag	Lag	Lag		Lag	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0	3.0	3.0		3.0	3.0	3.0
Recall Mode	None	None	Max		Max	None	None	None		None	None	None
Walk Time (s)			7.0		7.0	7.0	7.0	7.0				
Flash Dont Walk (s)			20.0		20.0	20.0	20.0	20.0				
Pedestrian Calls (#/hr)			0		0	0	0	0				
Act Effct Green (s)		58.6	58.6		58.6		34.6	34.6				7.5
Actuated g/C Ratio		0.40	0.40		0.40		0.24	0.24				0.05
v/c Ratio		1.15	0.84		0.38		0.34	1.01				1.23
Control Delay		141.9	46.9		9.6		62.2	75.4				241.0
Queue Delay		0.0	0.0		0.0		0.0	0.0				0.0
Total Delay		141.9	46.9		9.6		62.2	75.4				241.0
LOS		F	D		A		E	E				F
Approach Delay			55.5					75.1				241.0
Approach LOS			E					E				F

Intersection Summary

Area Type: Other
Cycle Length: 150
Actuated Cycle Length: 144.8
Natural Cycle: 150
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 1.23
Intersection Signal Delay: 79.8 Intersection LOS: E
Intersection Capacity Utilization 117.5% ICU Level of Service H
Analysis Period (min) 15

Splits and Phases: 7: Sproul Rd/Spring Mill Rd & Aldwyn Ln/Kenilworth Rd & Lancaster Ave



Lane Group	NBR	NBR2	SBL2	SBL	SBT	SBR	SBR2	NEL2	NEL	NET	NER	NER2
Total Split (s)			13.0	13.0	13.0			17.0	17.0	58.0		
Total Split (%)			8.7%	8.7%	8.7%			11.3%	11.3%	38.7%		
Maximum Green (s)			7.0	7.0	7.0			11.0	11.0	52.0		
Yellow Time (s)			3.0	3.0	3.0			4.0	4.0	4.0		
All-Red Time (s)			3.0	3.0	3.0			2.0	2.0	2.0		
Lost Time Adjust (s)					0.5				0.5	0.5		
Total Lost Time (s)					6.5				6.5	6.5		
Lead/Lag			Lead	Lead	Lead			Lead	Lead			
Lead-Lag Optimize?												
Vehicle Extension (s)			3.0	3.0	3.0			3.0	3.0	3.0		
Recall Mode			None	None	None			None	None	None		
Walk Time (s)										7.0		
Flash Dont Walk (s)										25.0		
Pedestrian Calls (#/hr)										0		
Act Effct Green (s)					6.1				51.6	51.6		
Actuated g/C Ratio					0.04				0.36	0.36		
v/c Ratio					0.32				1.19	0.24		
Control Delay					83.2				163.0	35.3		
Queue Delay					0.0				0.0	0.0		
Total Delay					83.2				163.0	35.3		
LOS					F				F	D		
Approach Delay					83.2					110.3		
Approach LOS					F					F		

Intersection Summary

Lanes, Volumes, Timings
7: Sproul Rd/Spring Mill Rd & Aldwyn Ln/Kenilworth Rd & Lancaster Ave 3/10/2015

Lane Group	SWL2	SWL	SWT	SWR	SWR2
Total Split (s)	41.0	41.0	41.0		
Total Split (%)	27.3%	27.3%	27.3%		
Maximum Green (s)	35.0	35.0	35.0		
Yellow Time (s)	4.0	4.0	4.0		
All-Red Time (s)	2.0	2.0	2.0		
Lost Time Adjust (s)		0.5	0.5		
Total Lost Time (s)		6.5	6.5		
Lead/Lag	Lag	Lag	Lag		
Lead-Lag Optimize?					
Vehicle Extension (s)	3.0	3.0	3.0		
Recall Mode	None	None	None		
Walk Time (s)					
Flash Dont Walk (s)					
Pedestrian Calls (#/hr)					
Act Effct Green (s)		34.6	34.6		
Actuated g/C Ratio		0.24	0.24		
v/c Ratio		0.18	1.13		
Control Delay		47.9	136.1		
Queue Delay		0.0	0.0		
Total Delay		47.9	136.1		
LOS		D	F		
Approach Delay			126.8		
Approach LOS			F		

Intersection Summary

Queues
7: Sproul Rd/Spring Mill Rd & Aldwyn Ln/Kenilworth Rd & Lancaster Ave 3/10/2015

Lane Group	EBL	EBT	EBR2	WBL	WBT	NBT	SBT	NEL	NET	SWL	SWT
Lane Group Flow (vph)	264	1084	294	26	966	76	19	199	140	49	419
v/c Ratio	1.15	0.84	0.38	0.34	1.01	1.23	0.32	1.19	0.24	0.18	1.13
Control Delay	141.9	46.9	9.6	62.2	75.4	241.0	83.2	163.0	35.3	47.9	136.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	141.9	46.9	9.6	62.2	75.4	241.0	83.2	163.0	35.3	47.9	136.1
Queue Length 50th (ft)	~266	514	44	22	~454	~93	18	~193	98	39	~487
Queue Length 95th (ft)	#455	614	119	56	#593	#205	48	#363	156	79	#704
Internal Link Dist (ft)		497			784	412	517		1256		3088
Turn Bay Length (ft)	300			75				200		150	
Base Capacity (vph)	230	1287	770	77	954	62	64	167	584	271	371
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.15	0.84	0.38	0.34	1.01	1.23	0.30	1.19	0.24	0.18	1.13

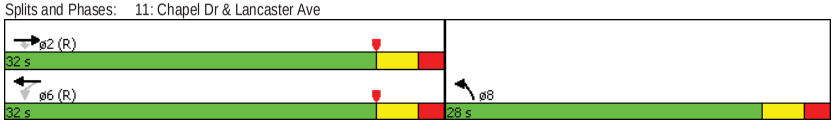
Intersection Summary
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	1180	31	34	861	91	16
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width (ft)	11	11	11	11	12	12
Storage Length (ft)		125	125		0	0
Storage Lanes		1	1		2	0
Taper Length (ft)			25		25	
Lane Util. Factor	0.95	1.00	1.00	0.95	0.97	0.95
Frt		0.850			0.978	
Flt Protected			0.950		0.959	
Satd. Flow (prot)	3241	1450	1621	3241	3211	0
Flt Permitted			0.193		0.959	
Satd. Flow (perm)	3241	1450	329	3241	3211	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		32			17	
Link Speed (mph)	35			35	25	
Link Distance (ft)	600			1433	319	
Travel Time (s)	11.7			27.9	8.7	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1283	34	37	936	99	17
Shared Lane Traffic (%)						
Lane Group Flow (vph)	1283	34	37	936	116	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	11			11	24	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	10			10	10	
Two way Left Turn Lane						
Headway Factor	1.12	1.12	1.12	1.12	1.07	1.07
Turning Speed (mph)		9	15		15	9
Number of Detectors	1	1	1	1	1	
Detector Template	Thru	Right	Left	Thru	Left	
Leading Detector (ft)	37	20	20	37	37	
Trailing Detector (ft)	-3	0	0	-3	-3	
Detector 1 Position(ft)	-3	0	0	-3	-3	
Detector 1 Size(ft)	40	20	20	40	40	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	
Turn Type	NA	Perm	Perm	NA	Prot	
Protected Phases	2			6	8	
Permitted Phases		2	6			
Detector Phase	2	2	6	6	8	
Switch Phase						
Minimum Initial (s)	10.0	10.0	10.0	10.0	4.0	
Minimum Split (s)	21.0	21.0	21.0	21.0	28.0	
Total Split (s)	32.0	32.0	32.0	32.0	28.0	

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Total Split (%)	53.3%	53.3%	53.3%	53.3%	46.7%	
Maximum Green (s)	27.0	27.0	27.0	27.0	23.0	
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	0.5	0.5	0.5	0.5	0.5	
Total Lost Time (s)	5.5	5.5	5.5	5.5	5.5	
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Recall Mode	C-Max	C-Max	C-Max	C-Max	None	
Walk Time (s)	10.0	10.0	10.0	10.0	7.0	
Flash Dont Walk (s)	0.0	0.0	0.0	0.0	16.0	
Pedestrian Calls (#/hr)	0	0	0	0	0	
Act Effct Green (s)	45.4	45.4	45.4	45.4	6.9	
Actuated g/C Ratio	0.76	0.76	0.76	0.76	0.12	
v/c Ratio	0.52	0.03	0.15	0.38	0.30	
Control Delay	5.2	1.5	1.4	0.7	22.7	
Queue Delay	0.0	0.0	0.0	0.0	0.0	
Total Delay	5.2	1.5	1.4	0.7	22.7	
LOS	A	A	A	A	C	
Approach Delay	5.1			0.7	22.7	
Approach LOS	A			A	C	

Intersection Summary			
Area Type:	Other		
Cycle Length: 60			
Actuated Cycle Length: 60			
Offset: 26 (43%), Referenced to phase 2:EBT and 6:WBTL, Start of Yellow			
Natural Cycle: 60			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.52			
Intersection Signal Delay: 4.2		Intersection LOS: A	
Intersection Capacity Utilization 46.9%		ICU Level of Service A	
Analysis Period (min) 15			

Splits and Phases: 11: Chapel Dr & Lancaster Ave



Queues
11: Chapel Dr & Lancaster Ave

3/10/2015

Lane Group	EBT	EBR	WBL	WBT	NBL
Lane Group Flow (vph)	1283	34	37	936	116
v/c Ratio	0.52	0.03	0.15	0.38	0.30
Control Delay	5.2	1.5	1.4	0.7	22.7
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	5.2	1.5	1.4	0.7	22.7
Queue Length 50th (ft)	91	0	1	6	17
Queue Length 95th (ft)	153	7	m1	m12	36
Internal Link Dist (ft)	520			1353	239
Turn Bay Length (ft)		125	125		
Base Capacity (vph)	2450	1104	248	2450	1214
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.52	0.03	0.15	0.38	0.10

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Lanes, Volumes, Timings
27: S Ithan Ave/N Ithan Ave & Lancaster Ave

3/10/2015

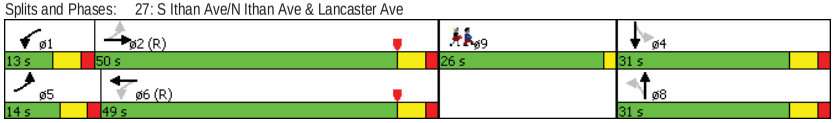
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	105	1017	92	63	698	39	82	124	31	118	201	115
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width (ft)	10	10	10	10	10	10	10	10	10	10	10	10
Grade (%)		0%			3%			1%			0%	
Storage Length (ft)	200		0	250		0	190		0	65		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.988			0.992			0.970			0.945	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1565	3092	0	1541	3058	0	1557	1590	0	1565	1556	0
Flt Permitted	0.236			0.101			0.213			0.571		
Satd. Flow (perm)	389	3092	0	164	3058	0	349	1590	0	940	1556	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		35			35			25			25	
Link Distance (ft)		1433			265			344			973	
Travel Time (s)		27.9			5.2			9.4			26.5	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	111	1071	97	66	735	41	86	131	33	124	212	121
Shared Lane Traffic (%)												
Lane Group Flow (vph)	111	1168	0	66	776	0	86	164	0	124	333	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		11			11			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		10			10			10			10	
Two way Left Turn Lane												
Headway Factor	1.17	1.17	1.17	1.19	1.19	1.19	1.18	1.18	1.18	1.17	1.17	1.17
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	1		1	1		1	1		1	1	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (ft)	37	37		37	37		37	37		37	37	
Trailing Detector (ft)	-3	-3		-3	-3		-3	-3		-3	-3	
Detector 1 Position(ft)	-3	-3		-3	-3		-3	-3		-3	-3	
Detector 1 Size(ft)	40	40		40	40		40	40		40	40	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2			6			8			4		
Detector Phase	5	2		1	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	3.0	34.0		3.0	34.0		3.0	3.0		3.0	3.0	
Minimum Split (s)	13.0	40.0		13.0	40.0		13.0	13.0		13.0	13.0	

Lane Group	ø9
Lane Configurations	
Volume (vph)	
Ideal Flow (vphpl)	
Lane Width (ft)	
Grade (%)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Lane Util. Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Enter Blocked Intersection	
Lane Alignment	
Median Width(ft)	
Link Offset(ft)	
Crosswalk Width(ft)	
Two way Left Turn Lane	
Headway Factor	
Turning Speed (mph)	
Number of Detectors	
Detector Template	
Leading Detector (ft)	
Trailing Detector (ft)	
Detector 1 Position(ft)	
Detector 1 Size(ft)	
Detector 1 Type	
Detector 1 Channel	
Detector 1 Extend (s)	
Detector 1 Queue (s)	
Detector 1 Delay (s)	
Turn Type	
Protected Phases	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	24.0
Minimum Split (s)	26.0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Split (s)	14.0	50.0		13.0	49.0		31.0	31.0		31.0	31.0	
Total Split (%)	11.7%	41.7%		10.8%	40.8%		25.8%	25.8%		25.8%	25.8%	
Maximum Green (s)	8.0	44.0		7.0	43.0		25.0	25.0		25.0	25.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.5	0.5		0.5	0.5		0.5	0.5		0.5	0.5	
Total Lost Time (s)	6.5	6.5		6.5	6.5		6.5	6.5		6.5	6.5	
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)	57.3	51.3		54.3	48.0		24.5	24.5		24.5	24.5	
Actuated g/C Ratio	0.48	0.43		0.45	0.40		0.20	0.20		0.20	0.20	
v/c Ratio	0.43	0.88		0.46	0.63		1.21	0.51		0.65	1.05	
Control Delay	23.2	43.9		24.4	26.0		216.4	48.7		61.0	110.7	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	23.2	43.9		24.4	26.0		216.4	48.7		61.0	110.7	
LOS	C	D		C	C		F	D		E	F	
Approach Delay		42.1			25.9			106.4			97.2	
Approach LOS		D			C			F			F	

Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 120			
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow, Master Intersection			
Natural Cycle: 125			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 1.21			
Intersection Signal Delay: 51.9		Intersection LOS: D	
Intersection Capacity Utilization 81.5%		ICU Level of Service D	
Analysis Period (min) 15			

Splits and Phases: 27: S Ithan Ave/N Ithan Ave & Lancaster Ave



Lanes, Volumes, Timings
27: S Ithan Ave/N Ithan Ave & Lancaster Ave 3/10/2015

Lane Group	ø9
Total Split (s)	26.0
Total Split (%)	22%
Maximum Green (s)	24.0
Yellow Time (s)	2.0
All-Red Time (s)	0.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0
Recall Mode	None
Walk Time (s)	9.0
Flash Dont Walk (s)	15.0
Pedestrian Calls (#/hr)	45
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	

Intersection Summary

Queues
27: S Ithan Ave/N Ithan Ave & Lancaster Ave 3/10/2015

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	111	1168	66	776	86	164	124	333
v/c Ratio	0.43	0.88	0.46	0.63	1.21	0.51	0.65	1.05
Control Delay	23.2	43.9	24.4	26.0	216.4	48.7	61.0	110.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	23.2	43.9	24.4	26.0	216.4	48.7	61.0	110.7
Queue Length 50th (ft)	47	~532	28	202	~81	114	89	~281
Queue Length 95th (ft)	78	#673	m45	241	#189	185	#171	#464
Internal Link Dist (ft)		1353		185		264		893
Turn Bay Length (ft)	200		250		190		65	
Base Capacity (vph)	258	1321	149	1223	71	324	191	317
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.43	0.88	0.44	0.63	1.21	0.51	0.65	1.05

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

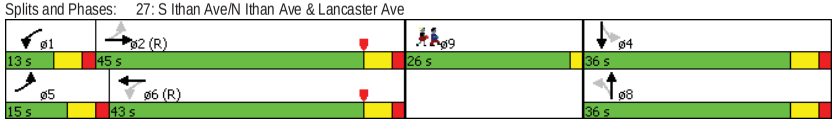
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	105	1017	92	63	698	39	82	124	31	118	201	115
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width (ft)	10	10	10	10	10	10	10	10	10	10	10	10
Grade (%)		0%			3%			1%			0%	
Storage Length (ft)	200		0	250		0	190		0	65		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.988			0.992			0.970			0.945	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1565	3092	0	1541	3058	0	1557	1590	0	1565	1556	0
Flt Permitted	0.212			0.092			0.271			0.589		
Satd. Flow (perm)	349	3092	0	149	3058	0	444	1590	0	970	1556	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		35			35			25			25	
Link Distance (ft)		1433			265			344			973	
Travel Time (s)		27.9			5.2			9.4			26.5	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	111	1071	97	66	735	41	86	131	33	124	212	121
Shared Lane Traffic (%)												
Lane Group Flow (vph)	111	1168	0	66	776	0	86	164	0	124	333	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		11			11			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		10			10			10			10	
Two way Left Turn Lane												
Headway Factor	1.17	1.17	1.17	1.19	1.19	1.19	1.18	1.18	1.18	1.17	1.17	1.17
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	1		1	1		1	1		1	1	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (ft)	37	37		37	37		37	37		37	37	
Trailing Detector (ft)	-3	-3		-3	-3		-3	-3		-3	-3	
Detector 1 Position(ft)	-3	-3		-3	-3		-3	-3		-3	-3	
Detector 1 Size(ft)	40	40		40	40		40	40		40	40	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2			6			8			4		
Detector Phase	5	2		1	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	3.0	34.0		3.0	34.0		3.0	3.0		3.0	3.0	
Minimum Split (s)	13.0	40.0		13.0	40.0		13.0	13.0		13.0	13.0	

Lane Group	ø9
Lane Configurations	
Volume (vph)	
Ideal Flow (vphpl)	
Lane Width (ft)	
Grade (%)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Lane Util. Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Enter Blocked Intersection	
Lane Alignment	
Median Width(ft)	
Link Offset(ft)	
Crosswalk Width(ft)	
Two way Left Turn Lane	
Headway Factor	
Turning Speed (mph)	
Number of Detectors	
Detector Template	
Leading Detector (ft)	
Trailing Detector (ft)	
Detector 1 Position(ft)	
Detector 1 Size(ft)	
Detector 1 Type	
Detector 1 Channel	
Detector 1 Extend (s)	
Detector 1 Queue (s)	
Detector 1 Delay (s)	
Turn Type	
Protected Phases	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	24.0
Minimum Split (s)	26.0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Split (s)	15.0	45.0		13.0	43.0		36.0	36.0		36.0	36.0	
Total Split (%)	12.5%	37.5%		10.8%	35.8%		30.0%	30.0%		30.0%	30.0%	
Maximum Green (s)	9.0	39.0		7.0	37.0		30.0	30.0		30.0	30.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.5	0.5		0.5	0.5		0.5	0.5		0.5	0.5	
Total Lost Time (s)	6.5	6.5		6.5	6.5		6.5	6.5		6.5	6.5	
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)	54.7	47.9		50.1	43.8		27.9	27.9		27.9	27.9	
Actuated g/C Ratio	0.46	0.40		0.42	0.36		0.23	0.23		0.23	0.23	
v/c Ratio	0.46	0.95		0.49	0.70		0.83	0.44		0.55	0.92	
Control Delay	26.6	53.4		30.9	31.1		97.7	43.2		50.3	76.4	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	26.6	53.4		30.9	31.1		97.7	43.2		50.3	76.4	
LOS	C	D		C	C		F	D		D	E	
Approach Delay		51.0			31.1			62.0			69.3	
Approach LOS		D			C			E			E	

Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 120			
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow, Master Intersection			
Natural Cycle: 125			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.95			
Intersection Signal Delay: 49.0		Intersection LOS: D	
Intersection Capacity Utilization 81.5%		ICU Level of Service D	
Analysis Period (min) 15			

Splits and Phases: 27: S Ithan Ave/N Ithan Ave & Lancaster Ave

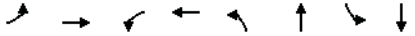


Lane Group	ø9
Total Split (s)	26.0
Total Split (%)	22%
Maximum Green (s)	24.0
Yellow Time (s)	2.0
All-Red Time (s)	0.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0
Recall Mode	None
Walk Time (s)	9.0
Flash Dont Walk (s)	15.0
Pedestrian Calls (#/hr)	45
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	

Intersection Summary

Queues
27: S Ithan Ave/N Ithan Ave & Lancaster Ave

3/10/2015



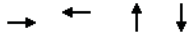
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	111	1168	66	776	86	164	124	333
v/c Ratio	0.46	0.95	0.49	0.70	0.83	0.44	0.55	0.92
Control Delay	26.6	53.4	30.9	31.1	97.7	43.2	50.3	76.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	26.6	53.4	30.9	31.1	97.7	43.2	50.3	76.4
Queue Length 50th (ft)	47	~588	30	242	63	107	83	249
Queue Length 95th (ft)	78	#729	m50	321	#159	175	150	#412
Internal Link Dist (ft)		1353		185		264		893
Turn Bay Length (ft)	200		250		190		65	
Base Capacity (vph)	245	1234	137	1116	109	390	238	382
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.45	0.95	0.48	0.70	0.79	0.42	0.52	0.87

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Queues
51: Lowrys Ln & Lancaster Ave

3/10/2015



Lane Group	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	1332	1027	77	263
v/c Ratio	0.77	0.62	0.22	0.80
Control Delay	12.0	10.7	20.1	42.3
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	12.0	10.7	20.1	42.3
Queue Length 50th (ft)	150	120	22	88
Queue Length 95th (ft)	577	176	52	#190
Internal Link Dist (ft)	1692	302	2747	520
Turn Bay Length (ft)				
Base Capacity (vph)	1739	1657	386	357
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.77	0.62	0.20	0.74

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM 2010 Signalized Intersection Summary
51: Lowrys Ln & Lancaster Ave

3/10/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	2	1201	23	15	926	4	20	36	15	99	71	72
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	1782	1800	1773	1755	1773	1900	1881	1900	1881	1863	1881
Adj Flow Rate, veh/h	2	1305	25	16	1007	4	22	39	16	108	77	78
Adj No. of Lanes	0	2	0	0	2	0	0	1	0	0	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	1	1	1	1	1	1	1	1	1	1	1	1
Cap, veh/h	61	2034	39	72	1999	8	134	204	68	193	106	90
Arrive On Green	0.61	0.61	0.61	0.61	0.61	0.61	0.19	0.19	0.19	0.19	0.19	0.19
Sat Flow, veh/h	1	3327	64	16	3269	13	304	1079	363	574	564	480
Grp Volume(v), veh/h	699	0	633	531	0	496	77	0	0	263	0	0
Grp Sat Flow(s),veh/h/ln	1781	0	1611	1702	0	1595	1746	0	0	1618	0	0
Q Serve(g_s), s	0.0	0.0	15.1	0.0	0.0	10.5	0.0	0.0	0.0	7.2	0.0	0.0
Cycle Q Clear(g_c), s	15.1	0.0	15.1	10.1	0.0	10.5	2.2	0.0	0.0	9.4	0.0	0.0
Prop In Lane	0.00		0.04	0.03		0.01	0.29		0.21	0.41		0.30
Lane Grp Cap(c), veh/h	1149	0	985	1103	0	975	406	0	0	390	0	0
V/C Ratio(X)	0.61	0.00	0.64	0.48	0.00	0.51	0.19	0.00	0.00	0.67	0.00	0.00
Avail Cap(c_a), veh/h	1149	0	985	1103	0	975	492	0	0	473	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	1.00	1.00	0.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	7.5	0.0	7.5	6.5	0.0	6.6	20.6	0.0	0.0	23.5	0.0	0.0
Incr Delay (d2), s/veh	2.4	0.0	3.2	1.5	0.0	1.9	0.2	0.0	0.0	2.9	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(-26165%),veh/ln	8.0	0.0	7.4	5.3	0.0	5.1	1.1	0.0	0.0	4.5	0.0	0.0
LnGrp Delay(d),s/veh	9.9	0.0	10.7	8.0	0.0	8.5	20.9	0.0	0.0	26.3	0.0	0.0
LnGrp LOS	A		B	A		A	C			C		
Approach Vol, veh/h		1332			1027			77			263	
Approach Delay, s/veh		10.2			8.2			20.9			26.3	
Approach LOS		B			A			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		43.2		16.8		43.2		16.8
Change Period (Y+Rc), s		6.0		5.0		6.0		5.0
Max Green Setting (Gmax), s		34.0		15.0		34.0		15.0
Max Q Clear Time (g_c+I1), s		17.1		11.4		12.5		4.2
Green Ext Time (p_c), s		9.6		0.5		10.9		1.0

Intersection Summary	
HCM 2010 Ctrl Delay	11.3
HCM 2010 LOS	B

Notes

User approved pedestrian interval to be less than phase max green.

Queues
16: Sproul Rd & Conestoga Rd

3/10/2015

Lane Group	EBL	EBT	WBL	WBT	NEL	NET	SWT
Lane Group Flow (vph)	112	825	29	606	112	227	455
v/c Ratio	0.54	1.08	0.32	0.96	0.44	0.34	1.15
Control Delay	23.5	81.1	34.8	58.3	20.6	17.3	123.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	23.5	81.1	34.8	58.3	20.6	17.3	123.9
Queue Length 50th (ft)	33	~487	12	~364	34	70	~272
Queue Length 95th (ft)	#65	#707	#43	#563	66	122	#447
Internal Link Dist (ft)		601		178		715	1701
Turn Bay Length (ft)	50		65		90		
Base Capacity (vph)	211	763	91	632	257	710	395
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.53	1.08	0.32	0.96	0.44	0.32	1.15

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM 2010 Signalized Intersection Summary
16: Sproul Rd & Conestoga Rd

3/10/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (veh/h)	106	562	221	28	527	48	106	188	28	52	296	84
Number	7	4	14	3	8	18	1	6	16	5	2	12
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1782	1782	1800	1827	1827	1845	1773	1773	1791	1809	1791	1809
Adj Flow Rate, veh/h	112	592	0	29	555	0	112	198	29	55	312	88
Adj No. of Lanes	1	1	0	1	1	0	1	1	0	0	1	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	1	1	1	1	1	1	1	1	1	1	1	1
Cap, veh/h	222	818	0	252	613	0	300	601	88	87	315	84
Arrive On Green	0.06	0.46	0.00	0.34	0.34	0.00	0.06	0.40	0.40	0.26	0.26	0.26
Sat Flow, veh/h	1697	1782	0	850	1827	0	1689	1513	222	140	1199	321
Grp Volume(v), veh/h	112	592	0	29	555	0	112	0	227	455	0	0
Grp Sat Flow(s),veh/h/ln	1697	1782	0	850	1827	0	1689	0	1734	1660	0	0
Q Serve(g_s), s	3.3	21.5	0.0	2.3	23.2	0.0	3.7	0.0	7.3	14.9	0.0	0.0
Cycle Q Clear(g_c), s	3.3	21.5	0.0	13.9	23.2	0.0	3.7	0.0	7.3	21.0	0.0	0.0
Prop In Lane	1.00		0.00	1.00		0.00	1.00		0.13	0.12		0.19
Lane Grp Cap(c), veh/h	222	818	0	252	613	0	300	0	689	486	0	0
V/C Ratio(X)	0.50	0.72	0.00	0.12	0.91	0.00	0.37	0.00	0.33	0.94	0.00	0.00
Avail Cap(c_a), veh/h	267	818	0	252	613	0	337	0	726	486	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	19.2	17.5	0.0	27.2	25.4	0.0	18.3	0.0	16.7	29.8	0.0	0.0
Incr Delay (d2), s/veh	1.8	5.5	0.0	0.9	19.4	0.0	0.8	0.0	0.3	25.7	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(-26165%),veh/ln	1.6	11.8	0.0	0.6	14.9	0.0	1.7	0.0	3.5	13.5	0.0	0.0
LnGrp Delay(d),s/veh	21.0	23.0	0.0	28.1	44.8	0.0	19.0	0.0	17.0	55.6	0.0	0.0
LnGrp LOS	C	C		C	D		B		B	E		
Approach Vol, veh/h		704			584			339			455	
Approach Delay, s/veh		22.7			43.9			17.7			55.6	
Approach LOS		C			D			B			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4		6	7	8
Phs Duration (G+Y+Rc), s	10.8	27.0		42.2		37.8	9.9	32.3
Change Period (Y+Rc), s	5.5	5.5		5.0		5.5	5.0	5.0
Max Green Setting (Gmax), s	7.0	21.5		35.5		34.0	7.0	23.5
Max Q Clear Time (g_c+I1), s	5.7	23.0		23.5		9.3	5.3	25.2
Green Ext Time (p_c), s	0.0	0.0		5.7		2.5	0.0	0.0

Intersection Summary		
HCM 2010 Ctrl Delay		35.0
HCM 2010 LOS		D

Queues
25: S Ithan Ave & Conestoga Rd

3/10/2015

Lane Group	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	686	609	42	333
v/c Ratio	0.86	0.72	0.11	0.77
Control Delay	24.3	15.9	16.3	30.5
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	24.3	15.9	16.3	30.5
Queue Length 50th (ft)	186	144	9	84
Queue Length 95th (ft)	#325	236	31	#204
Internal Link Dist (ft)	1193	2911	717	3163
Turn Bay Length (ft)				
Base Capacity (vph)	1076	1131	456	521
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.64	0.54	0.09	0.64

Intersection Summary
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM 2010 Signalized Intersection Summary
25: S Ithan Ave & Conestoga Rd

3/10/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	68	529	7	11	477	48	7	24	6	64	95	134
Number	1	6	16	5	2	12	7	4	14	3	8	18
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	1854	1836	1854	1764	1747	1764	1763	1745	1763	1844	1826	1844
Adj Flow Rate, veh/h	77	601	8	12	542	55	8	27	7	73	108	152
Adj No. of Lanes	0	1	0	0	1	0	0	1	0	0	1	0
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Percent Heavy Veh, %	1	1	1	1	1	1	1	1	1	1	1	1
Cap, veh/h	145	756	10	84	739	74	128	300	67	155	151	178
Arrive On Green	0.48	0.48	0.48	0.48	0.48	0.48	0.24	0.24	0.24	0.24	0.24	0.24
Sat Flow, veh/h	122	1579	20	10	1543	154	148	1247	279	253	629	740
Grp Volume(v), veh/h	686	0	0	609	0	0	42	0	0	333	0	0
Grp Sat Flow(s),veh/h/ln	1721	0	0	1707	0	0	1674	0	0	1622	0	0
Q Serve(g_s), s	2.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.0	0.0	0.0
Cycle Q Clear(g_c), s	15.3	0.0	0.0	13.2	0.0	0.0	0.9	0.0	0.0	9.1	0.0	0.0
Prop In Lane	0.11		0.01	0.02		0.09	0.19		0.17	0.22		0.46
Lane Grp Cap(c), veh/h	911	0	0	897	0	0	495	0	0	485	0	0
V/C Ratio(X)	0.75	0.00	0.00	0.68	0.00	0.00	0.08	0.00	0.00	0.69	0.00	0.00
Avail Cap(c_a), veh/h	1306	0	0	1307	0	0	639	0	0	635	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	9.7	0.0	0.0	13.7	0.0	0.0	16.8	0.0	0.0
Incr Delay (d2), s/veh	1.5	0.0	0.0	0.9	0.0	0.0	0.1	0.0	0.0	2.0	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(-26165%),veh/ln	7.6	0.0	0.0	6.3	0.0	0.0	0.4	0.0	0.0	4.3	0.0	0.0
LnGrp Delay(d),s/veh	11.7	0.0	0.0	10.6	0.0	0.0	13.8	0.0	0.0	18.8	0.0	0.0
LnGrp LOS	B			B			B			B		
Approach Vol, veh/h		686			609			42			333	
Approach Delay, s/veh		11.7			10.6			13.8			18.8	
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		28.7		17.6		28.7		17.6
Change Period (Y+Rc), s		6.0		6.0		6.0		6.0
Max Green Setting (Gmax), s		34.0		16.0		34.0		16.0
Max Q Clear Time (g_c+I1), s		15.2		2.9		17.3		11.1
Green Ext Time (p_c), s		5.6		1.2		5.4		0.7

Intersection Summary	
HCM 2010 Ctrl Delay	12.8
HCM 2010 LOS	B

Queues
33: Williams Rd/Garrett Ave & Conestoga Rd

3/10/2015

Lane Group	EBT	WBT	NET	SWT
Lane Group Flow (vph)	598	599	31	101
v/c Ratio	0.44	0.43	0.15	0.50
Control Delay	7.1	7.0	26.6	35.8
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	7.1	7.0	26.6	35.8
Queue Length 50th (ft)	109	108	12	40
Queue Length 95th (ft)	194	193	33	84
Internal Link Dist (ft)	1390	1278	368	1821
Turn Bay Length (ft)				
Base Capacity (vph)	1364	1394	273	258
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.44	0.43	0.11	0.39

Intersection Summary

HCM 2010 Signalized Intersection Summary
33: Williams Rd/Garrett Ave & Conestoga Rd

3/10/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		✣			✣			✣			✣	
Volume (veh/h)	27	514	9	12	510	29	17	1	11	28	12	53
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	1872	1872	1872	1872	1872	1872	1800	1800	1800	1728	1728	1728
Adj Flow Rate, veh/h	29	559	10	13	554	32	18	1	12	30	13	58
Adj No. of Lanes	0	1	0	0	1	0	0	1	0	0	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	0	0	0	0	0	0	0	0	0	0	0	0
Cap, veh/h	88	1245	22	67	1231	70	151	25	55	101	26	73
Arrive On Green	0.71	0.71	0.71	0.71	0.71	0.71	0.09	0.09	0.09	0.09	0.09	0.09
Sat Flow, veh/h	40	1750	30	13	1729	98	730	289	643	329	306	856
Grp Volume(v), veh/h	598	0	0	599	0	0	31	0	0	101	0	0
Grp Sat Flow(s),veh/h/ln	1821	0	0	1841	0	0	1662	0	0	1490	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	2.9	0.0	0.0
Cycle Q Clear(g_c), s	8.7	0.0	0.0	8.8	0.0	0.0	1.1	0.0	0.0	4.2	0.0	0.0
Prop In Lane	0.05		0.02	0.02		0.05	0.58		0.39	0.30		0.57
Lane Grp Cap(c), veh/h	1355	0	0	1367	0	0	230	0	0	200	0	0
V/C Ratio(X)	0.44	0.00	0.00	0.44	0.00	0.00	0.13	0.00	0.00	0.51	0.00	0.00
Avail Cap(c_a), veh/h	1355	0	0	1367	0	0	410	0	0	384	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	3.9	0.0	0.0	3.9	0.0	0.0	27.3	0.0	0.0	28.7	0.0	0.0
Incr Delay (d2), s/veh	1.0	0.0	0.0	1.0	0.0	0.0	0.4	0.0	0.0	2.8	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(-26165%),veh/ln	4.7	0.0	0.0	4.7	0.0	0.0	0.5	0.0	0.0	1.9	0.0	0.0
LnGrp Delay(d),s/veh	5.0	0.0	0.0	5.0	0.0	0.0	27.6	0.0	0.0	31.5	0.0	0.0
LnGrp LOS	A			A			C			C		
Approach Vol, veh/h		598			599			31			101	
Approach Delay, s/veh		5.0			5.0			27.6			31.5	
Approach LOS		A			A			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		52.0		11.9		52.0		11.9
Change Period (Y+Rc), s		6.0		6.0		6.0		6.0
Max Green Setting (Gmax), s		46.0		14.0		46.0		14.0
Max Q Clear Time (g_c+I1), s		10.7		6.2		10.8		3.1
Green Ext Time (p_c), s		5.9		0.3		5.9		0.4

Intersection Summary	
HCM 2010 Ctrl Delay	7.5
HCM 2010 LOS	A

Notes

User approved pedestrian interval to be less than phase max green.

Queues
3: County Line Rd & Spring Mill Rd

3/10/2015

Lane Group	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	561	458	413	587
v/c Ratio	1.00	0.98	0.79	0.99
Control Delay	60.9	59.8	28.8	56.7
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	60.9	59.8	28.8	56.7
Queue Length 50th (ft)	~190	153	119	199
Queue Length 95th (ft)	#386	#313	#178	#393
Internal Link Dist (ft)	3088	1481	1821	1084
Turn Bay Length (ft)				
Base Capacity (vph)	559	466	522	591
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	1.00	0.98	0.79	0.99

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	65	310	109	65	248	53	70	203	44	66	387	45
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	1789	1800	1800	1767	1800	1800	1800	1800	1800	1773	1800
Adj Flow Rate, veh/h	90	344	127	90	285	83	86	260	67	87	435	65
Adj No. of Lanes	0	1	0	0	1	0	0	1	0	0	1	0
Peak Hour Factor	0.72	0.90	0.86	0.72	0.87	0.64	0.81	0.78	0.66	0.76	0.89	0.69
Percent Heavy Veh, %	1	1	1	3	3	3	0	0	0	1	1	1
Cap, veh/h	139	397	136	145	371	98	147	374	87	135	487	69
Arrive On Green	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39
Sat Flow, veh/h	175	1005	345	185	939	249	192	963	224	171	1254	177
Grp Volume(v), veh/h	561	0	0	458	0	0	413	0	0	587	0	0
Grp Sat Flow(s),veh/h/ln	1526	0	0	1372	0	0	1379	0	0	1602	0	0
Q Serve(g_s), s	3.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.4	0.0	0.0
Cycle Q Clear(g_c), s	21.2	0.0	0.0	17.9	0.0	0.0	14.8	0.0	0.0	21.2	0.0	0.0
Prop In Lane	0.16		0.23	0.20		0.18	0.21		0.16	0.15		0.11
Lane Grp Cap(c), veh/h	672	0	0	614	0	0	608	0	0	691	0	0
V/C Ratio(X)	0.83	0.00	0.00	0.75	0.00	0.00	0.68	0.00	0.00	0.85	0.00	0.00
Avail Cap(c_a), veh/h	672	0	0	614	0	0	637	0	0	723	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)	0.44	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	17.1	0.0	0.0	15.8	0.0	0.0	15.2	0.0	0.0	17.5	0.0	0.0
Incr Delay (d2), s/veh	5.6	0.0	0.0	8.1	0.0	0.0	2.2	0.0	0.0	8.5	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(-26165%),veh/ln	9.9	0.0	0.0	8.1	0.0	0.0	6.1	0.0	0.0	10.9	0.0	0.0
LnGrp Delay(d),s/veh	22.7	0.0	0.0	23.8	0.0	0.0	17.4	0.0	0.0	26.0	0.0	0.0
LnGrp LOS	C			C			B			C		
Approach Vol, veh/h		561			458			413			587	
Approach Delay, s/veh		22.7			23.8			17.4			26.0	
Approach LOS		C			C			B			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		30.2		29.8		30.2		29.8
Change Period (Y+Rc), s		6.0		6.0		6.0		6.0
Max Green Setting (Gmax), s		23.0		25.0		23.0		25.0
Max Q Clear Time (g_c+I1), s		23.2		23.2		19.9		16.8
Green Ext Time (p_c), s		0.0		0.6		1.5		1.8

Intersection Summary	
HCM 2010 Ctrl Delay	22.8
HCM 2010 LOS	C

Intersection	
Int Delay, s/veh	1.7

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	1268	48	49	940	0	38
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, %	-3	-	-	3	0	-
Peak Hour Factor	82	82	82	82	82	82
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	1546	59	60	1146	0	46

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	1605	0	2269	802
Stage 1	-	-	-	-	1576	-
Stage 2	-	-	-	-	693	-
Critical Hdwy	-	-	4.1	-	6.8	6.9
Critical Hdwy Stg 1	-	-	-	-	5.8	-
Critical Hdwy Stg 2	-	-	-	-	5.8	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	413	-	35	331
Stage 1	-	-	-	-	159	-
Stage 2	-	-	-	-	463	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	413	-	21	331
Mov Cap-2 Maneuver	-	-	-	-	21	-
Stage 1	-	-	-	-	159	-
Stage 2	-	-	-	-	278	-

Approach	EB	WB	NB
HCM Control Delay, s	0	3.4	17.6
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	331	-	-	413	-
HCM Lane V/C Ratio	0.14	-	-	0.145	-
HCM Control Delay (s)	17.6	-	-	15.2	2.8
HCM Lane LOS	C	-	-	C	A
HCM 95th %tile Q(veh)	0.5	-	-	0.5	-

Intersection	
Int Delay, s/veh	0.6

Movement	EBL	EBT	WBT	WBR	SWL	SWR
Vol, veh/h	10	670	623	3	18	9
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	96	96	96	96	96	96
Heavy Vehicles, %	1	1	1	1	1	1
Mvmt Flow	10	698	649	3	19	9

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	652	0	-	0	1370	651
Stage 1	-	-	-	-	651	-
Stage 2	-	-	-	-	719	-
Critical Hdwy	4.11	-	-	-	6.41	6.21
Critical Hdwy Stg 1	-	-	-	-	5.41	-
Critical Hdwy Stg 2	-	-	-	-	5.41	-
Follow-up Hdwy	2.209	-	-	-	3.509	3.309
Pot Cap-1 Maneuver	939	-	-	-	162	470
Stage 1	-	-	-	-	521	-
Stage 2	-	-	-	-	484	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	939	-	-	-	159	470
Mov Cap-2 Maneuver	-	-	-	-	159	-
Stage 1	-	-	-	-	521	-
Stage 2	-	-	-	-	476	-

Approach	EB	WB	SW
HCM Control Delay, s	0.1	0	25.4
HCM LOS			D

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SWLn1
Capacity (veh/h)	939	-	-	-	204
HCM Lane V/C Ratio	0.011	-	-	-	0.138
HCM Control Delay (s)	8.9	0	-	-	25.4
HCM Lane LOS	A	A	-	-	D
HCM 95th %tile Q(veh)	0	-	-	-	0.5

Intersection	
Int Delay, s/veh	2.7

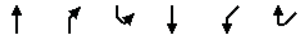
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	37	520	18	18	479	17	15	8	18	9	18	54
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	96	96	96	96	96	96	96	96	96	96	96	96
Heavy Vehicles, %	1	1	1	1	1	1	1	1	1	1	1	1
Mvmt Flow	39	542	19	19	499	18	16	8	19	9	19	56

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	517	0	0	560	0	0	1211	1182	551	1187	1183	508
Stage 1	-	-	-	-	-	-	628	628	-	545	545	-
Stage 2	-	-	-	-	-	-	583	554	-	642	638	-
Critical Hdwy	4.11	-	-	4.11	-	-	7.11	6.51	6.21	7.11	6.51	6.21
Critical Hdwy Stg 1	-	-	-	-	-	-	6.11	5.51	-	6.11	5.51	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.11	5.51	-	6.11	5.51	-
Follow-up Hdwy	2.209	-	-	2.209	-	-	3.509	4.009	3.309	3.509	4.009	3.309
Pot Cap-1 Maneuver	1054	-	-	1016	-	-	160	191	536	166	190	567
Stage 1	-	-	-	-	-	-	472	477	-	524	520	-
Stage 2	-	-	-	-	-	-	500	515	-	464	472	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1054	-	-	1016	-	-	124	176	536	145	175	567
Mov Cap-2 Maneuver	-	-	-	-	-	-	124	176	-	145	175	-
Stage 1	-	-	-	-	-	-	447	451	-	496	506	-
Stage 2	-	-	-	-	-	-	422	502	-	416	447	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.5	0.3	27.1	20.8
HCM LOS			D	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	205	1054	-	-	1016	-	-	311
HCM Lane V/C Ratio	0.208	0.037	-	-	0.018	-	-	0.271
HCM Control Delay (s)	27.1	8.5	0	-	8.6	0	-	20.8
HCM Lane LOS	D	A	A	-	A	A	-	C
HCM 95th %tile Q(veh)	0.8	0.1	-	-	0.1	-	-	1.1

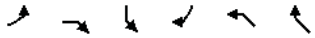
Lanes, Volumes, Timings
38: County Line Rd & N Ithan Ave 3/10/2015



Lane Group	NBT	NBR	SBL	SBT	SWL	SWR
Lane Configurations						
Volume (vph)	273	123	185	504	135	63
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.958				0.957	
Flt Protected				0.987	0.967	
Satd. Flow (prot)	1802	0	0	1857	1741	0
Flt Permitted				0.987	0.967	
Satd. Flow (perm)	1802	0	0	1857	1741	0
Link Speed (mph)	30			30	30	
Link Distance (ft)	295			1901	824	
Travel Time (s)	6.7			43.2	18.7	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%
Adj. Flow (vph)	290	131	197	536	144	67
Shared Lane Traffic (%)						
Lane Group Flow (vph)	421	0	0	733	211	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	0			0	12	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	10			10	10	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)		9	15		15	9
Sign Control	Free			Stop	Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	79.9%	ICU Level of Service	D
Analysis Period (min)	15		

Lanes, Volumes, Timings
2: County Line Rd & N Ithan Ave 3/10/2015



Lane Group	EBL	EBR	SBL	SBR	NWL	NWR
Lane Configurations						
Volume (vph)	230	37	306	336	24	164
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.981		0.929		0.883	
Flt Protected	0.959		0.977		0.994	
Satd. Flow (prot)	1763	0	1707	0	1651	0
Flt Permitted	0.959		0.977		0.994	
Satd. Flow (perm)	1763	0	1707	0	1651	0
Link Speed (mph)	30		30		30	
Link Distance (ft)	973		295		2014	
Travel Time (s)	22.1		6.7		45.8	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%
Bus Blockages (#/hr)	1	0	0	0	0	0
Adj. Flow (vph)	245	39	326	357	26	174
Shared Lane Traffic (%)						
Lane Group Flow (vph)	284	0	683	0	200	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Right
Median Width(ft)	22		12		12	
Link Offset(ft)	0		0		0	
Crosswalk Width(ft)	10		10		10	
Two way Left Turn Lane						
Headway Factor	1.01	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9	15	9	15	9
Sign Control	Stop		Free		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	74.0%	ICU Level of Service	D
Analysis Period (min)	15		

Intersection	
Int Delay, s/veh	1.5

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	17	19	53	185	158	126
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	0	0	0	0
Mvmt Flow	18	20	55	193	165	131

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	533	230	296	0	-	0
Stage 1	230	-	-	-	-	-
Stage 2	303	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	511	814	1277	-	-	-
Stage 1	813	-	-	-	-	-
Stage 2	754	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	486	814	1277	-	-	-
Mov Cap-2 Maneuver	486	-	-	-	-	-
Stage 1	813	-	-	-	-	-
Stage 2	718	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	11.2	1.8	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1277	-	617	-	-
HCM Lane V/C Ratio	0.043	-	0.061	-	-
HCM Control Delay (s)	7.9	0	11.2	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0.1	-	0.2	-	-

Intersection	
Int Delay, s/veh	3.6

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	171	218	349	17	12	120
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	98	98	98	98	98	98
Heavy Vehicles, %	1	1	1	1	1	1
Mvmt Flow	174	222	356	17	12	122

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	373	0	-	0	936	365
Stage 1	-	-	-	-	365	-
Stage 2	-	-	-	-	571	-
Critical Hdwy	4.11	-	-	-	6.41	6.21
Critical Hdwy Stg 1	-	-	-	-	5.41	-
Critical Hdwy Stg 2	-	-	-	-	5.41	-
Follow-up Hdwy	2.209	-	-	-	3.509	3.309
Pot Cap-1 Maneuver	1191	-	-	-	295	682
Stage 1	-	-	-	-	704	-
Stage 2	-	-	-	-	567	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1191	-	-	-	246	682
Mov Cap-2 Maneuver	-	-	-	-	246	-
Stage 1	-	-	-	-	704	-
Stage 2	-	-	-	-	472	-

Approach	EB	WB	SB
HCM Control Delay, s	3.8	0	13
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1191	-	-	-	587
HCM Lane V/C Ratio	0.147	-	-	-	0.229
HCM Control Delay (s)	8.5	0	-	-	13
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.5	-	-	-	0.9

Intersection	
Int Delay, s/veh	3.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	37	26	1	9	26	11	4	518	29	11	662	61
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	1	1	1	1	1	1	1	1	1	1	1	1
Mvmt Flow	39	27	1	9	27	12	4	545	31	12	697	64

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1047	1336	381	954	1353	288	761	0	0	576	0	0
Stage 1	752	752	-	569	569	-	-	-	-	-	-	-
Stage 2	295	584	-	385	784	-	-	-	-	-	-	-
Critical Hdwy	7.52	6.52	6.92	7.52	6.52	6.92	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.52	5.52	-	6.52	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.52	5.52	-	6.52	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.51	4.01	3.31	3.51	4.01	3.31	2.21	-	-	2.21	-	-
Pot Cap-1 Maneuver	184	154	620	215	150	712	853	-	-	1000	-	-
Stage 1	371	418	-	477	507	-	-	-	-	-	-	-
Stage 2	692	499	-	613	405	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	152	150	620	181	146	712	853	-	-	1000	-	-
Mov Cap-2 Maneuver	152	150	-	181	146	-	-	-	-	-	-	-
Stage 1	368	409	-	474	503	-	-	-	-	-	-	-
Stage 2	639	496	-	559	396	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	45.8	30.5	0.1	0.2
HCM LOS	E	D		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	853	-	-	153	189	1000	-	-
HCM Lane V/C Ratio	0.005	-	-	0.44	0.256	0.012	-	-
HCM Control Delay (s)	9.2	0	-	45.8	30.5	8.6	0.1	-
HCM Lane LOS	A	A	-	E	D	A	A	-
HCM 95th %tile Q(veh)	0	-	-	2	1	0	-	-

Intersection	
Int Delay, s/veh	2.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	35	150	5	51	288	22	8	3	37	4	0	13
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	91	91	91	91	91	91	91	91	91	91	91	91
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	38	165	5	56	316	24	9	3	41	4	0	14

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	341	0	0	170	0	0	693	698	168	707	688	329
Stage 1	-	-	-	-	-	-	245	245	-	441	441	-
Stage 2	-	-	-	-	-	-	448	453	-	266	247	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1218	-	-	1407	-	-	358	364	876	350	369	712
Stage 1	-	-	-	-	-	-	759	703	-	595	577	-
Stage 2	-	-	-	-	-	-	590	570	-	739	702	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1218	-	-	1407	-	-	329	334	876	311	339	712
Mov Cap-2 Maneuver	-	-	-	-	-	-	329	334	-	311	339	-
Stage 1	-	-	-	-	-	-	733	679	-	575	549	-
Stage 2	-	-	-	-	-	-	550	542	-	677	678	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	1.5	1.1	11.2	11.8
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	635	1218	-	-	1407	-	-	546
HCM Lane V/C Ratio	0.083	0.032	-	-	0.04	-	-	0.034
HCM Control Delay (s)	11.2	8.1	0	-	7.7	0	-	11.8
HCM Lane LOS	B	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	0.3	0.1	-	-	0.1	-	-	0.1

Intersection	
Int Delay, s/veh	0.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	1206	64	0	870	0	15
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	125	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	-2	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	1311	70	0	946	0	16

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	1311	0	1784	655
Stage 1	-	-	-	-	1311	-
Stage 2	-	-	-	-	473	-
Critical Hdwy	-	-	4.14	-	6.84	6.94
Critical Hdwy Stg 1	-	-	-	-	5.84	-
Critical Hdwy Stg 2	-	-	-	-	5.84	-
Follow-up Hdwy	-	-	2.22	-	3.52	3.32
Pot Cap-1 Maneuver	-	-	524	-	73	409
Stage 1	-	-	-	-	216	-
Stage 2	-	-	-	-	593	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	524	-	73	409
Mov Cap-2 Maneuver	-	-	-	-	73	-
Stage 1	-	-	-	-	216	-
Stage 2	-	-	-	-	593	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	14.2
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	409	-	-	524	-
HCM Lane V/C Ratio	0.04	-	-	-	-
HCM Control Delay (s)	14.2	-	-	0	-
HCM Lane LOS	B	-	-	A	-
HCM 95th %tile Q(veh)	0.1	-	-	0	-

Intersection	
Int Delay, s/veh	0.9

Movement	SET	SER	NWL	NWT	NEL	NER
Vol, veh/h	1091	72	47	800	0	91
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	100	75	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	3	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	1186	78	51	870	0	99

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	1186	0	1723	593
Stage 1	-	-	-	-	1186	-
Stage 2	-	-	-	-	537	-
Critical Hdwy	-	-	4.14	-	6.84	6.94
Critical Hdwy Stg 1	-	-	-	-	5.84	-
Critical Hdwy Stg 2	-	-	-	-	5.84	-
Follow-up Hdwy	-	-	2.22	-	3.52	3.32
Pot Cap-1 Maneuver	-	-	585	-	80	449
Stage 1	-	-	-	-	252	-
Stage 2	-	-	-	-	550	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	585	-	73	449
Mov Cap-2 Maneuver	-	-	-	-	73	-
Stage 1	-	-	-	-	252	-
Stage 2	-	-	-	-	502	-

Approach	SE	NW	NE
HCM Control Delay, s	0	0.7	15.3
HCM LOS			C

Minor Lane/Major Mvmt	NELn1	NWL	NWT	SET	SER
Capacity (veh/h)	449	585	-	-	-
HCM Lane V/C Ratio	0.22	0.087	-	-	-
HCM Control Delay (s)	15.3	11.7	-	-	-
HCM Lane LOS	C	B	-	-	-
HCM 95th %tile Q(veh)	0.8	0.3	-	-	-

HCM 2010 TWSC
76: Pike Garage & S Ithan Ave & LAH Drive 3/10/2015

Intersection	
Int Delay, s/veh	8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	SBL	SBR	NWU	NWL	NWR
Vol, veh/h	16	132	43	71	279	1	55	14	59	55	120
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	None	-	-	-
Storage Length	-	-	-	50	-	-	0	-	-	0	-
Veh in Median Storage, #	-	0	-	-	0	-	0	-	-	0	-
Grade, %	-	1	-	-	-1	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	17	143	47	77	303	1	60	15	64	60	130

Major/Minor	Major1			Major2			Minor2		Minor1		
Conflicting Flow All	304	0	0	190	0	0	725	304	0	698	167
Stage 1	-	-	-	-	-	-	458	-	0	202	-
Stage 2	-	-	-	-	-	-	267	-	0	496	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.22	-	7.12	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	-	-	6.12	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	-	-	6.12	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	3.318	-	3.518	3.318
Pot Cap-1 Maneuver	1257	-	-	1384	-	-	340	736	0	355	877
Stage 1	-	-	-	-	-	-	583	-	0	800	-
Stage 2	-	-	-	-	-	-	738	-	0	556	-
Platoon blocked, %		-	-		-	-			-		
Mov Cap-1 Maneuver	1257	-	-	1384	-	-	231	736	0	286	877
Mov Cap-2 Maneuver	-	-	-	-	-	-	231	-	0	286	-
Stage 1	-	-	-	-	-	-	574	-	0	788	-
Stage 2	-	-	-	-	-	-	596	-	0	457	-

Approach	EB	WB	SB	NW
HCM Control Delay, s	0.7	1.6	16.9	20.9
HCM LOS			C	C

Minor Lane/Major Mvmt	NWLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	286	1257	-	-	1384	-	-	380
HCM Lane V/C Ratio	0.209	0.014	-	-	0.056	-	-	0.203
HCM Control Delay (s)	20.9	7.9	0	-	7.8	-	-	16.9
HCM Lane LOS	C	A	A	-	A	-	-	C
HCM 95th %tile Q(veh)	0.8	0	-	-	0.2	-	-	0.8

Lanes, Volumes, Timings
7: Sproul Rd/Spring Mill Rd & Aldwyn Ln/Kenilworth Rd & Lancaster Ave 3/9/2015

Lane Group	EBL2	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR	WBR2	NBL2	NBL
Lane Configurations												
Volume (vph)	2	224	850	84	219	4	11	974	1	13	3	49
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width (ft)	10	10	11	11	14	10	12	12	12	12	10	10
Grade (%)			3%					-2%				
Storage Length (ft)		300		0			75		0			0
Storage Lanes		1		1			1		0			0
Taper Length (ft)		25					25					25
Lane Util. Factor	0.95	1.00	0.95	0.95	1.00	0.95	1.00	0.95	0.95	0.95	1.00	1.00
Frt			0.986		0.850			0.998				
Flt Protected		0.950					0.950					
Satd. Flow (prot)	0	1497	3058	0	1531	0	1645	3283	0	0	0	0
Flt Permitted		0.074					0.284					
Satd. Flow (perm)	0	117	3058	0	1531	0	492	3283	0	0	0	0
Right Turn on Red					Yes					Yes		
Satd. Flow (RTOR)					202			1				
Link Speed (mph)			35					35				
Link Distance (ft)			577					903				
Travel Time (s)			11.2					17.6				
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Adj. Flow (vph)	2	233	885	88	228	4	11	1015	1	14	3	51
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	235	973	0	228	0	15	1030	0	0	0	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Right	Left	Left	Left	Right	Right	Left	Left
Median Width(ft)			12					12				
Link Offset(ft)			0					0				
Crosswalk Width(ft)			10					10				
Two way Left Turn Lane												
Headway Factor	1.19	1.19	1.14	1.14	1.01	1.16	1.06	1.06	1.06	1.06	1.18	1.18
Turning Speed (mph)	15	15		9	9	15	15		9	9	15	15
Number of Detectors	1	1	1		0	1	1	1			1	1
Detector Template	Left	Left	Thru		Right	Left	Left	Thru			Left	Left
Leading Detector (ft)	20	37	37		0	20	37	37			20	20
Trailing Detector (ft)	0	-3	-3		0	0	-3	-3			0	0
Detector 1 Position(ft)	0	-3	-3		0	0	-3	-3			0	0
Detector 1 Size(ft)	20	40	40		37	20	40	40			20	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex			Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0		0.0	0.0	0.0	0.0			0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0		0.0	0.0	0.0	0.0			0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0		0.0	0.0	0.0	0.0			0.0	0.0
Turn Type	pm+pt	pm+pt	NA		Perm	Perm	Perm	NA			Perm	Perm
Protected Phases	5	5	2					6				
Permitted Phases	2	2			2	6	6				10	10
Detector Phase	5	5	2		2	6	6	6			10	10
Switch Phase												
Minimum Initial (s)	3.0	3.0	15.0		15.0	15.0	15.0	15.0			3.0	3.0

Lane Group	NBT	NBR	SBT	SBR	SBR2	NEL2	NEL	NET	NER	NER2	SWL2	SWL
Lane Configurations												
Volume (vph)	0	8	1	3	12	182	0	194	50	9	19	8
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width (ft)	10	10	10	10	10	12	12	11	11	11	10	10
Grade (%)	1%		-3%					3%				
Storage Length (ft)		0		0			200		0			150
Storage Lanes		0		0			1		0			1
Taper Length (ft)							25					25
Lane Util. 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
Frt	0.983		0.873					0.965				
Flt Protected	0.958						0.950					0.950
Satd. Flow (prot)	1499	0	1418	0	0	0	1604	1575	0	0	0	1573
Flt Permitted	0.742						0.171					0.597
Satd. Flow (perm)	1161	0	1418	0	0	0	289	1575	0	0	0	989
Right Turn on Red					No					No		
Satd. Flow (RTOR)												
Link Speed (mph)	25		25					40				
Link Distance (ft)	492		597					1336				
Travel Time (s)	13.4		16.3					22.8				
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Adj. Flow (vph)	0	8	1	3	12	190	0	202	52	9	20	8
Shared Lane Traffic (%)												
Lane Group Flow (vph)	62	0	16	0	0	0	190	263	0	0	0	28
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Right	Left	Left	Left	Right	Right	Left	Left
Median Width(ft)	0		0					12				
Link Offset(ft)	0		0					0				
Crosswalk Width(ft)	10		10					10				
Two way Left Turn Lane												
Headway Factor	1.18	1.18	1.15	1.15	1.15	1.09	1.09	1.14	1.14	1.14	1.12	1.12
Turning Speed (mph)		9		9	9	15	15		9	9	15	15
Number of Detectors	1		1			1	1	1			1	1
Detector Template	Thru		Thru			Left	Left	Thru			Left	Left
Leading Detector (ft)	37		37			20	37	37			20	37
Trailing Detector (ft)	-3		-3			0	-3	-3			0	-3
Detector 1 Position(ft)	-3		-3			0	-3	-3			0	-3
Detector 1 Size(ft)	40		40			20	40	40			20	40
Detector 1 Type	Cl+Ex		Cl+Ex			Cl+Ex	Cl+Ex	Cl+Ex			Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0		0.0			0.0	0.0	0.0			0.0	0.0
Detector 1 Queue (s)	0.0		0.0			0.0	0.0	0.0			0.0	0.0
Detector 1 Delay (s)	0.0		0.0			0.0	0.0	0.0			0.0	0.0
Turn Type	NA		NA			pm+pt	pm+pt	NA			Perm	Perm
Protected Phases	10		9			3	3	8				
Permitted Phases						8	8				4	4
Detector Phase	10		9			3	3	8			4	4
Switch Phase												
Minimum Initial (s)	3.0		3.0			3.0	3.0	3.0			3.0	3.0

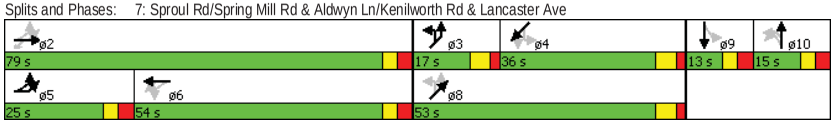
Lane Group	SWT	SWR
Lane Configurations		
Volume (vph)	134	155
Ideal Flow (vphpl)	1800	1800
Lane Width (ft)	10	10
Grade (%)	-7%	
Storage Length (ft)		0
Storage Lanes		0
Taper Length (ft)		
Lane Util. Factor	1.00	1.00
Frt	0.920	
Flt Protected		
Satd. Flow (prot)	1524	0
Flt Permitted		
Satd. Flow (perm)	1524	0
Right Turn on Red		
Satd. Flow (RTOR)		
Link Speed (mph)	25	
Link Distance (ft)	3168	
Travel Time (s)	86.4	
Peak Hour Factor	0.96	0.96
Heavy Vehicles (%)	5%	5%
Adj. Flow (vph)	140	161
Shared Lane Traffic (%)		
Lane Group Flow (vph)	301	0
Enter Blocked Intersection	No	No
Lane Alignment	Left	Right
Median Width(ft)	12	
Link Offset(ft)	0	
Crosswalk Width(ft)	10	
Two way Left Turn Lane		
Headway Factor	1.12	1.12
Turning Speed (mph)		9
Number of Detectors	1	
Detector Template	Thru	
Leading Detector (ft)	37	
Trailing Detector (ft)	-3	
Detector 1 Position(ft)	-3	
Detector 1 Size(ft)	40	
Detector 1 Type	Cl+Ex	
Detector 1 Channel		
Detector 1 Extend (s)	0.0	
Detector 1 Queue (s)	0.0	
Detector 1 Delay (s)	0.0	
Turn Type	NA	
Protected Phases	4	
Permitted Phases		
Detector Phase	4	
Switch Phase		
Minimum Initial (s)	3.0	

Lane Group	EBL2	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR	WBR2	NBL2	NBL
Minimum Split (s)	13.0	13.0	21.0		21.0	21.0	21.0	21.0			13.0	13.0
Total Split (s)	25.0	25.0	79.0		79.0	54.0	54.0	54.0			15.0	15.0
Total Split (%)	15.6%	15.6%	49.4%		49.4%	33.8%	33.8%	33.8%			9.4%	9.4%
Maximum Green (s)	19.0	19.0	73.0		73.0	48.0	48.0	48.0			9.0	9.0
Yellow Time (s)	3.0	3.0	3.0		3.0	3.0	3.0	3.0			3.0	3.0
All-Red Time (s)	3.0	3.0	3.0		3.0	3.0	3.0	3.0			3.0	3.0
Lost Time Adjust (s)		0.5	0.5		0.5		0.5	0.5				
Total Lost Time (s)		6.5	6.5		6.5		6.5	6.5				
Lead/Lag	Lead	Lead				Lag	Lag	Lag			Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0	3.0	3.0			3.0	3.0
Recall Mode	None	None	Max		Max	None	None	None			None	None
Walk Time (s)			7.0		7.0	7.0	7.0	7.0				
Flash Dont Walk (s)			20.0		20.0	20.0	20.0	20.0				
Pedestrian Calls (#/hr)			0		0	0	0	0				
Act Effct Green (s)		72.6	72.6		72.6		47.6	47.6				
Actuated g/C Ratio		0.48	0.48		0.48		0.31	0.31				
v/c Ratio		1.05	0.67		0.27		0.10	1.00				
Control Delay		117.1	34.0		5.4		41.9	80.3				
Queue Delay		0.0	0.0		0.0		0.0	0.0				
Total Delay		117.1	34.0		5.4		41.9	80.3				
LOS		F	C		A		D	F				
Approach Delay			43.1					79.7				
Approach LOS			D					E				
Queue Length 50th (ft)		~193	357		13		10	512				
Queue Length 95th (ft)		#422	507		67		33	#760				
Internal Link Dist (ft)			497					823				
Turn Bay Length (ft)		300					75					
Base Capacity (vph)		223	1459		836		153	1027				
Starvation Cap Reductn		0	0		0		0	0				
Spillback Cap Reductn		0	0		0		0	0				
Storage Cap Reductn		0	0		0		0	0				
Reduced v/c Ratio		1.05	0.67		0.27		0.10	1.00				

Intersection Summary			
Area Type:	Other		
Cycle Length: 160			
Actuated Cycle Length: 152.2			
Natural Cycle: 150			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 1.06			
Intersection Signal Delay: 69.2		Intersection LOS: E	
Intersection Capacity Utilization 107.5%		ICU Level of Service G	
Analysis Period (min) 15			

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 7: Sproul Rd/Spring Mill Rd & Aldwyn Ln/Kenilworth Rd & Lancaster Ave



Lane Group	NBT	NBR	SBT	SBR	SBR2	NEL2	NEL	NET	NER	NER2	SWL2	SWL
Minimum Split (s)	13.0		13.0			13.0	13.0	13.0			13.0	13.0
Total Split (s)	15.0		13.0			17.0	17.0	53.0			36.0	36.0
Total Split (%)	9.4%		8.1%			10.6%	10.6%	33.1%			22.5%	22.5%
Maximum Green (s)	9.0		7.0			11.0	11.0	47.0			30.0	30.0
Yellow Time (s)	3.0		3.0			4.0	4.0	4.0			4.0	4.0
All-Red Time (s)	3.0		3.0			2.0	2.0	2.0			2.0	2.0
Lost Time Adjust (s)	0.5		0.5				0.5	0.5				0.5
Total Lost Time (s)	6.5		6.5				6.5	6.5				6.5
Lead/Lag	Lag		Lead			Lead	Lead				Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0		3.0			3.0	3.0	3.0			3.0	3.0
Recall Mode	None		None			None	None	None			None	None
Walk Time (s)								7.0				
Flash Dont Walk (s)								25.0				
Pedestrian Calls (#/hr)								0				
Act Effct Green (s)	8.5		6.1				46.6	46.6				29.6
Actuated g/C Ratio	0.06		0.04				0.31	0.31				0.19
v/c Ratio	0.95		0.29				1.06	0.55				0.15
Control Delay	170.3		86.1				127.5	50.1				55.4
Queue Delay	0.0		0.0				0.0	0.0				0.0
Total Delay	170.3		86.1				127.5	50.1				55.4
LOS	F		F				F	D				E
Approach Delay	170.3		86.1					82.6				
Approach LOS	F		F					F				
Queue Length 50th (ft)	60		15				~147	207				22
Queue Length 95th (ft)	#174		44				#323	337				57
Internal Link Dist (ft)	412		517					1256				
Turn Bay Length (ft)							200					150
Base Capacity (vph)	65		60				179	482				192
Starvation Cap Reductn	0		0				0	0				0
Spillback Cap Reductn	0		0				0	0				0
Storage Cap Reductn	0		0				0	0				0
Reduced v/c Ratio	0.95		0.27				1.06	0.55				0.15

Intersection Summary

Lane Group	SWT	SWR
Minimum Split (s)	13.0	
Total Split (s)	36.0	
Total Split (%)	22.5%	
Maximum Green (s)	30.0	
Yellow Time (s)	4.0	
All-Red Time (s)	2.0	
Lost Time Adjust (s)	0.5	
Total Lost Time (s)	6.5	
Lead/Lag	Lag	
Lead-Lag Optimize?		
Vehicle Extension (s)	3.0	
Recall Mode	None	
Walk Time (s)		
Flash Dont Walk (s)		
Pedestrian Calls (#/hr)		
Act Effct Green (s)	29.6	
Actuated g/C Ratio	0.19	
v/c Ratio	1.02	
Control Delay	116.7	
Queue Delay	0.0	
Total Delay	116.7	
LOS	F	
Approach Delay	111.5	
Approach LOS	F	
Queue Length 50th (ft)	290	
Queue Length 95th (ft)	#545	
Internal Link Dist (ft)	3088	
Turn Bay Length (ft)		
Base Capacity (vph)	295	
Starvation Cap Reductn	0	
Spillback Cap Reductn	0	
Storage Cap Reductn	0	
Reduced v/c Ratio	1.02	

Intersection Summary

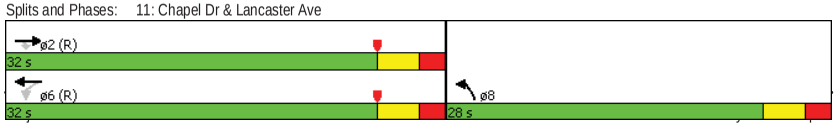
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	935	28	44	986	17	2
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width (ft)	11	11	11	11	12	12
Storage Length (ft)		125	125		0	0
Storage Lanes		1	1		2	0
Taper Length (ft)			25		25	
Lane Util. Factor	0.95	1.00	1.00	0.95	0.97	0.95
Frt		0.850			0.985	
Flt Protected			0.950		0.957	
Satd. Flow (prot)	3241	1450	1621	3241	3227	0
Flt Permitted			0.282		0.957	
Satd. Flow (perm)	3241	1450	481	3241	3227	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		30			2	
Link Speed (mph)	35			35	25	
Link Distance (ft)	540			1447	319	
Travel Time (s)	10.5			28.2	8.7	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1016	30	48	1072	18	2
Shared Lane Traffic (%)						
Lane Group Flow (vph)	1016	30	48	1072	20	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	11			11	24	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	10			10	10	
Two way Left Turn Lane						
Headway Factor	1.12	1.12	1.12	1.12	1.07	1.07
Turning Speed (mph)		9	15		15	9
Number of Detectors	1	1	1	1	1	
Detector Template	Thru	Right	Left	Thru	Left	
Leading Detector (ft)	37	20	20	37	37	
Trailing Detector (ft)	-3	0	0	-3	-3	
Detector 1 Position(ft)	-3	0	0	-3	-3	
Detector 1 Size(ft)	40	20	20	40	40	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	
Turn Type	NA	Perm	Perm	NA	Prot	
Protected Phases	2			6	8	
Permitted Phases		2	6			
Detector Phase	2	2	6	6	8	
Switch Phase						
Minimum Initial (s)	10.0	10.0	10.0	10.0	4.0	
Minimum Split (s)	21.0	21.0	21.0	21.0	28.0	
Total Split (s)	32.0	32.0	32.0	32.0	28.0	

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Total Split (%)	53.3%	53.3%	53.3%	53.3%	46.7%	
Maximum Green (s)	27.0	27.0	27.0	27.0	23.0	
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	0.5	0.5	0.5	0.5	0.5	
Total Lost Time (s)	5.5	5.5	5.5	5.5	5.5	
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Recall Mode	C-Max	C-Max	C-Max	C-Max	None	
Walk Time (s)	10.0	10.0	10.0	10.0	7.0	
Flash Dont Walk (s)	0.0	0.0	0.0	0.0	16.0	
Pedestrian Calls (#/hr)	0	0	0	0	0	
Act Effct Green (s)	56.6	56.6	56.6	56.6	5.5	
Actuated g/C Ratio	0.94	0.94	0.94	0.94	0.09	
v/c Ratio	0.33	0.02	0.11	0.35	0.07	
Control Delay	1.4	0.8	2.7	2.9	23.6	
Queue Delay	0.0	0.0	0.0	0.0	0.0	
Total Delay	1.4	0.8	2.7	2.9	23.6	
LOS	A	A	A	A	C	
Approach Delay	1.4			2.9	23.6	
Approach LOS	A			A	C	
Queue Length 50th (ft)	0	0	0	0	3	
Queue Length 95th (ft)	86	5	m17	346	11	
Internal Link Dist (ft)	460			1367	239	
Turn Bay Length (ft)		125	125			
Base Capacity (vph)	3055	1368	453	3055	1211	
Starvation Cap Reductn	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	
Reduced v/c Ratio	0.33	0.02	0.11	0.35	0.02	

Intersection Summary

Area Type: Other
Cycle Length: 60
Actuated Cycle Length: 60
Offset: 55 (92%), Referenced to phase 2:EBT and 6:WBTL, Start of Yellow
Natural Cycle: 55
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.35
Intersection Signal Delay: 2.3 Intersection LOS: A
Intersection Capacity Utilization 51.1% ICU Level of Service A
Analysis Period (min) 15
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 11: Chapel Dr & Lancaster Ave



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	106	809	23	55	863	57	93	187	75	78	141	76
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width (ft)	10	10	10	10	10	10	10	10	10	10	10	10
Grade (%)		0%			3%			1%			0%	
Storage Length (ft)	200		0	250		0	200		0	65		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.996			0.991			0.957			0.947	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1520	3028	0	1497	2967	0	1512	1524	0	1520	1515	0
Flt Permitted	0.157			0.214			0.415			0.311		
Satd. Flow (perm)	251	3028	0	337	2967	0	661	1524	0	498	1515	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		35			35			25			25	
Link Distance (ft)		1447			311			344			973	
Travel Time (s)		28.2			6.1			9.4			26.5	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles (%)	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Adj. Flow (vph)	113	861	24	59	918	61	99	199	80	83	150	81
Shared Lane Traffic (%)												
Lane Group Flow (vph)	113	885	0	59	979	0	99	279	0	83	231	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		11			11			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		10			10			10			10	
Two way Left Turn Lane												
Headway Factor	1.17	1.17	1.17	1.19	1.19	1.19	1.18	1.18	1.18	1.17	1.17	1.17
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	0		1	0		1	1		1	1	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (ft)	37	0		37	0		37	37		37	37	
Trailing Detector (ft)	-3	0		-3	0		-3	-3		-3	-3	
Detector 1 Position(ft)	-3	0		-3	0		-3	-3		-3	-3	
Detector 1 Size(ft)	40	6		40	6		40	40		40	40	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2			6			8			4		
Detector Phase	5	2		1	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	3.0	34.0		3.0	34.0		3.0	3.0		3.0	3.0	

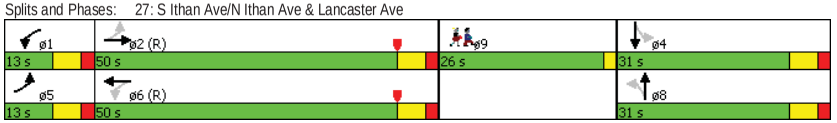
Lanes, Volumes, Timings
27: S Ithan Ave/N Ithan Ave & Lancaster Ave 3/9/2015

Lane Group	ø9
Lane Configurations	
Volume (vph)	
Ideal Flow (vphpl)	
Lane Width (ft)	
Grade (%)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Lane Util. Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	
Heavy Vehicles (%)	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Enter Blocked Intersection	
Lane Alignment	
Median Width(ft)	
Link Offset(ft)	
Crosswalk Width(ft)	
Two way Left Turn Lane	
Headway Factor	
Turning Speed (mph)	
Number of Detectors	
Detector Template	
Leading Detector (ft)	
Trailing Detector (ft)	
Detector 1 Position(ft)	
Detector 1 Size(ft)	
Detector 1 Type	
Detector 1 Channel	
Detector 1 Extend (s)	
Detector 1 Queue (s)	
Detector 1 Delay (s)	
Turn Type	
Protected Phases	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	24.0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Split (s)	13.0	40.0		13.0	40.0		13.0	13.0		13.0	13.0	
Total Split (s)	13.0	50.0		13.0	50.0		31.0	31.0		31.0	31.0	
Total Split (%)	10.8%	41.7%		10.8%	41.7%		25.8%	25.8%		25.8%	25.8%	
Maximum Green (s)	7.0	44.0		7.0	44.0		25.0	25.0		25.0	25.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.5	0.5		0.5	0.5		0.5	0.5		0.5	0.5	
Total Lost Time (s)	6.5	6.5		6.5	6.5		6.5	6.5		6.5	6.5	
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)	57.3	52.1		55.8	49.5		23.7	23.7		23.7	23.7	
Actuated g/C Ratio	0.48	0.43		0.46	0.41		0.20	0.20		0.20	0.20	
v/c Ratio	0.60	0.67		0.27	0.80		0.77	0.93		0.85	0.78	
Control Delay	34.4	32.7		15.7	30.9		81.0	84.4		104.8	63.8	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	34.4	32.7		15.7	30.9		81.0	84.4		104.8	63.8	
LOS	C	C		B	C		F	F		F	E	
Approach Delay		32.9			30.0			83.5			74.6	
Approach LOS		C			C			F			E	
Queue Length 50th (ft)	49	322		25	335		72	212		62	169	
Queue Length 95th (ft)	#100	315		m35	#497		#165	#371		#158	#284	
Internal Link Dist (ft)		1367			231			264			893	
Turn Bay Length (ft)	200			250			200			65		
Base Capacity (vph)	188	1315		220	1224		134	311		101	309	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.60	0.67		0.27	0.80		0.74	0.90		0.82	0.75	

Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 120			
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow, Master Intersection			
Natural Cycle: 95			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.93			
Intersection Signal Delay: 43.6		Intersection LOS: D	
Intersection Capacity Utilization 76.0%		ICU Level of Service D	
Analysis Period (min) 15			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			
m Volume for 95th percentile queue is metered by upstream signal.			

Splits and Phases: 27: S Ithan Ave/N Ithan Ave & Lancaster Ave



Lane Group	ø9
Minimum Split (s)	26.0
Total Split (s)	26.0
Total Split (%)	22%
Maximum Green (s)	24.0
Yellow Time (s)	2.0
All-Red Time (s)	0.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0
Recall Mode	None
Walk Time (s)	9.0
Flash Dont Walk (s)	15.0
Pedestrian Calls (#/hr)	45
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	16	1067	19	16	1098	22	47	104	39	22	71	19
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	1748	1800	1773	1721	1773	1900	1845	1900	1881	1827	1881
Adj Flow Rate, veh/h	17	1147	20	17	1181	24	51	112	42	24	76	20
Adj No. of Lanes	0	2	0	0	2	0	0	1	0	0	1	0
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	72	2098	36	71	2062	42	120	154	51	102	186	43
Arrive On Green	0.65	0.65	0.65	0.65	0.65	0.65	0.15	0.15	0.15	0.15	0.15	0.15
Sat Flow, veh/h	15	3214	56	15	3159	64	309	1046	349	200	1263	293
Grp Volume(v), veh/h	615	0	569	636	0	586	205	0	0	120	0	0
Grp Sat Flow(s),veh/h/ln	1704	0	1580	1682	0	1555	1704	0	0	1756	0	0
Q Serve(g_s), s	0.0	0.0	11.7	0.0	0.0	12.6	3.2	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	11.3	0.0	11.7	12.2	0.0	12.6	6.9	0.0	0.0	3.7	0.0	0.0
Prop In Lane	0.03		0.04	0.03		0.04	0.25		0.20	0.20		0.17
Lane Grp Cap(c), veh/h	1174	0	1032	1159	0	1015	326	0	0	331	0	0
V/C Ratio(X)	0.52	0.00	0.55	0.55	0.00	0.58	0.63	0.00	0.00	0.36	0.00	0.00
Avail Cap(c_a), veh/h	1174	0	1032	1159	0	1015	426	0	0	431	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	1.00	1.00	0.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	5.6	0.0	5.7	5.7	0.0	5.8	24.7	0.0	0.0	23.4	0.0	0.0
Incr Delay (d2), s/veh	1.7	0.0	2.1	1.9	0.0	2.4	2.0	0.0	0.0	0.7	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(-26165%),veh/ln	5.8	0.0	5.7	6.3	0.0	5.9	3.4	0.0	0.0	1.9	0.0	0.0
LnGrp Delay(d),s/veh	7.3	0.0	7.8	7.6	0.0	8.2	26.7	0.0	0.0	24.1	0.0	0.0
LnGrp LOS	A		A	A		A	C			C		
Approach Vol, veh/h		1184			1222			205			120	
Approach Delay, s/veh		7.5			7.9			26.7			24.1	
Approach LOS		A			A			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		45.7		14.3		45.7		14.3
Change Period (Y+Rc), s		6.0		5.0		6.0		5.0
Max Green Setting (Gmax), s		36.0		13.0		36.0		13.0
Max Q Clear Time (g_c+I1), s		13.7		5.7		14.6		8.9
Green Ext Time (p_c), s		11.6		0.7		11.3		0.5

Intersection Summary		
HCM 2010 Ctrl Delay		9.8
HCM 2010 LOS		A

Notes

User approved pedestrian interval to be less than phase max green.

HCM 2010 Signalized Intersection Summary
16: Sproul Rd & Conestoga Rd 3/9/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (veh/h)	149	555	138	36	600	57	213	267	28	56	200	74
Number	7	4	14	3	8	18	1	6	16	5	2	12
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	1748	1748	1800	1791	1791	1845	1739	1739	1791	1809	1756	1809
Adj Flow Rate, veh/h	164	610	0	40	659	0	234	293	31	62	220	81
Adj No. of Lanes	1	1	0	1	1	0	1	1	0	0	1	0
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	194	874	0	270	677	0	309	576	61	93	236	81
Arrive On Green	0.06	0.50	0.00	0.38	0.38	0.00	0.07	0.37	0.37	0.23	0.23	0.23
Sat Flow, veh/h	1664	1748	0	820	1791	0	1656	1546	164	199	1013	348
Grp Volume(v), veh/h	164	610	0	40	659	0	234	0	324	363	0	0
Grp Sat Flow(s),veh/h/ln	1664	1748	0	820	1791	0	1656	0	1710	1560	0	0
Q Serve(g_s), s	5.3	24.1	0.0	3.5	32.6	0.0	6.5	0.0	13.2	16.0	0.0	0.0
Cycle Q Clear(g_c), s	5.3	24.1	0.0	16.7	32.6	0.0	6.5	0.0	13.2	20.9	0.0	0.0
Prop In Lane	1.00		0.00	1.00		0.00	1.00		0.10	0.17		0.22
Lane Grp Cap(c), veh/h	194	874	0	270	677	0	309	0	636	411	0	0
V/C Ratio(X)	0.85	0.70	0.00	0.15	0.97	0.00	0.76	0.00	0.51	0.88	0.00	0.00
Avail Cap(c_a), veh/h	194	874	0	270	677	0	309	0	636	411	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	21.6	17.3	0.0	27.9	27.6	0.0	26.2	0.0	21.9	34.3	0.0	0.0
Incr Delay (d2), s/veh	27.8	4.6	0.0	1.2	28.8	0.0	10.3	0.0	0.7	19.7	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(-26165%),veh/ln	3.9	12.6	0.0	0.9	21.5	0.0	3.7	0.0	6.3	11.2	0.0	0.0
LnGrp Delay(d),s/veh	49.5	21.9	0.0	29.1	56.3	0.0	36.5	0.0	22.6	54.0	0.0	0.0
LnGrp LOS	D	C		C	E		D		C	D		
Approach Vol, veh/h		774			699			558			363	
Approach Delay, s/veh		27.7			54.8			28.4			54.0	
Approach LOS		C			D			C			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4		6	7	8
Phs Duration (G+Y+Rc), s	12.5	27.0		50.5		39.5	11.0	39.5
Change Period (Y+Rc), s	5.5	5.5		5.0		5.5	5.0	5.0
Max Green Setting (Gmax), s	7.0	21.5		45.5		34.0	6.0	34.5
Max Q Clear Time (g_c+I1), s	8.5	22.9		26.1		15.2	7.3	34.6
Green Ext Time (p_c), s	0.0	0.0		8.4		2.4	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	39.8
HCM 2010 LOS	D

HCM 2010 Signalized Intersection Summary
25: S Ithan Ave & Conestoga Rd 3/9/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	167	390	2	2	452	133	14	159	12	63	57	138
Number	1	6	16	5	2	12	7	4	14	3	8	18
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	1854	1783	1854	1764	1696	1764	1763	1695	1763	1844	1773	1844
Adj Flow Rate, veh/h	206	481	2	2	558	164	17	196	15	78	70	170
Adj No. of Lanes	0	1	0	0	1	0	0	1	0	0	1	0
Peak Hour Factor	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81
Percent Heavy Veh, %	4	4	4	4	4	4	4	4	4	4	4	4
Cap, veh/h	226	442	2	60	705	207	77	342	25	141	99	191
Arrive On Green	0.56	0.56	0.56	0.56	0.56	0.56	0.23	0.23	0.23	0.23	0.23	0.23
Sat Flow, veh/h	267	794	3	1	1268	372	55	1503	110	294	436	839
Grp Volume(v), veh/h	689	0	0	724	0	0	228	0	0	318	0	0
Grp Sat Flow(s),veh/h/ln	1064	0	0	1640	0	0	1668	0	0	1569	0	0
Q Serve(g_s), s	12.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.3	0.0	0.0
Cycle Q Clear(g_c), s	33.5	0.0	0.0	21.3	0.0	0.0	7.3	0.0	0.0	11.6	0.0	0.0
Prop In Lane	0.30		0.00	0.00		0.23	0.07		0.07	0.25		0.53
Lane Grp Cap(c), veh/h	670	0	0	972	0	0	444	0	0	432	0	0
V/C Ratio(X)	1.03	0.00	0.00	0.74	0.00	0.00	0.51	0.00	0.00	0.74	0.00	0.00
Avail Cap(c_a), veh/h	670	0	0	972	0	0	492	0	0	475	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	15.5	0.0	0.0	10.7	0.0	0.0	20.8	0.0	0.0	22.3	0.0	0.0
Incr Delay (d2), s/veh	42.3	0.0	0.0	3.1	0.0	0.0	0.9	0.0	0.0	5.4	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(-26165%),veh/ln	18.9	0.0	0.0	10.3	0.0	0.0	3.5	0.0	0.0	5.7	0.0	0.0
LnGrp Delay(d),s/veh	57.9	0.0	0.0	13.8	0.0	0.0	21.7	0.0	0.0	27.7	0.0	0.0
LnGrp LOS	F			B			C			C		
Approach Vol, veh/h		689			724			228			318	
Approach Delay, s/veh		57.9			13.8			21.7			27.7	
Approach LOS		E			B			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		40.0		20.2		40.0		20.2
Change Period (Y+Rc), s		6.0		6.0		6.0		6.0
Max Green Setting (Gmax), s		34.0		16.0		34.0		16.0
Max Q Clear Time (g_c+I1), s		23.3		9.3		35.5		13.6
Green Ext Time (p_c), s		5.3		1.3		0.0		0.6

Intersection Summary	
HCM 2010 Ctrl Delay	32.5
HCM 2010 LOS	C

HCM 2010 Signalized Intersection Summary
33: Williams Rd/Garrett Ave & Conestoga Rd

3/9/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (veh/h)	26	441	1	4	423	4	6	6	9	15	3	38
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	1872	1872	1872	1872	1872	1872	1800	1800	1800	1728	1728	1728
Adj Flow Rate, veh/h	30	501	1	5	481	5	7	7	10	17	3	43
Adj No. of Lanes	0	1	0	0	1	0	0	1	0	0	1	0
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Percent Heavy Veh, %	0	0	0	0	0	0	0	0	0	0	0	0
Cap, veh/h	94	1330	3	58	1382	14	88	35	37	86	8	54
Arrive On Green	0.75	0.75	0.75	0.75	0.75	0.75	0.05	0.05	0.05	0.05	0.05	0.05
Sat Flow, veh/h	49	1773	3	4	1842	19	333	655	706	325	147	1014
Grp Volume(v), veh/h	532	0	0	491	0	0	24	0	0	63	0	0
Grp Sat Flow(s),veh/h/ln	1825	0	0	1865	0	0	1695	0	0	1485	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	1.8	0.0	0.0
Cycle Q Clear(g_c), s	6.5	0.0	0.0	5.9	0.0	0.0	0.9	0.0	0.0	2.7	0.0	0.0
Prop In Lane	0.06		0.00	0.01		0.01	0.29		0.42	0.27		0.68
Lane Grp Cap(c), veh/h	1427	0	0	1454	0	0	160	0	0	148	0	0
V/C Ratio(X)	0.37	0.00	0.00	0.34	0.00	0.00	0.15	0.00	0.00	0.43	0.00	0.00
Avail Cap(c_a), veh/h	1427	0	0	1454	0	0	301	0	0	280	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	2.9	0.0	0.0	2.8	0.0	0.0	30.0	0.0	0.0	30.9	0.0	0.0
Incr Delay (d2), s/veh	0.7	0.0	0.0	0.6	0.0	0.0	0.6	0.0	0.0	2.8	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(-26165%),veh/ln	3.5	0.0	0.0	3.3	0.0	0.0	0.4	0.0	0.0	1.3	0.0	0.0
LnGrp Delay(d),s/veh	3.6	0.0	0.0	3.4	0.0	0.0	30.6	0.0	0.0	33.6	0.0	0.0
LnGrp LOS	A			A			C			C		
Approach Vol, veh/h		532			491			24			63	
Approach Delay, s/veh		3.6			3.4			30.6			33.6	
Approach LOS		A			A			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		56.0		10.0		56.0		10.0
Change Period (Y+Rc), s		6.0		6.0		6.0		6.0
Max Green Setting (Gmax), s		50.0		10.0		50.0		10.0
Max Q Clear Time (g_c+I1), s		8.5		4.7		7.9		2.9
Green Ext Time (p_c), s		4.6		0.1		4.6		0.2

Intersection Summary	
HCM 2010 Ctrl Delay	5.8
HCM 2010 LOS	A

Notes

User approved pedestrian interval to be less than phase max green.

HCM 2010 Signalized Intersection Summary
3: County Line Rd & Spring Mill Rd

3/9/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	35	280	70	68	265	78	43	250	45	33	322	53
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	1617	1800	1800	1731	1800	1800	1731	1800	1800	1731	1800
Adj Flow Rate, veh/h	37	295	74	72	279	82	45	263	47	35	339	56
Adj No. of Lanes	0	1	0	0	1	0	0	1	0	0	1	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	4	4	4	4	4	4	4	4	4	4	4	4
Cap, veh/h	99	586	139	155	547	148	100	361	60	85	396	63
Arrive On Green	0.50	0.50	0.50	0.50	0.50	0.50	0.29	0.29	0.29	0.29	0.29	0.29
Sat Flow, veh/h	71	1168	276	175	1089	295	118	1252	209	75	1374	217
Grp Volume(v), veh/h	406	0	0	433	0	0	355	0	0	430	0	0
Grp Sat Flow(s),veh/h/ln	1516	0	0	1559	0	0	1580	0	0	1667	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	2.7	0.0	0.0
Cycle Q Clear(g_c), s	10.8	0.0	0.0	10.7	0.0	0.0	12.5	0.0	0.0	15.2	0.0	0.0
Prop In Lane	0.09		0.18	0.17		0.19	0.13		0.13	0.08		0.13
Lane Grp Cap(c), veh/h	824	0	0	850	0	0	521	0	0	543	0	0
V/C Ratio(X)	0.49	0.00	0.00	0.51	0.00	0.00	0.68	0.00	0.00	0.79	0.00	0.00
Avail Cap(c_a), veh/h	824	0	0	850	0	0	661	0	0	689	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)	0.52	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	10.4	0.0	0.0	10.4	0.0	0.0	20.0	0.0	0.0	21.1	0.0	0.0
Incr Delay (d2), s/veh	1.1	0.0	0.0	2.2	0.0	0.0	1.1	0.0	0.0	3.7	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(-26165%),veh/ln	4.9	0.0	0.0	5.4	0.0	0.0	5.7	0.0	0.0	7.6	0.0	0.0
LnGrp Delay(d),s/veh	11.5	0.0	0.0	12.5	0.0	0.0	21.1	0.0	0.0	24.8	0.0	0.0
LnGrp LOS	B			B			C			C		
Approach Vol, veh/h		406			433			355			430	
Approach Delay, s/veh		11.5			12.5			21.1			24.8	
Approach LOS		B			B			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		37.6		24.4		37.6		24.4
Change Period (Y+Rc), s		6.0		6.0		6.0		6.0
Max Green Setting (Gmax), s		26.0		24.0		26.0		24.0
Max Q Clear Time (g_c+I1), s		12.8		17.2		12.7		14.5
Green Ext Time (p_c), s		3.1		1.2		3.1		1.4

Intersection Summary	
HCM 2010 Ctrl Delay	17.4
HCM 2010 LOS	B

Intersection	
Int Delay, s/veh	3.9

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	1103	24	19	1136	0	26
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, %	-3	-	-	3	0	-
Peak Hour Factor	67	67	67	67	67	67
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	1646	36	28	1696	0	39

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	1682	0	2568	841
Stage 1	-	-	-	-	1664	-
Stage 2	-	-	-	-	904	-
Critical Hdwy	-	-	4.1	-	6.8	6.9
Critical Hdwy Stg 1	-	-	-	-	5.8	-
Critical Hdwy Stg 2	-	-	-	-	5.8	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	386	-	22	312
Stage 1	-	-	-	-	142	-
Stage 2	-	-	-	-	360	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	386	-	22	312
Mov Cap-2 Maneuver	-	-	-	-	22	-
Stage 1	-	-	-	-	142	-
Stage 2	-	-	-	-	360	-

Approach	EB	WB	NB
HCM Control Delay, s	0	7.4	18.2
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	312	-	-	386	-
HCM Lane V/C Ratio	0.124	-	-	0.073	-
HCM Control Delay (s)	18.2	-	-	15.1	7.3
HCM Lane LOS	C	-	-	C	A
HCM 95th %tile Q(veh)	0.4	-	-	0.2	-

Intersection	
Int Delay, s/veh	0.2

Movement	EBL	EBT	WBT	WBR	SWL	SWR
Vol, veh/h	2	640	691	3	4	8
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	86	86	86	86	86	86
Heavy Vehicles, %	4	4	4	4	4	4
Mvmt Flow	2	744	803	3	5	9

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	807	0	-	0	1554	805
Stage 1	-	-	-	-	805	-
Stage 2	-	-	-	-	749	-
Critical Hdwy	4.14	-	-	-	6.44	6.24
Critical Hdwy Stg 1	-	-	-	-	5.44	-
Critical Hdwy Stg 2	-	-	-	-	5.44	-
Follow-up Hdwy	2.236	-	-	-	3.536	3.336
Pot Cap-1 Maneuver	809	-	-	-	123	379
Stage 1	-	-	-	-	436	-
Stage 2	-	-	-	-	464	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	809	-	-	-	123	379
Mov Cap-2 Maneuver	-	-	-	-	123	-
Stage 1	-	-	-	-	436	-
Stage 2	-	-	-	-	462	-

Approach	EB	WB	SW
HCM Control Delay, s	0	0	22.1
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SWLn1
Capacity (veh/h)	809	-	-	-	224
HCM Lane V/C Ratio	0.003	-	-	-	0.062
HCM Control Delay (s)	9.5	0	-	-	22.1
HCM Lane LOS	A	A	-	-	C
HCM 95th %tile Q(veh)	0	-	-	-	0.2

HCM 2010 TWSC
29: Strathmore Dr/Lowrys Ln & Conestoga Rd 3/9/2015

Intersection	
Int Delay, s/veh	3.8

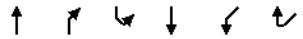
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	47	424	14	9	461	5	13	14	12	2	15	83
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	80	80	80	80	80	80	80	80	80	80	80	80
Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3
Mvmt Flow	59	530	18	11	576	6	16	18	15	2	19	104

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	583	0	0	548	0	0	1319	1261	539	1275	1267	579
Stage 1	-	-	-	-	-	-	656	656	-	602	602	-
Stage 2	-	-	-	-	-	-	663	605	-	673	665	-
Critical Hdwy	4.13	-	-	4.13	-	-	7.13	6.53	6.23	7.13	6.53	6.23
Critical Hdwy Stg 1	-	-	-	-	-	-	6.13	5.53	-	6.13	5.53	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.13	5.53	-	6.13	5.53	-
Follow-up Hdwy	2.227	-	-	2.227	-	-	3.527	4.027	3.327	3.527	4.027	3.327
Pot Cap-1 Maneuver	986	-	-	1016	-	-	133	169	541	143	168	513
Stage 1	-	-	-	-	-	-	453	461	-	485	487	-
Stage 2	-	-	-	-	-	-	449	486	-	443	456	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	986	-	-	1016	-	-	89	152	541	117	151	513
Mov Cap-2 Maneuver	-	-	-	-	-	-	89	152	-	117	151	-
Stage 1	-	-	-	-	-	-	414	421	-	443	479	-
Stage 2	-	-	-	-	-	-	339	478	-	377	417	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.9	0.2	40.1	20.3
HCM LOS			E	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	150	986	-	-	1016	-	-	359
HCM Lane V/C Ratio	0.325	0.06	-	-	0.011	-	-	0.348
HCM Control Delay (s)	40.1	8.9	0	-	8.6	0	-	20.3
HCM Lane LOS	E	A	A	-	A	A	-	C
HCM 95th %tile Q(veh)	1.3	0.2	-	-	0	-	-	1.5

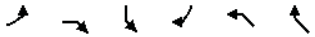
Lanes, Volumes, Timings
38: County Line Rd & N Ithan Ave 3/9/2015



Lane Group	NBT	NBR	SBL	SBT	SWL	SWR
Lane Configurations						
Volume (vph)	347	113	167	309	159	101
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.967				0.948	
Flt Protected				0.983	0.970	
Satd. Flow (prot)	1801	0	0	1831	1713	0
Flt Permitted				0.983	0.970	
Satd. Flow (perm)	1801	0	0	1831	1713	0
Link Speed (mph)	30			30	30	
Link Distance (ft)	295			1901	824	
Travel Time (s)	6.7			43.2	18.7	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	381	124	184	340	175	111
Shared Lane Traffic (%)						
Lane Group Flow (vph)	505	0	0	524	286	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	0			0	12	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	10			10	10	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)		9	15		15	9
Sign Control	Free			Stop	Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	75.6%	ICU Level of Service	D
Analysis Period (min)	15		

Lanes, Volumes, Timings
2: County Line Rd & N Ithan Ave 3/9/2015



Lane Group	EBL	EBR	SBL	SBR	NWL	NWR
Lane Configurations						
Volume (vph)	208	15	141	349	38	255
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.991		0.904		0.882	
Flt Protected	0.955		0.986		0.994	
Satd. Flow (prot)	1763	0	1660	0	1633	0
Flt Permitted	0.955		0.986		0.994	
Satd. Flow (perm)	1763	0	1660	0	1633	0
Link Speed (mph)	30		30		30	
Link Distance (ft)	973		295		2020	
Travel Time (s)	22.1		6.7		45.9	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	221	16	150	371	40	271
Shared Lane Traffic (%)						
Lane Group Flow (vph)	237	0	521	0	311	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Right
Median Width(ft)	22		12		12	
Link Offset(ft)	0		0		0	
Crosswalk Width(ft)	10		10		10	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9	15	9	15	9
Sign Control	Stop		Free		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	69.6%	ICU Level of Service	C
Analysis Period (min)	15		

HCM 2010 TWSC
53: County Line Rd & Lowrys Ln 3/9/2015

Intersection	
Int Delay, s/veh	3.7

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	61	81	58	238	150	31
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	87	87	87	87	87	87
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	70	93	67	274	172	36

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	597	190	208	0	-	0
Stage 1	190	-	-	-	-	-
Stage 2	407	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	469	857	1375	-	-	-
Stage 1	847	-	-	-	-	-
Stage 2	676	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	442	857	1375	-	-	-
Mov Cap-2 Maneuver	442	-	-	-	-	-
Stage 1	847	-	-	-	-	-
Stage 2	637	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	13	1.5	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1375	-	611	-	-
HCM Lane V/C Ratio	0.048	-	0.267	-	-
HCM Control Delay (s)	7.8	0	13	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0.2	-	1.1	-	-

Intersection	
Int Delay, s/veh	4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	203	220	288	20	15	98
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	88	88	88	88	88	88
Heavy Vehicles, %	1	1	1	1	1	1
Mvmt Flow	231	250	327	23	17	111

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	350	0	-	0	1050	339
Stage 1	-	-	-	-	339	-
Stage 2	-	-	-	-	711	-
Critical Hdwy	4.11	-	-	-	6.41	6.21
Critical Hdwy Stg 1	-	-	-	-	5.41	-
Critical Hdwy Stg 2	-	-	-	-	5.41	-
Follow-up Hdwy	2.209	-	-	-	3.509	3.309
Pot Cap-1 Maneuver	1214	-	-	-	253	706
Stage 1	-	-	-	-	724	-
Stage 2	-	-	-	-	489	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1214	-	-	-	197	706
Mov Cap-2 Maneuver	-	-	-	-	197	-
Stage 1	-	-	-	-	724	-
Stage 2	-	-	-	-	381	-

Approach	EB	WB	SB
HCM Control Delay, s	4.2	0	14
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1214	-	-	-	526
HCM Lane V/C Ratio	0.19	-	-	-	0.244
HCM Control Delay (s)	8.7	0	-	-	14
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.7	-	-	-	1

Intersection	
Int Delay, s/veh	27.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	67	100	8	2	23	6	14	619	26	8	473	38
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	88	88	88	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	76	114	9	2	26	7	16	703	30	9	538	43

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	974	1342	290	1094	1349	366	581	0	0	733	0	0
Stage 1	577	577	-	750	750	-	-	-	-	-	-	-
Stage 2	397	765	-	344	599	-	-	-	-	-	-	-
Critical Hdwy	7.54	6.54	6.94	7.54	6.54	6.94	4.14	-	-	4.14	-	-
Critical Hdwy Stg 1	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.54	5.54	-	6.54	5.54	-	-	-	-	-	-	-
Follow-up Hdwy	3.52	4.02	3.32	3.52	4.02	3.32	2.22	-	-	2.22	-	-
Pot Cap-1 Maneuver	206	151	707	168	149	631	989	-	-	868	-	-
Stage 1	469	500	-	369	417	-	-	-	-	-	-	-
Stage 2	600	410	-	645	489	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	170	145	707	57	143	631	989	-	-	868	-	-
Mov Cap-2 Maneuver	170	145	-	57	143	-	-	-	-	-	-	-
Stage 1	456	493	-	359	406	-	-	-	-	-	-	-
Stage 2	540	399	-	483	482	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	206.9	35.9	0.3	0.2
HCM LOS	F	E		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	989	-	-	160	151	868	-	-
HCM Lane V/C Ratio	0.016	-	-	1.243	0.233	0.01	-	-
HCM Control Delay (s)	8.7	0.1	-	206.9	35.9	9.2	0.1	-
HCM Lane LOS	A	A	-	F	E	A	A	-
HCM 95th %tile Q(veh)	0	-	-	11.4	0.9	0	-	-

Lane Group	EBL2	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR2	NBL2	NBL	NBT
Lane Configurations												
Volume (vph)	4	249	1007	31	282	2	22	893	33	7	52	0
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width (ft)	10	10	11	11	14	10	12	12	12	10	10	10
Grade (%)			3%					-2%				1%
Storage Length (ft)		300		0			75				0	
Storage Lanes		1		1			1				0	
Taper Length (ft)		25					25				25	
Lane Util. Factor	0.95	1.00	0.95	0.95	1.00	0.95	1.00	0.95	0.95	1.00	1.00	1.00
Frt			0.996		0.850			0.995				0.975
Flt Protected		0.950					0.950					0.961
Satd. Flow (prot)	0	1541	3180	0	1576	0	1693	3370	0	0	0	1536
Flt Permitted		0.097					0.191					0.753
Satd. Flow (perm)	0	157	3180	0	1576	0	340	3370	0	0	0	1203
Right Turn on Red					Yes				Yes			
Satd. Flow (RTOR)					224			196				
Link Speed (mph)			35					35				25
Link Distance (ft)			577					864				492
Travel Time (s)			11.2					16.8				13.4
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
Adj. Flow (vph)	4	257	1038	32	291	2	23	921	34	7	54	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	261	1070	0	291	0	25	955	0	0	0	75
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Right	Left	Left	Left	Right	Left	Left	Left
Median Width(ft)			12					12				0
Link Offset(ft)			0					0				0
Crosswalk Width(ft)			10					10				10
Two way Left Turn Lane												
Headway Factor	1.19	1.19	1.14	1.14	1.01	1.16	1.06	1.06	1.06	1.18	1.18	1.18
Turning Speed (mph)	15	15		9	9	15	15		9	15	15	
Number of Detectors	1	1	1		1	1	1	1		1	1	1
Detector Template	Left	Left	Thru		Right	Left	Left	Thru		Left	Left	Thru
Leading Detector (ft)	20	37	37		37	20	37	37		20	20	37
Trailing Detector (ft)	0	-3	-3		-3	0	-3	-3		0	0	-3
Detector 1 Position(ft)	0	-3	-3		-3	0	-3	-3		0	0	-3
Detector 1 Size(ft)	20	40	40		40	20	40	40		20	20	40
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0	0.0
Turn Type	pm+pt	pm+pt	NA		Perm	Perm	Perm	NA		Perm	Perm	NA
Protected Phases	5	5	2					6				10
Permitted Phases	2	2			2	6	6			10	10	
Detector Phase	5	5	2		2	6	6	6		10	10	10
Switch Phase												
Minimum Initial (s)	3.0	3.0	15.0		15.0	15.0	15.0	15.0		3.0	3.0	3.0
Minimum Split (s)	13.0	13.0	21.0		21.0	21.0	21.0	21.0		13.0	13.0	13.0

Lane Group	NBR	NBR2	SBL2	SBL	SBT	SBR	SBR2	NEL2	NEL	NET	NER	NER2
Lane Configurations												
Volume (vph)	4	10	1	1	0	3	14	191	0	112	20	1
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width (ft)	10	10	10	10	10	10	10	12	12	11	11	11
Grade (%)					-3%					3%		
Storage Length (ft)	0			0		0			200		0	
Storage Lanes	0			0		0			1		0	
Taper Length (ft)				25					25			
Lane Util. 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
Frt					0.879					0.976		
Flt Protected					0.995				0.950			
Satd. Flow (prot)	0	0	0	0	1462	0	0	0	1651	1640	0	0
Flt Permitted					0.982				0.108			
Satd. Flow (perm)	0	0	0	0	1443	0	0	0	188	1640	0	0
Right Turn on Red		No					No					No
Satd. Flow (RTOR)												
Link Speed (mph)					25					40		
Link Distance (ft)					597					1336		
Travel Time (s)					16.3					22.8		
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	4	10	1	1	0	3	14	197	0	115	21	1
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	19	0	0	0	197	137	0	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Right	Right	Left	Left	Left	Right	Right	Left	Left	Left	Right	Right
Median Width(ft)					0					12		
Link Offset(ft)					0					0		
Crosswalk Width(ft)					10					10		
Two way Left Turn Lane												
Headway Factor	1.18	1.18	1.15	1.15	1.15	1.15	1.15	1.09	1.09	1.14	1.14	1.14
Turning Speed (mph)	9	9	15	15		9	9	15	15		9	9
Number of Detectors			1	1	1			1	1	1		
Detector Template			Left	Left	Thru			Left	Left	Thru		
Leading Detector (ft)			20	20	37			20	37	37		
Trailing Detector (ft)			0	0	-3			0	-3	-3		
Detector 1 Position(ft)			0	0	-3			0	-3	-3		
Detector 1 Size(ft)			20	20	40			20	40	40		
Detector 1 Type			Cl+Ex	Cl+Ex	Cl+Ex			Cl+Ex	Cl+Ex	Cl+Ex		
Detector 1 Channel												
Detector 1 Extend (s)			0.0	0.0	0.0			0.0	0.0	0.0		
Detector 1 Queue (s)			0.0	0.0	0.0			0.0	0.0	0.0		
Detector 1 Delay (s)			0.0	0.0	0.0			0.0	0.0	0.0		
Turn Type			Perm	Perm	NA			pm+pt	pm+pt	NA		
Protected Phases					9			3	3	8		
Permitted Phases			9	9				8	8			
Detector Phase			9	9	9			3	3	8		
Switch Phase												
Minimum Initial (s)			3.0	3.0	3.0			3.0	3.0	3.0		
Minimum Split (s)			13.0	13.0	13.0			13.0	13.0	13.0		

Lane Group	SWL2	SWL	SWT	SWR	SWR2
Lane Configurations					
Volume (vph)	39	9	166	235	1
Ideal Flow (vphpl)	1800	1800	1800	1800	1800
Lane Width (ft)	10	10	10	10	10
Grade (%)			-7%		
Storage Length (ft)		150		0	
Storage Lanes		1		0	
Taper Length (ft)		25			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00
Frt			0.912		
Flt Protected		0.950			
Satd. Flow (prot)	0	1619	1555	0	0
Flt Permitted		0.669			
Satd. Flow (perm)	0	1140	1555	0	0
Right Turn on Red					No
Satd. Flow (RTOR)					
Link Speed (mph)			25		
Link Distance (ft)			3168		
Travel Time (s)			86.4		
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	40	9	171	242	1
Shared Lane Traffic (%)					
Lane Group Flow (vph)	0	49	414	0	0
Enter Blocked Intersection	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Right
Median Width(ft)			12		
Link Offset(ft)			0		
Crosswalk Width(ft)			10		
Two way Left Turn Lane					
Headway Factor	1.12	1.12	1.12	1.12	1.12
Turning Speed (mph)	15	15		9	9
Number of Detectors	1	1	1		
Detector Template	Left	Left	Thru		
Leading Detector (ft)	20	37	37		
Trailing Detector (ft)	0	-3	-3		
Detector 1 Position(ft)	0	-3	-3		
Detector 1 Size(ft)	20	40	40		
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex		
Detector 1 Channel					
Detector 1 Extend (s)	0.0	0.0	0.0		
Detector 1 Queue (s)	0.0	0.0	0.0		
Detector 1 Delay (s)	0.0	0.0	0.0		
Turn Type	Perm	Perm	NA		
Protected Phases			4		
Permitted Phases	4	4			
Detector Phase	4	4	4		
Switch Phase					
Minimum Initial (s)	3.0	3.0	3.0		
Minimum Split (s)	13.0	13.0	13.0		

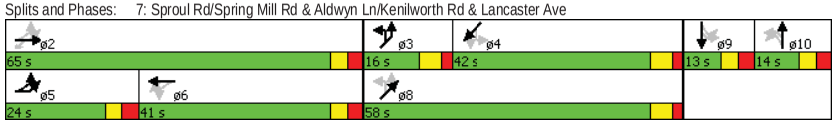
Lane Group	EBL2	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR2	NBL2	NBL	NBT
Total Split (s)	24.0	24.0	65.0		65.0	41.0	41.0	41.0		14.0	14.0	14.0
Total Split (%)	16.0%	16.0%	43.3%		43.3%	27.3%	27.3%	27.3%		9.3%	9.3%	9.3%
Maximum Green (s)	18.0	18.0	59.0		59.0	35.0	35.0	35.0		8.0	8.0	8.0
Yellow Time (s)	3.0	3.0	3.0		3.0	3.0	3.0	3.0		3.0	3.0	3.0
All-Red Time (s)	3.0	3.0	3.0		3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lost Time Adjust (s)		0.5	0.5		0.5		0.5	0.5				0.5
Total Lost Time (s)		6.5	6.5		6.5		6.5	6.5				6.5
Lead/Lag	Lead	Lead				Lag	Lag	Lag		Lag	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0	3.0	3.0		3.0	3.0	3.0
Recall Mode	None	None	Max		Max	None	None	None		None	None	None
Walk Time (s)			7.0		7.0	7.0	7.0	7.0				
Flash Dont Walk (s)			20.0		20.0	20.0	20.0	20.0				
Pedestrian Calls (#/hr)			0		0	0	0	0				
Act Effct Green (s)		58.6	58.6		58.6		34.6	34.6				7.5
Actuated g/C Ratio		0.40	0.40		0.40		0.24	0.24				0.05
v/c Ratio		1.13	0.83		0.38		0.31	1.00				1.21
Control Delay		137.6	46.2		9.3		59.8	72.8				236.1
Queue Delay		0.0	0.0		0.0		0.0	0.0				0.0
Total Delay		137.6	46.2		9.3		59.8	72.8				236.1
LOS		F	D		A		E	E				F
Approach Delay			54.3					72.5				236.1
Approach LOS			D					E				F
Queue Length 50th (ft)		~260	504		42		21	~443				~91
Queue Length 95th (ft)		#447	603		114		54	#582				#205
Internal Link Dist (ft)			497					784				412
Turn Bay Length (ft)		300					75					
Base Capacity (vph)		230	1287		771		81	954				62
Starvation Cap Reductn		0	0		0		0	0				0
Spillback Cap Reductn		0	0		0		0	0				0
Storage Cap Reductn		0	0		0		0	0				0
Reduced v/c Ratio		1.13	0.83		0.38		0.31	1.00				1.21

Intersection Summary			
Area Type:	Other		
Cycle Length: 150			
Actuated Cycle Length: 144.8			
Natural Cycle: 150			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 1.21			
Intersection Signal Delay: 77.1		Intersection LOS: E	
Intersection Capacity Utilization 116.7%		ICU Level of Service H	
Analysis Period (min) 15			

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 7: Sproul Rd/Spring Mill Rd & Aldwyn Ln/Kenilworth Rd & Lancaster Ave



Lane Group	NBR	NBR2	SBL2	SBL	SBT	SBR	SBR2	NEL2	NEL	NET	NER	NER2
Total Split (s)			13.0	13.0	13.0			16.0	16.0	58.0		
Total Split (%)			8.7%	8.7%	8.7%			10.7%	10.7%	38.7%		
Maximum Green (s)			7.0	7.0	7.0			10.0	10.0	52.0		
Yellow Time (s)			3.0	3.0	3.0			4.0	4.0	4.0		
All-Red Time (s)			3.0	3.0	3.0			2.0	2.0	2.0		
Lost Time Adjust (s)					0.5				0.5	0.5		
Total Lost Time (s)					6.5				6.5	6.5		
Lead/Lag			Lead	Lead	Lead			Lead	Lead			
Lead-Lag Optimize?												
Vehicle Extension (s)			3.0	3.0	3.0			3.0	3.0	3.0		
Recall Mode			None	None	None			None	None	None		
Walk Time (s)										7.0		
Flash Dont Walk (s)										25.0		
Pedestrian Calls (#/hr)										0		
Act Effct Green (s)					6.1				51.6	51.6		
Actuated g/C Ratio					0.04				0.36	0.36		
v/c Ratio					0.32				1.21	0.23		
Control Delay					83.2				171.1	35.2		
Queue Delay					0.0				0.0	0.0		
Total Delay					83.2				171.1	35.2		
LOS					F				F	D		
Approach Delay					83.2					115.3		
Approach LOS					F					F		
Queue Length 50th (ft)					18				~186	96		
Queue Length 95th (ft)					48				#355	153		
Internal Link Dist (ft)					517					1256		
Turn Bay Length (ft)									200			
Base Capacity (vph)					64				163	584		
Starvation Cap Reductn					0				0	0		
Spillback Cap Reductn					0				0	0		
Storage Cap Reductn					0				0	0		
Reduced v/c Ratio					0.30				1.21	0.23		

Intersection Summary

Lane Group	SWL2	SWL	SWT	SWR	SWR2
Total Split (s)	42.0	42.0	42.0		
Total Split (%)	28.0%	28.0%	28.0%		
Maximum Green (s)	36.0	36.0	36.0		
Yellow Time (s)	4.0	4.0	4.0		
All-Red Time (s)	2.0	2.0	2.0		
Lost Time Adjust (s)		0.5	0.5		
Total Lost Time (s)		6.5	6.5		
Lead/Lag	Lag	Lag	Lag		
Lead-Lag Optimize?					
Vehicle Extension (s)	3.0	3.0	3.0		
Recall Mode	None	None	None		
Walk Time (s)					
Flash Dont Walk (s)					
Pedestrian Calls (#/hr)					
Act Effct Green (s)		35.6	35.6		
Actuated g/C Ratio		0.25	0.25		
v/c Ratio		0.18	1.08		
Control Delay		47.0	121.1		
Queue Delay		0.0	0.0		
Total Delay		47.0	121.1		
LOS		D	F		
Approach Delay			113.3		
Approach LOS			F		
Queue Length 50th (ft)		39	~467		
Queue Length 95th (ft)		78	#682		
Internal Link Dist (ft)			3088		
Turn Bay Length (ft)		150			
Base Capacity (vph)		279	382		
Starvation Cap Reductn		0	0		
Spillback Cap Reductn		0	0		
Storage Cap Reductn		0	0		
Reduced v/c Ratio		0.18	1.08		

Intersection Summary

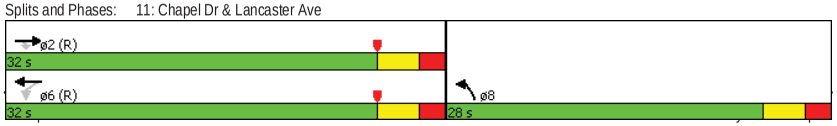
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	1176	31	34	851	91	16
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width (ft)	11	11	11	11	12	12
Storage Length (ft)		125	125		0	0
Storage Lanes		1	1		2	0
Taper Length (ft)			25		25	
Lane Util. Factor	0.95	1.00	1.00	0.95	0.97	0.95
Frt		0.850			0.978	
Flt Protected			0.950		0.959	
Satd. Flow (prot)	3241	1450	1621	3241	3211	0
Flt Permitted			0.195		0.959	
Satd. Flow (perm)	3241	1450	333	3241	3211	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		33			17	
Link Speed (mph)	35			35	25	
Link Distance (ft)	542			1488	319	
Travel Time (s)	10.6			29.0	8.7	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1278	34	37	925	99	17
Shared Lane Traffic (%)						
Lane Group Flow (vph)	1278	34	37	925	116	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	11			11	24	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	10			10	10	
Two way Left Turn Lane						
Headway Factor	1.12	1.12	1.12	1.12	1.07	1.07
Turning Speed (mph)		9	15		15	9
Number of Detectors	1	1	1	1	1	
Detector Template	Thru	Right	Left	Thru	Left	
Leading Detector (ft)	37	20	20	37	37	
Trailing Detector (ft)	-3	0	0	-3	-3	
Detector 1 Position(ft)	-3	0	0	-3	-3	
Detector 1 Size(ft)	40	20	20	40	40	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	
Turn Type	NA	Perm	Perm	NA	Prot	
Protected Phases	2			6	8	
Permitted Phases		2	6			
Detector Phase	2	2	6	6	8	
Switch Phase						
Minimum Initial (s)	10.0	10.0	10.0	10.0	4.0	
Minimum Split (s)	21.0	21.0	21.0	21.0	28.0	
Total Split (s)	32.0	32.0	32.0	32.0	28.0	

Lanes, Volumes, Timings
11: Chapel Dr & Lancaster Ave 3/10/2015

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Total Split (%)	53.3%	53.3%	53.3%	53.3%	46.7%	
Maximum Green (s)	27.0	27.0	27.0	27.0	23.0	
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	0.5	0.5	0.5	0.5	0.5	
Total Lost Time (s)	5.5	5.5	5.5	5.5	5.5	
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Recall Mode	C-Max	C-Max	C-Max	C-Max	None	
Walk Time (s)	10.0	10.0	10.0	10.0	7.0	
Flash Dont Walk (s)	0.0	0.0	0.0	0.0	16.0	
Pedestrian Calls (#/hr)	0	0	0	0	0	
Act Effct Green (s)	45.4	45.4	45.4	45.4	6.9	
Actuated g/C Ratio	0.76	0.76	0.76	0.76	0.12	
v/c Ratio	0.52	0.03	0.15	0.38	0.30	
Control Delay	5.1	1.5	1.4	0.8	22.7	
Queue Delay	0.0	0.0	0.0	0.0	0.0	
Total Delay	5.1	1.5	1.4	0.8	22.7	
LOS	A	A	A	A	C	
Approach Delay	5.1			0.8	22.7	
Approach LOS	A			A	C	
Queue Length 50th (ft)	91	0	1	8	17	
Queue Length 95th (ft)	152	6	m1	m10	36	
Internal Link Dist (ft)	462			1408	239	
Turn Bay Length (ft)		125	125			
Base Capacity (vph)	2450	1104	251	2450	1214	
Starvation Cap Reductn	0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0	
Storage Cap Reductn	0	0	0	0	0	
Reduced v/c Ratio	0.52	0.03	0.15	0.38	0.10	

Intersection Summary		
Area Type:	Other	
Cycle Length: 60		
Actuated Cycle Length: 60		
Offset: 26 (43%), Referenced to phase 2:EBT and 6:WBTL, Start of Yellow		
Natural Cycle: 60		
Control Type: Actuated-Coordinated		
Maximum v/c Ratio: 0.52		
Intersection Signal Delay: 4.2		Intersection LOS: A
Intersection Capacity Utilization 46.8%		ICU Level of Service A
Analysis Period (min) 15		
m Volume for 95th percentile queue is metered by upstream signal.		

Splits and Phases: 11: Chapel Dr & Lancaster Ave



Lanes, Volumes, Timings
27: S Ithan Ave/N Ithan Ave & Lancaster Ave 3/10/2015

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	104	1001	91	62	689	39	81	122	78	117	198	114
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width (ft)	10	10	10	10	10	10	10	10	10	10	10	10
Grade (%)		0%			3%			1%			0%	
Storage Length (ft)	250		0	250		0	190		0	65		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.987			0.992			0.941			0.945	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1565	3089	0	1541	3058	0	1557	1542	0	1565	1556	0
Flt Permitted	0.244			0.099			0.241			0.480		
Satd. Flow (perm)	402	3089	0	161	3058	0	395	1542	0	791	1556	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		35			35			25			25	
Link Distance (ft)		1488			265			344			973	
Travel Time (s)		29.0			5.2			9.4			26.5	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	109	1054	96	65	725	41	85	128	82	123	208	120
Shared Lane Traffic (%)												
Lane Group Flow (vph)	109	1150	0	65	766	0	85	210	0	123	328	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		11			11			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		10			10			10			10	
Two way Left Turn Lane												
Headway Factor	1.17	1.17	1.17	1.19	1.19	1.19	1.18	1.18	1.18	1.17	1.17	1.17
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	1		1	1		1	1		1	1	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (ft)	37	37		37	37		37	37		37	37	
Trailing Detector (ft)	-3	-3		-3	-3		-3	-3		-3	-3	
Detector 1 Position(ft)	-3	-3		-3	-3		-3	-3		-3	-3	
Detector 1 Size(ft)	40	40		40	40		40	40		40	40	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2			6			8			4		
Detector Phase	5	2		1	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	3.0	34.0		3.0	34.0		3.0	3.0		3.0	3.0	
Minimum Split (s)	13.0	40.0		13.0	40.0		13.0	13.0		13.0	13.0	

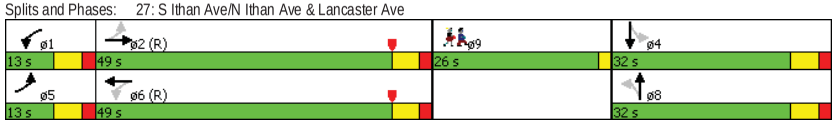
Lane Group	ø9
Lane Configurations	
Volume (vph)	
Ideal Flow (vphpl)	
Lane Width (ft)	
Grade (%)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Lane Util. Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Right Turn on Red	
Satd. Flow (RTOR)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Peak Hour Factor	
Adj. Flow (vph)	
Shared Lane Traffic (%)	
Lane Group Flow (vph)	
Enter Blocked Intersection	
Lane Alignment	
Median Width(ft)	
Link Offset(ft)	
Crosswalk Width(ft)	
Two way Left Turn Lane	
Headway Factor	
Turning Speed (mph)	
Number of Detectors	
Detector Template	
Leading Detector (ft)	
Trailing Detector (ft)	
Detector 1 Position(ft)	
Detector 1 Size(ft)	
Detector 1 Type	
Detector 1 Channel	
Detector 1 Extend (s)	
Detector 1 Queue (s)	
Detector 1 Delay (s)	
Turn Type	
Protected Phases	9
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	24.0
Minimum Split (s)	26.0

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Split (s)	13.0	49.0		13.0	49.0		32.0	32.0		32.0	32.0	
Total Split (%)	10.8%	40.8%		10.8%	40.8%		26.7%	26.7%		26.7%	26.7%	
Maximum Green (s)	7.0	43.0		7.0	43.0		26.0	26.0		26.0	26.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	0.5	0.5		0.5	0.5		0.5	0.5		0.5	0.5	
Total Lost Time (s)	6.5	6.5		6.5	6.5		6.5	6.5		6.5	6.5	
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	C-Max		None	C-Max		None	None		None	None	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effct Green (s)	55.5	50.3		54.1	47.8		25.5	25.5		25.5	25.5	
Actuated g/C Ratio	0.46	0.42		0.45	0.40		0.21	0.21		0.21	0.21	
v/c Ratio	0.44	0.89		0.45	0.63		1.02	0.64		0.73	0.99	
Control Delay	23.7	44.2		26.2	26.5		153.6	53.3		70.1	95.7	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	23.7	44.2		26.2	26.5		153.6	53.3		70.1	95.7	
LOS	C	D		C	C		F	D		E	F	
Approach Delay		42.4			26.5			82.2			88.7	
Approach LOS		D			C			F			F	
Queue Length 50th (ft)	46	~528		27	200		~68	149		90	255	
Queue Length 95th (ft)	77	#669		m51	238		#176	236		#189	#446	
Internal Link Dist (ft)		1408			185			264			893	
Turn Bay Length (ft)	250			250			190			65		
Base Capacity (vph)	249	1295		147	1218		83	327		168	330	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.44	0.89		0.44	0.63		1.02	0.64		0.73	0.99	

Intersection Summary			
Area Type:	Other		
Cycle Length: 120			
Actuated Cycle Length: 120			
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow, Master Intersection			
Natural Cycle: 125			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 1.02			
Intersection Signal Delay: 49.3		Intersection LOS: D	
Intersection Capacity Utilization 80.6%		ICU Level of Service D	
Analysis Period (min) 15			

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 27: S Ithan Ave/N Ithan Ave & Lancaster Ave



Lane Group	ø9
Total Split (s)	26.0
Total Split (%)	22%
Maximum Green (s)	24.0
Yellow Time (s)	2.0
All-Red Time (s)	0.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	
Lead-Lag Optimize?	
Vehicle Extension (s)	3.0
Recall Mode	None
Walk Time (s)	9.0
Flash Dont Walk (s)	15.0
Pedestrian Calls (#/hr)	45
Act Effct Green (s)	
Actuated g/C Ratio	
v/c Ratio	
Control Delay	
Queue Delay	
Total Delay	
LOS	
Approach Delay	
Approach LOS	
Queue Length 50th (ft)	
Queue Length 95th (ft)	
Internal Link Dist (ft)	
Turn Bay Length (ft)	
Base Capacity (vph)	
Starvation Cap Reductn	
Spillback Cap Reductn	
Storage Cap Reductn	
Reduced v/c Ratio	

Intersection Summary

HCM 2010 Signalized Intersection Summary
51: Lowrys Ln & Lancaster Ave

3/10/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	2	1186	22	15	915	4	19	36	15	98	70	71
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	1782	1800	1773	1755	1773	1900	1881	1900	1881	1863	1881
Adj Flow Rate, veh/h	2	1289	24	16	995	4	21	39	16	107	76	77
Adj No. of Lanes	0	2	0	0	2	0	0	1	0	0	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	1	1	1	1	1	1	1	1	1	1	1	1
Cap, veh/h	61	2042	38	72	2004	8	131	205	69	192	105	89
Arrive On Green	0.61	0.61	0.61	0.61	0.61	0.61	0.19	0.19	0.19	0.19	0.19	0.19
Sat Flow, veh/h	1	3329	62	16	3269	13	290	1098	370	575	564	479
Grp Volume(v), veh/h	690	0	625	525	0	490	76	0	0	260	0	0
Grp Sat Flow(s),veh/h/ln	1781	0	1611	1703	0	1595	1758	0	0	1617	0	0
Q Serve(g_s), s	0.0	0.0	14.7	0.0	0.0	10.3	0.0	0.0	0.0	7.2	0.0	0.0
Cycle Q Clear(g_c), s	14.7	0.0	14.7	9.9	0.0	10.3	2.1	0.0	0.0	9.3	0.0	0.0
Prop In Lane	0.00		0.04	0.03		0.01	0.28		0.21	0.41		0.30
Lane Grp Cap(c), veh/h	1152	0	988	1106	0	978	405	0	0	387	0	0
V/C Ratio(X)	0.60	0.00	0.63	0.47	0.00	0.50	0.19	0.00	0.00	0.67	0.00	0.00
Avail Cap(c_a), veh/h	1152	0	988	1106	0	978	494	0	0	473	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	1.00	1.00	0.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	7.3	0.0	7.3	6.4	0.0	6.5	20.7	0.0	0.0	23.5	0.0	0.0
Incr Delay (d2), s/veh	2.3	0.0	3.1	1.5	0.0	1.8	0.2	0.0	0.0	2.7	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(-26165%),veh/ln	7.8	0.0	7.3	5.1	0.0	5.0	1.1	0.0	0.0	4.4	0.0	0.0
LnGrp Delay(d),s/veh	9.6	0.0	10.4	7.9	0.0	8.3	20.9	0.0	0.0	26.3	0.0	0.0
LnGrp LOS	A		B	A		A	C			C		
Approach Vol, veh/h		1315			1015			76			260	
Approach Delay, s/veh		10.0			8.1			20.9			26.3	
Approach LOS		B			A			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		43.3		16.7		43.3		16.7
Change Period (Y+Rc), s		6.0		5.0		6.0		5.0
Max Green Setting (Gmax), s		34.0		15.0		34.0		15.0
Max Q Clear Time (g_c+I1), s		16.7		11.3		12.3		4.1
Green Ext Time (p_c), s		9.5		0.5		10.8		1.0

Intersection Summary	
HCM 2010 Ctrl Delay	11.2
HCM 2010 LOS	B

Notes

User approved pedestrian interval to be less than phase max green.

HCM 2010 Signalized Intersection Summary
16: Sproul Rd & Conestoga Rd

3/10/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (veh/h)	105	555	218	28	520	47	105	186	28	51	293	83
Number	7	4	14	3	8	18	1	6	16	5	2	12
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1782	1782	1800	1827	1827	1845	1773	1773	1791	1809	1791	1809
Adj Flow Rate, veh/h	111	584	0	29	547	0	111	196	29	54	308	87
Adj No. of Lanes	1	1	0	1	1	0	1	1	0	0	1	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	1	1	1	1	1	1	1	1	1	1	1	1
Cap, veh/h	228	819	0	258	615	0	299	599	89	87	315	84
Arrive On Green	0.05	0.46	0.00	0.34	0.34	0.00	0.06	0.40	0.40	0.26	0.26	0.26
Sat Flow, veh/h	1697	1782	0	857	1827	0	1689	1510	223	138	1201	322
Grp Volume(v), veh/h	111	584	0	29	547	0	111	0	225	449	0	0
Grp Sat Flow(s),veh/h/ln	1697	1782	0	857	1827	0	1689	0	1734	1661	0	0
Q Serve(g_s), s	3.3	21.1	0.0	2.3	22.7	0.0	3.7	0.0	7.2	14.8	0.0	0.0
Cycle Q Clear(g_c), s	3.3	21.1	0.0	13.5	22.7	0.0	3.7	0.0	7.2	21.0	0.0	0.0
Prop In Lane	1.00		0.00	1.00		0.00	1.00		0.13	0.12		0.19
Lane Grp Cap(c), veh/h	228	819	0	258	615	0	299	0	688	486	0	0
V/C Ratio(X)	0.49	0.71	0.00	0.11	0.89	0.00	0.37	0.00	0.33	0.92	0.00	0.00
Avail Cap(c_a), veh/h	274	819	0	258	615	0	337	0	726	486	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	1.00	1.00	0.00	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	19.0	17.4	0.0	26.7	25.1	0.0	18.3	0.0	16.7	29.7	0.0	0.0
Incr Delay (d2), s/veh	1.6	5.2	0.0	0.9	17.5	0.0	0.8	0.0	0.3	23.4	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(-26165%),veh/ln	1.6	11.4	0.0	0.6	14.4	0.0	1.7	0.0	3.5	13.0	0.0	0.0
LnGrp Delay(d),s/veh	20.6	22.6	0.0	27.6	42.7	0.0	19.0	0.0	17.0	53.0	0.0	0.0
LnGrp LOS	C	C		C	D		B		B	D		
Approach Vol, veh/h		695			576			336			449	
Approach Delay, s/veh		22.3			41.9			17.7			53.0	
Approach LOS		C			D			B			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4		6	7	8
Phs Duration (G+Y+Rc), s	10.7	27.0		42.3		37.7	9.9	32.4
Change Period (Y+Rc), s	5.5	5.5		5.0		5.5	5.0	5.0
Max Green Setting (Gmax), s	7.0	21.5		35.5		34.0	7.0	23.5
Max Q Clear Time (g_c+I1), s	5.7	23.0		23.1		9.2	5.3	24.7
Green Ext Time (p_c), s	0.0	0.0		5.7		2.5	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	33.7
HCM 2010 LOS	C

HCM 2010 Signalized Intersection Summary
25: S Ithan Ave & Conestoga Rd 3/10/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	67	522	7	11	471	48	7	23	6	63	94	133
Number	1	6	16	5	2	12	7	4	14	3	8	18
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	1854	1836	1854	1764	1747	1764	1763	1745	1763	1844	1826	1844
Adj Flow Rate, veh/h	76	593	8	12	535	55	8	26	7	72	107	151
Adj No. of Lanes	0	1	0	0	1	0	0	1	0	0	1	0
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Percent Heavy Veh, %	1	1	1	1	1	1	1	1	1	1	1	1
Cap, veh/h	146	752	10	86	732	74	131	295	68	156	151	178
Arrive On Green	0.47	0.47	0.47	0.47	0.47	0.47	0.24	0.24	0.24	0.24	0.24	0.24
Sat Flow, veh/h	122	1584	20	10	1541	156	152	1234	285	250	630	742
Grp Volume(v), veh/h	677	0	0	602	0	0	41	0	0	330	0	0
Grp Sat Flow(s),veh/h/ln	1726	0	0	1707	0	0	1671	0	0	1623	0	0
Q Serve(g_s), s	1.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.7	0.0	0.0
Cycle Q Clear(g_c), s	14.7	0.0	0.0	12.9	0.0	0.0	0.9	0.0	0.0	8.8	0.0	0.0
Prop In Lane	0.11		0.01	0.02		0.09	0.20		0.17	0.22		0.46
Lane Grp Cap(c), veh/h	908	0	0	891	0	0	495	0	0	485	0	0
V/C Ratio(X)	0.75	0.00	0.00	0.68	0.00	0.00	0.08	0.00	0.00	0.68	0.00	0.00
Avail Cap(c_a), veh/h	1333	0	0	1331	0	0	650	0	0	647	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	10.0	0.0	0.0	9.7	0.0	0.0	13.5	0.0	0.0	16.4	0.0	0.0
Incr Delay (d2), s/veh	1.3	0.0	0.0	0.9	0.0	0.0	0.1	0.0	0.0	1.8	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(-26165%),veh/ln	7.3	0.0	0.0	6.2	0.0	0.0	0.4	0.0	0.0	4.2	0.0	0.0
LnGrp Delay(d),s/veh	11.3	0.0	0.0	10.6	0.0	0.0	13.6	0.0	0.0	18.3	0.0	0.0
LnGrp LOS	B			B			B			B		
Approach Vol, veh/h		677			602			41			330	
Approach Delay, s/veh		11.3			10.6			13.6			18.3	
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		28.1		17.4		28.1		17.4
Change Period (Y+Rc), s		6.0		6.0		6.0		6.0
Max Green Setting (Gmax), s		34.0		16.0		34.0		16.0
Max Q Clear Time (g_c+I1), s		14.9		2.9		16.7		10.8
Green Ext Time (p_c), s		5.5		1.2		5.3		0.7

Intersection Summary	
HCM 2010 Ctrl Delay	12.5
HCM 2010 LOS	B

HCM 2010 Signalized Intersection Summary
33: Williams Rd/Garrett Ave & Conestoga Rd 3/10/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (veh/h)	27	508	9	12	504	29	16	1	11	28	12	52
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	1872	1872	1872	1872	1872	1872	1800	1800	1800	1728	1728	1728
Adj Flow Rate, veh/h	29	552	10	13	548	32	17	1	12	30	13	57
Adj No. of Lanes	0	1	0	0	1	0	0	1	0	0	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	0	0	0	0	0	0	0	0	0	0	0	0
Cap, veh/h	88	1246	22	67	1231	71	147	25	56	101	26	71
Arrive On Green	0.71	0.71	0.71	0.71	0.71	0.71	0.08	0.08	0.08	0.08	0.08	0.08
Sat Flow, veh/h	41	1749	31	13	1728	99	699	298	665	334	307	849
Grp Volume(v), veh/h	591	0	0	593	0	0	30	0	0	100	0	0
Grp Sat Flow(s),veh/h/ln	1821	0	0	1840	0	0	1662	0	0	1490	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	2.9	0.0	0.0
Cycle Q Clear(g_c), s	8.5	0.0	0.0	8.6	0.0	0.0	1.1	0.0	0.0	4.2	0.0	0.0
Prop In Lane	0.05		0.02	0.02		0.05	0.57		0.40	0.30		0.57
Lane Grp Cap(c), veh/h	1356	0	0	1369	0	0	228	0	0	199	0	0
V/C Ratio(X)	0.44	0.00	0.00	0.43	0.00	0.00	0.13	0.00	0.00	0.50	0.00	0.00
Avail Cap(c_a), veh/h	1356	0	0	1369	0	0	410	0	0	385	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	3.9	0.0	0.0	3.9	0.0	0.0	27.3	0.0	0.0	28.7	0.0	0.0
Incr Delay (d2), s/veh	1.0	0.0	0.0	1.0	0.0	0.0	0.4	0.0	0.0	2.8	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(-26165%),veh/ln	4.7	0.0	0.0	4.7	0.0	0.0	0.5	0.0	0.0	1.9	0.0	0.0
LnGrp Delay(d),s/veh	4.9	0.0	0.0	4.9	0.0	0.0	27.6	0.0	0.0	31.5	0.0	0.0
LnGrp LOS	A			A			C			C		
Approach Vol, veh/h		591			593			30			100	
Approach Delay, s/veh		4.9			4.9			27.6			31.5	
Approach LOS		A			A			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		52.0		11.9		52.0		11.9
Change Period (Y+Rc), s		6.0		6.0		6.0		6.0
Max Green Setting (Gmax), s		46.0		14.0		46.0		14.0
Max Q Clear Time (g_c+I1), s		10.5		6.2		10.6		3.1
Green Ext Time (p_c), s		5.8		0.3		5.8		0.4

Intersection Summary	
HCM 2010 Ctrl Delay	7.4
HCM 2010 LOS	A

Notes
User approved pedestrian interval to be less than phase max green.

HCM 2010 Signalized Intersection Summary
3: County Line Rd & Spring Mill Rd 3/10/2015

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	64	306	108	64	245	52	69	200	44	65	382	45
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	1789	1800	1800	1767	1800	1800	1800	1800	1800	1773	1800
Adj Flow Rate, veh/h	89	340	126	89	282	81	85	256	67	86	429	65
Adj No. of Lanes	0	1	0	0	1	0	0	1	0	0	1	0
Peak Hour Factor	0.72	0.90	0.86	0.72	0.87	0.64	0.81	0.78	0.66	0.76	0.89	0.69
Percent Heavy Veh, %	1	1	1	3	3	3	0	0	0	1	1	1
Cap, veh/h	141	407	140	148	384	100	147	371	87	135	482	69
Arrive On Green	0.40	0.40	0.40	0.40	0.40	0.40	0.38	0.38	0.38	0.38	0.38	0.38
Sat Flow, veh/h	178	1020	352	190	962	252	193	966	228	171	1255	180
Grp Volume(v), veh/h	555	0	0	452	0	0	408	0	0	580	0	0
Grp Sat Flow(s),veh/h/ln	1549	0	0	1404	0	0	1386	0	0	1606	0	0
Q Serve(g_s), s	3.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.3	0.0	0.0
Cycle Q Clear(g_c), s	20.1	0.0	0.0	16.8	0.0	0.0	14.5	0.0	0.0	20.8	0.0	0.0
Prop In Lane	0.16		0.23	0.20		0.18	0.21		0.16	0.15		0.11
Lane Grp Cap(c), veh/h	688	0	0	632	0	0	605	0	0	686	0	0
V/C Ratio(X)	0.81	0.00	0.00	0.71	0.00	0.00	0.67	0.00	0.00	0.85	0.00	0.00
Avail Cap(c_a), veh/h	688	0	0	632	0	0	641	0	0	724	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)	0.46	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	16.6	0.0	0.0	15.3	0.0	0.0	15.3	0.0	0.0	17.6	0.0	0.0
Incr Delay (d2), s/veh	4.7	0.0	0.0	6.8	0.0	0.0	2.0	0.0	0.0	8.1	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(-26165%),veh/ln	9.4	0.0	0.0	7.7	0.0	0.0	6.1	0.0	0.0	10.7	0.0	0.0
LnGrp Delay(d),s/veh	21.3	0.0	0.0	22.1	0.0	0.0	17.3	0.0	0.0	25.7	0.0	0.0
LnGrp LOS	C			C			B			C		
Approach Vol, veh/h		555			452			408			580	
Approach Delay, s/veh		21.3			22.1			17.3			25.7	
Approach LOS		C			C			B			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		8
Phs Duration (G+Y+Rc), s		30.4		29.6		30.4		29.6
Change Period (Y+Rc), s		6.0		6.0		6.0		6.0
Max Green Setting (Gmax), s		23.0		25.0		23.0		25.0
Max Q Clear Time (g_c+I1), s		22.1		22.8		18.8		16.5
Green Ext Time (p_c), s		0.5		0.7		1.9		1.8

Intersection Summary	
HCM 2010 Ctrl Delay	22.0
HCM 2010 LOS	C

HCM 2010 TWSC
79: Garrett Rd & Lancaster Ave 3/10/2015

Intersection	
Int Delay, s/veh	1.6

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	1252	47	48	928	0	38
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, %	-3	-	-	3	0	-
Peak Hour Factor	82	82	82	82	82	82
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	1527	57	59	1132	0	46

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	1584	0	2238	792
Stage 1	-	-	-	-	1555	-
Stage 2	-	-	-	-	683	-
Critical Hdwy	-	-	4.1	-	6.8	6.9
Critical Hdwy Stg 1	-	-	-	-	5.8	-
Critical Hdwy Stg 2	-	-	-	-	5.8	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	421	-	37	336
Stage 1	-	-	-	-	163	-
Stage 2	-	-	-	-	468	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	421	-	23	336
Mov Cap-2 Maneuver	-	-	-	-	23	-
Stage 1	-	-	-	-	163	-
Stage 2	-	-	-	-	292	-

Approach	EB	WB	NB
HCM Control Delay, s	0	3.1	17.4
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	336	-	-	421	-
HCM Lane V/C Ratio	0.138	-	-	0.139	-
HCM Control Delay (s)	17.4	-	-	14.9	2.5
HCM Lane LOS	C	-	-	B	A
HCM 95th %tile Q(veh)	0.5	-	-	0.5	-

Intersection	
Int Delay, s/veh	0.5

Movement	EBL	EBT	WBT	WBR	SWL	SWR
Vol, veh/h	10	662	615	3	17	9
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	96	96	96	96	96	96
Heavy Vehicles, %	1	1	1	1	1	1
Mvmt Flow	10	690	641	3	18	9

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	644	0	-	0	1352	642
Stage 1	-	-	-	-	642	-
Stage 2	-	-	-	-	710	-
Critical Hdwy	4.11	-	-	-	6.41	6.21
Critical Hdwy Stg 1	-	-	-	-	5.41	-
Critical Hdwy Stg 2	-	-	-	-	5.41	-
Follow-up Hdwy	2.209	-	-	-	3.509	3.309
Pot Cap-1 Maneuver	946	-	-	-	166	476
Stage 1	-	-	-	-	526	-
Stage 2	-	-	-	-	489	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	946	-	-	-	163	476
Mov Cap-2 Maneuver	-	-	-	-	163	-
Stage 1	-	-	-	-	526	-
Stage 2	-	-	-	-	481	-

Approach	EB	WB	SW
HCM Control Delay, s	0.1	0	24.6
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SWLn1
Capacity (veh/h)	946	-	-	-	211
HCM Lane V/C Ratio	0.011	-	-	-	0.128
HCM Control Delay (s)	8.8	0	-	-	24.6
HCM Lane LOS	A	A	-	-	C
HCM 95th %tile Q(veh)	0	-	-	-	0.4

Intersection	
Int Delay, s/veh	2.6

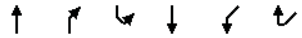
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	37	514	17	17	473	16	15	8	17	9	17	53
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	96	96	96	96	96	96	96	96	96	96	96	96
Heavy Vehicles, %	1	1	1	1	1	1	1	1	1	1	1	1
Mvmt Flow	39	535	18	18	493	17	16	8	18	9	18	55

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	509	0	0	553	0	0	1194	1166	544	1170	1166	501
Stage 1	-	-	-	-	-	-	621	621	-	536	536	-
Stage 2	-	-	-	-	-	-	573	545	-	634	630	-
Critical Hdwy	4.11	-	-	4.11	-	-	7.11	6.51	6.21	7.11	6.51	6.21
Critical Hdwy Stg 1	-	-	-	-	-	-	6.11	5.51	-	6.11	5.51	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.11	5.51	-	6.11	5.51	-
Follow-up Hdwy	2.209	-	-	2.209	-	-	3.509	4.009	3.309	3.509	4.009	3.309
Pot Cap-1 Maneuver	1061	-	-	1022	-	-	164	195	541	171	195	572
Stage 1	-	-	-	-	-	-	477	481	-	530	525	-
Stage 2	-	-	-	-	-	-	506	520	-	469	476	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1061	-	-	1022	-	-	129	180	541	150	180	572
Mov Cap-2 Maneuver	-	-	-	-	-	-	129	180	-	150	180	-
Stage 1	-	-	-	-	-	-	452	456	-	502	512	-
Stage 2	-	-	-	-	-	-	430	507	-	422	451	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.6	0.3	26.6	20.1
HCM LOS			D	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	208	1061	-	-	1022	-	-	320
HCM Lane V/C Ratio	0.2	0.036	-	-	0.017	-	-	0.257
HCM Control Delay (s)	26.6	8.5	0	-	8.6	0	-	20.1
HCM Lane LOS	D	A	A	-	A	A	-	C
HCM 95th %tile Q(veh)	0.7	0.1	-	-	0.1	-	-	1

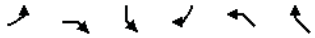
Lanes, Volumes, Timings
38: County Line Rd & N Ithan Ave 3/10/2015



Lane Group	NBT	NBR	SBL	SBT	SWL	SWR
Lane Configurations						
Volume (vph)	269	121	183	498	133	62
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.958				0.957	
Flt Protected				0.987	0.967	
Satd. Flow (prot)	1802	0	0	1857	1741	0
Flt Permitted				0.987	0.967	
Satd. Flow (perm)	1802	0	0	1857	1741	0
Link Speed (mph)	30			30	30	
Link Distance (ft)	295			1901	824	
Travel Time (s)	6.7			43.2	18.7	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%
Adj. Flow (vph)	286	129	195	530	141	66
Shared Lane Traffic (%)						
Lane Group Flow (vph)	415	0	0	725	207	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	0			0	12	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	10			10	10	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)		9	15		15	9
Sign Control	Free			Stop	Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	79.0%	ICU Level of Service	D
Analysis Period (min)	15		

Lanes, Volumes, Timings
2: County Line Rd & N Ithan Ave 3/10/2015



Lane Group	EBL	EBR	SBL	SBR	NWL	NWR
Lane Configurations						
Volume (vph)	226	37	302	332	23	162
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.981		0.929		0.882	
Flt Protected	0.959		0.977		0.994	
Satd. Flow (prot)	1763	0	1707	0	1649	0
Flt Permitted	0.959		0.977		0.994	
Satd. Flow (perm)	1763	0	1707	0	1649	0
Link Speed (mph)	30		30		30	
Link Distance (ft)	973		295		2014	
Travel Time (s)	22.1		6.7		45.8	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%
Bus Blockages (#/hr)	1	0	0	0	0	0
Adj. Flow (vph)	240	39	321	353	24	172
Shared Lane Traffic (%)						
Lane Group Flow (vph)	279	0	674	0	196	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Right
Median Width(ft)	22		12		12	
Link Offset(ft)	0		0		0	
Crosswalk Width(ft)	10		10		10	
Two way Left Turn Lane						
Headway Factor	1.01	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9	15	9	15	9
Sign Control	Stop		Free		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	73.2%	ICU Level of Service	D
Analysis Period (min)	15		

Intersection	
Int Delay, s/veh	1.5

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	16	18	52	183	156	124
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	17	19	54	191	162	129

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	526	227	292	0	-	0
Stage 1	227	-	-	-	-	-
Stage 2	299	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	516	817	1281	-	-	-
Stage 1	815	-	-	-	-	-
Stage 2	757	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	492	817	1281	-	-	-
Mov Cap-2 Maneuver	492	-	-	-	-	-
Stage 1	815	-	-	-	-	-
Stage 2	721	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	11.1	1.8	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1281	-	623	-	-
HCM Lane V/C Ratio	0.042	-	0.057	-	-
HCM Control Delay (s)	7.9	0	11.1	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0.1	-	0.2	-	-

Intersection	
Int Delay, s/veh	3.5

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	169	215	345	16	12	118
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	98	98	98	98	98	98
Heavy Vehicles, %	1	1	1	1	1	1
Mvmt Flow	172	219	352	16	12	120

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	368	0	-	0	924	360
Stage 1	-	-	-	-	360	-
Stage 2	-	-	-	-	564	-
Critical Hdwy	4.11	-	-	-	6.41	6.21
Critical Hdwy Stg 1	-	-	-	-	5.41	-
Critical Hdwy Stg 2	-	-	-	-	5.41	-
Follow-up Hdwy	2.209	-	-	-	3.509	3.309
Pot Cap-1 Maneuver	1196	-	-	-	300	687
Stage 1	-	-	-	-	708	-
Stage 2	-	-	-	-	571	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1196	-	-	-	251	687
Mov Cap-2 Maneuver	-	-	-	-	251	-
Stage 1	-	-	-	-	708	-
Stage 2	-	-	-	-	477	-

Approach	EB	WB	SB
HCM Control Delay, s	3.7	0	12.8
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1196	-	-	-	592
HCM Lane V/C Ratio	0.144	-	-	-	0.224
HCM Control Delay (s)	8.5	0	-	-	12.8
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.5	-	-	-	0.9

HCM 2010 TWSC
43: County Line Rd & Roberts Rd 3/10/2015

Intersection													
Int Delay, s/veh	3.2												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	37	26	1	9	26	11	4	511	28	11	654	60
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	1	1	1	1	1	1	1	1	1	1	1	1
Mvmt Flow	39	27	1	9	27	12	4	538	29	12	688	63

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1034	1319	376	942	1336	284	752	0	0	567	0	0
Stage 1	743	743	-	561	561	-	-	-	-	-	-	-
Stage 2	291	576	-	381	775	-	-	-	-	-	-	-
Critical Hdwy	7.52	6.52	6.92	7.52	6.52	6.92	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.52	5.52	-	6.52	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.52	5.52	-	6.52	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.51	4.01	3.31	3.51	4.01	3.31	2.21	-	-	2.21	-	-
Pot Cap-1 Maneuver	188	157	624	219	154	716	860	-	-	1008	-	-
Stage 1	375	422	-	482	511	-	-	-	-	-	-	-
Stage 2	695	503	-	616	408	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	156	153	624	185	150	716	860	-	-	1008	-	-
Mov Cap-2 Maneuver	156	153	-	185	150	-	-	-	-	-	-	-
Stage 1	372	413	-	479	507	-	-	-	-	-	-	-
Stage 2	642	499	-	562	399	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	44.1	29.6	0.1	0.2
HCM LOS	E	D		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	860	-	-	157	194	1008	-	-
HCM Lane V/C Ratio	0.005	-	-	0.429	0.25	0.011	-	-
HCM Control Delay (s)	9.2	0	-	44.1	29.6	8.6	0.1	-
HCM Lane LOS	A	A	-	E	D	A	A	-
HCM 95th %tile Q(veh)	0	-	-	1.9	0.9	0	-	-

HCM 2010 TWSC
61: Dwy/Aldwyn Ln & S Ithan Ave 3/10/2015

Intersection													
Int Delay, s/veh	2.3												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	35	149	5	51	284	21	8	3	37	4	0	13
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	91	91	91	91	91	91	91	91	91	91	91	91
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	38	164	5	56	312	23	9	3	41	4	0	14

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	335	0	0	169	0	0	686	690	166	701	682	324
Stage 1	-	-	-	-	-	-	243	243	-	436	436	-
Stage 2	-	-	-	-	-	-	443	447	-	265	246	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1224	-	-	1409	-	-	362	368	878	353	372	717
Stage 1	-	-	-	-	-	-	761	705	-	599	580	-
Stage 2	-	-	-	-	-	-	594	573	-	740	703	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1224	-	-	1409	-	-	333	338	878	313	342	717
Mov Cap-2 Maneuver	-	-	-	-	-	-	333	338	-	313	342	-
Stage 1	-	-	-	-	-	-	735	681	-	579	552	-
Stage 2	-	-	-	-	-	-	554	545	-	678	679	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	1.5	1.1	11.1	11.8
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	640	1224	-	-	1409	-	-	550
HCM Lane V/C Ratio	0.082	0.031	-	-	0.04	-	-	0.034
HCM Control Delay (s)	11.1	8	0	-	7.7	0	-	11.8
HCM Lane LOS	B	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	0.3	0.1	-	-	0.1	-	-	0.1

Intersection	
Int Delay, s/veh	0.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	1192	64	0	942	0	15
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	125	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	-2	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	1296	70	0	1024	0	16

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	1296	0	1808	648
Stage 1	-	-	-	-	1296	-
Stage 2	-	-	-	-	512	-
Critical Hdwy	-	-	4.14	-	6.84	6.94
Critical Hdwy Stg 1	-	-	-	-	5.84	-
Critical Hdwy Stg 2	-	-	-	-	5.84	-
Follow-up Hdwy	-	-	2.22	-	3.52	3.32
Pot Cap-1 Maneuver	-	-	531	-	70	413
Stage 1	-	-	-	-	220	-
Stage 2	-	-	-	-	567	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	531	-	70	413
Mov Cap-2 Maneuver	-	-	-	-	70	-
Stage 1	-	-	-	-	220	-
Stage 2	-	-	-	-	567	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	14.1
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	413	-	-	531	-
HCM Lane V/C Ratio	0.039	-	-	-	-
HCM Control Delay (s)	14.1	-	-	0	-
HCM Lane LOS	B	-	-	A	-
HCM 95th %tile Q(veh)	0.1	-	-	0	-

Intersection	
Int Delay, s/veh	0.9

Movement	SET	SER	NWL	NWT	NEL	NER
Vol, veh/h	1077	72	47	789	0	91
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	100	75	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	3	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	1171	78	51	858	0	99

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	1171	0	1702	585
Stage 1	-	-	-	-	1171	-
Stage 2	-	-	-	-	531	-
Critical Hdwy	-	-	4.14	-	6.84	6.94
Critical Hdwy Stg 1	-	-	-	-	5.84	-
Critical Hdwy Stg 2	-	-	-	-	5.84	-
Follow-up Hdwy	-	-	2.22	-	3.52	3.32
Pot Cap-1 Maneuver	-	-	592	-	83	454
Stage 1	-	-	-	-	257	-
Stage 2	-	-	-	-	554	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	592	-	76	454
Mov Cap-2 Maneuver	-	-	-	-	76	-
Stage 1	-	-	-	-	257	-
Stage 2	-	-	-	-	506	-

Approach	SE	NW	NE
HCM Control Delay, s	0	0.7	15.1
HCM LOS			C

Minor Lane/Major Mvmt	NELn1	NWL	NWT	SET	SER
Capacity (veh/h)	454	592	-	-	-
HCM Lane V/C Ratio	0.218	0.086	-	-	-
HCM Control Delay (s)	15.1	11.7	-	-	-
HCM Lane LOS	C	B	-	-	-
HCM 95th %tile Q(veh)	0.8	0.3	-	-	-

Intersection	
Int Delay, s/veh	7.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	SBL	SBR	NWU	NWL	NWR
Vol, veh/h	16	129	43	71	255	1	55	14	59	55	120
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	None	-	-	-
Storage Length	-	-	-	50	-	-	0	-	-	0	-
Veh in Median Storage, #	-	0	-	-	0	-	0	-	-	0	-
Grade, %	-	1	-	-	-1	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	17	140	47	77	277	1	60	15	64	60	130

Major/Minor	Major1			Major2			Minor2		Minor1		
Conflicting Flow All	278	0	0	187	0	0	696	278	0	668	164
Stage 1	-	-	-	-	-	-	432	-	0	198	-
Stage 2	-	-	-	-	-	-	264	-	0	470	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.22	-	7.12	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	-	-	6.12	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	-	-	6.12	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	3.318	-	3.518	3.318
Pot Cap-1 Maneuver	1285	-	-	1387	-	-	356	761	0	372	881
Stage 1	-	-	-	-	-	-	602	-	0	804	-
Stage 2	-	-	-	-	-	-	741	-	0	574	-
Platoon blocked, %		-	-		-	-			-		
Mov Cap-1 Maneuver	1285	-	-	1387	-	-	246	761	0	301	881
Mov Cap-2 Maneuver	-	-	-	-	-	-	246	-	0	301	-
Stage 1	-	-	-	-	-	-	593	-	0	792	-
Stage 2	-	-	-	-	-	-	599	-	0	474	-

Approach	EB	WB	SB	NW
HCM Control Delay, s	0.7	1.7	16.3	19.9
HCM LOS			C	C

Minor Lane/Major Mvmt	NWLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	301	1285	-	-	1387	-	-	395
HCM Lane V/C Ratio	0.199	0.014	-	-	0.056	-	-	0.195
HCM Control Delay (s)	19.9	7.8	0	-	7.7	-	-	16.3
HCM Lane LOS	C	A	A	-	A	-	-	C
HCM 95th %tile Q(veh)	0.7	0	-	-	0.2	-	-	0.7

APPENDIX J

Auxiliary Turn Lane Warrant Analyses

Turn Lane Warrant and Length Analysis Workbook

STUDY LOCATION AND ANALYSIS INFORMATION

Municipality:	Radnor Township	**Analysis Date:**	3/5/2015
County:	Delaware County	**Conducted By:**	FLT
PennDOT Engineering District:	6	**Checked By:**	FLT
		Agency/Company Name:	F. Tavani and Associates, Inc.

Intersection & Approach Description: Lancaster Avenue (SR0030) & Proposed WLA RI/RO Driveway

Analysis Period:	2025 Build	**Number of Approach Lanes:**	2
Design Hour:	AM 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	0.0%	N/A
	Through	-	0	0.0%	N/A
	Right	Yes	0	0.0%	N/A
Opposing	Left	Yes	0	0.0%	N/A
	Through	-	0	0.0%	N/A
	Right	Yes	0	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	0	0.0%	0
	Through	-	972	7.0%	1007
	Right	-	64	0.0%	64

Advancing Volume:	1071
Right Turn Volume:	64

TURN LANE WARRANT FINDINGS

Left Turn Lane Warrant Findings

Applicable Warrant Figure: N/A

Warrant Met?: N/A

Right Turn Lane Warrant Findings

Applicable Warrant Figure: Figure 11

Warrant Met?: Yes

TURN LANE LENGTH CALCULATIONS

Intersection Control:	Unsignalized
Design Hour Volume of Turning Lane:	64
Cycles Per Hour (Assumed):	Known
Cycles Per Hour (If Known):	40

Average # of Vehicles/Cycle: 2.0

PennDOT Publication 46, Exhibit 11-6

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

Right Turn Lane Storage Length, Condition A:	100	Feet
Condition B:	N/A	Feet
Condition C:	N/A	Feet
Required Right Turn Lane Storage Length:	100	Feet

Additional Findings: N/A

Additional Comments / Justifications:

A storage length of 125 feet is provided on the plans

Turn Lane Warrant and Length Analysis Workbook

STUDY LOCATION AND ANALYSIS INFORMATION

Municipality:	Radnor Township	**Analysis Date:**	3/5/2015
County:	Delaware County	**Conducted By:**	FLT
PennDOT Engineering District:	6	**Checked By:**	FLT
		Agency/Company Name:	F. Tavani and Associates, Inc.

Intersection & Approach Description: Lancaster Avenue (SR0030) & Proposed WLA RI/RO Driveway

Analysis Period:	2025 Build	**Number of Approach Lanes:**	2
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	0.0%	N/A
	Through	-	0	0.0%	N/A
	Right	Yes	0	0.0%	N/A
Opposing	Left	Yes	0	0.0%	N/A
	Through	-	0	0.0%	N/A
	Right	Yes	0	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	0	0.0%	0
	Through	-	1206	1.0%	1213
	Right	-	64	0.0%	64

Advancing Volume:	1277
Right Turn Volume:	64

TURN LANE WARRANT FINDINGS

Left Turn Lane Warrant Findings

Applicable Warrant Figure: N/A

Warrant Met?: N/A

Right Turn Lane Warrant Findings

Applicable Warrant Figure: Figure 11

Warrant Met?: Yes

TURN LANE LENGTH CALCULATIONS

Intersection Control:	Unsignalized
Design Hour Volume of Turning Lane:	64
Cycles Per Hour (Assumed):	Known
Cycles Per Hour (If Known):	40

Average # of Vehicles/Cycle: 2.0

PennDOT Publication 46, Exhibit 11-6

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

Right Turn Lane Storage Length, Condition A:	100	Feet
Condition B:	N/A	Feet
Condition C:	N/A	Feet
Required Right Turn Lane Storage Length:	100	Feet

Additional Findings: N/A

Additional Comments / Justifications:

A storage length of 125 feet is provided on the plans

Turn Lane Warrant and Length Analysis Workbook

STUDY LOCATION AND ANALYSIS INFORMATION

Municipality:	Radnor Township	**Analysis Date:**	3/5/2015
County:	Delaware County	**Conducted By:**	FLT
PennDOT Engineering District:	6	**Checked By:**	FLT
		Agency/Company Name:	F. Tavani and Associates, Inc.

Intersection & Approach Description: Lancaster Avenue (SR0030) & Relocated Church Walk Driveway

Analysis Period:	2025 Build	**Number of Approach Lanes:**	2
Design Hour:	AM Peak Hour	**Undivided or Divided Highway:**	Undivided
Intersection Control:	Signalized		
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	0.0%	N/A
	Through	-	0	0.0%	N/A
	Right	Yes	0	0.0%	N/A
Opposing	Left	Yes	0	0.0%	N/A
	Through	-	0	0.0%	N/A
	Right	Yes	0	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	0	0.0%	0
	Through	-	947	7.0%	981
	Right	-	28	0.0%	28

Advancing Volume:	1009
Right Turn Volume:	28

TURN LANE WARRANT FINDINGS

Left Turn Lane Warrant Findings

Applicable Warrant Figure: N/A

Warrant Met?: N/A

Right Turn Lane Warrant Findings

Applicable Warrant Figure: Figure 11

Warrant Met?: No

TURN LANE LENGTH CALCULATIONS

Intersection Control:	Signalized
Design Hour Volume of Turning Lane:	28
Cycles Per Hour (Assumed):	Known
Cycles Per Hour (If Known):	60

Average # of Vehicles/Cycle: N/A

PennDOT Publication 46, Exhibit 11-6

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

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

Additional Findings: N/A

Additional Comments / Justifications:

A storage length of 125 feet is provided on the plans

Turn Lane Warrant and Length Analysis Workbook

STUDY LOCATION AND ANALYSIS INFORMATION

Municipality:	Radnor Township	**Analysis Date:**	3/5/2015
County:	Delaware County	**Conducted By:**	FLT
PennDOT Engineering District:	6	**Checked By:**	FLT
		Agency/Company Name:	F. Tavani and Associates, Inc.

Intersection & Approach Description: Lancaster Avenue (SR0030) & Relocated Church Walk Driveway

Analysis Period:	2025 Build	**Number of Approach Lanes:**	2
Design Hour:	PM Peak Hour	**Undivided or Divided Highway:**	Undivided
Intersection Control:	Signalized		
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	0.0%	N/A
	Through	-	0	0.0%	N/A
	Right	Yes	0	0.0%	N/A
Opposing	Left	Yes	0	0.0%	N/A
	Through	-	0	0.0%	N/A
	Right	Yes	0	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	0	0.0%	0
	Through	-	1190	1.0%	1196
	Right	-	31	0.0%	31

Advancing Volume:	1227
Right Turn Volume:	31

TURN LANE WARRANT FINDINGS

Left Turn Lane Warrant Findings

Applicable Warrant Figure: N/A

Warrant Met?: N/A

Right Turn Lane Warrant Findings

Applicable Warrant Figure: Figure 11

Warrant Met?: No

TURN LANE LENGTH CALCULATIONS

Intersection Control:	Signalized
Design Hour Volume of Turning Lane:	31
Cycles Per Hour (Assumed):	Known
Cycles Per Hour (If Known):	60

Average # of Vehicles/Cycle: N/A

PennDOT Publication 46, Exhibit 11-6

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

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

Additional Findings: N/A

Additional Comments / Justifications:

A storage length of 125 feet is provided on the plans

Turn Lane Warrant and Length Analysis Workbook

STUDY LOCATION AND ANALYSIS INFORMATION

Municipality:	Radnor Township	**Analysis Date:**	3/5/2015
County:	Delaware County	**Conducted By:**	FLT
PennDOT Engineering District:	6	**Checked By:**	FLT
		Agency/Company Name:	F. Tavani and Associates, Inc.

Intersection & Approach Description: Lancaster Avenue (SR0030) & Relocated Church Walk Driveway

Analysis Period:	2025 Build	**Number of Approach Lanes:**	2
Design Hour:	AM Peak Hour	**Undivided or Divided Highway:**	Undivided
Intersection Control:	Signalized		
Posted Speed Limit (MPH):	25	**Type of Analysis**	
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	44	0.0%	44
	Through	-	999	4.0%	1019
	Right	Yes	0	0.0%	0
Opposing	Left	Yes	0	0.0%	0
	Through	-	947	7.0%	981
	Right	Yes	28	0.0%	28

Advancing Volume:	1063
Opposing Volume:	1009
Left Turn Volume:	44
% Left Turns in Advancing Volume:	4.14%

Right Turn Lane Volume Calculations

Movement		Include?	Volume	% Trucks	PCEV
Advancing	Left	Yes	0	0.0%	N/A
	Through	-	0	0.0%	N/A
	Right	-	0	0.0%	N/A

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

TURN LANE WARRANT FINDINGS

Left Turn Lane Warrant Findings

Applicable Warrant Figure: Figure 7

Warrant Met?: Yes

Right Turn Lane Warrant Findings

Applicable Warrant Figure: N/A

Warrant Met?: N/A

TURN LANE LENGTH CALCULATIONS

Intersection Control:	Signalized
Design Hour Volume of Turning Lane:	44
Cycles Per Hour (Assumed):	Known
Cycles Per Hour (If Known):	60

Average # of Vehicles/Cycle: 1.0

PennDOT Publication 46, Exhibit 11-6

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

Left Turn Lane Storage Length, Condition A:	75	Feet
Condition B:	N/A	Feet
Condition C:	N/A	Feet
Required Left Turn Lane Storage Length:	75	Feet

Additional Findings: N/A

Additional Comments / Justifications:

A storage length of 125 feet is provided on the plans

Turn Lane Warrant and Length Analysis Workbook

STUDY LOCATION AND ANALYSIS INFORMATION

Municipality:	Radnor Township	**Analysis Date:**	3/5/2015
County:	Delaware County	**Conducted By:**	FLT
PennDOT Engineering District:	6	**Checked By:**	FLT
		Agency/Company Name:	F. Tavani and Associates, Inc.

Intersection & Approach Description: Lancaster Avenue (SR0030) & Relocated Church Walk Driveway

Analysis Period:	2025 Build	**Number of Approach Lanes:**	2
Design Hour:	PM Peak Hour	**Undivided or Divided Highway:**	Undivided
Intersection Control:	Signalized		
Posted Speed Limit (MPH):	25	**Type of Analysis**	
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	34	0.0%	34
	Through	-	861	3.0%	874
	Right	Yes	0	0.0%	0
Opposing	Left	Yes	0	0.0%	0
	Through	-	1190	1.0%	1196
	Right	Yes	31	0.0%	31

Advancing Volume:	908
Opposing Volume:	1227
Left Turn Volume:	34
% Left Turns in Advancing Volume:	3.74%

Right Turn Lane Volume Calculations

Movement		Include?	Volume	% Trucks	PCEV
Advancing	Left	Yes	0	0.0%	N/A
	Through	-	0	0.0%	N/A
	Right	-	0	0.0%	N/A

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

TURN LANE WARRANT FINDINGS

Left Turn Lane Warrant Findings

Applicable Warrant Figure: **Figure 7**

Warrant Met?: **Yes**

Right Turn Lane Warrant Findings

Applicable Warrant Figure: **N/A**

Warrant Met?: **N/A**

TURN LANE LENGTH CALCULATIONS

Intersection Control:	Signalized
Design Hour Volume of Turning Lane:	34
Cycles Per Hour (Assumed):	Known
Cycles Per Hour (If Known):	60

Average # of Vehicles/Cycle: 1.0

PennDOT Publication 46, Exhibit 11-6

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

Left Turn Lane Storage Length, Condition A:	**75**	**Feet**
Condition B:	**N/A**	**Feet**
Condition C:	**N/A**	**Feet**
Required Left Turn Lane Storage Length:	**75**	**Feet**

Additional Findings:

N/A

Additional Comments / Justifications:

A storage length of 125 feet is provided on the plans

Turn Lane Warrant and Length Analysis Workbook

STUDY LOCATION AND ANALYSIS INFORMATION

Municipality:	Radnor Township	**Analysis Date:**	3/5/2015
County:	Delaware County	**Conducted By:**	FLT
PennDOT Engineering District:	6	**Checked By:**	FLT
		Agency/Company Name:	F. Tavani and Associates, Inc.

Intersection & Approach Description: Lancaster Avenue (SR0030) & PAC Driveway

Analysis Period:	2025 Build	**Number of Approach Lanes:**	2
Design Hour:	AM 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	0.0%	N/A
	Through	-	0	0.0%	N/A
	Right	Yes	0	0.0%	N/A
Opposing	Left	Yes	0	0.0%	N/A
	Through	-	0	0.0%	N/A
	Right	Yes	0	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	0	0.0%	0
	Through	-	910	7.0%	942
	Right	-	63	0.0%	63

Advancing Volume:	1005
Right Turn Volume:	63

TURN LANE WARRANT FINDINGS

Left Turn Lane Warrant Findings

Applicable Warrant Figure: N/A

Warrant Met?: N/A

Right Turn Lane Warrant Findings

Applicable Warrant Figure: Figure 11

Warrant Met?: No

TURN LANE LENGTH CALCULATIONS

Intersection Control:	Unsignalized
Design Hour Volume of Turning Lane:	63
Cycles Per Hour (Assumed):	Known
Cycles Per Hour (If Known):	60

Average # of Vehicles/Cycle: N/A

PennDOT Publication 46, Exhibit 11-6

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

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

Additional Findings: N/A

Additional Comments / Justifications:

A storage length of 100 feet is provided on the plans

Turn Lane Warrant and Length Analysis Workbook

STUDY LOCATION AND ANALYSIS INFORMATION

Municipality:	Radnor Township	**Analysis Date:**	3/5/2015
County:	Delaware County	**Conducted By:**	FLT
PennDOT Engineering District:	6	**Checked By:**	FLT
		Agency/Company Name:	F. Tavani and Associates, Inc.

Intersection & Approach Description: Lancaster Avenue (SR0030) & PAC Driveway

Analysis Period:	2025 Build	**Number of Approach Lanes:**	2
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	0.0%	N/A
	Through	-	0	0.0%	N/A
	Right	Yes	0	0.0%	N/A
Opposing	Left	Yes	0	0.0%	N/A
	Through	-	0	0.0%	N/A
	Right	Yes	0	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	0	0.0%	0
	Through	-	1091	1.0%	1097
	Right	-	72	0.0%	72

Advancing Volume:	1169
Right Turn Volume:	72

TURN LANE WARRANT FINDINGS

Left Turn Lane Warrant Findings

Applicable Warrant Figure: N/A

Warrant Met?: N/A

Right Turn Lane Warrant Findings

Applicable Warrant Figure: Figure 11

Warrant Met?: Yes

TURN LANE LENGTH CALCULATIONS

Intersection Control:	Unsignalized
Design Hour Volume of Turning Lane:	72
Cycles Per Hour (Assumed):	Known
Cycles Per Hour (If Known):	60

Average # of Vehicles/Cycle: 1.0

PennDOT Publication 46, Exhibit 11-6

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

Right Turn Lane Storage Length, Condition A:	75	Feet
Condition B:	N/A	Feet
Condition C:	N/A	Feet
Required Right Turn Lane Storage Length:	75	Feet

Additional Findings: N/A

Additional Comments / Justifications:

A storage length of 100 feet is provided on the plans

Turn Lane Warrant and Length Analysis Workbook

STUDY LOCATION AND ANALYSIS INFORMATION

Municipality:	Radnor Township	**Analysis Date:**	3/5/2015
County:	Delaware County	**Conducted By:**	FLT
PennDOT Engineering District:	6	**Checked By:**	FLT
		Agency/Company Name:	F. Tavani and Associates, Inc.

Intersection & Approach Description: Lancaster Avenue (SR0030) & PAC Driveway

Analysis Period:	2025 Build	**Number of Approach Lanes:**	2
Design Hour:	AM 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?:**	Left Turn Lane

VOLUME CALCULATIONS

Left Turn Lane Volume Calculations

Movement		Include?	Volume	% Trucks	PCEV
Advancing	Left	Yes	76	0.0%	76
	Through	-	988	4.0%	1008
	Right	Yes	0	0.0%	0
Opposing	Left	Yes	0	0.0%	0
	Through	-	910	7.0%	942
	Right	Yes	63	0.0%	63

Advancing Volume:	1084
Opposing Volume:	1005
Left Turn Volume:	76
% Left Turns in Advancing Volume:	7.01%

Right Turn Lane Volume Calculations

Movement		Include?	Volume	% Trucks	PCEV
Advancing	Left	Yes	0	0.0%	N/A
	Through	-	0	0.0%	N/A
	Right	-	0	0.0%	N/A

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

TURN LANE WARRANT FINDINGS

Left Turn Lane Warrant Findings

Applicable Warrant Figure: Figure 7

Warrant Met?: Yes

Right Turn Lane Warrant Findings

Applicable Warrant Figure: N/A

Warrant Met?: N/A

TURN LANE LENGTH CALCULATIONS

Intersection Control:	Unsignalized
Design Hour Volume of Turning Lane:	76
Cycles Per Hour (Assumed):	Known
Cycles Per Hour (If Known):	60

Average # of Vehicles/Cycle: 1.0

PennDOT Publication 46, Exhibit 11-6

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

Left Turn Lane Storage Length, Condition A:	75	Feet
Condition B:	N/A	Feet
Condition C:	N/A	Feet
Required Left Turn Lane Storage Length:	75	Feet

Additional Findings: N/A

Additional Comments / Justifications:

A storage length of 75 feet is provided on the plans

Turn Lane Warrant and Length Analysis Workbook

STUDY LOCATION AND ANALYSIS INFORMATION

Municipality:	Radnor Township	**Analysis Date:**	3/5/2015
County:	Delaware County	**Conducted By:**	FLT
PennDOT Engineering District:	6	**Checked By:**	FLT
		Agency/Company Name:	F. Tavani and Associates, Inc.

Intersection & Approach Description: Lancaster Avenue (SR0030) & PAC Driveway

Analysis Period:	2025 Build	**Number of Approach Lanes:**	2
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?:**	Left Turn Lane

VOLUME CALCULATIONS

Left Turn Lane Volume Calculations

Movement		Include?	Volume	% Trucks	PCEV
Advancing	Left	Yes	47	0.0%	47
	Through	-	800	3.0%	812
	Right	Yes	0	0.0%	0
Opposing	Left	Yes	0	0.0%	0
	Through	-	1091	1.0%	1097
	Right	Yes	72	0.0%	72

Advancing Volume:	859
Opposing Volume:	1169
Left Turn Volume:	47
% Left Turns in Advancing Volume:	5.47%

Right Turn Lane Volume Calculations

Movement		Include?	Volume	% Trucks	PCEV
Advancing	Left	Yes	0	0.0%	N/A
	Through	-	0	0.0%	N/A
	Right	-	0	0.0%	N/A

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

TURN LANE WARRANT FINDINGS

Left Turn Lane Warrant Findings

Applicable Warrant Figure: Figure 7

Warrant Met?: Yes

Right Turn Lane Warrant Findings

Applicable Warrant Figure: N/A

Warrant Met?: N/A

TURN LANE LENGTH CALCULATIONS

Intersection Control:	Unsignalized
Design Hour Volume of Turning Lane:	47
Cycles Per Hour (Assumed):	Known
Cycles Per Hour (If Known):	60

Average # of Vehicles/Cycle: 1.0

PennDOT Publication 46, Exhibit 11-6

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

Left Turn Lane Storage Length, Condition A:	75	Feet
Condition B:	N/A	Feet
Condition C:	N/A	Feet
Required Left Turn Lane Storage Length:	75	Feet

Additional Findings: N/A

Additional Comments / Justifications:

A storage length of 75 feet is provided on the plans

Turn Lane Warrant and Length Analysis Workbook

STUDY LOCATION AND ANALYSIS INFORMATION

Municipality:	Radnor Township	**Analysis Date:**	3/5/2015
County:	Delaware County	**Conducted By:**	FLT
PennDOT Engineering District:	6	**Checked By:**	FLT
		Agency/Company Name:	F. Tavani and Associates, Inc.

Intersection & Approach Description: Ithan Avenue & LAH/PAC Driveway; NB

Analysis Period:	2025 Build	**Number of Approach Lanes:**	1
Design Hour:	AM 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?:**	Left Turn Lane

VOLUME CALCULATIONS

Left Turn Lane Volume Calculations

Movement		Include?	Volume	% Trucks	PCEV
Advancing	Left	Yes	16	0.0%	16
	Through	-	350	2.0%	354
	Right	Yes	36	0.0%	36
Opposing	Left	Yes	60	0.0%	60
	Through	-	195	4.0%	199
	Right	Yes	2	0.0%	2

Advancing Volume:	406
Opposing Volume:	261
Left Turn Volume:	16
% Left Turns in Advancing Volume:	3.94%

Right Turn Lane Volume Calculations

Movement		Include?	Volume	% Trucks	PCEV
Advancing	Left	Yes	0	0.0%	N/A
	Through	-	0	0.0%	N/A
	Right	-	0	0.0%	N/A

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

TURN LANE WARRANT FINDINGS

Left Turn Lane Warrant Findings

Applicable Warrant Figure: Figure 1

Warrant Met?: No

Right Turn Lane Warrant Findings

Applicable Warrant Figure: N/A

Warrant Met?: N/A

TURN LANE LENGTH CALCULATIONS

Intersection Control:	Unsignalized
Design Hour Volume of Turning Lane:	16
Cycles Per Hour (Assumed):	Known
Cycles Per Hour (If Known):	60

Average # of Vehicles/Cycle: N/A

PennDOT Publication 46, Exhibit 11-6

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

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

Additional Findings: N/A

Additional Comments / Justifications:

Turn Lane Warrant and Length Analysis Workbook

STUDY LOCATION AND ANALYSIS INFORMATION

Municipality:	Radnor Township	**Analysis Date:**	3/5/2015
County:	Delaware County	**Conducted By:**	FLT
PennDOT Engineering District:	6	**Checked By:**	FLT
		Agency/Company Name:	F. Tavani and Associates, Inc.

Intersection & Approach Description: Ithan Avenue & LAH/PAC Driveway; NB

Analysis Period:	2025 Build	**Number of Approach Lanes:**	1
Design Hour:	AM 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	0.0%	N/A
	Through	-	0	0.0%	N/A
	Right	Yes	0	0.0%	N/A
Opposing	Left	Yes	0	0.0%	N/A
	Through	-	0	0.0%	N/A
	Right	Yes	0	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	16	0.0%	16
	Through	-	350	2.0%	354
	Right	-	36	0.0%	36

Advancing Volume:	406
Right Turn Volume:	36

TURN LANE WARRANT FINDINGS

Left Turn Lane Warrant Findings

Applicable Warrant Figure: N/A

Warrant Met?: N/A

Right Turn Lane Warrant Findings

Applicable Warrant Figure: Figure 9

Warrant Met?: No

TURN LANE LENGTH CALCULATIONS

Intersection Control:	Unsignalized
Design Hour Volume of Turning Lane:	36
Cycles Per Hour (Assumed):	Known
Cycles Per Hour (If Known):	60

Average # of Vehicles/Cycle: N/A

PennDOT Publication 46, Exhibit 11-6

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

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

Additional Findings: N/A

Additional Comments / Justifications:

Turn Lane Warrant and Length Analysis Workbook

STUDY LOCATION AND ANALYSIS INFORMATION

Municipality:	Radnor Township	**Analysis Date:**	3/5/2015
County:	Delaware County	**Conducted By:**	FLT
PennDOT Engineering District:	6	**Checked By:**	FLT
		Agency/Company Name:	F. Tavani and Associates, Inc.

Intersection & Approach Description: Ithan Avenue & LAH/PAC Driveway; NB

Analysis Period:	2025 Build	**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?:**	Left Turn Lane

VOLUME CALCULATIONS

Left Turn Lane Volume Calculations

Movement		Include?	Volume	% Trucks	PCEV
Advancing	Left	Yes	16	0.0%	16
	Through	-	132	3.0%	134
	Right	Yes	43	0.0%	43
Opposing	Left	Yes	71	0.0%	71
	Through	-	279	2.0%	282
	Right	Yes	1	0.0%	1

Advancing Volume:	193
Opposing Volume:	354
Left Turn Volume:	16
% Left Turns in Advancing Volume:	8.29%

Right Turn Lane Volume Calculations

Movement		Include?	Volume	% Trucks	PCEV
Advancing	Left	Yes	0	0.0%	N/A
	Through	-	0	0.0%	N/A
	Right	-	0	0.0%	N/A

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

TURN LANE WARRANT FINDINGS

Left Turn Lane Warrant Findings

Applicable Warrant Figure: Figure 1

Warrant Met?: No

Right Turn Lane Warrant Findings

Applicable Warrant Figure: N/A

Warrant Met?: N/A

TURN LANE LENGTH CALCULATIONS

Intersection Control:	Unsignalized
Design Hour Volume of Turning Lane:	16
Cycles Per Hour (Assumed):	Known
Cycles Per Hour (If Known):	60

Average # of Vehicles/Cycle: N/A

PennDOT Publication 46, Exhibit 11-6

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

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

Additional Findings: N/A

Additional Comments / Justifications:

Turn Lane Warrant and Length Analysis Workbook

STUDY LOCATION AND ANALYSIS INFORMATION

Municipality:	Radnor Township	**Analysis Date:**	3/5/2015
County:	Delaware County	**Conducted By:**	FLT
PennDOT Engineering District:	6	**Checked By:**	FLT
		Agency/Company Name:	F. Tavani and Associates, Inc.

Intersection & Approach Description: Ithan Avenue & LAH/PAC Driveway; NB

Analysis Period:	2025 Build	**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	0.0%	N/A
	Through	-	0	0.0%	N/A
	Right	Yes	0	0.0%	N/A
Opposing	Left	Yes	0	0.0%	N/A
	Through	-	0	0.0%	N/A
	Right	Yes	0	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	16	0.0%	16
	Through	-	132	3.0%	134
	Right	-	43	0.0%	43

Advancing Volume:	193
Right Turn Volume:	43

TURN LANE WARRANT FINDINGS

Left Turn Lane Warrant Findings

Applicable Warrant Figure: N/A

Warrant Met?: N/A

Right Turn Lane Warrant Findings

Applicable Warrant Figure: Figure 9

Warrant Met?: No

TURN LANE LENGTH CALCULATIONS

Intersection Control:	Unsignalized
Design Hour Volume of Turning Lane:	43
Cycles Per Hour (Assumed):	Known
Cycles Per Hour (If Known):	60

Average # of Vehicles/Cycle: N/A

PennDOT Publication 46, Exhibit 11-6

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

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

Additional Findings:

N/A

Additional Comments / Justifications:

Turn Lane Warrant and Length Analysis Workbook

STUDY LOCATION AND ANALYSIS INFORMATION

Municipality:	Radnor Township	**Analysis Date:**	3/5/2015
County:	Delaware County	**Conducted By:**	FLT
PennDOT Engineering District:	6	**Checked By:**	FLT
		Agency/Company Name:	F. Tavani and Associates, Inc.

Intersection & Approach Description: Ithan Avenue & LAH/PAC Driveway; SB

Analysis Period:	2025 Build	**Number of Approach Lanes:**	1
Design Hour:	AM 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?:**	Left Turn Lane

VOLUME CALCULATIONS

Left Turn Lane Volume Calculations

Movement		Include?	Volume	% Trucks	PCEV
Advancing	Left	Yes	60	0.0%	60
	Through	-	195	4.0%	199
	Right	Yes	2	0.0%	2
Opposing	Left	Yes	16	0.0%	16
	Through	-	350	2.0%	354
	Right	Yes	36	0.0%	36

Advancing Volume:	261
Opposing Volume:	406
Left Turn Volume:	60
% Left Turns in Advancing Volume:	22.99%

Right Turn Lane Volume Calculations

Movement		Include?	Volume	% Trucks	PCEV
Advancing	Left	Yes	0	0.0%	N/A
	Through	-	0	0.0%	N/A
	Right	-	0	0.0%	N/A

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

TURN LANE WARRANT FINDINGS

Left Turn Lane Warrant Findings

Applicable Warrant Figure: Figure 1

Warrant Met?: No

Right Turn Lane Warrant Findings

Applicable Warrant Figure: N/A

Warrant Met?: N/A

TURN LANE LENGTH CALCULATIONS

Intersection Control:	Unsignalized
Design Hour Volume of Turning Lane:	60
Cycles Per Hour (Assumed):	Known
Cycles Per Hour (If Known):	60

Average # of Vehicles/Cycle: N/A

PennDOT Publication 46, Exhibit 11-6

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

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

Additional Findings: N/A

Additional Comments / Justifications:

A storage length of 50 feet is provided on the plans.

Turn Lane Warrant and Length Analysis Workbook

STUDY LOCATION AND ANALYSIS INFORMATION

Municipality:	Radnor Township	**Analysis Date:**	3/5/2015
County:	Delaware County	**Conducted By:**	FLT
PennDOT Engineering District:	6	**Checked By:**	FLT
		Agency/Company Name:	F. Tavani and Associates, Inc.

Intersection & Approach Description: Ithan Avenue & LAH/PAC Driveway; SB

Analysis Period:	2025 Build	**Number of Approach Lanes:**	1
Design Hour:	AM 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	0.0%	N/A
	Through	-	0	0.0%	N/A
	Right	Yes	0	0.0%	N/A
Opposing	Left	Yes	0	0.0%	N/A
	Through	-	0	0.0%	N/A
	Right	Yes	0	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	60	0.0%	60
	Through	-	195	4.0%	199
	Right	-	2	0.0%	2

Advancing Volume:	261
Right Turn Volume:	2

TURN LANE WARRANT FINDINGS

Left Turn Lane Warrant Findings

Applicable Warrant Figure: N/A

Warrant Met?: N/A

Right Turn Lane Warrant Findings

Applicable Warrant Figure: Figure 9

Warrant Met?: No

TURN LANE LENGTH CALCULATIONS

Intersection Control:	Unsignalized
Design Hour Volume of Turning Lane:	2
Cycles Per Hour (Assumed):	Known
Cycles Per Hour (If Known):	60

Average # of Vehicles/Cycle: N/A

PennDOT Publication 46, Exhibit 11-6

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

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

Additional Findings:

N/A

Additional Comments / Justifications:

Turn Lane Warrant and Length Analysis Workbook

STUDY LOCATION AND ANALYSIS INFORMATION

Municipality:	Radnor Township	**Analysis Date:**	3/5/2015
County:	Delaware County	**Conducted By:**	FLT
PennDOT Engineering District:	6	**Checked By:**	FLT
		Agency/Company Name:	F. Tavani and Associates, Inc.

Intersection & Approach Description: Ithan Avenue & LAH/PAC Driveway; SB

Analysis Period:	2025 Build	**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?:**	Left Turn Lane

VOLUME CALCULATIONS

Left Turn Lane Volume Calculations

Movement		Include?	Volume	% Trucks	PCEV
Advancing	Left	Yes	71	0.0%	71
	Through	-	279	2.0%	282
	Right	Yes	1	0.0%	1
Opposing	Left	Yes	16	0.0%	16
	Through	-	132	3.0%	134
	Right	Yes	43	0.0%	43

Advancing Volume:	354
Opposing Volume:	193
Left Turn Volume:	71
% Left Turns in Advancing Volume:	20.06%

Right Turn Lane Volume Calculations

Movement		Include?	Volume	% Trucks	PCEV
Advancing	Left	Yes	0	0.0%	N/A
	Through	-	0	0.0%	N/A
	Right	-	0	0.0%	N/A

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

TURN LANE WARRANT FINDINGS

Left Turn Lane Warrant Findings

Applicable Warrant Figure: Figure 1

Warrant Met?: No

Right Turn Lane Warrant Findings

Applicable Warrant Figure: N/A

Warrant Met?: N/A

TURN LANE LENGTH CALCULATIONS

Intersection Control:	Unsignalized
Design Hour Volume of Turning Lane:	71
Cycles Per Hour (Assumed):	Known
Cycles Per Hour (If Known):	60

Average # of Vehicles/Cycle: N/A

PennDOT Publication 46, Exhibit 11-6

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

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

Additional Findings: N/A

Additional Comments / Justifications:

A storage length of 50 feet is provided on the plans.

Turn Lane Warrant and Length Analysis Workbook

STUDY LOCATION AND ANALYSIS INFORMATION

Municipality:	Radnor Township	**Analysis Date:**	3/5/2015
County:	Delaware County	**Conducted By:**	FLT
PennDOT Engineering District:	6	**Checked By:**	FLT
		Agency/Company Name:	F. Tavani and Associates, Inc.

Intersection & Approach Description: Ithan Avenue & LAH/PAC Driveway; SB

Analysis Period:	2025 Build	**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	0.0%	N/A
	Through	-	0	0.0%	N/A
	Right	Yes	0	0.0%	N/A
Opposing	Left	Yes	0	0.0%	N/A
	Through	-	0	0.0%	N/A
	Right	Yes	0	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	71	0.0%	71
	Through	-	279	2.0%	282
	Right	-	1	0.0%	1

Advancing Volume:	354
Right Turn Volume:	1

TURN LANE WARRANT FINDINGS

Left Turn Lane Warrant Findings

Applicable Warrant Figure: N/A

Warrant Met?: N/A

Right Turn Lane Warrant Findings

Applicable Warrant Figure: Figure 9

Warrant Met?: No

TURN LANE LENGTH CALCULATIONS

Intersection Control:	Unsignalized
Design Hour Volume of Turning Lane:	1
Cycles Per Hour (Assumed):	Known
Cycles Per Hour (If Known):	60

Average # of Vehicles/Cycle: N/A

PennDOT Publication 46, Exhibit 11-6

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

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

Additional Findings:

N/A

Additional Comments / Justifications:

APPENDIX K

Parking

Parking Notes

Parking demands have been documented throughout the entire campus under both 'ordinary class' conditions and 'special event' conditions including home basketball games by the University. Spreadsheets which summarize campus-wide parking observations on more than a dozen different days are provided on the next two pages. Refer to **Appendix F** (Map Key) if required.

Questions regarding midday vehicular activity (trip generation) by the proposed LAH residents have been raised (see Gilmore letter dated 24 April 2013, **Appendix A**). The likelihood that campus residing students are any more (or less) likely to make midday trips is questionable, but regardless West Campus midday parking "turnover" was documented to quantify midday trip making. Investigations occurred on Tuesday, 30 April 2013. Spreadsheets summarizing those investigations are provided in this appendix. The conclusion was this midday trip generation rate per parking space was much lower than weekday peak period trip generation rates.

Villanova University Parking Lot Inventory - Class Days

Lot Name	# of Spaces	Date	11/5/2012		11/6/2012		11/7/2012		11/8/2012		11/9/2012		10/4/2011		10/6/2011		10/18/2011		10/20/2011		11/1/2011	11/2/2011	11/3/2011
		Time	10:00 AM	12:00 PM	10:00 AM	12:00 PM	10:00 AM	12:00 PM	10:00 AM	12:00 PM	10:00 AM	12:00 PM	10:00 AM	12:00 PM	10:00 AM	12:00 PM	10:00 AM	12:00 PM	10:00 AM	12:00 PM	1:30PM	1:30PM	1:30PM
			Spaces Available																				
Alumni House	14		7	7	8	7	8	8	8	8	7	7	2	1	1	4	2	3	4	4	4	3	2
CEER	79		16	18	18	18	17	15	12	12	8	6	31	27	55	28	23	18	34	28	10	12	17
Campus Corner	14		2	1	3	2	1	0	1	1	2	1	0	2	1	2	1	2	2	1	0	0	0
Connelly	6		1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	0	0	0
Dougherty Drive	22		0	0	0	0	0	0	0	0	0	0	0	1	3	0	1	0	5	1	0	0	0
Dundale	39		10	10	8	14	8	9	13	12	18	17	8	12	15	13	7	12	13	10	10	9	11
Farrell Hall	27		0	0	0	0	6	6	5	5	5	5	2	1	2	2	3	0	4	4	0	2	6
Fieldhouse	48		7	5	7	7	6	6	4	3	7	7	5	6	6	2	8	0	23	4	5	4	4
Galberry	10		5	5	0	0	4	4	5	5	7	7	1	3	2	0	2	2	2	2	2	1	1
Garey	**109**		**14**	**7**	**2**	**5**	**14**	**5**	**13**	**11**	**20**	**15**	**0**	**4**	**6**	**8**	**4**	**15**	**4**	**6**	**13**	**9**	**12**
Geraghty	7		5	5	6	4	6	6	6	6	4	4	2	1	2	3	1	0	1	1	1	2	0
HSB Upper	84		29	29	31	27	29	8	6	6	21	19	18	6	27	16	30	24	36	22	7	3	6
HSB Lower	89		21	20	22	22	7	8	0	0	19	21	9	4	21	8	23	15	22	14	9	13	9
Kennedy	20		1	0	0	0	0	6	0	6	6	0	0	0	0	1	0	0	0	0	0	0	0
Geraghty B	13		6	4	6	6	6	6	5	6	6	7	0	0	0	0	0	0	0	0	9	4	0
Law Lot Upper	**147**		**166**	**98**	**161**	**114**	**164**	**95**	**164**	**139**	**174**	**171**	**110**	**96**	**115**	**102**	**109**	**81**	**105**	**79**	**71**	**80**	**73**
Law Lot Middle	**199**		**30**	**1**	**15**	**11**	**26**	**4**	**22**	**7**	**116**	**83**	**43**	**41**	**66**	**70**	**104**	**34**	**74**	**28**	**32**	**58**	**36**
Law Lot Lower	**197**		**0**	**0**	**1**	**10**	**2**	**8**	**7**	**6**	**37**	**50**	**4**	**5**	**14**	**10**	**37**	**5**	**8**	**10**	**2**	**22**	**14**
Law Lot Bottom	**64**		**3**	**0**	**15**	**0**	**8**	**4**	**32**	**12**	**52**	**46**	**8**	**10**	**17**	**21**	**33**	**13**	**23**	**16**	**1**	**17**	**9**
Law Surface Lot	**113**		**8**	**3**	**13**	**9**	**15**	**4**	**11**	**7**	**23**	**14**	**10**	**6**	**7**	**6**	**23**	**12**	**4**	**1**	**13**	**8**	**10**
Main Lot East	577		335	158	194	0	239	135	239	89	306	213	132	0	213	32	157	75	272	20	0	113	74
Main Lot West	1,126		327	71	138	0	170	99	170	113	251	228	317	0	302	46	229	30	308	30	0	62	82
Main Visitor Lot	80		55	44	43	0	76	66	76	69	0	22	69	0	76	67	48	65	63	39	60	75	60
Mendel	109		22	19	27	15	24	17	13	7	31	11	23	12	33	22	23	18	26	10	4	15	7
Monastery	25		1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	0	0	0
Moriarity	15		0	3	2	0	5	0	1	0	0	0	4	2	7	1	0	0	3	1	0	0	4
Pavillion	222		104	84	88	85	103	107	94	92	120	126	83	94	122	80	125	84	123	79	83	75	78
St. Ritas	9		0	0	0	0	0	0	0	0	0	0	0	1	1	0	2	0	0	1	0	1	1
SAC Upper	136		6	8	7	7	10	10	6	2	17	9	6	1	32	0	1	5	6	1	2	5	0
SAC Lower	135		75	79	81	45	44	25	66	36	75	65	48	28	61	37	30	29	71	41	23	33	25
SAC Roadway	58		24	26	31	32	30	20	21	17	35	29	22	20	24	20	25	20	30	21	12	10	13
South Campus	281		141	132	152	135	145	137	146	136	131	145	151	168	176	178	176	181	191	182	142	143	160
Steam Plant	122		16	10	18	25	19	16	18	10	27	17	24	17	18	17	19	17	8	8	13	21	12
St. Mary's	98		19	17	19	16	20	27	22	24	29	20	18	15	29	25	22	22	20	19	29	20	22
Stone Hall	16		3	4	2	2	7	2	2	2	7	2	0	1	1	1	0	0	2	1	1	0	1
TSB	57		2	11	3	12	7	15	4	8	9	7	12	4	10	6	14	10	11	10	0	0	0
Tolentine	88		18	16	19	12	21	21	24	19	11	23	0	3	0	2	0	0	0	0	1	3	2
John Barry	10		2	1	0	5	5	4	2	3	4	4	3	0	1	2	1	0	2	1	2	3	3
Stadium	50		41	41	20	32	44	37	27	35	43	45	8	2	23	22	19	17	25	19	22	25	15
Football offices	19		1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
West Campus	596		164	171	212	197	191	192	199	190	185	180	184	170	182	190	165	178	169	151	165	175	169
Total Spaces	5,130		1,687	1,110	1,374	876	1,489	1,132	1,446	1,104	1,815	1,626	1,359	764	1,673	1,044	1,469	987	1,696	865	748	1,026	938

Upon further review of Public Safety data, it is unclear if certain '0' entries for Main Lot observations (conducted on 11/6/12, 10/4/2011, and 11/1/12) are in fact times when the Main Lot was 100% full or if the lots simply were not surveyed due to time constraints, calls, or other factors. This spreadsheet incorporates the '0' entries thereby giving the most conservative (i.e., highest demand) interpretation of the data.

Campus Wide Parking Demand Summary Spreadsheet - Class Days

Villanova University Selected Parking Lot Inventory - Basketball Event Parking

Lot Name	Date	1/17/2013		2/7/2012		1/18/2012	
	Time	5:30PM	7:30PM	7:30PM	8:30PM	6:30 PM	7:30 PM
	# of Spaces	Empty Parking Spaces					
HSB Upper	84	38	2	27	4	13	5
HSB Lower	89	13	7	34	4	22	2
Law Lot Upper	147	102	116	147	162	171	159
Law Lot Middle	199	104	136	97	135	82	142
Law Lot Lower	197	44	71	28	46	25	121
Law Lot Bottom	64	45	43	31	34	30	10
Law Surface	113	50	38	50	62	51	65
Main East	577	164	23	147	81	200	41
Main West	1,126	385	76	171	204	382	52
Main Visitors	80	42	10	21	22	47	2
Mendel	109	68	78	64	77	0	66
Moriarity	15	12	1	12	11	0	7
SAC Upper	136	83	33	89	49	78	52
SAC Lower	135	109	81	102	79	182	80
SAC Roadway	58	25	30	50	58	28	37
South Campus	281	147	0	0	0	0	0
Garey Hall	109	33	32	0	0	0	45
Total Spaces	3,519	1,464	777	1,070	1,028	1,311	886
Pavilion seat capacity	6,500	Attendance = 6,300		Attendance = 4,332		Attendance = 5,794	

Parking Demand Summary Spreadsheet - Basketball Events

West Campus Parking Turnover Investigation

This spreadsheet provides data regarding traffic counts as well as a table summarizing a sample of 30 vehicles which were randomly selected throughout the West Campus (WC) on-street parking areas and parking lots surrounding the resident housing (vehicles displaying West Campus Resident parking permits). The 30 vehicles were evenly spaced throughout the parking areas to achieve a broad sample. The traffic counts were conducted at the gate house which is the only point of vehicular entry to the campus for WC student residents.

The traffic counts and parked vehicle survey were conducted on Tuesday, 30 April 2013 which was a regular school day for Villanova's campus. The counts were conducted midday as requested by the township traffic engineer. Data collection began at 10:00 AM and ended at 12:00 PM. Although all vehicles entering and exiting were counted at the gate house, only those displaying WR hang tags (West Campus Resident Students) were counted and are shown in the summary of count activity table below. Note the peak hour of the traffic counts was 11:00 AM to 12:00 PM.

The purpose of the study was to investigate parking turnover and so the vehicle survey included documenting license plate prefixes (i.e., the first three characters of a vehicle's license plate) and state (if other than PA) and then monitoring the parknig space associated with each individual vehicle over the two-hour count period to see if there was turnover of the space as requested by the township. A key next to the table explains how this was documented. A summary below the key tabulates the turnover activity. A summary below the table provides data from the traffic counts near the gate house. More information (raw data) from the counts are provided on the next page.

NUMBER	**PREFIX**	*(PA if blank)* **STATE**	**10:00**	*SEE KEY TO LEFT* **10:30**	**11:00**	**11:30**	**12:00**	TURNOVER?
1	196	MA		***V***	***V***	74S		Yes, 1 in
2	HJA							
3	PR3	IL						
4	W11	NJ						
5	456	CT						
6	024	MD						
7	NLE	NJ						
8	DND	NY						
9	AHE	NY						
10	ERB	NY						
11	YCL	NJ						
12	JBS							
13	YBU	NJ						
14	ZRB	NJ			***V***	HGK	***V***	Yes, 1 in 2 out
15	ERT							
16	807	CT						
17	HGC							
18	X10	NJ						
19	HZD							
20	14K	MA						
21	XSS	VA						
22	BHO	TX						
23	GTE							
24	572	MA						
25	JCG							
26	9AT	MD						
27	1DD	MA						
28	GPH			***V***				
29	HTX							
30	YRY	NC						

KEY

1) If vehicle did not move during the count period, cell was left blank. 2) If vehicle left and no vehicle arrived to occupy the vacant space "***V***", is shown. 3) If vehicle left and a different vehicle arrived and occupied the vacant space, the new vehicle's prefix was entered.

SUMMARY

During the peak hour (11:00 - 12:00), there were 2 exiting vehicles and 2 arriving vehicles

PK HR TURNOVER	
IN	*OUT*
2	*2*

The traffic counts at the gate shown the following student resident turnover activity during the peak hour:

IN	*OUT*
30	*23*

F. Tavani and Associates, Inc.
105 Kenilworth Street
Philadelphia, PA 19147

pass given includes those given
access but no phyiscal paper pass

File Name : West Lot_MID
Site Code : 00000003
Start Date : 4/30/2013
Page No : 1

Groups Printed- WR hang tag - VU hang tag - Main hang tag - St Mary/Dundale/Gary hang - pass given - no hang - FH hang tag

	Southbound			
Start Time	ins	outs	App. Total	Int. Total
10:00 AM	10	4	14	14
10:15 AM	8	9	17	17
10:30 AM	7	7	14	14
10:45 AM	5	6	11	11
Total	30	26	56	56
11:00 AM	13	6	19	19
11:15 AM	14	10	24	24
11:30 AM	8	7	15	15
11:45 AM	8	9	17	17
Total	43	32	75	75
Grand Total	73	58	131	131
Apprch %	55.7	44.3		
Total %	55.7	44.3	100	
WR hang tag	50	41	91	91
% WR hang tag	68.5	70.7	69.5	69.5
VU hang tag	1	4	5	5
% VU hang tag	1.4	6.9	3.8	3.8
Main hang tag	5	0	5	5
% Main hang tag	6.8	0	3.8	3.8
St Mary/Dundale/Gary hang	5	0	5	5
% St Mary/Dundale/Gary hang	6.8	0	3.8	3.8
pass given	12	0	12	12
% pass given	16.4	0	9.2	9.2
no hang	0	12	12	12
% no hang	0	20.7	9.2	9.2
FH hang tag	0	1	1	1
% FH hang tag	0	1.7	0.8	0.8

	Southbound			
Start Time	ins	outs	App. Total	Int. Total
Peak Hour Analysis From 10:00 AM to 11:45 AM - Peak 1 of 1				
Peak Hour for Entire Intersection Begins at 11:00 AM				
11:00 AM	13	6	19	19
11:15 AM	**14**	**10**	**24**	**24**
11:30 AM	8	7	15	15
11:45 AM	8	9	17	17
Total Volume	43	32	75	75
% App. Total	57.3	42.7		
PHF	.768	.800	.781	.781
WR hang tag	30	23	53	53
% WR hang tag	69.8	71.9	70.7	70.7
VU hang tag	1	2	3	3
% VU hang tag	2.3	6.3	4.0	4.0
Main hang tag	2	0	2	2
% Main hang tag	4.7	0	2.7	2.7
St Mary/Dundale/Gary hang	2	0	2	2
% St Mary/Dundale/Gary hang	4.7	0	2.7	2.7
pass given	8	0	8	8
% pass given	18.6	0	10.7	10.7
no hang	0	6	6	6
% no hang	0	18.8	8.0	8.0
FH hang tag	0	1	1	1
% FH hang tag	0	3.1	1.3	1.3

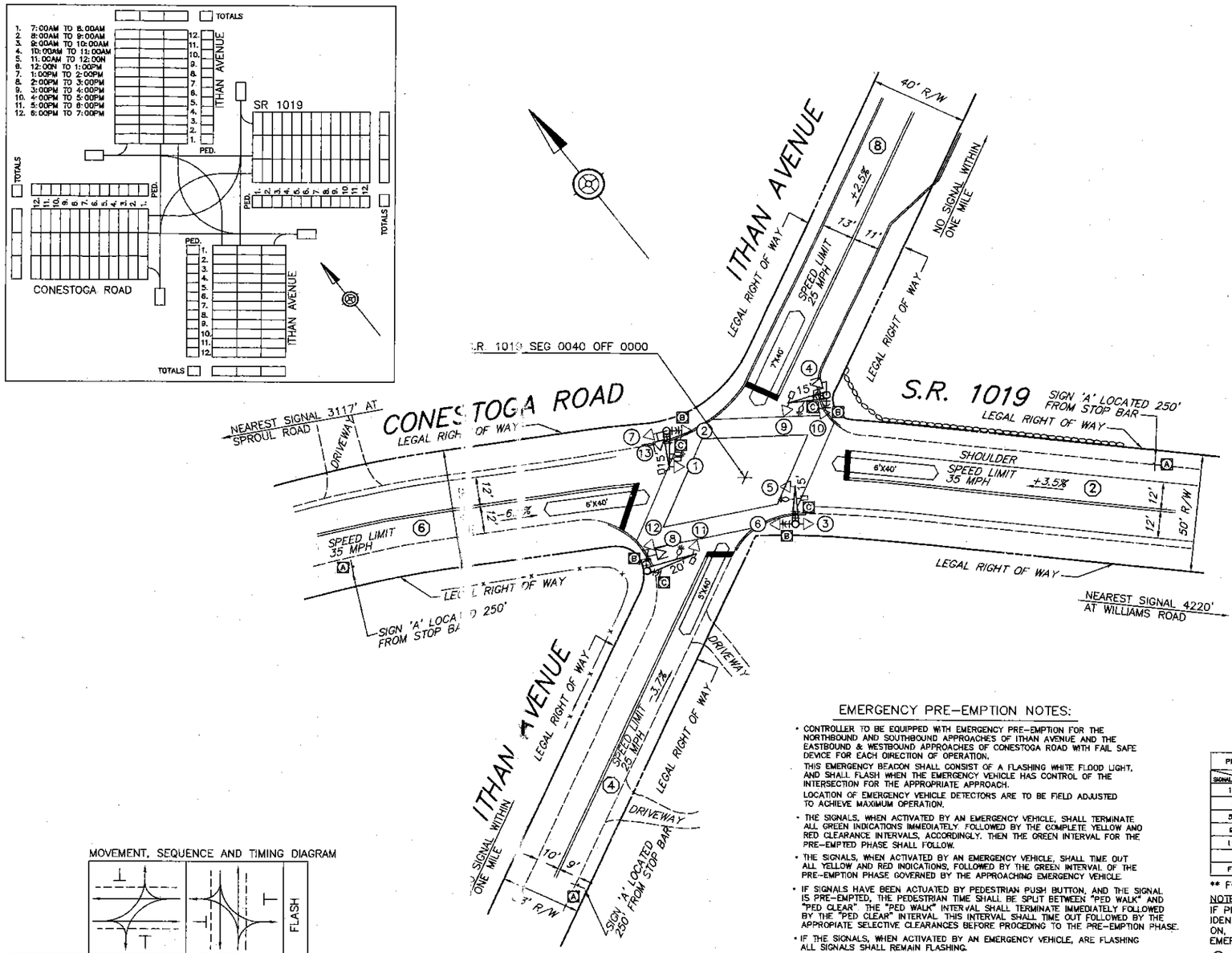
APPENDIX L

Example of RRFB and Signal Plans

Rectangular Rapid Flash Beacon (RRFB)
Example

Radnor

File # 0009



SIGN TABULATION			
PLAN SYMBOL	SERIES NUMBER	SIZE	REMARKS
A	W3-3	36X36	SIGNAL AHEAD
B	R10-3(L)	9X12	PUSH BUTTON FOR GREEN LIGHT ←
C	R10-3(R)	9X12	PUSH BUTTON FOR GREEN LIGHT →

GENERAL NOTES

NO MODIFICATIONS OF THIS INSTALLATION ARE PERMITTED UNLESS PRIOR APPROVAL IS GRANTED IN WRITING BY A REPRESENTATIVE OF THE DEPARTMENT OF TRANSPORTATION.

ALL MAINTENANCE WORK INCLUDING TRIMMING OF TREES, NECESSARY FOR PROPER VISIBILITY OF THE SIGNALS IS THE RESPONSIBILITY OF THE PERMITTEE.

ALL SIGNS AND PAVEMENT MARKINGS INDICATED ON THIS DRAWING ARE CONSIDERED PART OF THE PERMIT AND SHALL BE INSTALLED AND MAINTAINED IN ACCORDANCE WITH PUBLICATION NO. 68.

POST MOUNTED SIGNALS SHALL BE INSTALLED WITH THE SIGNAL HEADS A MINIMUM OF 2 FEET BEHIND THE FACE OF CURB OR THE EDGE OF THE SHOULDER. SUPPORT POLES FOR OVERHEAD SIGNALS SHALL ALSO HAVE A MINIMUM CLEARANCE HORIZONTALLY OF 2 FEET.

SIGNALS ERECTED OVER THE ROADWAY SHALL HAVE A MINIMUM VERTICAL CLEARANCE OF 16 FT. ABOVE THE ROADWAY. POST MOUNTED SIGNALS SHALL BE A MINIMUM OF 8 FT. ABOVE THE SIDEWALK OR PAVEMENT.

ALL OVERHEAD SIGNALS MUST BE RIGIDLY MOUNTED, TOP AND BOTTOM, AND EQUIPPED WITH BACKPLATES.

THE MINIMUM HORIZONTAL DISTANCE BETWEEN SIGNALS MEASURED AT RIGHT ANGLES TO THE APPROACH SHALL BE 8 FEET.

EXACT LOCATION OF DETECTORS SHALL BE DETERMINED PRIOR TO INSTALLATION BY A REPRESENTATIVE OF PENNDOT.

CURBING TO BE INSTALLED BY MUNICIPALITY AND WHERE NOTED, SHALL BE PLAIN CEMENT CONCRETE CURB OR GRANITE CURB, INSTALLED IN ACCORDANCE WITH DEPARTMENT SPECIFICATIONS FORM 408.

PRIOR TO INSTALLATION THE CONTRACTOR SHALL CONSULT WITH THE LOCAL OFFICIALS AND UTILITY COMPANIES TO RESOLVE ANY PROBLEMS WHICH MAY BE CREATED DUE TO THE LOCATION OF UTILITIES.

THIS DRAWING CANNOT BE USED AS A CONSTRUCTION DRAWING UNLESS THE PERMITTEE COMPLIES WITH THE PROVISIONS OF ACT 187, PREVENTION OF DAMAGE TO UNDERGROUND UTILITIES, EFFECTIVE DATE DECEMBER 19, 1996.

WHEN LIQUID FUELS MONEY IS USED, SIGNAL INSTALLATION MUST CONFORM TO FORM 408 AND A COPY OF THE PROPOSED SPECIFICATIONS MUST BE SUBMITTED TO THE DISTRICT TRAFFIC UNIT, FOR REVIEW, PRIOR TO BIDDING.

PERMITTEE SHALL OBTAIN A HIGHWAY OCCUPANCY PERMIT FOR ANY CHANGES IN INTERSECTION GEOMETRY REGARDING EXCAVATION.

CONDUIT INSTALLED IN BITUMINOUS ROADWAY LESS THAN 5 YEARS OLD, OR CONCRETE ROADWAY REGARDLESS OF AGE, MUST BE BORED OR JACKED UNDER THE ROADWAY. INSTALL IN ACCORDANCE WITH TRAFFIC SIGNAL STANDAROS TC-7800 SERIES.

MOVEMENT, SEQUENCE AND TIMING DIAGRAM

PHASE	2+6				4+8				FLASH
INTERVAL / SIGNALS	1	2	3		4	5	6		
1,2,3	G	Y	R		R	R	R		Y
4,8	G	Y	R		R	R	R		OFF
5,6,7	G	Y	R		R	R	R		Y
9,10	R	R	R		G	Y	R		R
11,12	R	R	R		G	Y	R		R
13	R	R	R		G	Y	R		OFF

FIXED		4	2			4	2	
MINIMUM	3				3			
PASSAGE	3				3			
MAX. 1	30				20			
PEDESTRIAN*	11				11			
MEMORY	NL				NL			

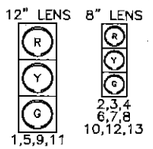
* UPON PEDESTRIAN ACTUATION ONLY.

EMERGENCY PRE-EMPTION NOTES:

- CONTROLLER TO BE EQUIPPED WITH EMERGENCY PRE-EMPTION FOR THE NORTHBOUND AND SOUTHBOUND APPROACHES OF ITHAN AVENUE AND THE EASTBOUND & WESTBOUND APPROACHES OF CONESTOGA ROAD WITH FAIL SAFE DEVICE FOR EACH DIRECTION OF OPERATION.
  THIS EMERGENCY BEACON SHALL CONSIST OF A FLASHING WHITE FLOOD LIGHT, AND SHALL FLASH WHEN THE EMERGENCY VEHICLE HAS CONTROL OF THE INTERSECTION FOR THE APPROPRIATE APPROACH.
  LOCATION OF EMERGENCY VEHICLE DETECTORS ARE TO BE FIELD ADJUSTED TO ACHIEVE MAXIMUM OPERATION.
- THE SIGNALS, WHEN ACTIVATED BY AN EMERGENCY VEHICLE, SHALL TERMINATE ALL GREEN INDICATIONS IMMEDIATELY FOLLOWED BY THE COMPLETE YELLOW ANO RED CLEARANCE INTERVALS, ACCORDINGLY. THEN THE GREEN INTERVAL FOR THE PRE-EMPTED PHASE SHALL FOLLOW.
- THE SIGNALS, WHEN ACTIVATED BY AN EMERGENCY VEHICLE, SHALL TIME OUT ALL YELLOW AND RED INDICATIONS, FOLLOWED BY THE GREEN INTERVAL OF THE PRE-EMPTION PHASE GOVERNED BY THE APPROACHING EMERGENCY VEHICLE.
- IF SIGNALS HAVE BEEN ACTUATED BY PEDESTRIAN PUSH BUTTON, AND THE SIGNAL IS PRE-EMPTED, THE PEDESTRIAN TIME SHALL BE SPLIT BETWEEN "PED WALK" AND "PED CLEAR". THE "PED WALK" INTERVAL SHALL TERMINATE IMMEDIATELY FOLLOWED BY THE "PED CLEAR" INTERVAL. THIS INTERVAL SHALL TIME OUT FOLLOWED BY THE APPROPIATE SELECTIVE CLEARANCES BEFORE PROCEDING TO 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 TIME OUT BEFORE PROCEEDING TO THE NEXT PRE-EMPTION PHASE.
- UPON COMPLETION OF PRE-EMPTION, PHASE 2,4,8 OR 8 IN RETURNING TO NORMAL OPERATION, PHASE 2+8 INTERVAL 1 SHALL FOLLOW.
- IN EMERGENCY PRE-EMPTION, NO PRIORITY SHALL BE ESTABLISHED, PRE-EMPTION SHALL BE A "FIRST COME, FIRST SERVE" OPERATION.

SIGNAL INDICATIONS

12" LENS 8" LENS



SIGNALS TO BE EQUIPPED WITH TUNNEL VISORS & LOUVERS 4,8,13

EMERGENCY PRE-EMPTION PHASING
MOVEMENT, SEQUENCE AND TIMING DIAGRAM

PHASE	2			4			6			8		
INTERVAL / SIGNALS	7	8	9	10	11	12	13	14	15	16	17	18
1,2,3	G	Y ⓞ	R ⓞ	R	R	R	R	R	R	R	R	R
4,8	R	R	R	R	R	R	R	R	R	R	R	R
5,6,7	R	R	R	R	R	R	G	Y ⓞ	R ⓞ	R	R	R
9,10	R	R	R	G	Y	R	R	R	R	R	R	R
11,12	R	R	R	R	R	R	R	R	R	G	Y	R
13	R	R	R	R	R	R	R	R	R	R	R	R
FIXED	**	4	2	**	4	2	**	4	2	**	4	2

** FOR DURATION DF PRE-EMPTION

NOTE:
IF PRE-EMPTION EQUIPMENT HAS ENCODING CAPABILITIES FOR VEHICLE IDENTIFICATION, IT IS RECOMMENDED TO HAVE THE ZERO "00" FEATURE ON, TO GIVE UNCODED EMITTERS THE ABILITY TO ACTIVATE THE EMERGENCY PRE-EMPTION.

ⓞ G WHEN RETURNING TO NORMAL OPERATION

SCALE
25 0 25

LEGEND

- 20' — MAST ARM/ IDENTIFYING LENGTH
- (2) — VEHICULAR SIGNAL HEAD/ BACKPLATE/VISORS/ DIRECTIONAL ARROW/ IDENTIFYING NUMBER
- (2) — PEDESTRIAN SIGNAL HEAD/ IDENTIFYING NUMBER
- PEDESTRIAN PUSHBUTTON/ SIGN
- A — SIGN/IDENTIFYING LETTER
- 12'x8' — LOOP SENSOR/SIZE
- MICROWAVE PRESENCE DETECTOR
- EMERGENCY PRE-EMPTION FLASHING BEACON
- EMERGENCY PRE-EMPTION DEVICE
- C.R. — CURB RAMP
- ø — UTILITY POLE
- (2) — PHASE NUMBER
- INLET

PENNSYLVANIA DEPARTMENT OF TRANSPORTATION
ENGINEERING DISTRICT 6-0

COUNTY: DELAWARE
MUNICIPALITY: RADNOR TOWNSHIP
INTERSECTION: CONESTOGA ROAD (S.R. 1019) AND ITHAN AVENUE

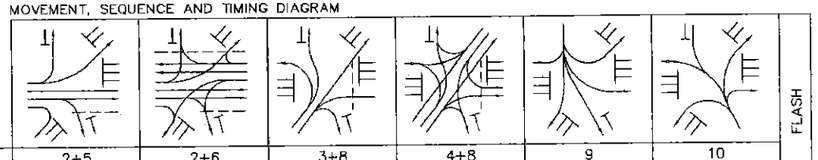
REVIEWED:
DATE
MUNICIPAL OFFICIAL DATE

RECOMMENDED: [signature] 5/11/71
FRANK SEIBOTH 11/15/71
DISTRICT TRAFFIC ENGINEER DATE

NO.	REVISION	DES./ REVW.	DATE	REVW.	DATE	RECOM.	DATE
1	NEW PLAN, ADDED PRE-EMPTION	MCR	5/4/71	MLK	5/4/71	JDB	5/8/71
2							
3							
4							
5							
6							
7							
8							

SHEET 2 OF 2 | PERMIT # 63-0009 | FILE # 0009

MOVEMENT, SEQUENCE AND TIMING DIAGRAM



PHASE	2+5				2+6				3+8				4+8				9				10				FLASH
INTERVAL / SIGNALS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19		20	21	22		
1	R	R	R	R	R	R	R	R	G/⊘	G/⊘	Y①	R②	G	G	Y	R	R	R	R		R	R	R		R
2	R	R	R	R	R	R	R	R	G	G	Y②	R②	G	G	Y	R	R	R	R		R	R	R		R
3,4	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	G	Y	R		R	R	R		R
5,6	R	R	R	R	R	R	R	R	R	R	R	R	G	G	Y	R	R	R	R		R	R	R		R
7	G/⊘	G/⊘	Y③	R④	G	G	Y	R	R	R	R	R	R	R	R	R	R	R	R		R	R	R		Y
8	G	G	Y④	R④	G	G	Y	R	R	R	R	R	R	R	R	R	R	R	R		R	R	R		Y
9,10	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R		G	Y	R		R
11,12	R	R	R	R	G	G	Y	R	R	R	R	R	R	R	R	R	R	R	R		R	R	R		Y
13,14*	H	H	H	H	M	FH	H	H	H	H	H	H	H	H	H	H	H	H	H		H	H	H		OFF
15,16*	H	H	H	H	M	FH	H	H	H	H	H	H	H	H	H	H	H	H	H		H	H	H		OFF
17,18*	M	FH⑤	H⑤	H⑤	M	FH	H	H	H	H	H	H	H	H	H	H	H	H	H		H	H	H		OFF
19,20*	H	H	H	H	H	H	H	H	M	FH⑦	H⑦	H⑦	M	FH	H	H	H	H	H		H	H	H		OFF

			3	3			3	3		4	2			4	2		3	3			3	3	
FIXED																							
MINIMUM	3				15				3				3				3				3			
PASSAGE	3				5				3				3				3				3			
MAXIMUM 1	13				35				25				28				10				10			
MAXIMUM 2	16				72				21				45				37				37			
PEDESTRIAN*	⑥				7	20			⑧				7	25										
MEMORY	NL				MN				NL				NL				NL				NL			

*MAN SYMBOL UPON PEDESTRIAN ACTUATION ONLY, OTHERWISE HAND SYMBOL AT ALL TIMES.

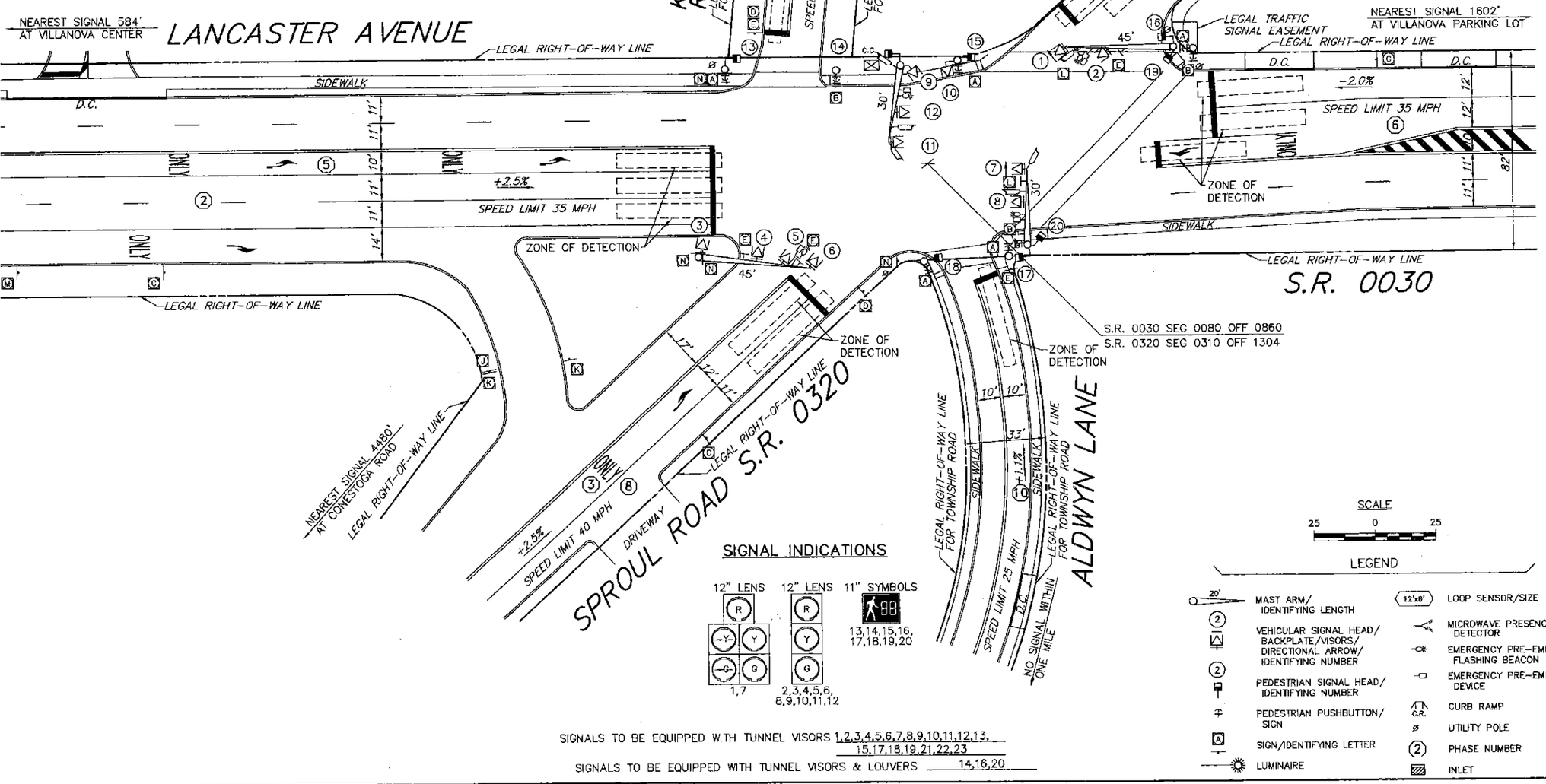
OPERATION NOTES:

① G/→ IF FOLLOWED BY 4+8
② G IF FOLLOWED BY 4+8
③ G/→ IF FOLLOWED BY 2+6
④ G IF FOLLOWED BY 2+6
⑤ MAN SYMBOL IF FOLLOWED BY 2+6
⑥ TIMING FOR THIS PHASE SHALL BE AS SHOWN IN PHASE 2+6 AND SHALL TIME OUT IN THIS PHASE OR PHASE 2+6.
⑦ MAN SYMBOL IF FOLLOWED BY 4+8
⑧ TIMING FOR THIS PHASE SHALL BE AS SHOWN IN PHASE 4+8 AND SHALL TIME OUT IN THIS PHASE OR PHASE 4+8.

- REFER TO SYSTEM PERMIT #1-0156 FOR PROGRAM TIMES AND TIME-OF-DAY OPERATION
- PED RECYCLE FOR PHASE 2+6

SIGN TABULATION

PLAN SYMBOL	SERIES NUMBER	SIZE	REMARKS
A	R10-3E(R)	9X15	EDUCATIONAL PUSH BUTTON FOR WALKING PERSON
B	R10-3E(L)	9X15	EDUCATIONAL PUSH BUTTON FOR WALKING PERSON
C	R3-7L	30X30	LEFT LANE MUST TURN LEFT
D	R10-6L	24X30	STOP HERE ON RED
E	R10-11	30X36	NO TURN ON RED
F	R10-11	24X30	NO TURN ON RED
J	R1-2	36X36	YIELD
K	R5-1	30X30	DO NOT ENTER
L	R10-12	30X36	LEFT TURN YIELD ON GREEN ●
M	R3-7R	30X30	RIGHT LANE MUST TURN RIGHT
N	R9-3A	18X18	NO PEDESTRIAN CROSSING



SIGNAL INDICATIONS

SCALE
25 0 25

LEGEND

20'	MAST ARM/ IDENTIFYING LENGTH	12'x6'	LOOP SENSOR/SIZE
②	VEHICULAR SIGNAL HEAD/ BACKPLATE/VISORS/ DIRECTIONAL ARROW/ IDENTIFYING NUMBER		MICROWAVE PRESENCE DETECTOR
			EMERGENCY PRE-EMPTION FLASHING BEACON
②	PEDESTRIAN SIGNAL HEAD/ IDENTIFYING NUMBER		EMERGENCY PRE-EMPTION DEVICE
	PEDESTRIAN PUSHBUTTON/ SIGN	C.R.	CURB RAMP
A	SIGN/IDENTIFYING LETTER	ø	UTILITY POLE
	LUMINAIRE	②	PHASE NUMBER
			INLET

SIGNALS TO BE EQUIPPED WITH TUNNEL VISORS 1,2,3,4,5,6,7,8,9,10,11,12,13, 15,17,18,19,21,22,23

SIGNALS TO BE EQUIPPED WITH TUNNEL VISORS & LOUVERS 14,16,20

GENERAL NOTES

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ALL MAINTENANCE WORK INCLUDING TRIMMING OF TREES, NECESSARY FOR PROPER VISIBILITY OF THE SIGNALS IS THE RESPONSIBILITY OF THE PERMITTEE.

ALL SIGNS AND PAVEMENT MARKINGS INDICATED ON THIS DRAWING ARE CONSIDERED PART OF THE PERMIT AND SHALL BE INSTALLED AND MAINTAINED IN ACCORDANCE WITH PUBLICATION NO. 212.

POST MOUNTED SIGNALS SHALL BE INSTALLED WITH THE SIGNAL HEADS A MINIMUM OF 2 FEET BEHIND THE FACE OF CURB OR THE EDGE OF THE SHOULDER. SUPPORT POLES FOR OVERHEAD SIGNALS SHALL ALSO HAVE A MINIMUM CLEARANCE HORIZONTALLY OF 2 FEET.

SIGNALS ERECTED OVER THE ROADWAY SHALL HAVE A MINIMUM VERTICAL CLEARANCE OF 16 FT. ABOVE THE ROADWAY. POST MOUNTED SIGNALS SHALL BE A MINIMUM OF 8 FT. ABOVE THE SIDEWALK OR PAVEMENT.

ALL OVERHEAD SIGNALS MUST BE RIGIDLY MOUNTED, TOP AND BOTTOM, AND EQUIPPED WITH BACKPLATES.

THE MINIMUM HORIZONTAL DISTANCE BETWEEN SIGNALS MEASURED AT RIGHT ANGLES TO THE APPROACH SHALL BE 8 FEET.

EXACT LOCATION OF DETECTORS SHALL BE DETERMINED PRIOR TO INSTALLATION BY A REPRESENTATIVE OF PENNDOT.

CURBING TO BE INSTALLED BY MUNICIPALITY AND WHERE NOTED, SHALL BE PLAIN CEMENT CONCRETE CURB OR GRANITE CURB, INSTALLED IN ACCORDANCE WITH DEPARTMENT SPECIFICATIONS FORM 408.

PRIOR TO INSTALLATION THE CONTRACTOR SHALL CONSULT WITH THE LOCAL OFFICIALS AND UTILITY COMPANIES TO RESOLVE ANY PROBLEMS WHICH MAY BE CREATED DUE TO THE LOCATION OF UTILITIES.

THIS DRAWING CANNOT BE USED AS A CONSTRUCTION DRAWING UNLESS THE PERMITTEE COMPLIES WITH THE PROVISIONS OF THE LATEST AMENDMENT TO ACT 287, PREVENTION OF DAMAGE TO UNDERGROUND UTILITIES, DATED DECEMBER 20, 1974.

WHEN LIQUID FUELS MONEY IS USED, SIGNAL INSTALLATION MUST CONFORM TO FORM 408 AND A COPY OF THE PROPOSED SPECIFICATIONS MUST BE SUBMITTED TO THE DISTRICT TRAFFIC UNIT, FOR REVIEW, PRIOR TO BIDDING.

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CONDUIT INSTALLED IN BITUMINOUS ROADWAY LESS THAN 5 YEARS OLD, OR CONCRETE ROADWAY REGARDLESS OF AGE, MUST BE BORED OR JACKED UNDER THE ROADWAY. INSTALL IN ACCORDANCE WITH TRAFFIC SIGNAL STANDARDS TC-8800 SERIES.

SYSTEM PERMIT #1-0156

PENNSYLVANIA DEPARTMENT OF TRANSPORTATION
ENGINEERING DISTRICT 6-0

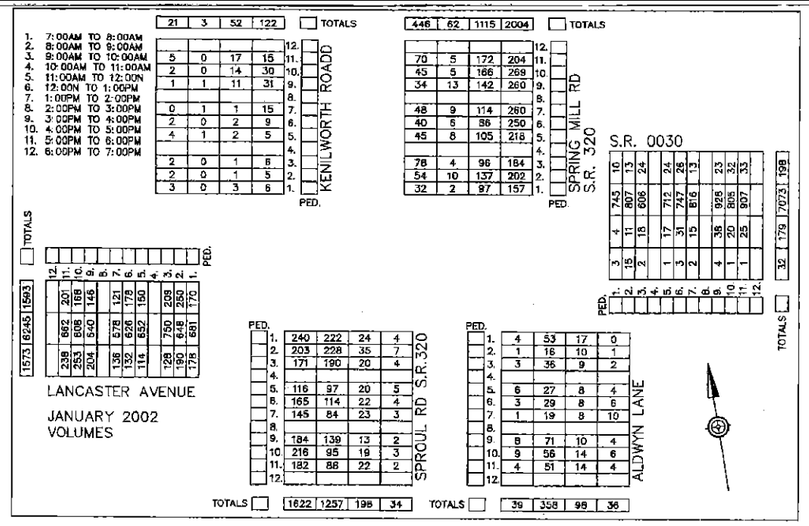
COUNTY: DELAWARE
MUNICIPALITY: RADNOR TOWNSHIP
INTERSECTION: LANCASTER AVENUE (S.R. 0030) & SPROUL ROAD/SPRING MILL ROAD (S.R. 0320)

REVIEWED:
DATE
MUNICIPAL OFFICIAL DATE

RECOMMENDED:
PAUL M. LUTZ 11/24/08
LOUIS R. BELMONTE, P.E. 11/24/08
DISTRICT TRAFFIC ENGINEER DATE

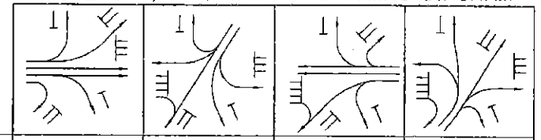
NO.	REVISION	DES./ REVW.	DATE	REVW.	DATE	RECOM.	DATE
1	AS-BUILT DRAWING	McM	3/5/12	WJE	3/12/12	JRB	3/11/12
2							
3							
4							
5							
6							
7							
8							

SHEET 2 OF 3 | PERMIT # 63-0226 | FILE # 025615



EMERGENCY PRE-EMPTION PHASING

MOVEMENT, SEQUENCE AND TIMING DIAGRAM



PHASE	2			4			6			8		
INTERVAL / SIGNALS	23	24	25	26	27	28	29	30	31	32	33	34
1	R	R	R	R	R	R	R	R	R	G/⊖	Y	R
2	R	R	R	R	R	R	R	R	R	G	Y	R
3,4	R	R	R	R	R	R	R	R	R	R	R	R
5,6	R	R	R	G	Y	R	R	R	R	R	R	R
7	G/⊖	Y ⓐ	R ⓑ	R	R	R	R	R	R	R	R	R
8	G	Y ⓑ	R ⓑ	R	R	R	R	R	R	R	R	R
9,10	R	R	R	R	R	R	R	R	R	R	R	R
11,12	R	R	R	R	R	R	G	Y ⓑ	R ⓑ	R	R	R
13,14	H	H	H	H	H	H	H	H	H	H	H	H
15,16	H	H	H	H	H	H	H	H	H	H	H	H
17,18	H	H	H	H	H	H	H	H	H	H	H	H
19,20	H	H	H	H	H	H	H	H	H	H	H	H
FIXED	**	3	3	**	4	2	**	3	3	**	4	2

** FOR DURATION OF PRE-EMPTION

NOTE:
IF PRE-EMPTION EQUIPMENT HAS ENCODING CAPABILITIES FOR VEHICLE IDENTIFICATION, IT IS RECOMMENDED TO HAVE THE ZERO "00" FEATURE ON, TO GIVE UNCODED EMITTERS THE ABILITY TO ACTIVATE THE EMERGENCY PRE-EMPTION.

ⓐ G/⊖ WHEN RETURNING TO NORMAL OPERATION
ⓑ G WHEN RETURNING TO NORMAL OPERATION

EMERGENCY PRE-EMPTION NOTES:

- CONTROLLER TO BE EQUIPPED WITH EMERGENCY PRE-EMPTION FOR THE NORTHBOUND & SOUTHBOUND APPROACHES OF SPROUL ROAD AND THE EASTBOUND & WESTBOUND APPROACHES OF LANCASTER AVENUE WITH A FAIL SAFE DEVICE FOR EACH DIRECTION OF OPERATION.
  THIS EMERGENCY BEACON SHALL CONSIST OF A FLASHING WHITE FLOOD LIGHT, AND SHALL FLASH WHEN THE EMERGENCY VEHICLE HAS CONTROL OF THE INTERSECTION FOR THE APPROPRIATE APPROACH.
- THE SIGNALS, WHEN ACTIVATED BY AN EMERGENCY VEHICLE, SHALL TERMINATE ALL GREEN INDICATIONS IMMEDIATELY, FOLLOWED BY THE COMPLETE YELLOW AND RED CLEARANCE INTERVALS, ACCORDINGLY. THEN THE GREEN INTERVAL FOR THE PRE-EMPTED PHASE SHALL FOLLOW.
- THE SIGNALS, WHEN ACTIVATED BY EMERGENCY VEHICLE, SHALL TIME OUT ALL YELLOW AND RED INDICATIONS, FOLLOWED BY THE GREEN INTERVAL OF THE PRE-EMPTION PHASE GOVERNED BY THE APPROACHING EMERGENCY VEHICLE.
- IF SIGNALS HAVE BEEN ACTUATED BY PEDESTRIAN PUSH BUTTON AND THE SIGNAL IS PRE-EMPTED DURING THE "MAN" INTERVAL, THE "MAN" INTERVAL SHALL TERMINATE IMMEDIATELY FOLLOWED BY THE "FLASHING HAND" INDICATION IN ITS ENTIRETY, FOLLOWED BY THE APPROPRIATE SELECTIVE CLEARANCES BEFORE PROCEEDING INTO 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 TIME OUT BEFORE PROCEEDING TO THE NEXT PRE-EMPTION PHASE.
- UPON COMPLETION OF PRE-EMPTION, PHASE 2,4,6 OR 8 IN RETURNING TO NORMAL OPERATION, PHASE 2+6 INTERVAL 4 SHALL FOLLOW.
- IN EMERGENCY PRE-EMPTION, NO PRIORITY SHALL BE ESTABLISHED, PRE-EMPTION SHALL BE A "FIRST COME, FIRST SERVE" OPERATION.

SCALE
25 0 25

LEGEND

- 20' — MAST ARM/ IDENTIFYING LENGTH
- (2) — VEHICULAR SIGNAL HEAD/ BACKPLATE/VISORS/ DIRECTIONAL ARROW/ IDENTIFYING NUMBER
- (2) — PEDESTRIAN SIGNAL HEAD/ IDENTIFYING NUMBER
- PEDESTRIAN PUSHBUTTON/ SIGN
- SIGN/IDENTIFYING LETTER
- 12'x6' — LOOP SENSDR/SIZE
- MICROWAVE PRESENCE DETECTOR
- EMERGENCY PRE-EMPTION FLASHING BEACON
- EMERGENCY PRE-EMPTION DEVICE
- C.R. — CURB RAMP
- UTILITY POLE
- (2) — PHASE NUMBER
- INLET

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SYSTEM PERMIT #1-0156

PENNSYLVANIA DEPARTMENT OF TRANSPORTATION
ENGINEERING DISTRICT 6-0

COUNTY: DELAWARE
MUNICIPALITY: RADNOR TOWNSHIP
INTERSECTION: LANCASTER AVENUE (S.R. 0030) & SPROUL ROAD/SPRING MILL ROAD (S.R. 0320)

REVIEWED:

DATE

MUNICIPAL OFFICIAL DATE

RECOMMENDED:

PAUL M. LUTZ 11/24/08

LOUIS R. BELMONTE, P.E. 11/24/08
DISTRICT TRAFFIC ENGINEER DATE

NO.	REVISION	DES./ REVW.	DATE	REVW.	DATE	RECOM.	DATE
1	AS-BUILT DRAWING	MGM	3/5/12	[illegible]	3/12/12	[illegible]	3/19/12
2							
3							
4							
5							
6							
7							
8							

SHEET 3 OF 3 | PERMIT # 63-0226 | FILE # 0226

RADNOR

#780

SIGN TABULATION

SIGN SYMBOL	SERIES NUMBER	SIZE	REMARKS
A	R10–11	24"x30"	NO TURN ON RED
B	R3–7L	30"x30"	LEFT LANE MUST TURN LEFT
C	R10–3B	9"x12"	EDUCATIONAL PUSH BUTTON FOR WALKING PERSON
D	R10–11	30"x36"	NO TURN ON RED
G	R10–12	30"x36"	LEFT TURN YIELD ON GREEN ●

EMERGENCY PRE–EMPTION PHASING
MOVEMENT, SEQUENCE AND TIMING DIAGRAM

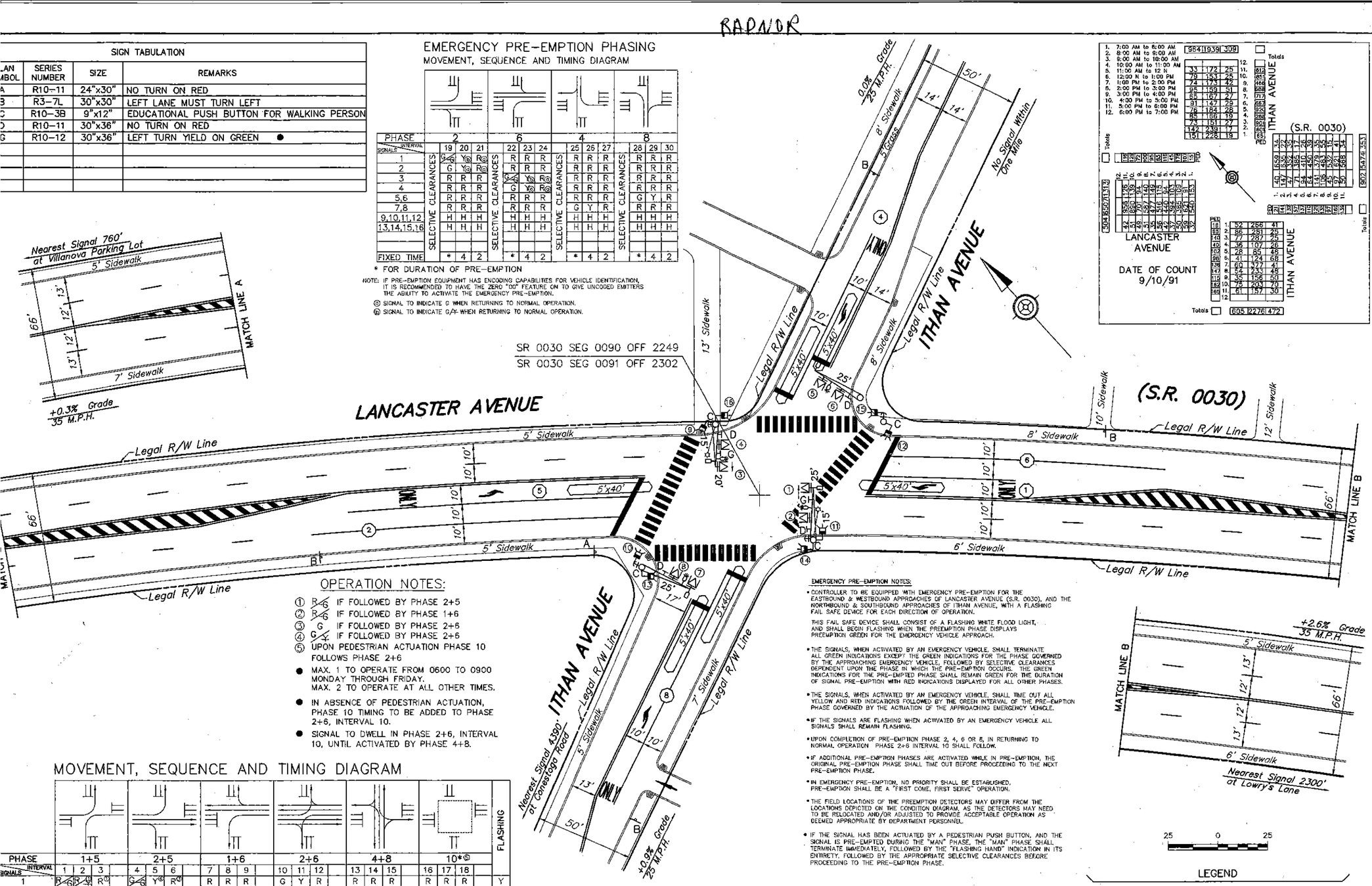
PHASE		2			6			4			8		
INTERVAL / SIGNALS		19	20	21	22	23	24	25	26	27	28	29	30
1	SELECTIVE CLEARANCES	Ⓨ	Ⓡ	Ⓡ	R	R	R	R	R	R	R	R	R
2		G	Ⓨ	Ⓡ	R	R	R	R	R	R	R	R	R
3		R	R	R	Ⓨ	Ⓡ	Ⓡ	R	R	R	R	R	R
4		R	R	R	G	Ⓨ	Ⓡ	R	R	R	R	R	R
5,6		R	R	R	R	R	R	R	R	R	G	Y	R
7,8		R	R	R	R	R	R	G	Y	R	R	R	R
9,10,11,12		H	H	H	H	H	H	H	H	H	H	H	H
13,14,15,16		H	H	H	H	H	H	H	H	H	H	H	H
FIXED TIME		*	4	2	*	4	2	*	4	2	*	4	2

* FOR DURATION OF PRE–EMPTION

NOTE: IF PRE–EMPTION EQUIPMENT HAS ENCODING CAPABILITIES FOR VEHICLE IDENTIFICATION, IT IS RECOMMENDED TO HAVE THE ZERO "00" FEATURE ON TO GIVE UNCODED EMITTERS THE ABILITY TO ACTIVATE THE EMERGENCY PRE–EMPTION.

Ⓒ SIGNAL TO INDICATE C WHEN RETURNING TO NORMAL OPERATION.

Ⓖ SIGNAL TO INDICATE G/A WHEN RETURNING TO NORMAL OPERATION.



OPERATION NOTES:

① R→G IF FOLLOWED BY PHASE 2+5
② R→G IF FOLLOWED BY PHASE 1+6
③ G IF FOLLOWED BY PHASE 2+6
④ G→Y IF FOLLOWED BY PHASE 2+6
⑤ UPON PEDESTRIAN ACTUATION PHASE 10 FOLLOWS PHASE 2+6

- MAX. 1 TO OPERATE FROM 0600 TO 0900 MONDAY THROUGH FRIDAY. MAX. 2 TO OPERATE AT ALL OTHER TIMES.
- IN ABSENCE OF PEDESTRIAN ACTUATION, PHASE 10 TIMING TO BE ADDED TO PHASE 2+6, INTERVAL 10.
- SIGNAL TO DWELL IN PHASE 2+6, INTERVAL 10, UNTIL ACTIVATED BY PHASE 4+8.

MOVEMENT, SEQUENCE AND TIMING DIAGRAM

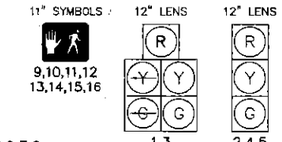
PHASE	1+5			2+5			1+6			2+6			4+8			10*Ⓒ			FLASHING
INTERVAL / SIGNALS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	
1	R→G	R	R	G→Y	Y	R	R	R	R	G	Y	R	R	R	R	R	R	R	Y
2	R	R	R	G	Y	R	R	R	R	G	Y	R	R	R	R	R	R	R	Y
3	R→G	R	R	R	R	R	G→Y	Y	R	G	Y	R	R	R	R	R	R	R	Y
4	R	R	R	R	R	R	G	Y	R	G	Y	R	R	R	R	R	R	R	Y
5,6,7,8	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	G	Y	R	R
9,10,11,12	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	M	FH	H	OUT
13,14,15,16	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	M	FH	H	OUT
FIXED		4	2		4	2		4	2		4	2		4	2				
MINIMUM	7			7			7			24			3						
PASSAGE	3			3			3						3						
MAXIMUM 1	7			7			7			24			27						
MAXIMUM 2	7			7			7			34			17						
PEDESTRIAN*																9	15	2	
MEMORY	NL			NL			NL			MR			NL						

* UPON PEDESTRIAN ACTUATION ONLY.

SIGNALS TO BE EQUIPPED WITH TUNNEL VISORS 1,2,3,4,5,6,7,8

SIGNALS TO BE EQUIPPED WITH TUNNEL VISORS & LOUVERS _____

SIGNAL INDICATIONS



EMERGENCY PRE–EMPTION NOTES:

- CONTROLLER TO BE EQUIPPED WITH EMERGENCY PRE–EMPTION FOR THE EASTBOUND & WESTBOUND APPROACHES OF LANCASTER AVENUE (S.R. 0030), AND THE NORTHBOUND & SOUTHBOUND APPROACHES OF ITHAN AVENUE, WITH A FLASHING FAIL SAFE DEVICE FOR EACH DIRECTION OF OPERATION.

  THIS FAIL SAFE DEVICE SHALL CONSIST OF A FLASHING WHITE FLOOD LIGHT, AND SHALL BEGIN FLASHING WHEN THE PREEMPTION PHASE DISPLAYS PREEMPTION GREEN FOR THE EMERGENCY VEHICLE APPROACH.

- THE SIGNALS, WHEN ACTIVATED BY AN EMERGENCY VEHICLE, SHALL TERMINATE ALL GREEN INDICATIONS EXCEPT THE GREEN INDICATIONS FOR THE PHASE GOVERNED BY THE APPROACHING EMERGENCY VEHICLE, FOLLOWED BY SELECTIVE CLEARANCES DEPENDENT UPON THE PHASE IN WHICH THE PRE–EMPTION OCCURS. THE GREEN INDICATIONS FOR THE PRE–EMPTED PHASE SHALL REMAIN GREEN FOR THE DURATION OF SIGNAL PRE–EMPTION WITH RED INDICATIONS DISPLAYED FOR ALL OTHER PHASES.
- THE SIGNALS, WHEN ACTIVATED BY AN EMERGENCY VEHICLE, SHALL TIME OUT ALL YELLOW AND RED INDICATIONS FOLLOWED BY THE GREEN INTERVAL OF THE PRE–EMPTION PHASE GOVERNED BY THE ACTUATION OF THE APPROACHING EMERGENCY VEHICLE.
- IF THE SIGNALS ARE FLASHING WHEN ACTIVATED BY AN EMERGENCY VEHICLE ALL SIGNALS SHALL REMAIN FLASHING.
- UPON COMPLETION OF PRE–EMPTION PHASE 2, 4, 6 OR 8, IN RETURNING TO NORMAL OPERATION PHASE 2+6 INTERVAL 10 SHALL FOLLOW.
- IF ADDITIONAL PRE–EMPTION PHASES ARE ACTIVATED WHILE IN PRE–EMPTION, THE ORIGINAL PRE–EMPTION PHASE SHALL TIME OUT BEFORE PROCEEDING TO THE NEXT PRE–EMPTION PHASE.
- IN EMERGENCY PRE–EMPTION, NO PRIORITY SHALL BE ESTABLISHED, PRE–EMPTION SHALL BE A "FIRST COME, FIRST SERVE" OPERATION.
- THE FIELD LOCATIONS OF THE PREEMPTION DETECTORS MAY DIFFER FROM THE LOCATIONS DEPICTED ON THE CONDITION DIAGRAM, AS THE DETECTORS MAY NEED TO BE RELOCATED AND/OR ADJUSTED TO PROVIDE ACCEPTABLE OPERATION AS DEEMED APPROPRIATE BY DEPARTMENT PERSONNEL.
- IF THE SIGNAL HAS BEEN ACTUATED BY A PEDESTRIAN PUSH BUTTON, AND THE SIGNAL IS PRE–EMPTED DURING THE "WALK" PHASE, THE "WALK" PHASE SHALL TERMINATE IMMEDIATELY, FOLLOWED BY THE "FLASHING HAND" INDICATION IN ITS ENTIRETY, FOLLOWED BY THE APPROPRIATE SELECTIVE CLEARANCES BEFORE PROCEEDING TO THE PRE–EMPTION PHASE.

25 0 25

LEGEND

- 20' MAST ARM/IDENTIFYING LENGTH
- ② VEHICULAR SIGNAL HEAD/BACKPLATE/VISORS/DIRECTIONAL ARROW/IDENTIFYING NUMBER
- ② PEDESTRIAN SIGNAL HEAD/IDENTIFYING NUMBER
- ② AUDIBLE PEDESTRIAN SIGNAL/IDENTIFYING NUMBER
- PEDESTRIAN PUSHBUTTON/SIGN
- A SIGN/IDENTIFYING LETTER
- 20' LUMINAIRE/IDENTIFYING LENGTH
- MICROWAVE DETECTOR
- EMERGENCY PREEMPTION BEACON
- EMERGENCY PREEMPTION DETECTOR
- CURB CUT RAMP
- UTILITY POLE
- (2) PHASE NUMBER
- INLET
- LOOP SENSOR/SIZE 12'x6'

GENERAL NOTES

NO MODIFICATIONS OF THIS INSTALLATION ARE PERMITTED UNLESS PRIOR APPROVAL IS GRANTED IN WRITING BY A REPRESENTATIVE OF THE DEPARTMENT OF TRANSPORTATION.

ALL MAINTENANCE WORK INCLUDING TRIMMING OF TREES, NECESSARY FOR PROPER VISIBILITY OF THE SIGNALS IS THE RESPONSIBILITY OF THE PERMITTEE.

ALL SIGNS AND PAVEMENT MARKINGS INDICATED ON THIS DRAWING ARE CONSIDERED PART OF THE PERMIT AND SHALL BE INSTALLED AND MAINTAINED IN ACCORDANCE WITH PUBLICATION NO. 68.

POST MOUNTED SIGNALS SHALL BE INSTALLED WITH THE SIGNAL HEADS A MINIMUM OF 2 FEET BEHIND THE FACE OF CURB OR THE EDGE OF THE SHOULDER. SUPPORT POLES FOR OVERHEAD SIGNALS SHALL ALSO HAVE A MINIMUM CLEARANCE HORIZONTALLY OF 2 FEET.

SIGNALS ERECTED OVER THE ROADWAY SHALL HAVE A MINIMUM VERTICAL CLEARANCE OF 16 FT. ABOVE THE ROADWAY. POST MOUNTED SIGNALS SHALL BE A MINIMUM OF 8 FT. ABOVE THE SIDEWALK OR PAVEMENT.

ALL OVERHEAD SIGNALS MUST BE RIGIDLY MOUNTED, TOP AND BOTTOM, AND EQUIPPED WITH BACKPLATES.

THE MINIMUM HORIZONTAL DISTANCE BETWEEN SIGNALS MEASURED AT RIGHT ANGLES TO THE APPROACH SHALL BE 8 FEET.

EXACT LOCATION OF DETECTORS SHALL BE DETERMINED PRIOR TO INSTALLATION BY A REPRESENTATIVE OF PENNDOT.

CURBING TO BE INSTALLED BY MUNICIPALITY AND WHERE NOTED, SHALL BE PLAIN CEMENT CONCRETE CURB OR GRANITE CURB, INSTALLED IN ACCORDANCE WITH DEPARTMENT SPECIFICATIONS FORM 408.

PRIOR TO INSTALLATION THE CONTRACTOR SHALL CONSULT WITH THE LOCAL OFFICIALS AND UTILITY COMPANIES TO RESOLVE ANY PROBLEMS WHICH MAY BE CREATED DUE TO THE LOCATION OF UTILITIES.

THIS DRAWING CANNOT BE USED AS A CONSTRUCTION DRAWING UNLESS THE PERMITTEE COMPLIES WITH THE PROVISIONS OF ACT 187, PREVENTION OF DAMAGE TO UNDERGROUND UTILITIES, EFFECTIVE DATE DECEMBER 19, 1996.

WHEN LIQUID FUELS MONEY IS USED, SIGNAL INSTALLATION MUST CONFORM TO FORM 408 AND A COPY OF THE PROPOSED SPECIFICATIONS MUST BE SUBMITTED TO THE DISTRICT TRAFFIC UNIT, FOR REVIEW, PRIOR TO BIDDING.

PERMITTEE SHALL OBTAIN A HIGHWAY OCCUPANCY PERMIT FOR ANY CHANGES IN INTERSECTION GEOMETRY REGARDING EXCAVATION.

CONDUIT INSTALLED IN BITUMINOUS ROADWAY LESS THAN 5 YEARS OLD, OR CONCRETE ROADWAY REGARDLESS OF AGE, MUST BE BORED OR JACKED UNDER THE ROADWAY. INSTALL IN ACCORDANCE WITH TRAFFIC SIGNAL STANDARDS TC–7800 SERIES.

PENNSYLVANIA DEPARTMENT OF TRANSPORTATION
ENGINEERING DISTRICT 6–0

COUNTY: DELAWARE

MUNICIPALITY: RADNOR TOWNSHIP

INTERSECTION: LANCASTER AVENUE (S.R. 0030) AND ITHAN AVENUE

REVIEWED: _____ DATE

_____ MUNICIPAL OFFICIAL DATE

RECOMMENDED:

Mark Kray 8/5/92
DATE

Douglas May 8/13/92
DISTRICT TRAFFIC ENGINEER DATE

NO.	REVISION	DES./REVW.	DATE	REVW.	DATE	RECOM.	DATE
1	Modernization, New Drawing	NV	8/5/92	MK	8/5/92		
2	Changed M/A length, Mvd Ped. Sig., Controller	BRK	8/7/92	MK	8/11/92	MK	8/13/92
3	Added Pre–Emption, Sign "C"	PAI	4/04/01	MK	6/13/01	WJE	6/19/01
4	Added Hand/Man Indications	PAI	7/16/02	MK	7/18/02	WJE	7/31/02
5							
6							
7							
8							

SHEET 2 OF 2 | PERMIT # 63–0780 | FILE # 0780

MOVEMENT, SEQUENCE AND TIMING DIAGRAM

PHASE	1+5			2+5			1+6			2+6			9*			4+8			FLASH
INTERVAL / SIGNALS	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	27	18	
1	R/G ②	R/G ①	R ①	G/G	Y ③	R ④	R	R	R	G	Y	R	R	R	R	R	R	R	Y
2	R	R	R	G	Y ④	R ④	R	R	R	G	Y	R	R	R	R	R	R	R	Y
3	R/G ②	R/G ②	R ②	R	R	R	G/G	Y ③	R ④	G	Y	R	R	R	R	R	R	R	Y
4	R	R	R	R	R	R	G	Y ④	R ④	G	Y	R	R	R	R	R	R	R	Y
5,6,7,8	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	G	Y	R	R
9,10,11,12*	H	H	H	H	H	H	H	H	H	H	H	H	M	FH	H	H	H	H	OFF
13,14,15,16*	H	H	H	H	H	H	H	H	H	H	H	H	M	FH	H	H	H	H	OFF

FIXED		4	2		4	2		4	2		4	2					4	2
MINIMUM	3			3			3			34						3		
PASSAGE	3			3			3									3		
MAXIMUM 1	7			7			7			34						27		
MAXIMUM 2	14			7			7			48						35		
PEDESTRIAN*													9	15	2			
MEMORY	NL			NL			NL			MN						NL		

*UPON PEDESTRIAN ACTUATION ONLY.

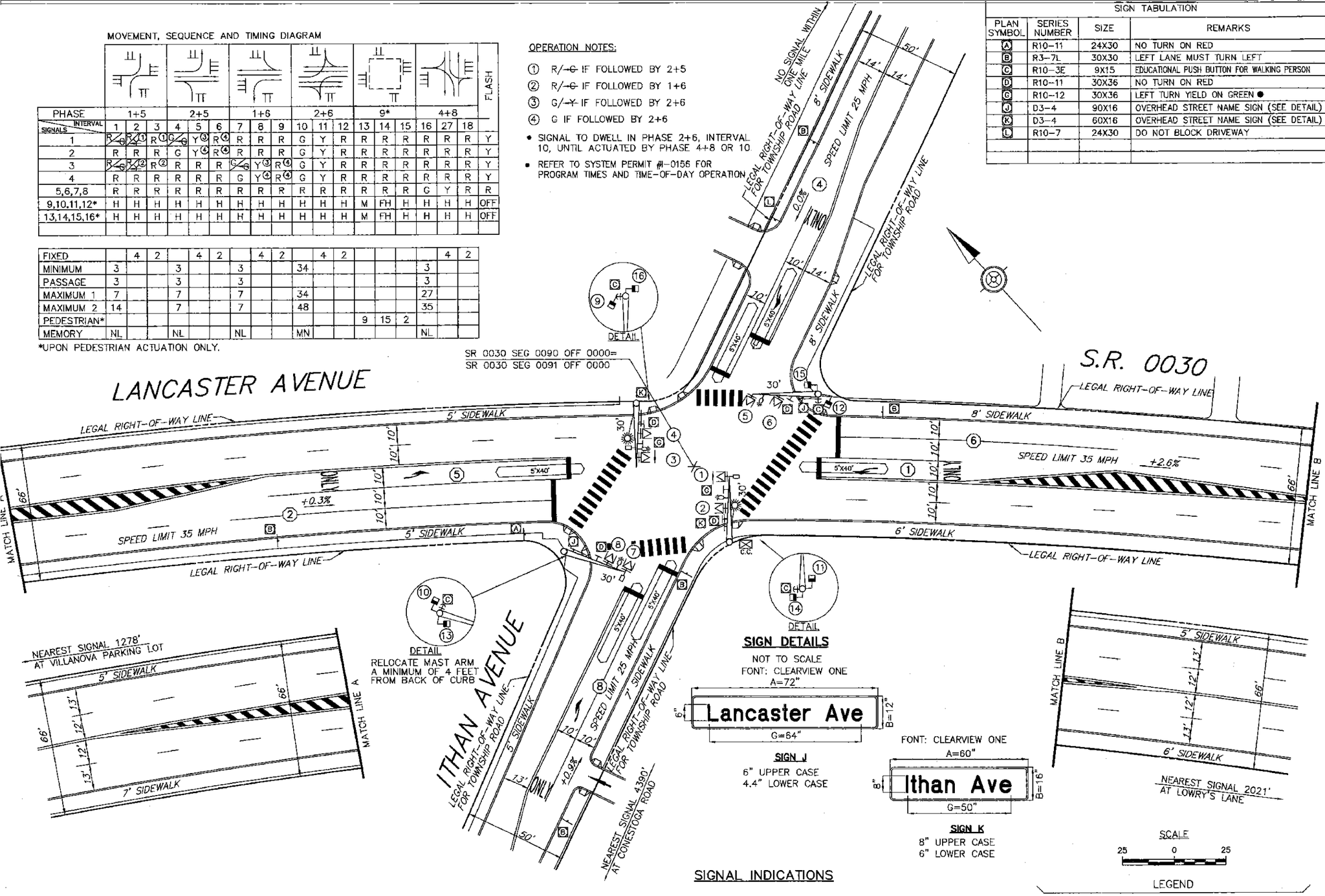
OPERATION NOTES:

① R/→G IF FOLLOWED BY 2+5
② R/→G IF FOLLOWED BY 1+6
③ G/→Y IF FOLLOWED BY 2+6
④ G IF FOLLOWED BY 2+6

- SIGNAL TO DWELL IN PHASE 2+6, INTERVAL 10, UNTIL ACTUATED BY PHASE 4+8 OR 10
- REFER TO SYSTEM PERMIT #-0156 FOR PROGRAM TIMES AND TIME-OF-DAY OPERATION

SIGN TABULATION

PLAN SYMBOL	SERIES NUMBER	SIZE	REMARKS
A	R10-11	24X30	NO TURN ON RED
B	R3-7L	30X30	LEFT LANE MUST TURN LEFT
C	R10-3E	9X15	EDUCATIONAL PUSH BUTTON FOR WALKING PERSON
D	R10-11	30X36	NO TURN ON RED
G	R10-12	30X36	LEFT TURN YIELD ON GREEN ●
J	D3-4	90X16	OVERHEAD STREET NAME SIGN (SEE DETAIL)
K	D3-4	60X16	OVERHEAD STREET NAME SIGN (SEE DETAIL)
L	R10-7	24X30	DO NOT BLOCK DRIVEWAY



SIGN DETAILS

NOT TO SCALE
FONT: CLEARVIEW ONE
A=72"
Lancaster Ave
6" B=12" G=64"

SIGN J
6" UPPER CASE
4.4" LOWER CASE

FONT: CLEARVIEW ONE
A=60"
Ithan Ave
8" B=16" G=50"

SIGN K
8" UPPER CASE
6" LOWER CASE

SCALE
25 0 25

SIGNAL INDICATIONS

11" SYMBOLS* 9,10,11,12, 13,14,15,16

12" LENS 1,3

12" LENS 2,4,5, 6,7,8

SIGNALS TO BE EQUIPPED WITH TUNNEL VISORS 1,2,3,4,5,6,7,8
*AUDIBLE PEDESTRIAN SIGNAL HEADS

LEGEND

- MAST ARM/ IDENTIFYING LENGTH
- VEHICULAR SIGNAL HEAD/ BACKPLATE/VISORS/ DIRECTIONAL ARROW/ IDENTIFYING NUMBER
- PEDESTRIAN SIGNAL HEAD/ IDENTIFYING NUMBER
- PEDESTRIAN PUSHBUTTON/ SIGN
- SIGN/IDENTIFYING LETTER
- LUMINAIRE
- LOOP SENSOR/SIZE
- MICROWAVE PRESENCE DETECTOR
- EMERGENCY PRE-EMPTION FLASHING BEACON
- EMERGENCY PRE-EMPTION DEVICE
- CURB RAMP
- UTILITY POLE
- PHASE NUMBER
- INLET

GENERAL NOTES

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ALL SIGNS AND PAVEMENT MARKINGS INDICATED ON THIS DRAWING ARE CONSIDERED PART OF THE PERMIT AND SHALL BE INSTALLED AND MAINTAINED IN ACCORDANCE WITH PUBLICATION NO. 212.

POST MOUNTED SIGNALS SHALL BE INSTALLED WITH THE SIGNAL HEADS A MINIMUM OF 2 FEET BEHIND THE FACE OF CURB OR THE EDGE OF THE SHOULDER. SUPPORT POLES FOR OVERHEAD SIGNALS SHALL ALSO HAVE A MINIMUM CLEARANCE HORIZONTALLY OF 2 FEET.

SIGNALS ERECTED OVER THE ROADWAY SHALL HAVE A MINIMUM VERTICAL CLEARANCE OF 18 FT. ABOVE THE ROADWAY. POST MOUNTED SIGNALS SHALL BE A MINIMUM OF 8 FT. ABOVE THE SIDEWALK OR PAVEMENT.

ALL OVERHEAD SIGNALS MUST BE RIGIDLY MOUNTED, TOP AND BOTTOM, AND EQUIPPED WITH BACKPLATES.

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WHEN LIQUID FUELS MONEY IS USED, SIGNAL INSTALLATION MUST CONFORM TO FORM 408 AND A COPY OF THE PROPOSED SPECIFICATIONS MUST BE SUBMITTED TO THE DISTRICT TRAFFIC UNIT, FOR REVIEW, PRIOR TO BIDDING.

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SYSTEM PERMIT #-0156

PENNSYLVANIA DEPARTMENT OF TRANSPORTATION
ENGINEERING DISTRICT 6-0

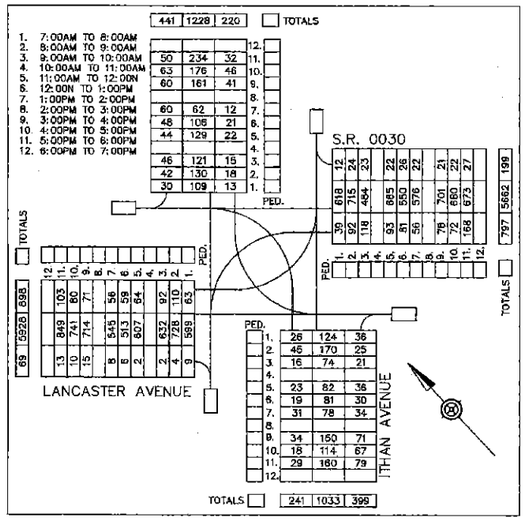
COUNTY: DELWARE
MUNICIPALITY: RADNOR TOWNSHIP
INTERSECTION: LANCASTER AVENUE (S.R. 0030) AND ITHAN AVENUE

REVIEWED:
DATE
MUNICIPAL OFFICIAL DATE

RECOMMENDED:
PAUL M. LUTZ 11/24/08
LOUIS R. BELMONTE, P.E. 11/24/08
DISTRICT TRAFFIC ENGINEER DATE

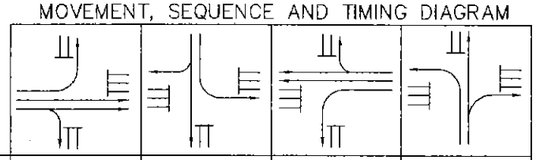
NO.	REVISION	DES./ REVR.	DATE	REVR.	DATE	RECOM.	DATE
1	AS-BUILT DRAWING	MCM	3/5/12	[illegible]	5/14/12	DMR	5/14/12
2							
3							
4							
5							
6							
7							
8							

SHEET 2 OF 3 | PERMIT # 63-0780 | FILE # 075918



EMERGENCY PRE-EMPTION PHASING

MOVEMENT, SEQUENCE AND TIMING DIAGRAM



PHASE	2				4				6				8			
INTERVAL / SIGNALS	19	20	21		22	23	24		25	26	27		28	29	30	
1	G/⊖	Y ⓞ	R ⓑ		R	R	R		R	R	R		R	R	R	
2	G	Y ⓑ	R ⓑ		R	R	R		R	R	R		R	R	R	
3	R	R	R		R	R	R		G/⊖	Y ⓞ	R ⓑ		R	R	R	
4	R	R	R		R	R	R		G	Y ⓑ	R ⓑ		R	R	R	
5,6	R	R	R		R	R	R		R	R	R		G	Y	R	
7,8	R	R	R		G	Y	R		R	R	R		R	R	R	
9,10,11,12	H	H	H		H	H	H		H	H	H		H	H	H	
13,14,15,16	H	H	H		H	H	H		H	H	H		H	H	H	
FIXED	**	4	2		**	4	2		**	4	2		**	4	2	

** FOR DURATION OF PRE-EMPTION

NOTE:
IF PRE-EMPTION EQUIPMENT HAS ENCODING CAPABILITIES FOR VEHICLE IDENTIFICATION, IT IS RECOMMENDED TO HAVE THE ZERO "00" FEATURE ON, TO GIVE UNCODED EMITTERS THE ABILITY TO ACTIVATE THE EMERGENCY PRE-EMPTION.

ⓐ G/⊖ WHEN RETURNING TO NORMAL OPERATION
ⓑ G WHEN RETURNING TO NORMAL OPERATION

EMERGENCY PRE-EMPTION NOTES:

- CONTROLLER TO BE EQUIPPED WITH EMERGENCY PRE-EMPTION FOR THE NORTHBOUND & SOUTHBOUND APPROACHES OF ITHAN AVENUE AND THE EASTBOUND & WESTBOUND APPROACHES OF LANCASTER AVENUE WITH A FAIL SAFE DEVICE FOR EACH DIRECTION OF OPERATION.
  THIS EMERGENCY BEACON SHALL CONSIST OF A FLASHING WHITE FLOOD LIGHT, AND SHALL FLASH WHEN THE EMERGENCY VEHICLE HAS CONTROL OF THE INTERSECTION FOR THE APPROPRIATE APPROACH.
- THE SIGNALS, WHEN ACTIVATED BY AN EMERGENCY VEHICLE, SHALL TERMINATE ALL GREEN INDICATIONS IMMEDIATELY, FOLLOWED BY THE COMPLETE YELLOW AND RED CLEARANCE INTERVALS, ACCORDINGLY. THEN THE GREEN INTERVAL FOR THE PRE-EMPTED PHASE SHALL FOLLOW.
- THE SIGNALS, WHEN ACTIVATED BY EMERGENCY VEHICLE, SHALL TIME OUT ALL YELLOW AND RED INDICATIONS, FOLLOWED BY THE GREEN INTERVAL OF THE PRE-EMPTION PHASE GOVERNED BY THE APPROACHING EMERGENCY VEHICLE.
- IF SIGNALS HAVE BEEN ACTUATED BY PEDESTRIAN PUSH BUTTON AND THE SIGNAL IS PRE-EMPTED DURING THE "MAN" INTERVAL, THE "MAN" INTERVAL SHALL TERMINATE IMMEDIATELY FOLLOWED BY THE "FLASHING HAND" INDICATION IN ITS ENTIRETY, FOLLOWED BY THE APPROPRIATE SELECTIVE CLEARANCES BEFORE PROCEEDING INTO 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 TIME OUT BEFORE PROCEEDING TO THE NEXT PRE-EMPTION PHASE.
- UPON COMPLETION OF PRE-EMPTION, PHASE 2,4,6 OR 8 IN RETURNING TO NORMAL OPERATION, PHASE 2+6 INTERVAL 10 SHALL FOLLOW.
- IN EMERGENCY PRE-EMPTION, NO PRIORITY SHALL BE ESTABLISHED. PRE-EMPTION SHALL BE A "FIRST COME, FIRST SERVE" OPERATION.

SCALE
25 0 25

LEGEND

- 20' — MAST ARM/ IDENTIFYING LENGTH
- (2) — VEHICULAR SIGNAL HEAD/ BACKPLATE/VISORS/ DIRECTIONAL ARROW/ IDENTIFYING NUMBER
- (2) — PEDESTRIAN SIGNAL HEAD/ IDENTIFYING NUMBER
- PEDESTRIAN PUSHBUTTON/ SIGN
- (A) — SIGN/IDENTIFYING LETTER
- 12'x6' — LOOP SENSOR/SIZE
- MICROWAVE PRESENCE DETECTOR
- EMERGENCY PRE-EMPTION FLASHING BEACON
- EMERGENCY PRE-EMPTION DEVICE
- C.R. — CURB RAMP
- UTILITY POLE
- (2) — PHASE NUMBER
- INLET

GENERAL NOTES

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POST MOUNTED SIGNALS SHALL BE INSTALLED WITH THE SIGNAL HEADS A MINIMUM OF 2 FEET BEHIND THE FACE OF CURB OR THE EDGE OF THE SHOULDER. SUPPORT POLES FOR OVERHEAD SIGNALS SHALL ALSO HAVE A MINIMUM CLEARANCE HORIZONTALLY OF 2 FEET.

SIGNALS ERECTED OVER THE ROADWAY SHALL HAVE A MINIMUM VERTICAL CLEARANCE OF 16 FT. ABOVE THE ROADWAY. POST MOUNTED SIGNALS SHALL BE A MINIMUM OF 8 FT. ABOVE THE SIDEWALK OR PAVEMENT.

ALL OVERHEAD SIGNALS MUST BE RIGIDLY MOUNTED, TOP AND BOTTOM, AND EQUIPPED WITH BACKPLATES.

THE MINIMUM HORIZONTAL DISTANCE BETWEEN SIGNALS MEASURED AT RIGHT ANGLES TO THE APPROACH SHALL BE 8 FEET.

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CURBING TO BE INSTALLED BY MUNICIPALITY AND WHERE NOTED, SHALL BE PLAIN CEMENT CONCRETE CURB OR GRANITE CURB, INSTALLED IN ACCORDANCE WITH DEPARTMENT SPECIFICATIONS FORM 408.

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WHEN LIQUID FUELS MONEY IS USED, SIGNAL INSTALLATION MUST CONFORM TO FORM 408 AND A COPY OF THE PROPOSED SPECIFICATIONS MUST BE SUBMITTED TO THE DISTRICT TRAFFIC UNIT, FOR REVIEW, PRIOR TO BIDDING.

PERMITTEE SHALL OBTAIN A HIGHWAY OCCUPANCY PERMIT FOR ANY CHANGES IN INTERSECTION GEOMETRY REGARDING EXCAVATION.

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SYSTEM PERMIT #1-0156

PENNSYLVANIA DEPARTMENT OF TRANSPORTATION
ENGINEERING DISTRICT 6-0

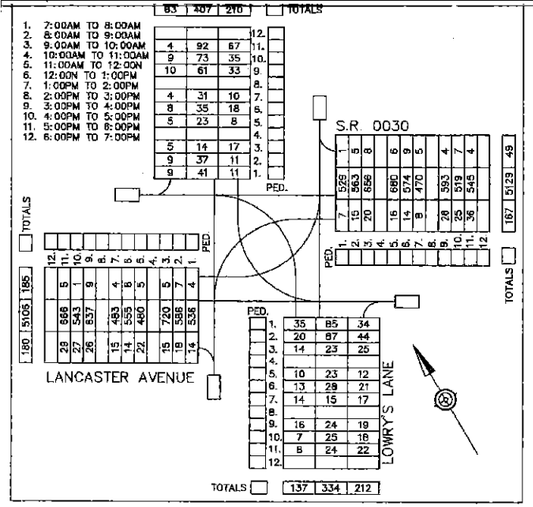
COUNTY: DELWARE
MUNICIPALITY: RADNOR TOWNSHIP
INTERSECTION: LANCASTER AVENUE (S.R. 0030) AND ITHAN AVENUE

REVIEWED:
DATE
MUNICIPAL OFFICIAL DATE

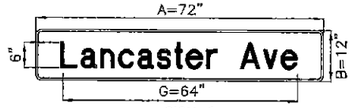
RECOMMENDED:
PAUL M. LUTZ 11/24/08
LOUIS R. BELMONTE, P.E. 11/24/08
DISTRICT TRAFFIC ENGINEER DATE

NO.	REVISION	DES./ REVW.	DATE	REVW.	DATE	RECOM.	DATE
1	AS-BUILT DRAWING	McM	3/5/12		3/12/12		3/14/12
2							
3							
4							
5							
6							
7							
8							

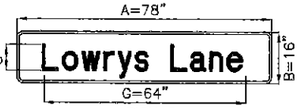
SHEET 3 OF 3 | PERMIT # 63-0780 | FILE # 0780



NOT TO SCALE
FONT: CLEARVIEW ONE

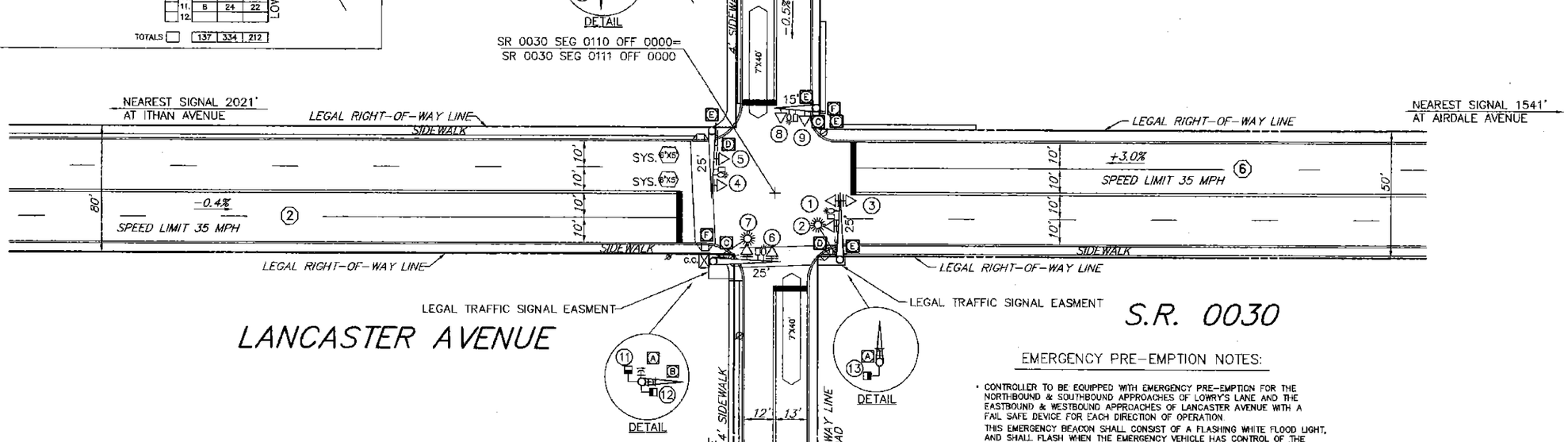


SIGN C
6" UPPER CASE
4.4" LOWER CASE



SIGN D
8" UPPER CASE
6" LOWER CASE

PLAN SYMBOL	SERIES NUMBER	SIZE	REMARKS
A	R10-3E(L)	9X12	EDUCATIONAL PUSH BUTTON FOR WALKING PERSON
B	R10-3E(R)	9X12	EDUCATIONAL PUSH BUTTON FOR WALKING PERSON
C	D3-4	90X16	OVERHEAD STREET NAME SIGN (SEE DETAIL)
D	D3-4	78X16	OVERHEAD STREET NAME SIGN (SEE DETAIL)
E	R9-3A	18X18	NO PEDESTRIAN CROSSING
F	R10-11	30X36	NO TURN ON RED



S.R. 0030

EMERGENCY PRE-EMPTION NOTES:

- CONTROLLER TO BE EQUIPPED WITH EMERGENCY PRE-EMPTION FOR THE NORTHBOUND & SOUTHBOUND APPROACHES OF LOWRY'S LANE AND THE EASTBOUND & WESTBOUND APPROACHES OF LANCASTER AVENUE WITH A FAIL SAFE DEVICE FOR EACH DIRECTION OF OPERATION.
  THIS EMERGENCY BEACON SHALL CONSIST OF A FLASHING WHITE FLOOD LIGHT, AND SHALL FLASH WHEN THE EMERGENCY VEHICLE HAS CONTROL OF THE INTERSECTION FOR THE APPROPRIATE APPROACH.
- THE SIGNALS, WHEN ACTIVATED BY AN EMERGENCY VEHICLE, SHALL TERMINATE ALL GREEN INDICATIONS IMMEDIATELY FOLLOWED BY THE COMPLETE YELLOW AND RED CLEARANCE INTERVALS, ACCORDINGLY. THEN THE GREEN INTERVAL FOR THE PRE-EMPTED PHASE SHALL FOLLOW.
- THE SIGNALS, WHEN ACTIVATED BY EMERGENCY VEHICLE SHALL TIME OUT ALL YELLOW AND RED INDICATIONS, FOLLOWED BY THE GREEN INTERVAL OF THE PRE-EMPTION PHASE GOVERNED BY THE APPROACHING EMERGENCY VEHICLE.
- IF SIGNALS HAVE BEEN ACTUATED BY PEDESTRIAN PUSH BUTTON AND THE SIGNAL IS PRE-EMPTED, THE PEDESTRIAN TIME SHALL BE SPLIT BETWEEN "PED WALK" AND "PED CLEAR". THE "PED WALK" INTERVAL SHALL TERMINATE IMMEDIATELY FOLLOWED BY THE "PED CLEAR" INTERVAL. THIS INTERVAL SHALL TIME OUT FOLLOWED BY THE APPROPRIATE SELECTIVE CLEARANCES BEFORE GOING INTO EMERGENCY PRE-EMPTION.
- IF THE SIGNALS, WHEN ACTIVATED BY AN EMERGENCY VEHICLE, ARE FLASHING ALL SIGNALS SHALL REMAIN FLASHING.
- IF ADDITIONAL PRE-EMPTION PHASES ARE ACTIVATED WHILE IN PRE-EMPTION, THE ORIGINAL PRE-EMPTION PHASE SHALL TIME OUT BEFORE PROCEEDING TO THE NEXT PRE-EMPTION PHASE.
- UPON COMPLETION OF PRE-EMPTION, PHASE 2,4,6 OR 8 IN RETURNING TO NORMAL OPERATION, PHASE 2+6 INTERVAL 1 SHALL FOLLOW.
- IN EMERGENCY PRE-EMPTION, NO PRIORITY SHALL BE ESTABLISHED, PRE-EMPTION SHALL BE A "FIRST COME, FIRST SERVE" OPERATION.

SCALE
25 0 25

GENERAL NOTES

NO MODIFICATIONS OF THIS INSTALLATION ARE PERMITTED UNLESS PRIOR APPROVAL IS GRANTED IN WRITING BY A REPRESENTATIVE OF THE DEPARTMENT OF TRANSPORTATION.

ALL MAINTENANCE WORK INCLUDING TRIMMING OF TREES, NECESSARY FOR PROPER VISIBILITY OF THE SIGNALS IS THE RESPONSIBILITY OF THE PERMITTEE.

ALL SIGNS AND PAVEMENT MARKINGS INDICATED ON THIS DRAWING ARE CONSIDERED PART OF THE PERMIT AND SHALL BE INSTALLED AND MAINTAINED IN ACCORDANCE WITH PUBLICATION NO. 212.

POST MOUNTED SIGNALS SHALL BE INSTALLED WITH THE SIGNAL HEADS A MINIMUM OF 2 FEET BEHIND THE FACE OF CURB OR THE EDGE OF THE SHOULDER. SUPPORT POLES FOR OVERHEAD SIGNALS SHALL ALSO HAVE A MINIMUM CLEARANCE HORIZONTALLY OF 2 FEET.

SIGNALS ERECTED OVER THE ROADWAY SHALL HAVE A MINIMUM VERTICAL CLEARANCE OF 16 FT. ABOVE THE ROADWAY. POST MOUNTED SIGNALS SHALL BE A MINIMUM OF 8 FT. ABOVE THE SIDEWALK OR PAVEMENT.

ALL OVERHEAD SIGNALS MUST BE RIGIDLY MOUNTED, TOP AND BOTTOM, AND EQUIPPED WITH BACKPLATES.

THE MINIMUM HORIZONTAL DISTANCE BETWEEN SIGNALS MEASURED AT RIGHT ANGLES TO THE APPROACH SHALL BE 8 FEET.

EXACT LOCATION OF DETECTORS SHALL BE DETERMINED PRIOR TO INSTALLATION BY A REPRESENTATIVE OF PENNDOT.

CURBING TO BE INSTALLED BY MUNICIPALITY AND WHERE NOTED, SHALL BE PLAIN CEMENT CONCRETE CURB OR GRANITE CURB, INSTALLED IN ACCORDANCE WITH DEPARTMENT SPECIFICATIONS FORM 408.

PRIOR TO INSTALLATION THE CONTRACTOR SHALL CONSULT WITH THE LOCAL OFFICIALS AND UTILITY COMPANIES TO RESOLVE ANY PROBLEMS WHICH MAY BE CREATED DUE TO THE LOCATION OF UTILITIES.

THIS DRAWING CANNOT BE USED AS A CONSTRUCTION DRAWING UNLESS THE PERMITTEE COMPLIES WITH THE PROVISIONS OF THE LATEST AMENDMENT TO ACT 287, PREVENTION OF DAMAGE TO UNDERGROUND UTILITIES, DATED DECEMBER 20, 1974.

WHEN LIQUID FUELS MONEY IS USED, SIGNAL INSTALLATION MUST CONFORM TO FORM 408 AND A COPY OF THE PROPOSED SPECIFICATIONS MUST BE SUBMITTED TO THE DISTRICT TRAFFIC UNIT, FOR REVIEW, PRIOR TO BIDDING.

PERMITTEE SHALL OBTAIN A HIGHWAY OCCUPANCY PERMIT FOR ANY CHANGES IN INTERSECTION GEOMETRY REGARDING EXCAVATION.

CONDUIT INSTALLED IN BITUMINOUS ROADWAY LESS THAN 5 YEARS OLD, OR CONCRETE ROADWAY REGARDLESS OF AGE, MUST BE BORED OR JACKED UNDER THE ROADWAY. INSTALL IN ACCORDANCE WITH TRAFFIC SIGNAL STANDARDS TC-8800 SERIES.

SYSTEM PERMIT #-0156

PENNSYLVANIA DEPARTMENT OF TRANSPORTATION
ENGINEERING DISTRICT 6-0

COUNTY: DELAWARE
MUNICIPALITY: RADNOR TOWNSHIP
INTERSECTION: LANCASTER AVENUE (S.R. 0030) AND LOWRY'S LANE

REVIEWED:
DATE
MUNICIPAL OFFICIAL DATE

RECOMMENDED:
PAUL M. LUTZ 11/24/08
LOUIS R. BELMONTE, P.E. 11/24/08
DISTRICT TRAFFIC ENGINEER DATE

NO.	REVISION	DES./REVW.	DATE	REVW.	DATE	RECOM.	DATE
1	AS-BUILT DRAWING	MCM	3/5/12	[illegible]	5/12/12	[illegible]	5/14/12
2							
3							
4							
5							
6							
7							
8							

SHEET 2 OF 2 | PERMIT # 63-0781 | FILE # 0781

MOVEMENT, SEQUENCE AND TIMING DIAGRAM

PHASE	2+6				4+8				FLASH
INTERVAL / SIGNALS	1	2	3	4	5	6	7	8	
1,2	G	G	Y	R	R	R	R	R	Y
3,4,5	G	G	Y	R	R	R	R	R	Y
6,7	R	R	R	R	G	G	Y	R	R
8,9	R	R	R	R	G	G	Y	R	R
10,11	H	H	H	H	M	FH	H	H	OFF
12,13	M	FH	H	H	H	H	H	H	OFF

FIXED			4	2		3	2
MINIMUM	10				3		
PASSAGE					3		
MAXIMUM 1	30				15		
MAXIMUM 2	49				15		
PEDESTRIAN	7	8			7	12	
MEMORY	MN				NL		

* MAN SYMBOL UPON PEDESTRIAN ACTUATION ONLY, OTHERWISE HAND SYMBOL AT ALL TIMES

EMERGENCY PRE-EMPTION PHASING

MOVEMENT, SEQUENCE AND TIMING DIAGRAM

PHASE	2			4			6			8		
INTERVAL / SIGNALS	9	10	11	12	13	14	15	16	17	18	19	20
1,2	G	Y	R©	R	R	R	R	R	R	R	R	R
3,4,5	R	R	R	R	R	R	G	Y	R©	R	R	R
6,7	R	R	R	G	Y	R	R	R	R	R	R	R
8,9	R	R	R	R	R	R	R	R	R	G	Y	R
10,11	H	H	H	H	H	H	H	H	H	H	H	H
12,13	H	H	H	H	H	H	H	H	H	H	H	H
FIXED	**	4	2	**	3	2	**	4	2	**	3	2

** FOR DURATION OF PRE-EMPTION

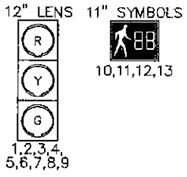
NOTE:
IF PRE-EMPTION EQUIPMENT HAS ENCODING CAPABILITIES FOR VEHICLE IDENTIFICATION, IT IS RECOMMENDED TO HAVE THE ZERO "00" FEATURE ON, TO GIVE UNCODED EMITTERS THE ABILITY TO ACTIVATE THE EMERGENCY PRE-EMPTION.

© G WHEN RETURNING TO NORMAL OPERATION

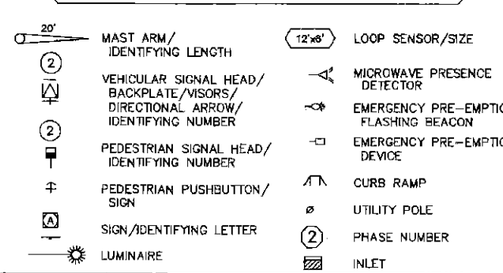
- REFER TO SYSTEM PERMIT #-0156 FOR PROGRAM TIMES AND TIME-OF-DAY OPERATION
- PED RECYCLE FOR PHASE 2+6

SIGNAL INDICATIONS

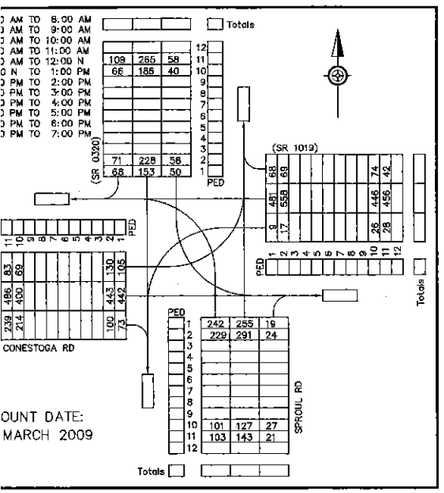
12" LENS 11" SYMBOLS



LEGEND



Radnor Twp #0886



OUNT DATE:
MARCH 2009

EMERGENCY PRE-EMPTION:

MOVEMENT, SEQUENCE, AND TIMING DIAGRAM

SIGNALS \ INTERVAL	6 13	6 14	6 15	2 16	2 17	2 18	4 19	4 20	4 21	8 22	8 23	8 24
1,5	G	Y	R	R	R	R	R	R	R	R	R	R
6	G/G	Y	R	R	R	R	R	R	R	R	R	R
3,8,10	R	R	R	G	Y	R	R	R	R	R	R	R
2	R	R	R	R	R	R	G	Y	R⑧	R	R	R
4	R	R	R	R	R	R	G/G	Y	R⑧	R	R	R
7,9,11	R	R	R	R	R	R	R	R	R	G	Y	R
FIXED TIME	*	3.5	2	*	3.5	2	*	3	2	*	3	2

* FOR DURATION OF OPTICAL PRE-EMPTION
Ⓒ G WHEN RETURNING TO NORMAL OPERATION.
Ⓓ G/A WHEN RETURNING TO NORMAL OPERATION.

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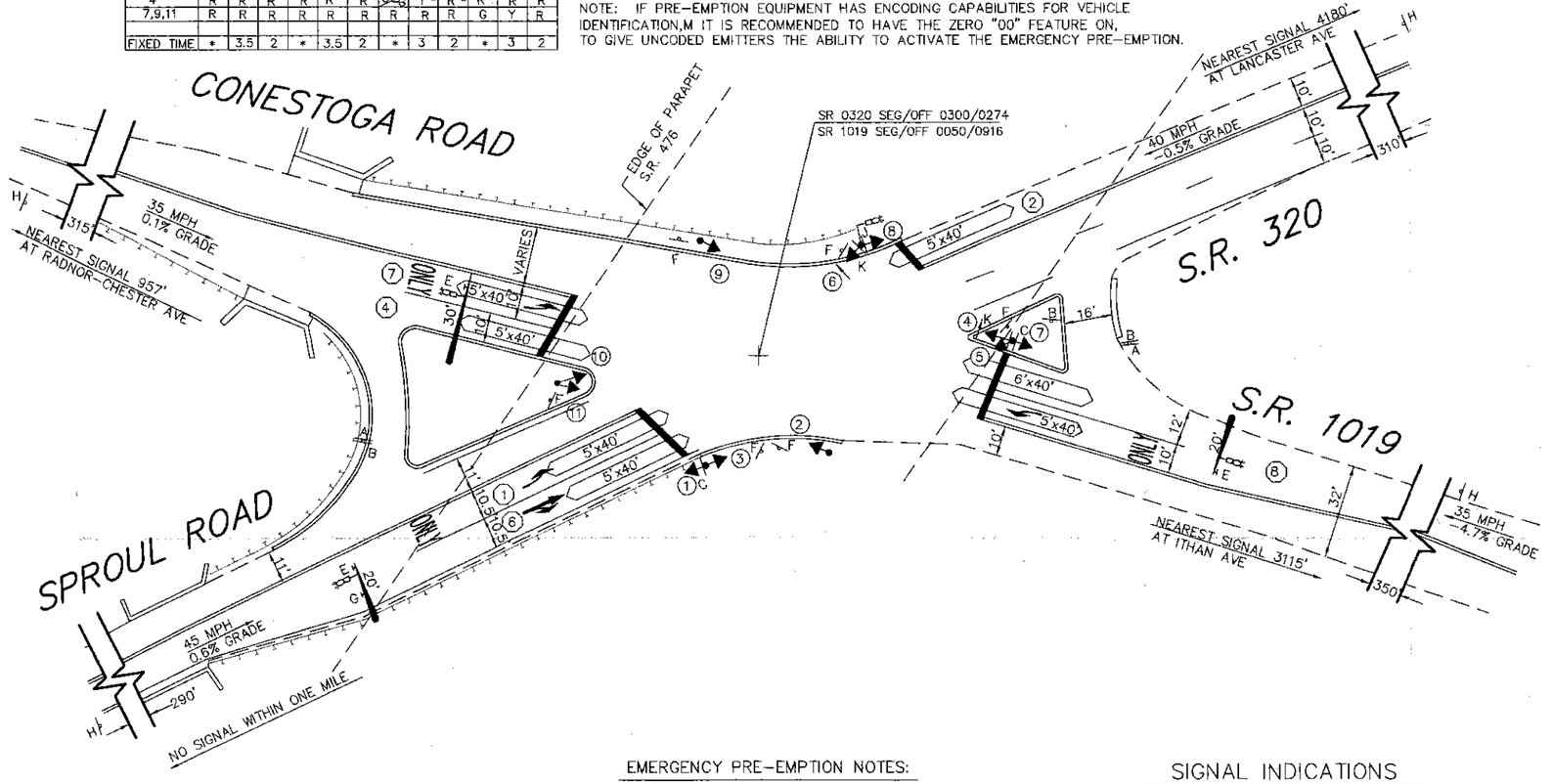

SIGN TABULATION			
PLAN SYMBOL	SERIES NUMBER	SIZE	REMARKS
A	R1-2	36"X36"	YIELD
B	R5-1	36"X36"	DO NOT ENTER
C	R3-7L	30"X30"	LEFT LANE MUST TURN LEFT
E	R3-5L	30"X36"	LEFT TURN SIGN
F	R3-9	18"X18"	NO PEDESTRIAN CROSSING
G	R3-6SR	30"X36"	OPTIONAL RIGHT TURN SIGN
H	W3-3	36"X36"	SIGNAL AHEAD SIGN
J	R10-11	24"X30"	NO TURN ON RED
K	R10-12	30"X36"	LEFT TURN YIELD ON GREEN ●

GENERAL NOTES

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PERMITTEE SHALL BE OBTAIN A HIGHWAY OCCUPANCY PERMIT FOR ANY CHANGES IN INTERSECTION GEOMETRY REGARDING EXCAVATION.

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WEEKLY PROGRAM CHART					
EVENT	DAY*	TIME	CYCLE	PROGRAM	REMARKS
1	1-5	0600	90	1	AM PEAK
2	1-5	1000	80	2	MID DAY
3	1-5	1600	80	3	PM PEAK
4	1-5	1900	-	MAX.	FREE
5	6,7	0800	80	2	WEEKEND
6	6,7	2000	-	MAX.	FREE

* DAY 1 = MONDAY

MOVEMENT, SEQUENCE AND TIMING DIAGRAM

PHASE	1+6			2+6			4+7			4+8			FLASHING
INTERVAL / SIGNALS	1	2	3	4	5	6	7	8	9	10	11	12	
1,5	G	Y②	R②	G	Y	R	R	R	R	R	R	R	R
6	G/G	Y①	R②	G	Y	R	R	R	R	R	R	R	R
3,8,10	R	R	R	G	Y	R	R	R	R	R	R	R	R
2	R	R	R	R	R	R	G	Y④	R④	G	Y	R	Y
4	R	R	R	R	R	R	G/G	Y③	R④	G	Y	R	Y
7,9,11	R	R	R	R	R	R	R	R	R	G	Y	R	Y
FIXED		3.5	2		3.5	2		3.0	2		3.0	2	
MINIMUM	3			5			3			10			
PASSAGE	3			3			3			4			
MAXIMUM	7			15			7			20			
PEDESTRIAN													
MEMORY	NL			NL			NL			MN			
PROGRAM 1	7	3.5	2	26	3.5	2	7	3	2	29≠	3	2	90 SEC
PROGRAM 2	7	3.5	2	20	3.5	2	7	3	2	25≠	3	2	80 SEC
PROGRAM 3	7	3.5	2	21	3.5	2	7	3	2	24≠	3	2	80 SEC

● SIGNAL TO DWELL IN PHASE 4+8 UNTIL ACTUATED BY PHASE 1,2 OR 6.

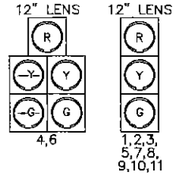
① G/A IF FOLLOWED BY 2+6
② G IF FOLLOWED BY 2+6
③ G/A IF FOLLOWED BY 4+8
④ G IF FOLLOWED BY 4+8

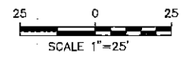
≠ MINIMUM TIME. ACTUAL GREEN TIME DETERMINED BY CYCLE LENGTH.

EMERGENCY PRE-EMPTION NOTES:

- CONTROLLER TO BE EQUIPPED WITH EMERGENCY PRE-EMPTION FOR THE NORTHBOUND & SOUTHBOUND APPROACHES OF SPROUL ROAD AND THE EASTBOUND & WESTBOUND APPROACHES OF CONESTOGA ROAD WITH A FAIL SAFE DEVICE FOR EACH DIRECTION OF OPERATION.
  THIS EMERGENCY BEACON SHALL CONSIST OF A FLASHING WHITE FLOOD LIGHT, AND SHALL FLASH WHEN THE EMERGENCY VEHICLE HAS CONTROL OF THE INTERSECTION FOR THE APPROPRIATE APPROACH.
  LOCATION OF EMERGENCY VEHICLE DETECTORS ARE TO BE FIELD ADJUSTED TO ACHIEVE MAXIMUM OPERATION.
- THE SIGNALS SHALL TERMINATE ALL GREEN INDICATIONS IMMEDIATELY, WHEN ACTIVATED BY AN EMERGENCY VEHICLE, FOLLOWED BY THE COMPLETE YELLOW AND RED CLEARANCE INTERVALS, ACCORDINGLY. THEN THE GREEN INTERVAL FOR THE PRE-EMPTED PHASE SHALL FOLLOW.
- THE SIGNALS SHALL TIME OUT ALL YELLOW AND RED INDICATIONS, WHEN ACTIVATED BY EMERGENCY VEHICLE, FOLLOWED BY THE GREEN INTERVAL OF THE PRE-EMPTION PHASE GOVERNED BY THE APPROACHING EMERGENCY VEHICLE.
- IF THE SIGNALS ARE FLASHING WHEN ACTIVATED BY AN EMERGENCY VEHICLE, ALL SIGNALS SHALL REMAIN FLASHING.
- IF ADDITIONAL PRE-EMPTION PHASES ARE ACTIVATED WHILE IN PRE-EMPTION, THE ORIGINAL PRE-EMPTION PHASE SHALL TIME OUT BEFORE PROCEEDING TO THE NEXT PRE-EMPTION PHASE.
- UPON COMPLETION OF PRE-EMPTION, PHASE 2,4,6 OR 8 IN RETURNING TO NORMAL OPERATION, PHASE 4+8 INTERVAL 10 SHALL FOLLOW.
- IN EMERGENCY PRE-EMPTION, NO PRIORITY SHALL BE ESTABLISHED, PRE-EMPTION SHALL BE A "FIRST COME, FIRST SERVE" OPERATION.

SIGNAL INDICATIONS





SIGNALS TO BE EQUIPPED WITH LOUVERS 5,9,10,11

SIGNALS TO BE EQUIPPED WITH TUNNEL VISORS 1-11

ALL SIGNAL HEADS SHALL BE SIDE MOUNTED

LEGEND

- 20' — MAST ARM/ IDENTIFYING LENGTH
- ② — VEHICULAR SIGNAL HEAD/ BACKPLATE/VISORS/ DIRECTIONAL ARROW/ IDENTIFYING NUMBER
- ② — PEDESTRIAN SIGNAL HEAD/ IDENTIFYING NUMBER
- PEDESTRIAN PUSHBUTTON/ SIGN
- A — SIGN/IDENTIFYING LETTER
- 12'x6' — LOOP SENSOR/SIZE
- MICROWAVE DETECTOR
- FLASHING BEACON
- DETECTOR
- CURB CUT RAMP
- ② — PHASE NUMBER

PENNSYLVANIA DEPARTMENT OF TRANSPORTATION
ENGINEERING DISTRICT 6-0

COUNTY: DELAWARE
MUNICIPALITY: RADNOR TOWNSHIP
INTERSECTION: SPROUL ROAD (S.R. 320) AND CONESTOGA ROAD (S.R. 1019)

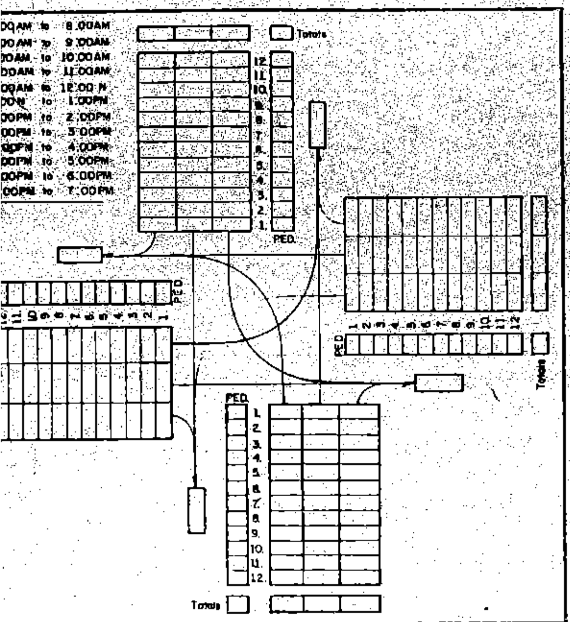
REVIEWED:
DATE
MUNICIPAL OFFICIAL DATE

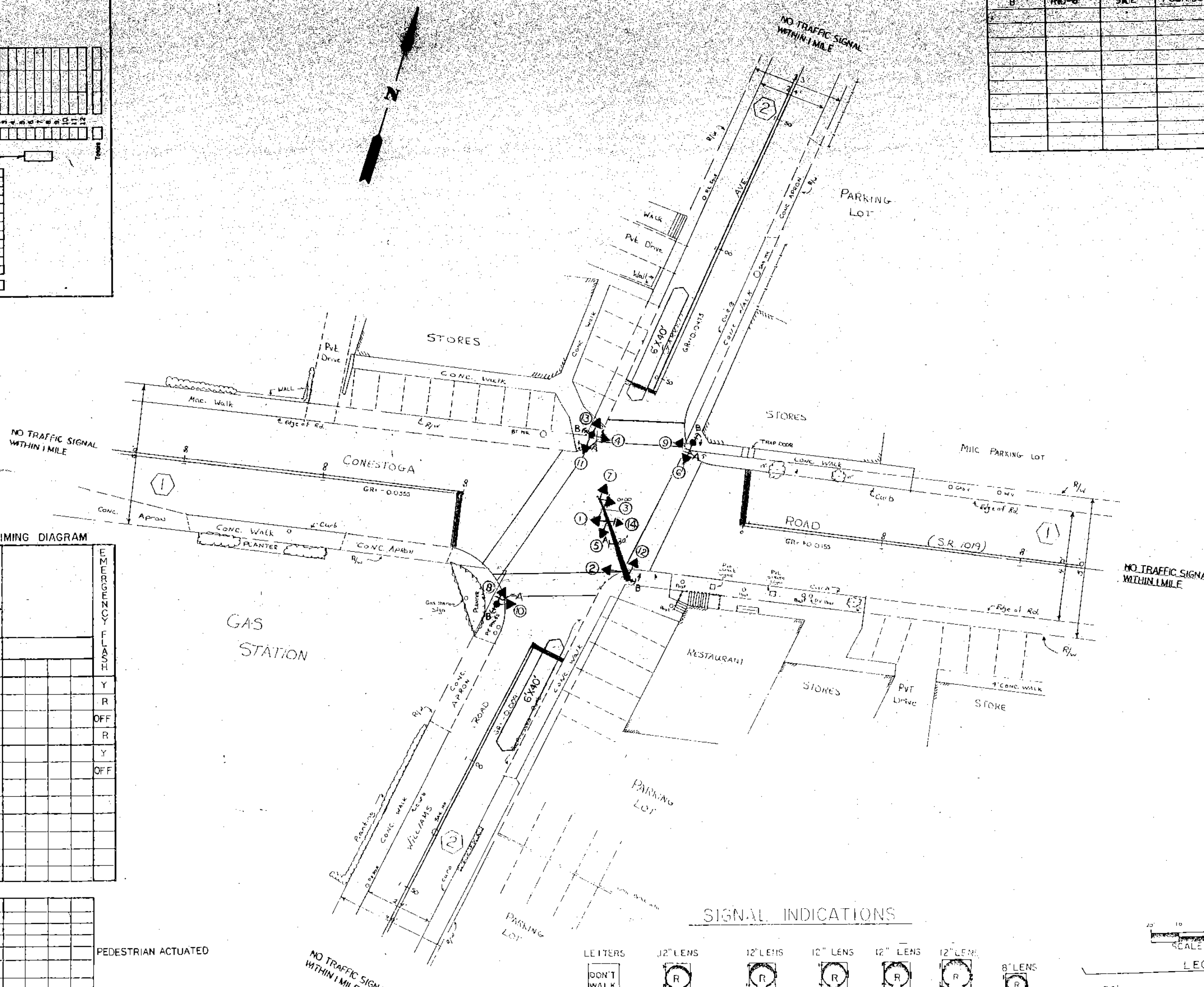
RECOMMENDED:
MUNICIPAL SIGNALS ENGINEER DATE
WERNER J. EICHORN 5/17/87
DISTRICT TRAFFIC ENGINEER DATE

NO.	REVISION	DES. REVW.	DATE	REVW.	DATE	RECOM.	DATE
1	ADDED PRE-EMPTION	CLR RMC MCM	8/9/04	MLK	9/13/04	LRB	9/20/04
2	ADD EB LT PHASE, RETIMING		5/4/09	LJB	5/4/09	JDR	6/4/09
3							
4							
5							
6							
7							
8							

521

SHEET 2 OF 2 PERMIT # 23-0886 FILE # 0886





SIGN TABULATION			
PLAN SYMBOL	SERIES NUMBER	SIZE	REMARKS
A	R10-11	30X36	NO TURN ON RED
B	R10-5	9X12	PUSH BUTTON FOR GREEN LIGHT

PERMIT NO. 4055 SHEET 1 OF 1

DATE ISSUED ______ FILE # 887

GENERAL NOTES

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ALL SIGNS AND PAVEMENT MARKINGS INDICATED ON THIS DRAWING ARE CONSIDERED PART OF THE PERMIT AND SHALL BE INSTALLED AND MAINTAINED IN ACCORDANCE WITH PUBLICATION N° 68.

POST MOUNTED SIGNALS SHALL BE INSTALLED WITH THE SIGNAL HEADS A MINIMUM OF 2 FEET BEHIND THE FACE OF CURB OR THE EDGE OF THE SHOULDER. SUPPORT POLES FOR OVERHEAD SIGNALS SHALL ALSO HAVE A MINIMUM CLEARANCE HORIZONTALLY OF 2 FEET.

SIGNALS ERECTED OVER THE ROADWAY SHALL HAVE A MINIMUM VERTICAL CLEARANCE OF 16 FT. ABOVE THE ROADWAY. POST MOUNTED SIGNALS SHALL BE A MINIMUM OF 8 FT. ABOVE THE SIDEWALK OR PAVEMENT GRADE.

ALL OVERHEAD SIGNALS MUST BE RIGIDLY MOUNTED, TOP AND BOTTOM, AND EQUIPPED WITH BACKPLATES.

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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.

IN ADDITION TO THIS SIGNAL PERMIT THE PERMITTEE SHALL OBTAIN A HIGHWAY OCCUPANCY PERMIT PRIOR TO ANY OPENINGS BEING MADE IN OR UNDER ANY PORTION OF A STATE HIGHWAY.

THIS DRAWING CANNOT BE USED AS A CONSTRUCTION DRAWING UNLESS THE PERMITTEE COMPLIES WITH THE PROVISIONS OF ACT 287, PREVENTION OF DAMAGE TO UNDERGROUND UTILITIES, EFFECTIVE DATE APRIL 10, 1975.

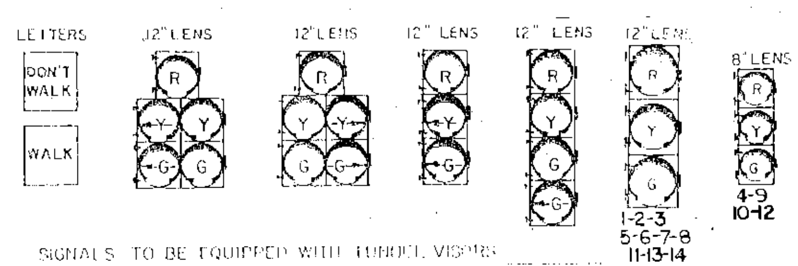
WHEN LIQUID FUELS MONEY IS USED, SIGNAL INSTALLATION MUST CONFORM TO FORM 408 AND A COPY OF THE PROPOSED SPECIFICATIONS MUST BE SUBMITTED TO THE DISTRICT TRAFFIC UNIT, FOR REVIEW, PRIOR TO BIDDING.

MOVEMENT, SEQUENCE, AND TIMING DIAGRAM

HASE	1				2							EMERGENCY FLASH
INTERVAL S	1	2	3		4	5	6					
3	G	Y	R		R	R	R					Y
-7-8	R	R	R		G	Y	R					R
)-4	G	Y	R		R	R	R					OFF
	R	R	R		G	Y	R					R
	G	Y	R		R	R	R					Y
	R	R	R		G	Y	R					OFF

)		4	2			4	2	
UM	40				5			
AGE					4			
					20			
STRIAN					20*			PEDESTRIAN ACTUATED
RY	MR				NL			

SIGNAL INDICATIONS



SIGNALS TO BE EQUIPPED WITH TUNNEL VISORS

SCALE IN FEET

LEGEND

Mast Arm with identifying Length

Loop Detector Presence & Directional

Sign with identifying Letter

Pedestrian Pushbutton

Signal Head with identifying Number

Signal Head with Arrow Section & identifying Number

PHASE NUMBER

PENNSYLVANIA DEPARTMENT OF TRANSPORTATION
ENGINEERING DISTRICT 6-0

COUNTY : DELAWARE COUNTY

MUNICIPALITY : RADNOR TOWNSHIP

INTERSECTION : CONESTOGA ROAD (1019) AND GARRETT AVENUE

REVIEWED :

MUNICIPAL OFFICIAL DATE

RECOMMENDED [signature] 10-22-96

DISTRICT TRAFFIC ENGINEER DATE

Revised [illegible]

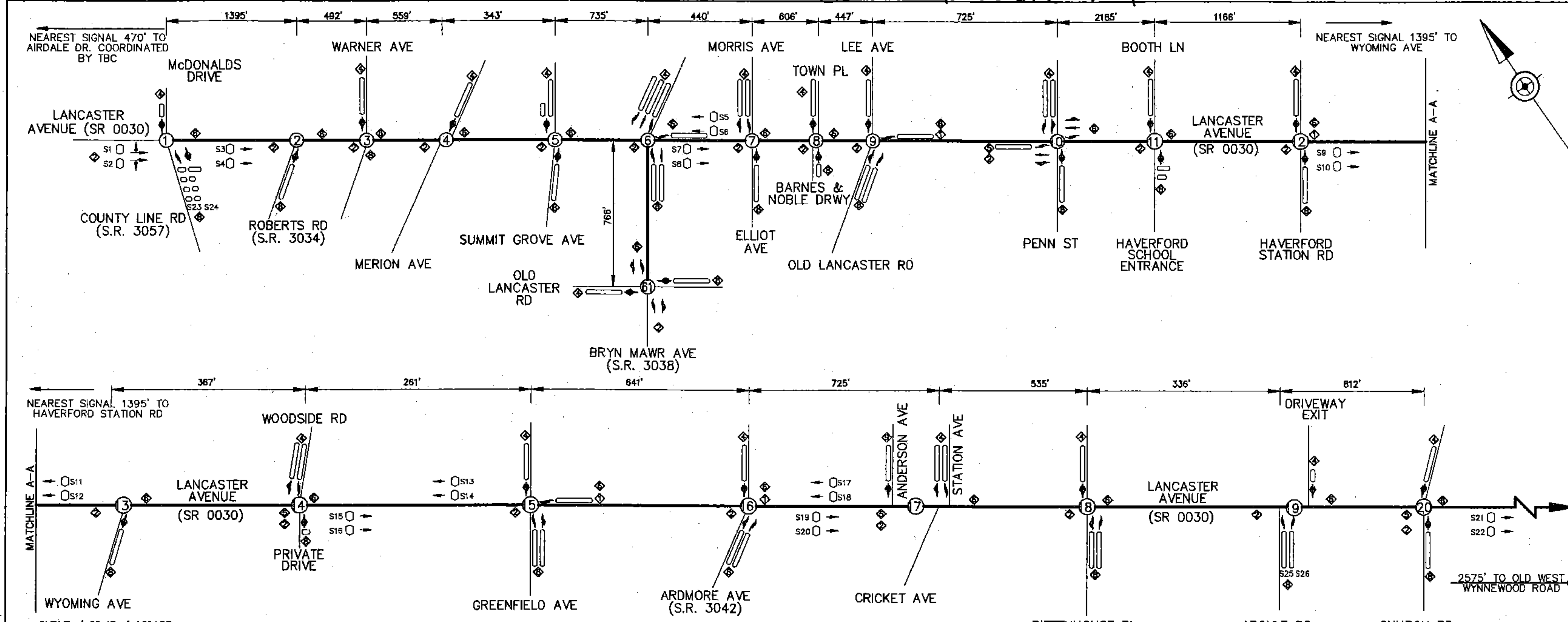
Revised MOVE SIGNAL HEAD 14 FOR WEST BOUND AND CHANGE HEADS FROM 12" TO 8" 3-15-91 mk DWM 3/22/91

Revised INSTALLED LOOP DETECTOR & P/B mk DWM 5/18/92

Revised INTERVAL 1 MIN. INCREASED: 20→40 mk DWM 6/17/92

Lower Merion twp.

I-0065



CYCLE / SPLIT / OFFSET

ADDRESS	PROGRAM 1* INTERSECTIONS	FILE NUMBER	PHASE 1	2	3	4	5	6	7	8	CYCLE	OFFSET#1	OFFSET#2	OFFSET#3
	SEE SYSTEM PERMIT #0066 FOR COORDINATION OF SIGNALS ALONG LANCASTER AVENUE BETWEEN OLD WEST WYNNEWOOD ROAD & LANKENAU HOSPITAL DRIVE													
61	OLD LANCASTER RD & BRYN MAWR AVE	1044									△	FREE		
20	LANCASTER AVE & CHURCH RD	0466		57		33	13 (LEAD)	44		33	90	10		
19	LANCASTER AVE & ARGYLE RD/DRIVEWAY EXIT	0465		40		24(SPLIT)		40		28(SPLIT)	90	54		
18	LANCASTER AVE & RITTENHOUSE PLACE	0464		53		37		53		37	90	43		
17	LANCASTER AVE & STATION AVE / CRICKET AVE	0463		61		29**	15 (LEAD)	46			90	44		
16	LANCASTER AVE & ARDMORE AVE	0462	13 (LEAD)	38		21(SPLIT)		48		21(SPLIT)	90	48		
15	LANCASTER AVE & GREENFIELD AVE	0461	16 (LEAD)	42		30		60		30	90	49		
14	LANCASTER AVE & WOODSIDE RD	0460		48		42	19 (LEAD)	29		42	90	87		
13	LANCASTER AVE & WYOMING AVE	0421		53				53		37	90	83		
12	LANCASTER AVE & HAVERFORD STATION RD	0458	15 (LEAD)	41		34		56		34	90	87		
11	LANCASTER AVE & BOOTH LANE	0457		65		25		65		25	90	60		
10	LANCASTER AVE & PENN ST	0837		61		28	12 (LEAD)	49		29	90	4		
9	LANCASTER AVE & OLD LANCASTER AVE / LEE AVE	0829	13 (LEAD)	38		21		69		21	90	0		
8	LANCASTER AVE & TOWN PL/BARNES & NOBLE DRWY	3342		46		22(SPLIT)		46		22(SPLIT)	90	22		
7	LANCASTER AVE & MORRIS AVE / ELLIOT AVE	0456		59		31		59		31	90	0		
6	LANCASTER AVE & BRYN MAWR AVE	0455	13 (LEAD)	27	28 (PED)	24		40		24	90	86		
5	LANCASTER AVE & SUMMIT GROVE AVE	0454		65		25		65		25	90	2		
4	LANCASTER AVE & MERION AVE	0453		55		35		55			90	1		
3	LANCASTER AVE & WARNER AVE	1507		36	23 (PED)	31		36		31	90	75		
2	LANCASTER AVE & ROBERTS RD	0318		62				62		28	90	60		
1	LANCASTER AVE & COUNTY LINE RD	0452		42		21(SPLIT)		42		17(SPLIT)	80	0*		

ADDRESS	PROGRAM 2** INTERSECTIONS	FILE NUMBER	PHASE 1	2	3	4	5	6	7	8	CYCLE	OFFSET#1	OFFSET#2	OFFSET#3
	SEE SYSTEM PERMIT #0066 FOR COORDINATION OF SIGNALS ALONG LANCASTER AVENUE BETWEEN OLD WEST WYNNEWOOD ROAD & LANKENAU HOSPITAL DRIVE													
61	OLD LANCASTER RD & BRYN MAWR AVE	1044									△	FREE		
20	LANCASTER AVE & CHURCH RD	0466		48		32	13 (LEAD)	35		32	80	22		
19	LANCASTER AVE & ARGYLE RD/DRIVEWAY EXIT	0465		34		23(SPLIT)		34		23(SPLIT)	80	32		
18	LANCASTER AVE & RITTENHOUSE PLACE	0464		48		32		48		32	80	29		
17	LANCASTER AVE & STATION AVE / CRICKET AVE	0463		59		21**	13 (LEAD)	46			80	48		
16	LANCASTER AVE & ARDMORE AVE	0462	13 (LEAD)	25		21(SPLIT)		38		21(SPLIT)	80	57		
15	LANCASTER AVE & GREENFIELD AVE	0461	15 (LEAD)	34		31		49		31	80	79		
14	LANCASTER AVE & WOODSIDE RD	0460		49		31	13 (LEAD)	36		31	80	76		
13	LANCASTER AVE & WYOMING AVE	0421		47				47		33	80	10		
12	LANCASTER AVE & HAVERFORD STATION RD	0458	15 (LEAD)	41		24		66		24	80	14		
11	LANCASTER AVE & BOOTH LANE	0457		50		30		50		30	80	0		
10	LANCASTER AVE & PENN ST	0837		53		27	12 (LEAD)	41		27	80	27		
9	LANCASTER AVE & OLD LANCASTER AVE / LEE AVE	0829	18 (LEAD)	37		25		55		25	80	1		
8	LANCASTER AVE & TOWN PL/BARNES & NOBLE DRWY	3342		38		21(SPLIT)		38		21(SPLIT)	80	8		
7	LANCASTER AVE & MORRIS AVE / ELLIOT AVE	0456		51		29		51		29	80	0		
6	LANCASTER AVE & BRYN MAWR AVE	0455	13 (LEAD)	20	26 (PED)	21		33		21	80	50		
5	LANCASTER AVE & SUMMIT GROVE AVE	0454		45		35		45		35	80	52		
4	LANCASTER AVE & MERION AVE	0453		47		33		47			80	11		
3	LANCASTER AVE & WARNER AVE	1507		34	23 (PED)	23		34		23	80	17		
2	LANCASTER AVE & ROBERTS RD	0318		55				55		25	80	7		
1	LANCASTER AVE & COUNTY LINE RD	0452		42		21(SPLIT)		42		17(SPLIT)	80	0*		

ADDRESS	PROGRAM 3** INTERSECTIONS	FILE NUMBER	PHASE 1	2	3	4	5	6	7	8	CYCLE	OFFSET#1	OFFSET#2	OFFSET#3
	SEE SYSTEM PERMIT #0066 FOR COORDINATION OF SIGNALS ALONG LANCASTER AVENUE BETWEEN OLD WEST WYNNEWOOD ROAD & LANKENAU HOSPITAL DRIVE													
61	OLD LANCASTER RD & BRYN MAWR AVE	1044									△	FREE		
20	LANCASTER AVE & CHURCH RD	0466		61		39	13 (LEAD)	48		39	100	88		
19	LANCASTER AVE & ARGYLE RD/DRIVEWAY EXIT	0465		51		23(SPLIT)		51		28(SPLIT)	100	23		
18	LANCASTER AVE & RITTENHOUSE PLACE	0464		66		34		66		34	100	88		
17	LANCASTER AVE & STATION AVE / CRICKET AVE	0463		73		27**	15 (LEAD)	58			100	67		
16	LANCASTER AVE & ARDMORE AVE	0462	13 (LEAD)	40		21(SPLIT)		53		26(SPLIT)	100	74		
15	LANCASTER AVE & GREENFIELD AVE	0461	16 (LEAD)	56		28		72		28	100	40		
14	LANCASTER AVE & WOODSIDE RD	0460		67		33	14 (LEAD)	53		33	100	58		
13	LANCASTER AVE & WYOMING AVE	0421		64				64		36	100	73		
12	LANCASTER AVE & HAVERFORD STATION RD	0458	13 (LEAD)	52		35		65		35	100	94		
11	LANCASTER AVE & BOOTH LANE	0457		67		33		67		33	100	81		
10	LANCASTER AVE & PENN ST	0837		62		38	12 (LEAD)	50		38	100	11		
9	LANCASTER AVE & OLD LANCASTER AVE / LEE AVE	0829	13 (LEAD)	63		24		76		24	100	27		
8	LANCASTER AVE & TOWN PL/BARNES & NOBLE DRWY	3342		58		21(SPLIT)		58		21(SPLIT)	100	31		
7	LANCASTER AVE & MORRIS AVE / ELLIOT AVE	0456		65		35		65		35	100	0		
6	LANCASTER AVE & BRYN MAWR AVE	0455	15 (LEAD)	32	26 (PED)	27		47		27	100	26		
5	LANCASTER AVE & SUMMIT GROVE AVE	0454		58		42		58		42	100	42		
4	LANCASTER AVE & MERION AVE	0453		59		41		59			100	40		
3	LANCASTER AVE & WARNER AVE	1507		48	23 (PED)	29		48		29	100	21		
2	LANCASTER AVE & ROBERTS RD	0318		75				75		25	100	5		
1	LANCASTER AVE & COUNTY LINE RD	0452		42		21(SPLIT)		42		17(SPLIT)	80	0*		

Notes:
- ALL SPLIT TIMES INCLUDE YELLOW AND RED TIMES FOR A GIVEN PHASE.
- REFER TO SIGNAL PERMIT PLAN FOR MAX 1, MAX 2 AND CLEARANCE AND PED TIMES.

△REFER TO SIGNAL PERMIT PLAN FOR WEEKLY PROGRAM SCHEDULE.
*COORDINATED WITH AIRDALE DR AND LANCASTER AVENUE
**INCLUDES PHASE 9 AS SHOWN ON PERMIT PLAN

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3/17/2011 5:38:38 PM efarley Traffic Planning and Design, Inc.

SYSTEM NOTES

1. PROGRAM TO BE SELECTED BY CLOSED LOOP SYSTEM (TIME OF DAY) OR TBC BACKUP.
2. OFFSETS ARE REFERENCED TO NEMA TS2 1ST GREEN, ON LANCASTER AVENUE.
3. SYSTEM LIMITS:
   LANCASTER AVENUE – FROM COUNTY LINE ROAD TO CHURCH ROAD.
   BRYN MAWR AVENUE – FROM LANCASTER AVENUE TO OLD LANCASTER AVENUE.
   MASTER CONTROLLER:
   RADIO TOWER AT TOWNSHIP BUILDING NEAR LANCASTER AVENUE & ARGYLE ROAD.
4. PRIMARY COORDINATION: CLOSED LOOP SYSTEM – SPREAD SPECTRUM RADIO COMMUNICATION
   SECONDARY COORDINATION: TBC (DEFAULT TO BACKUP TBC).
5. SYSTEM IS DESIGNED FOR THE SYSTEM SOFTWARE: MARC NX.
6. CYCLES, SPLITS & OFFSETS ARE IN SECONDS.

WEEKLY PROGRAM CHART				
EVENT	△DAY	TIME	PROGRAM*	REMARKS
1	1–5	0000	---	FLASH
2	1–5	0600	1	AM PEAK
3	1–5	0900	2	MD PEAK
4	1–5	1500	3	PM PEAK
5	1–5	2000	---	FREE
6	6,7	0000	---	FLASH
7	6,7	0600	2	MD PEAK
8	6,7	1900	---	FREE

△ – DAY 1=MONDAY
* – MAX/FREE WHERE NOTED IN CYCLE/SPLIT/OFFSET MATRIX

LEGEND

- ④ INTERSECTION ADDRESS
- S## SYSTEM LOOP/IDENTIFYING NUMBER
- LOOP SENSOR
- ◈ PHASE NUMBER

NOT TO SCALE

GENERAL NOTES

NO MODIFICATIONS OF THIS INSTALLATION ARE PERMITTED UNLESS PRIOR APPROVAL IS GRANTED IN WRITING BY A REPRESENTATIVE OF THE DEPARTMENT OF TRANSPORTATION.

REFER TO TRAFFIC SIGNAL PERMIT DRAWING FOR INDIVIDUAL INTERSECTION OPERATION, GEOMETRY, PHASING AND CRITICAL TIMES.

FOR CONSTRUCTION AND INSPECTION THE SYSTEM PERMIT SHOULD ALWAYS BE ACCOMPANIED WITH TRAFFIC SIGNAL PERMIT DRAWING.

TEST THE SYSTEM AT LOCAL INTERSECTION LEVEL, SUBSYSTEM LEVEL MASTER CONTROLLER LEVEL AND PERSONAL COMPUTER REMOTE DIAL UP LEVEL.

GATHER THE SYSTEM FAILURE CRITICAL ALARMS REPORT AND ARCHIVE THEM WHERE APPLICABLE.

SET UP PENNDOT DISTRICT 6-0 COMPUTER WITH THE SYSTEM DATABASE AND GRAPHICS. MODIFY THE DATABASE AND GRAPHICS FOR SYSTEMS REVISIONS.

ASSIGN LOOP DETECTORS AND PROGRAM THE CONTROLLERS TO GATHER TRAFFIC VOLUMES IN 15 MINUTE INTERVAL, WHERE APPLICABLE.

EXACT LOCATION OF DETECTORS SHALL BE DETERMINED PRIOR TO INSTALLATION BY A REPRESENTATIVE OF PENNDOT.

OBTAIN POLE ATTACHMENT PERMIT FOR AERIAL FIBER OPTIC INSTALLATION.

MAINTAIN MASTER CONTROLLER COMMUNICATION SUCH AS PHONE DROPS.

PRIOR TO INSTALLATION THE CONTRACTOR SHALL CONSULT WITH THE LOCAL OFFICIALS AND UTILITY COMPANIES TO RESOLVE ANY PROBLEMS WHICH MAY BE CREATED DUE TO THE LOCATION OF UTILITIES.

THIS DRAWING CANNOT BE USED AS A CONSTRUCTION DRAWING UNLESS THE PERMITTEE COMPLIES WITH THE PROVISIONS OF THE LATEST AMENDMENT TO ACT 287, PREVENTION OF DAMAGE TO UNDERGROUND UTILITIES, DATED DECEMBER 20, 1974.

WHEN LIQUID FUELS MONEY IS USED, SIGNAL INSTALLATION MUST CONFORM TO FORM 408 AND A COPY OF THE PROPOSED SPECIFICATIONS MUST BE SUBMITTED TO THE DISTRICT TRAFFIC UNIT FOR REVIEW PRIOR TO BIDDING.

PERMITTEE SHALL OBTAIN A HIGHWAY OCCUPANCY PERMIT FOR ANY CHANGES IN INTERSECTION GEOMETRY REGARDING EXCAVATION.

CONDUIT INSTALLED IN BITUMINOUS ROADWAY LESS THAN 5 YEARS OLD, OR CONCRETE ROADWAY REGARDLESS OF AGE, MUST BE BORED OR JACKED UNDER THE ROADWAY. INSTALL IN ACCORDANCE WITH TRAFFIC SIGNAL STANDARDS TC-8800 SERIES.

PENNSYLVANIA DEPARTMENT OF TRANSPORTATION
ENGINEERING DISTRICT 6-0

COUNTY: MONTGOMERY
MUNICIPALITY: LOWER MERION TOWNSHIP
INTERSECTION: LANCASTER AVENUE (SR 0030) CORRIDOR BETWEEN COUNTY LINE RD TO CHURCH RD

REVIEWED:
[signature] DATE 4/6/11
MUNICIPAL OFFICIAL DATE

RECOMMENDED:
A B PATEL 03/05/04
L R BELMONTE 03/08/04
DISTRICT TRAFFIC ENGINEER DATE

NO	REVISION	DES/REVW	DATE	REVW	DATE	RECOM	DATE
1	ADD OLD LANCASTER RD & OLD BRYN MAWR AVE	TPD		DLA	02/27/09	ABP	02/27/09
2	ADD RT LANE TO SB & ADD LT LANES TO EB & WB AT INT #10	TPD	4/14/11	[initials]	4/14/11	[initials]	4/14/11
3							
4							
5							
6							
7							
8							

SYSTEM PERMIT # I-0065

Delaware County - Radnor Twp

System # I-0156 p 4/9

TRAFFIC SIGNAL SYSTEM PERMIT PLAN

WEEKLY PROGRAM CHART						
EVENT	DAY	TIME	CYCLE	OFFSET	PROGRAM	REMARKS
1	1-7	20:00	--	--	MAX. 1	FREE
2	1-5	05:00	VARIES	VARIES	1	AM PEAK
3	1-5	10:00	VARIES	VARIES	2	OFF PEAK
4	1-5	15:00	VARIES	VARIES	3	PM PEAK
5	6,7	08:00	VARIES	VARIES	2	OFF PEAK

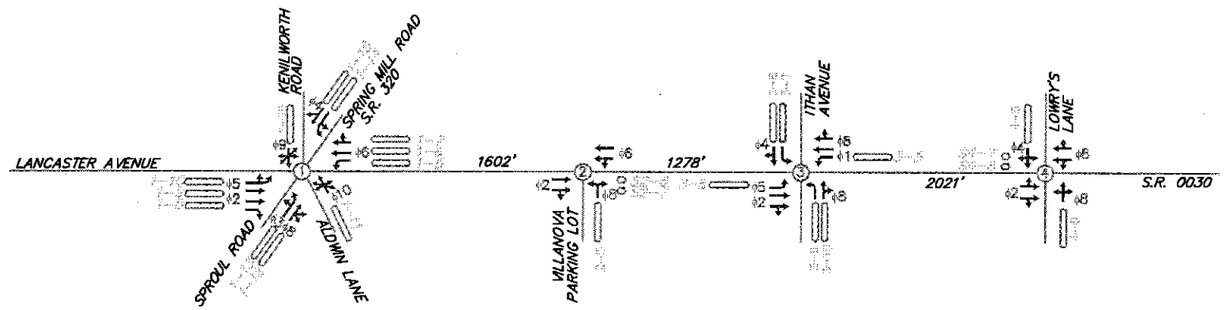
MONDAY = DAY 1
OFFSET IN SECONDS

OFFSET REFERENCED TO START OF YELLOW ON LANCASTER AVE.

NOTES: – ALL SPLIT TIMES INCLUDE YELLOW AND RED TIMES FOR A GIVEN PHASE.
– REFER TO SIGNAL PERMIT PLAN FOR MAX 1, MAX 2, CLEARANCE AND PED TIMES.

SYSTEM NOTES

1. PROGRAM TO BE SELECTED BY CLOSED LOOP SYSTEM (TIME OF DAY) OR TBC BACKUP.
2. OFFSETS ARE REFERENCED TO THE BEGINNING OF YELLOW ON LANCASTER AVENUE.
3. SYSTEM LIMITS : LANCASTER AVENUE AT INTERSECTION OF KENILWORTH ROAD TO LOWRY'S LANE.
MASTER: RADNOR MAINTENANCE BUILDING
4. PRIMARY COORDINATION: FIBER OPTIC CABLE.
SECONDARY COORDINATION: TBC (DEFAULT TO BACKUP TBC).



CYCLE/SPLIT/OFFSET

Program 1 =			Phase											Cycle	Offset
	Intersections	File # Master	1	2	3	4	5	6	7	8	9	10			
1	LANCASTER AVE & SPROUL ROAD	0226		55	15 (LEAD)	26	16 (LEAD)	39		41	32 (SPLIT)	32 (SPLIT)		160	FREE
2	LANCASTER AVE & VILLANOVA PARKING LOT	0779		29				29		31				60	24
3	LANCASTER AVE & ITHAN AVE	0780	15 (LEAD)	44		35	13 (LEAD)	46		35	26 (PED)			120	0
4	LANCASTER AVE & LOWRY'S LANE	0781		33		27		33		27				60	25

CYCLE/SPLIT/OFFSET

Program 2 =			Phase											Cycle	Offset
	Intersections	File # Master	1	2	3	4	5	6	7	8	9	10			
1	LANCASTER AVE & SPROUL ROAD	0226		49	13 (LEAD)	24	13 (LEAD)	39		37	32 (SPLIT)	32 (SPLIT)		150	FREE
2	LANCASTER AVE & VILLANOVA PARKING LOT	0779		29				29		31				60	24
3	LANCASTER AVE & ITHAN AVE	0780	19 (LEAD)	42		33	13 (LEAD)	46		33	26 (PED)			120	0
4	LANCASTER AVE & LOWRY'S LANE	0781		33		27		33		27				60	25

CYCLE/SPLIT/OFFSET

Program 3 =			Phase											Cycle	Offset
	Intersections	File # Master	1	2	3	4	5	6	7	8	9	10			
1	LANCASTER AVE & SPROUL ROAD	0226		50	13 (LEAD)	23	14 (LEAD)	36		36	32 (SPLIT)	32 (SPLIT)		150	FREE
2	LANCASTER AVE & VILLANOVA PARKING LOT	0779		29				29		31				60	28
3	LANCASTER AVE & ITHAN AVE	0780	16 (LEAD)	46		32	15 (LEAD)	47		32	26 (PED)			120	0
4	LANCASTER AVE & LOWRY'S LANE	0781		33		27		33		27				60	27

LEGEND

- SYSTEM DETECTOR, INTERSECTION X – LOOP NO. Y
- DETECTOR, INTERSECTION X – LOOP NO. Y
- Φ PHASE

SCALE: NOT TO SCALE

DISTRICT	COUNTY	ROUTE	SECTION	SHEET
6-0	DELAWARE	0030	CLR-T	4 OF 4
RADNOR TOWNSHIP				

REVISION NUMBER	REVISIONS	DATE	BY

GENERAL NOTES

NO MODIFICATIONS OF THIS INSTALLATION ARE PERMITTED UNLESS PRIOR APPROVAL IS GRANTED IN WRITING BY A REPRESENTATIVE OF THE DEPARTMENT OF TRANSPORTATION.

REFER TO TRAFFIC SIGNAL PERMIT DRAWING FOR INDIVIDUAL INTERSECTION OPERATION, GEOMETRY, PHASING AND CRITICAL TIMES.

FOR CONSTRUCTION AND INSPECTION THE SYSTEM PERMIT SHOULD ALWAYS BE ACCOMPANIED WITH TRAFFIC SIGNAL PERMIT DRAWING.

TEST THE SYSTEM AT LOCAL INTERSECTION LEVEL, SUBSYSTEM LEVEL MASTER CONTROLLER LEVEL AND PERSONAL COMPUTER REMOTE DIAL UP LEVEL.

GATHER THE SYSTEM FAILURE CRITICAL ALARMS REPORT AND ARCHIVE THEM WHERE APPLICABLE.

SET UP PENNDOT DISTRICT 6-0 COMPUTER WITH THE SYSTEM DATABASE AND GRAPHICS. MODIFY THE DATABASE AND GRAPHICS FOR SYSTEMS REVISIONS.

ASSIGN LOOP DETECTORS AND PROGRAM THE CONTROLLERS TO GATHER TRAFFIC VOLUMES IN 15 MINUTE INTERVAL, WHERE APPLICABLE.

EXACT LOCATION OF DETECTORS SHALL BE DETERMINED PRIOR TO INSTALLATION BY A REPRESENTATIVE OF PENNDOT.

OBTAIN POLE ATTACHMENT PERMIT FOR AERIAL FIBER OPTIC INSTALLATION.

MAINTAIN MASTER CONTROLLER COMMUNICATION SUCH AS PHONE DROPS.

PRIOR TO INSTALLATION THE CONTRACTOR SHALL CONSULT WITH THE LOCAL OFFICIALS AND UTILITY COMPANIES TO RESOLVE ANY PROBLEMS WHICH MAY BE CREATED DUE TO THE LOCATION OF UTILITIES.

THIS DRAWING CANNOT BE USED AS A CONSTRUCTION DRAWING UNLESS THE PERMITTEE COMPLIES WITH THE PROVISIONS OF ACT 181, PREVENTION OF DAMAGE TO UNDERGROUND UTILITIES EFFECTIVE DATE MARCH 29, 2007.

WHEN LIQUID FUELS MONEY IS USED, SIGNAL INSTALLATION MUST CONFORM TO FORM 408 AND A COPY OF THE PROPOSED SPECIFICATIONS MUST BE SUBMITTED TO THE DISTRICT TRAFFIC UNIT FOR REVIEW PRIOR TO BIDDING.

PERMITTEE SHALL OBTAIN A HIGHWAY OCCUPANCY PERMIT FOR ANY CHANGES IN INTERSECTION GEOMETRY REGARDING EXCAVATION.

CONDUIT INSTALLED IN BITUMINOUS ROADWAY LESS THAN 5 YEARS OLD, OR CONCRETE ROADWAY REGARDLESS OF AGE, MUST BE BORED OR JACKED UNDER THE ROADWAY. INSTALL IN ACCORDANCE WITH TRAFFIC SIGNAL STANDARDS TC-7600 SERIES.

PENNSYLVANIA DEPARTMENT OF TRANSPORTATION
ENGINEERING DISTRICT 6-0

COUNTY: DELAWARE
MUNICIPALITY: RADNOR TOWNSHIP
INTERSECTION: TRAFFIC SIGNAL SYSTEM

REVIEWED:

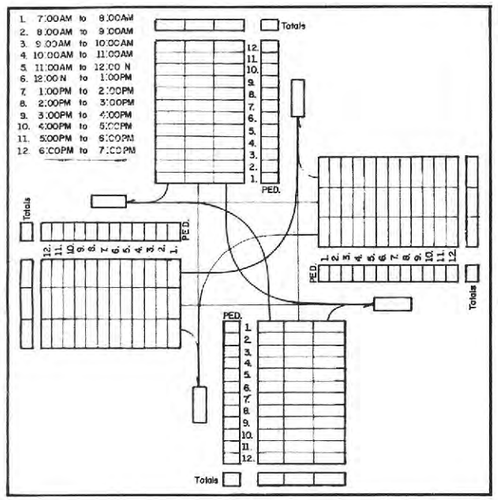
DISTRICT TRAFFIC UNIT — DATE

RECOMMENDED:

DISTRICT TRAFFIC ENGINEER — DATE

NO.	REVISION	INIT.	DATE	INIT.	DATE	INIT.	DATE
1							
2							
3							
4							
5							
6							
7							
8							

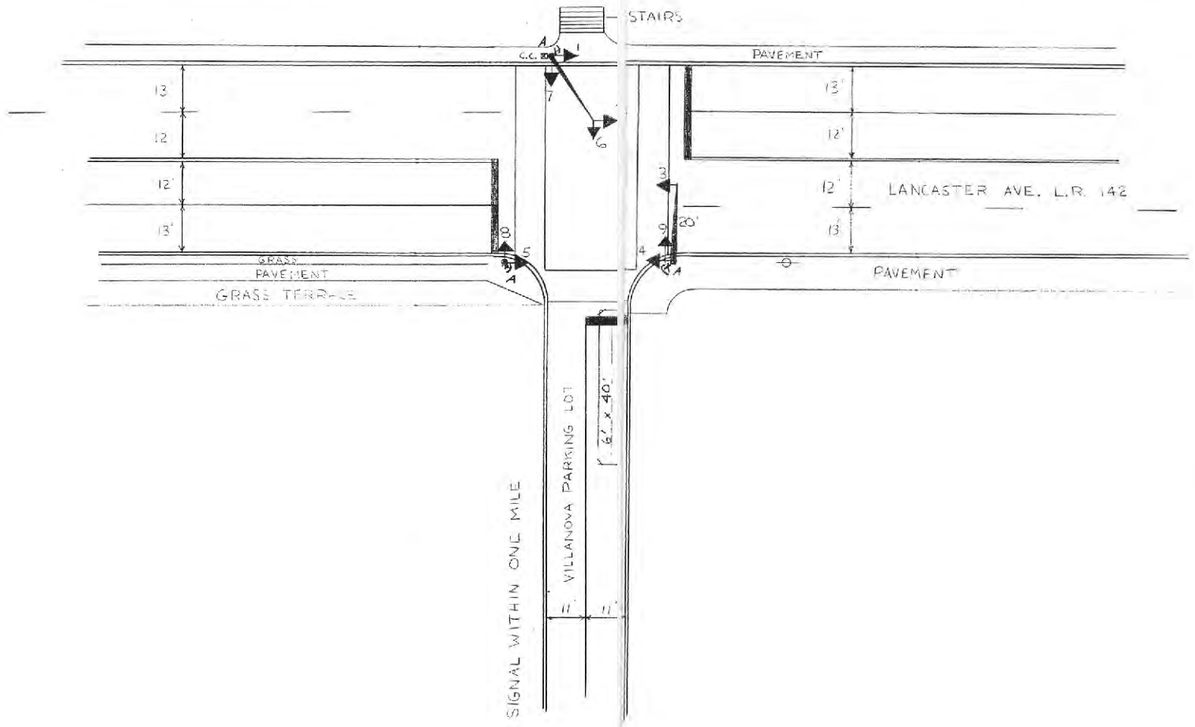
INTERCONNECT PERMIT #I-0156 | SHEET 1 OF 524



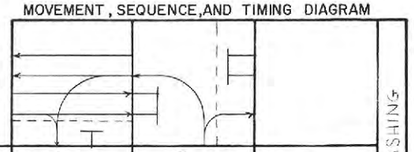
SIGN TABULATION			
PLAN SYMBOL	SERIES NUMBER	SIZE	REMARKS
A	R10-3	9 x 12	PUSH BUTTON FOR GREEN

← NEAREST SIGNAL 680' TO SPRING MILL RD.

NEAREST SIGNAL 760' TO ITHAN AVE. →



MOVEMENT, SEQUENCE, AND TIMING DIAGRAM



PHASE	A				B							FLASHING
INTERVAL / SIGNALS	1	2	3		4	5	6					
1-2-3-4-5	G	Y	R		R	R	R					Y
6-7-8-9	R	R	R		G	Y	R					R

FIXED TIME	287	3	2			3	2					
INITIAL					4							
VEHICLE EXT.					4							
MAXIMUM					20							
PEDESTRIAN					*20							

* UPON ACTUATION ONLY

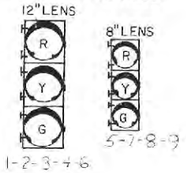
	RELEASE	OFFSET **
DIAL 1 80 SEC.		9.5 SEC.
DIAL 2 70 SEC.		8.5 SEC.
DIAL 3 FLASH		

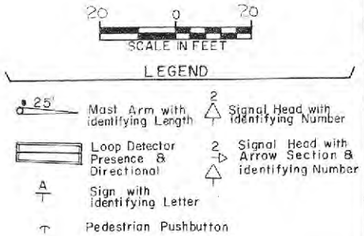
DIAL	DAY	OPERATION
1	MON - SUN	6:00AM - 6:00PM
2	MON - SUN	6:00PM - 12MID
3	MON - SUN	12MID - 600AM - FLASH

* MINIMUM GREEN TIME; ACTUAL GREEN TIME TO BE DETERMINED BY CYCLE LENGTH AND TBU.

** OFFSET REFERENCED TO START OF INTERVAL Nº 2

SIGNAL INDICATIONS





PERMIT NO. 1308	SHEET 2 OF 2
DATE ISSUED 5-24-48	DATE REVISED

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GENERAL NOTES

NO MODIFICATIONS OF THIS INSTALLATION ARE PERMITTED UNLESS PRIOR APPROVAL IS GRANTED IN WRITING BY A REPRESENTATIVE OF THE DEPARTMENT OF TRANSPORTATION.

ALL MAINTENANCE WORK INCLUDING TRIMMING TREES, NECESSARY FOR PROPER VISIBILITY OF THE SIGNALS IS THE RESPONSIBILITY OF THE PERMITTEE.

ALL SIGNS AND PAVEMENT MARKINGS INDICATED ON THIS DRAWING ARE CONSIDERED PART OF THE PERMIT AND SHALL BE INSTALLED AND MAINTAINED IN ACCORDANCE WITH PUBLICATION Nº 68.

POST MOUNTED SIGNALS SHALL BE INSTALLED WITH THE SIGNAL HEADS A MINIMUM OF 2 FEET BEHIND THE FACE OF CURB OR THE EDGE OF THE SHOULDER. SUPPORT POLES FOR OVERHEAD SIGNALS SHALL ALSO HAVE A MINIMUM CLEARANCE HORIZONTALLY OF 2 FEET.

SIGNALS ERECTED OVER THE ROADWAY SHALL HAVE A MINIMUM VERTICAL CLEARANCE OF 16 FT. ABOVE THE ROADWAY. POST MOUNTED SIGNALS SHALL BE A MINIMUM OF 8 FT. ABOVE THE SIDEWALK OR PAVEMENT GRADE.

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 WHERE NOTED, SHALL BE PLAIN CEMENT CONCRETE CURB OR GRANITE CURB, INSTALLED IN ACCORDANCE WITH DEPARTMENT SPECIFICATIONS FORM 408.

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.

IN ADDITION TO THIS SIGNAL PERMIT THE PERMITTEE SHALL OBTAIN A HIGHWAY OCCUPANCY PERMIT PRIOR TO ANY OPENINGS BEING MADE IN OR UNDER ANY PORTION OF A STATE HIGHWAY.

THIS DRAWING CANNOT BE USED AS A CONSTRUCTION DRAWING UNLESS THE PERMITTEE COMPLIES WITH THE PROVISIONS OF ACT 287, PREVENTION OF DAMAGE TO UNDERGROUND UTILITIES, EFFECTIVE DATE APRIL 10, 1975.

WHEN LIQUID FUELS MONEY IS USED, SIGNAL INSTALLATION MUST CONFORM TO FORM 408 AND A COPY OF THE PROPOSED SPECIFICATIONS MUST BE SUBMITTED TO THE DISTRICT TRAFFIC UNIT, FOR REVIEW, PRIOR TO BIDDING.

ENGINEERING DISTRICT 6-0

INTERSECTION LANCASTER AVE. AND VILLANOVA PARKING LOT

COUNTY DELAWARE MUNICIPALITY RADNOR

Drawn by RAYMOND M. LABADIE Date 7-17-8

Checked by M. J. Cyborn Date 7-18-8

Approved by Stephen B. Linton Date 7-19-
DISTRICT TRAFFIC ENGR.

FILE 77

REVISED New Drawing added TBC 11/88

REVISED offset 3/88 C. BROWN

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