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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.

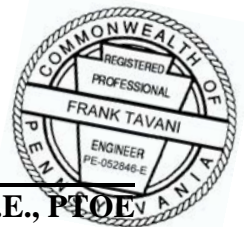
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REVISED

4 DECEMBER 2014

A handwritten signature in black ink, appearing to read 'Frank Tavani', is written over a horizontal line.

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FTA JOB NUMBER 211-027

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EXECUTIVE SUMMARY

The purpose of this transportation impact study is to examine the potential traffic impact associated with a proposed Villanova University project located near the intersection of Route 30 and Ithan Avenue. 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:

- The project includes 1,135 new beds for undergraduate students, a new performing arts center (PAC), a new 1,293-space garage, and approximately 15,000 SF of Villanova-centric retail space on either side of Ithan Avenue south of Route 30, all of which is targeted to open in 2018.
- 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 1,135 currently-commuting students was left remaining in the road network and site driveways.
- The retail component of the site is estimated to generate 22 new vehicle trips during the weekday AM peak hour and 64 new vehicle trips during the weekday PM peak hour.
- The PAC will replace currently existing outdated theater / classroom space found on the north side of campus and will not result in new peak hour traffic.
- The project includes elimination of multiple driveways, consolidation of other small parking lots, and some expanded (existing) structured parking on main campus.
- Access to the project will take place via existing driveways along Route 30 and Ithan Avenue, though some will be removed, relocated, or otherwise 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 one (1) unsignalized right-in/right-out (RIRO) driveway.
 - At the Church Walk signalized intersection along Route 30:
 - New auxiliary turn lanes along Route 30 will be provided,
 - A second exit lane will be provided, and
 - A grade-separated pedestrian bridge will be constructed.
 - At the unsignalized exit-only driveway along Route 30 just east of Ithan Avenue:
 - The driveway shall be modified to two-way operation (entry/exit),
 - A new auxiliary turn lane along Route 30 will be provided, and
 - Exiting left turns will be prohibited.
 - At the four (4) unsignalized driveways along Ithan Avenue just south of Route 30:
 - One driveway along the west side of Ithan Avenue will be eliminated,
 - The remaining driveway along the west side of Ithan Avenue will be converted to two-way operation,

- Up to three (3) driveways will be provided on the east side of Ithan Avenue though two (2) will be one-way *and* limited access (i.e., emergencies, deliveries, etc.), and
 - The main garage access driveway along the east side of Ithan Avenue will be located opposite the driveway along the west side of Ithan Avenue and will be also be two-way operation.
- The measured sight distances at the proposed site driveways will satisfy all PennDOT sight distance requirements.
- F. Tavani and Associates, Inc. (FTA) recommends the following roadway improvements as outlined at key study area intersections:

Route 30 and Route 320/Kenilworth Street/Aldwyn Lane

- Optimize signal timings at the intersection during the studied peak hours in order to improve operations and queuing.

Route 30 and New RIRO Access

- Provide channelization islands to prohibit entering and exiting left turns.
- Provide new EB right-turn only lane with 75 feet of taper, 125 feet of storage, and 14 feet width.

Route 30 and Church Walk

- Optimize signal timings at the intersection during the studied peak hours in order to improve operations and queuing.
- Provide grade-separated pedestrian bridge.
- Eliminate existing pedestrian crosswalks crossing Route 30.
- Provide new EB right-turn only lane with 75 feet of taper, 125 feet of storage, and 14 feet width.
- Provide new WB left-turn only lane with 75 feet of taper, 100 feet of storage, and 10 feet width.
- Provide 11 foot wide inside and 12 foot wide outside travel lanes (10-foot travel lanes presently exist).

Route 30 and Ithan Avenue

- Optimize signal timings at the intersection during the studied peak hours in order to improve operations and queuing.
- Extend the existing EB left-turn only lane to provide a 75 feet of taper, 200 feet of storage, and 10 feet width.
- Extend the existing WB left-turn only lane 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 east of the PAC driveway measuring 100 feet with a 75-foot taper.
- Provide 11 foot wide inside and 12 foot wide outside travel lanes (10-foot travel lanes presently exist).
- Investigate reducing the existing 26-second long all-red ped-scramble phase.

Additional Site Access Points

- At the currently-existing exit-only unsignalized driveway along Route 30 just east of Ithan Avenue:
 - Modify the driveway to two-way operation (entry/exit).
 - Provide new WB left-turn only lane with 75 feet of taper, 100 feet of storage, and 10 feet width.
 - Prohibit exiting left turns.
- At the four (4) unsignalized driveways along Ithan Avenue just south of Route 30:
 - Eliminate one driveway along the west side of Ithan Avenue.
 - Relocate the remaining driveway further south along the west side of Ithan Avenue and convert to two-way operation (entry/exit).
 - Provide up to three (3) driveways on the east side of Ithan Avenue though two (2) will be limited access (i.e., emergencies, deliveries, etc.) subject to final garage design.
 - Locate the 3rd driveway will be the main garage access driveway along the east side of Ithan Avenue opposite the driveway along the west side of Ithan Avenue and provide two-way operation (entry/exit) and all-way stop-control (AWSC) with a pedestrian crosswalk connecting the garage and the resident halls.
- Level of service comparison tables were prepared in accordance with PennDOT requirements. The offered improvements, where needed, exceed the required mitigations as shown in the tables.
- Queue summary tables were prepared in accordance with PennDOT requirements. Proposed storage lengths reflect projected queues.
- Requested accident investigations reveal no correctable patterns or significant roadway design elements which should be considered.
- Additional information relative to special event parking and traffic management is being addressed by other consultants.
- The addition of a new exclusive EB right-turn lane on Lancaster Avenue at Ithan Avenue is of limited value during ordinary traffic conditions and not needed to satisfy SOL requirements. During special event conditions, its role is also likely to be insignificant since the project will result in fundamental changes to parking and circulation in the immediate vicinity of this intersection. Additional information relative to special event parking and traffic management is being addressed by other consultants.
- The intersection of Ithan Avenue and LAH/Garage Access should be designated as AWSC to benefit pedestrian mobility and garage entry/exit traffic (and related queue management).
- All other SOL-required / additional PennDOT-requested information to date (photo-documentation, pedestrian and bicycle facility descriptions, etc.) is provided.
- Levels of service (LOS) for the study area intersections have been summarized in matrix form (**Table I**) on the following pages.

**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	2018 Base	2018 Projected	2023 Base	2023 Projected	2023 w/ Imp's	2012 Existing	2018 Base	2018 Projected	2023 Base	2023 Projected	2023 w/ Imp's	
Eastbound	L	F 201	F 117	F 117	F 121	F121	None Required	F 283	F 136	F135	F 140	F 140	F 139	
	TT	D	C	D	C	D		D	D	D	D	D	D	
	R	A	A	A	A	A		B	B	A	B	B	A	
Westbound	L	D	D	D	D	D		D	E	D	E	E	D	
	TTR	F 93	F 81	F 84	F 83	F 87		D	E	E	F 83	F 101	E	
Spring Mill Road														
Northbound	L	F 121	F 112	F 112	F 119	F 119		F 158	F 121	F 228	F 132	F 132	F 235	
	TR	D	D	D	D	D		D	C	D	C	C	D	
Southbound	L	D	D	D	D	D		D	D	D	D	D	D	
	TR	F 146	F 106	F 106	F 109	F 109		F 352	F 110	F 129	F 114	F 114	F 134	
Aldwyn Lane														
Northbound	LTR	E	F 170	F 170	F 170	F 170		E	F 189	F 236	F 189	F 189	F 236	
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 71	F 99	E 75	E 78	E 78	F 83	E 80		

2. Lancaster Avenue & Church Walk													
Direction	Movement	AM Peak Hour						PM Peak Hour					
Lancaster Avenue		2012 Existing	2018 Base	2018 Projected	2023 Base	2023 Projected	2023 w/ Imp's	2012 Existing	2018 Base	2018 Projected	2023 Base	2023 Projected	2023 Proj'd 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	C	C	C	C	C		C	C	C	C	C	
OVERALL:		A 2	A 3	A 2	A 3	A 2		A 6	A 6	A 7	A 6	A 7	

3. Lancaster Avenue & Ithan Avenues

Direction	Movement	AM Peak Hour						PM Peak Hour					
Lancaster Avenue		2012 Existing	2018 Base	2018 Projected	2023 Base	2023 Projected	2023 Proj'd w/EB RT	2012 Existing	2018 Base	2018 Projected	2023 Base	2023 Projected	2023 Proj'd w/EB RT
Eastbound	L	C	C	C	C	C	C	C	C	C	C	C	C
	TTR	D	D	D	D	D	C	D	D	D	D	D	D
Westbound	L	C	C	C	C	C	C	D	D	E	D	E	D
	TTR	C	C	C	C	C	C	C	C	C	C	C	C
Ithan Avenue													
Northbound	L	F 92	F 116	E	F 112	E	E	F 94	F 126	F 135	F 137	F 143	F 143
	TR	E	E	F 85	E	F 86	F 86	D	E	D	E	D	D
Southbound	L	D	D	D	D	D	D	D	D	D	D	D	D
	TR	E	E	D	E	D	D	F 88	F 100	F 82	F 102	F 83	F 83
OVERALL:		D 43	D 45	D 41	D 46	D 41	D40	D 48	D 48	D 48	D 49	D 49	D 43

4. Lancaster Avenue & Lowrys Lane

Direction	Movement	AM Peak Hour						PM Peak Hour					
Lancaster Avenue		2012 Existing	2018 Base	2018 Projected	2023 Base	2023 Projected	2023 w/ Imp's	2012 Existing	2018 Base	2018 Projected	2023 Base	2023 Projected	2023 w/ Imp's
Eastbound	LTR	A	A	A	A	A	None Required	A	A	B	A	B	None Required
Westbound	LTR	A	A	A	A	A		A	A	A	A	A	
Lowrys Lane													
Northbound	LTR	B	C	C	C	C		B	B	B	B	B	
Southbound	LTR	B	C	C	C	C		B	C	C	C	C	
OVERALL:		A 7	A 7	A 10	A 7	B 10		A 9	A 7	B 11	A 7	B 12	

5. Conestoga Road & Sproul Road

Direction	Movement	AM Peak Hour						PM Peak Hour					
Conestoga Road		2012 Existing	2018 Base	2018 Projected	2023 Base	2023 Projected	2023 w/ Imp's	2012 Existing	2018 Base	2018 Projected	2023 Base	2023 Projected	2023 w/ Imp's
Eastbound	L	D	D	D	D	E	None Required	C	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 93	E	E	E	E		D	D	D	D	D	
Sproul Road													
Northbound	L	E	F 141	F 141	F 151	F 151		C	C	C	C	C	
	TR	B	C	C	C	C	B	B	B	B	B		
Southbound	LTR	D	D	D	E	E	D	D	D	D	D		
OVERALL:		D 50	D 52	D 51	D 52	D 53	C 33	C 35	C 34	D 36	C 35		

6. Conestoga Road & Ithan Avenue

Direction	Movement	AM Peak Hour						PM Peak Hour					
Conestoga Road		2012 Existing	2018 Base	2018 Projected	2023 Base	2023 Projected	2023 w/ Imp's	2012 Existing	2018 Base	2018 Projected	2023 Base	2023 Projected	2023 w/ Imp's
Eastbound	LTR	F 114	F 105	F 88	F 128	F 107	None Required	B	B	B	B	B	None Required
Westbound	LTR	B	B	B	B	B		B	B	A	B	A	
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:		D 52	D 49	D 43	E 58	D 50		B 12	B 12	B 11	B 12	B 11	

7. Conestoga Road & Garrett Avenue

Direction	Movement	AM Peak Hour						PM Peak Hour					
Conestoga Road		2012 Existing	2018 Base	2018 Projected	2023 Base	2023 Projected	2023 w/ Imp's	2012 Existing	2018 Base	2018 Projected	2023 Base	2023 Projected	2023 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 7	A 7	

8. County Line & Spring Mill Roads

Direction	Movement	AM Peak Hour						PM Peak Hour					
County Line Road		2012 Existing	2018 Base	2018 Projected	2023 Base	2023 Projected	2023 w/ Imp's	2012 Existing	2018 Base	2018 Projected	2023 Base	2023 Projected	2023 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		C	C	C	C	C	
Spring Mill Road													
Northbound	LTR	B	B	B	B	B		B	B	B	B	B	
Southbound	LTR	B	C	B	C	B		B	C	C	C	C	
OVERALL:		B 13	B 16	B 15	B 16	B 15		C 21	C 28	C 22	C 30	C 24	

9. Lancaster Avenue & Garrett Avenue

Direction	Movement	AM Peak Hour						PM Peak Hour					
Lancaster Avenue		2012 Existing	2018 Base	2018 Projected	2023 Base	2023 Projected	2023 w/ Imp's	2012 Existing	2018 Base	2018 Projected	2023 Base	2023 Projected	2023 w/ Imp's
Westbound	L	B	B	B	C	C	None Required	B	B	C	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	2018 Base	2018 Projected	2023 Base	2023 Projected	2023 w/ Imp's	2012 Existing	2018 Base	2018 Projected	2023 Base	2023 Projected	2023 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	C		
OVERALL:		A 1	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	2018 Base	2018 Projected	2023 Base	2023 Projected	2023 w/ Imp's	2012 Existing	2018 Base	2018 Projected	2023 Base	2023 Projected	2023 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	E	E	E	E		C	D	D	D	D		D
Southbound	LTR	C	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		A 3

12. County Line Road & Ithan Avenue North

Direction	Movement	AM Peak Hour						PM Peak Hour						
County Line Road		2012 Existing	2018 Base	2018 Projected	2023 Base	2023 Projected	2023 w/ Imp's	2012 Existing	2018 Base	2018 Projected	2023 Base	2023 Projected	2023 w/ Imp's	
Eastbound	LR	D	D	C	D	C	None Required	D	D	D	D	D	None Required	
Ithan Avenue														
Southbound	TR	D	D	C	D	C		D	D	D	D	D		D
OVERALL:		D 30	D 30	C 25	D 30	C 25		D 30	D 30	D 30	D 30	D 30		D 30

13. County Line Road & Ithan Avenue South

Direction	Movement	AM Peak Hour						PM Peak Hour						
County Line Road		2012 Existing	2018 Base	2018 Projected	2023 Base	2023 Projected	2023 w/ Imp's	2012 Existing	2018 Base	2018 Projected	2023 Base	2023 Projected	2023 w/ Imp's	
Westbound	LR	C	C	B	C	C	None Required	C	C	C	C	C	None Required	
Ithan Avenue														
Northbound	TR	C	C	B	C	C		C	C	C	C	C		C
OVERALL:		C 20	C 20	B 15	C 20	C 16		C 20	C 20	C 15	C 20	C 15		C 15

14. County Line Road & Lowrys Lane

Direction	Movement	AM Peak Hour						PM Peak Hour					
County Line Road		2012 Existing	2018 Base	2018 Projected	2023 Base	2023 Projected	2023 w/ Imp's	2012 Existing	2018 Base	2018 Projected	2023 Base	2023 Projected	2023 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	2018 Base	2018 Projected	2023 Base	2023 Projected	2023 w/ Imp's	2012 Existing	2018 Base	2018 Projected	2023 Base	2023 Projected	2023 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	2018 Base	2018 Projected	2023 Base	2023 Projected	2023 w/ Imp's	2012 Existing	2018 Base	2018 Projected	2023 Base	2023 Projected	2023 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		
Roberts Road													
Northbound	LTR	F 181	F 201	F 201	F 222	F 222		E	E	E	E	E	
Southbound	LTR	D	E	E	E	E		D	D	D	D	D	
OVERALL:		C 24	D 26	D 26	D 29	D 29		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	2018 Base	2018 Projected	2023 Base	2023 Projected	2023 w/ Imp's	2012 Existing	2018 Base	2018 Projected	2023 Base	2023 Projected	2023 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		
Ithan Avenue													
Northbound	L	A	A	A	A	A		A	A	A	A		
Southbound	L	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 3	A 3	A 3	

18. Lancaster Avenue & WLL RIRO Drive

Direction	Movement	AM Peak Hour						PM Peak Hour					
WLL RIRO Drive		2012 Existing	2018 Base	2018 Projected	2023 Base	2023 Projected	2023 w/ Imp's	2012 Existing	2018 Base	2018 Projected	2023 Base	2023 Projected	2023 w/ Imp's
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	2018 Base	2018 Projected	2023 Base	2023 Projected	2023 w/ Imp's	2012 Existing	2018 Base	2018 Projected	2023 Base	2023 Projected	2023 w/ Imp's	
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	2018 Base	2018 Projected	2023 Base	2023 Projected	2023 w/ AWS	2012 Existing	2018 Base	2018 Projected	2023 Base	2023 Projected	2023 w/ AWS
Eastbound	LTR			C		C	A			C		C	A
Westbound	LTR			B		C	A			C		C	B
Ithan Avenue													
Northbound	L / LTR			A		A	B			A		A	B
Southbound	L / LTR			A		A	B			A		A	B
OVERALL:				A 3		A 3	B 12			A 7		A 7	B 11

Base = No-Build Scenario

Projected = Build Scenario

For Ithan/LAH, 2023 Projected was performed twice -- once as an TWSC and once as AWSC.

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 a performing art center and approximately 15,000 SF of Villanova-centric retail space, the exact users of which are to be determined. This transportation impact study was prepared per the requirements of the CICD ordinance of Radnor Township as adopted in January 2014 (Zoning 280-68.1). 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 mid 2012 with most data collection taking place that fall. See **Appendix A** for more details and other project correspondence. Additional efforts unfolded as ordinance deliberation continued through 2013. With the ordinance recently adopted and a conditional use hearing now underway, 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 1,135 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. Radnor Township places limits on student housing and some Villanova students live outside of the Township. Regardless of their location and the possibility of more distanced students ‘backfilling’ nearby student housing, the number of peak hour commuting trips will be less after the project is constructed as 1,135 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 a figure 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 2018, or approximately six (6) 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 (2023). Thus this report includes two base conditions:

- 1.51% (0.25% per year for 6 years) for Full-Build (2018), and
- 2.78% (0.25% per year for 11 years) for Design Year (2023).

BACKGROUND GROWTH

In 2013 the Delaware Valley Regional Planning Commission (DVRPC) performed studies which resulted in a recommended growth rate for the study area in Radnor Township. 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 6 or 11 years of compounded growth at 0.25% per year applied to all through movements (i.e., excluding driveways and dead-end streets). 2018 and 2023 Base Condition turning movement peak hour volumes are presented in **Figures 5** thru **8**.

PROJECT DESCRIPTION

The most significant component of the project is the residence halls which yield 1,135 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 automobiles will – in large part – not be utilized or moving during weekday commuter peak periods. This is but one of a few fundamental changes in traffic patterns which will result from the project. Other changes include:

- added parking to existing garages (HSB and SAC) 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 locations of buildings and parking lots throughout 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 Conditions 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 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 may result in a small net increase in parking. More importantly, the project includes significant shifts 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 1,293 spaces in a structure on the ‘former’ Pike Lot (many of which will be occupied by non-moving student-owned vehicles).

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 HSB garage, at the expanded SAC garage, and at the ‘new’ West Lancaster surface lot (WLL). 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		
	<u>IN</u>	<u>OUT</u>	<u>TOTAL</u>	<u>IN</u>	<u>OUT</u>	<u>TOTAL</u>
Rates	0.227	0.028	0.255	0.199	0.225	0.424

Note that the plans submitted with the conditional use application revealed a small net increase in parking (19 spaces) but this number is subject to further refinement as land development ensues.

In addition to this trip generation, the Township traffic engineer requested (in a letter dated 23 July 2014 as found in **Appendix A**) that the trip generation potential of the university-centric retail space be examined and discussed. This was conducted as requested and was based upon similar retail space found at St. Joe’s University and is described in greater detail in **Appendix G**. In summary, the retail component of the site is estimated to generate 22 new vehicle trips during the weekday AM peak hour and 64 new vehicle trips during the weekday PM peak hour. Even though the Township traffic engineer only asked for a discussion of the potential of this traffic, the referenced trips were in fact included in the Projected Conditions of this TIS. **Table 3** summarizes the weekday AM and PM peak hour new vehicular trip generation potential of the site.

**TABLE 3
TRIP GENERATION (NEW VEHICULAR TRIPS)**

Trip Component	AM Peak Hour			PM Peak Hour		
	<u>IN</u>	<u>OUT</u>	<u>TOTAL</u>	<u>IN</u>	<u>OUT</u>	<u>TOTAL</u>
Retail	11	11	22	34	30	64
Net Parking Gain (potential)	4	1	5	4	4	8
TOTAL	15	12	27	38	34	72

TRIP DISTRIBUTION

The distribution of site traffic is essentially an extensive redistribution of existing traffic due to the reassignment of parking supply in different locations throughout the core campus area (HSB & SAC garages, WLL, 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 exist 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 HSB/SAC Garages.

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 which are sources or sinks of said volumes). Retail traffic was added along Route 30 equally in each direction as further described in the worksheets. **Appendix H** includes the results of all individual peak hour worksheet 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,
- 2018 Base Conditions,
- 2018 Projected Conditions,
- 2023 Base Conditions, and
- 2023 Projected Conditions.

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

Note that per chapter 10 of PennDOT's *Publication 46*, certain default values in *Synchro 8* were changed. These adjustments were made using Suburban classification data at all intersections and driveways in the study area.

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.

Note that at the intersection of Lancaster Avenue and Ithan Avenue, the 2023 Projected Condition was analyzed twice – once with a new exclusive EB right-turn lane added and once without said lane. Adding the lane provides a small benefit – a reduction of 1 second of delay in the AM peak hour and slightly more during the PM peak hour. However, PennDOT SOL regulations (as well as the CICD ordinance) are satisfied without the addition of the lane. The benefit of the lane during special event management will no longer be as important as it is today since both the location of parking and the management of special events are proposed to be significantly different. An exclusive EB right-turn lane also extends pedestrian crosswalk distance and for all these reasons is not recommended.

The intersection of Ithan Avenue and LAH/Garage Access was also examined twice – as an AWSC and as a TWSC intersection. The levels of service in either case are comparable but AWSC provides added benefit to pedestrian crossing / mobility and garage turning movement queue management. For these reasons, AWSC control is recommended at this location.

The large number of intersections in the study area and the complexity of the analysis – which incorporates both alternating HCM 2010 and Percentile Delay methodologies as well as alternating lane configuration / traffic control treatment at certain locations – precludes a manageable printed output of capacity worksheets. More details regarding capacity analyses are explained in **Appendix I**. The signal plans utilized in the analyses are provided in **Appendix J**.

QUEUE LENGTH ANALYSIS

Projected 95th percentile queues are available from *Synchro*'s electronic files which can be produced upon request for all AM and PM peak hour investigations. In terms of requirements, PennDOT Guidelines provide direction in Strike Off Letter 470-09-4, specifically, page 27 of the Guidelines describes for both Base and Projected Conditions queue and turn lane analysis shall be conducted and provided "as appropriate".

The project primarily affects the intersections of Lancaster Avenue and Ithan Avenue and Lancaster Avenue and Church Walk as well as the proposed points of access both along Lancaster Avenue and along Ithan Avenue. Queue estimates at these locations are summarized in **Table 6**.

**TABLE 6
QUEUE ANALYSIS (FEET)**

LANCASTER AVENUE & ITHAN AVENUE

Lane Group	2023 Base Conditions			2023 Projected Conditions		
	Available	AM	PM	Proposed	AM	PM
EB L	100	59	63	200	90	63
EB T	--	453	623	--	492	682
EB TR	--			--		
WB L	70	112	107	250	82	147
WB T	--	496	241	--	502	243
WB TR						
NB L	100	173	147	200	138	187
NB TR	--	346	243	--	381	149
SB L	70	48	99	70	49	95
SB TR	--	367	456	--	208	377

LANCASTER AVENUE & CHURCH WALK

Lane Group	2023 Base Conditions			2023 Projected Conditions		
	Available	AM	PM	Proposed	AM	PM
EB T	--	101	206	--	102	206
EB R	n/a	--	--	125	25	0
WB L	n/a	--	--	100	25	0
WB T	--	329	109	--	318	210
NB L	--	25	67	200	25	73
NB R	n/a	--	--	200	25	25

LANCASTER AVENUE & WLL RIRO

Lane Group	2023 Base Conditions			2023 Projected Conditions		
	Available	AM	PM	Proposed	AM	PM
EB R	n/a	--	--	125	0	0
NB R	n/a	--	--	100+	25	25

LANCASTER AVENUE & PAC RILIRO

Lane Group	2023 Base Conditions			2023 Projected Conditions		
	Available	AM	PM	Proposed	AM	PM
EB R	n/a	--	--	--	0	0
WB L	n/a	--	--	100	25	25
NB R	n/a	--	--	200+	25	25

ITHAN AVENUE & LAH / GARAGE ACCESS

Lane Group	2023 Base Conditions			2023 Projected Conditions		
	Available	AM	PM	Proposed	AM	PM
NB L	n/a	--	--	50	0	0
SB L	n/a	--	--	100	25	25

n/a indicates lane does not exist under base (current) conditions. + indicates proposed length = length of driveway / throat
 minimum value of 25 used if returned value is <25 and >0 0 value used if prediction is 0
 -- indicates through lane (or shared through lane) having no defined stacking distance or not applicable/not proposed.

TURN LANE WARRANT ANALYSIS

The project includes providing new auxiliary left- and right-turn lanes as appropriate at nearly all proposed points of access. As they are offered with the project, the warrant analysis is inconsequential. The locations where a new auxiliary left or right turn lanes are *not* proposed – and the reasons for the proposed omission – follow:

- Route 30 WLL driveway, no WB left turn lane is suggested since the movement is prohibited.
- Route 30 PAC driveway, no EB right turn lane is suggested since it is not warranted.
- Ithan Ave LAH/Garage driveways, no NB/SB right turn lanes are suggested since they are not warranted.

Evidence of the lack of need for the PAC and LAH/Garage auxiliary lanes were based on SOL 470-08-4 as well as PennDOT *Publication 46* Chapter 11 page 11-46 Turn Lane Warrants. The details of the investigations are included in **Appendix K**.

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 summarized in **Appendix L**. As shown, there typically exist hundreds of unused parking spaces throughout campus regardless of 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% which suggests that auto ownership at the proposed student resident halls (which may be comparable) may be significant. The number of spaces in the garage which will not be moving during weekday commuter peak periods could potentially be about 600 and possibly more. 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 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 questionable, 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 L**.

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 7
SIGHT DISTANCES**

RT 30 WLL 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. Vegetation trimming/removal was considered for some locations. Finally, note that while sight distances for entering left turns, approaching same direction have been provided, they are essentially irrelevant since separate entering left-turn lanes are provided (where applicable) at all site access points.

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 (see **Appendix A**). Villanova has retained Chance Management Advisors, Inc. to prepare a Special Event Management Plan for future conditions.

RECOMMENDATIONS

F. Tavani and Associates, Inc. (FTA) recommends the following roadway improvements as outlined at key study area intersections:

Route 30 and Route 320/Kenilworth Street/Aldwyn Lane

- Optimize signal timings at the intersection during the studied peak hours in order to improve operations and queuing.

Route 30 and New RIRO Access

- Provide channelization islands to prohibit entering and exiting left turns.
- Provide new EB right-turn only lane with 75 feet of taper, 125 feet of storage, and 14 feet width.

Route 30 and Church Walk

- Optimize signal timings at the intersection during the studied peak hours in order to improve operations and queuing.
- Provide grade-separated pedestrian bridge.
- Eliminate existing pedestrian crosswalks crossing Route 30.
- Provide new EB right-turn only lane with 75 feet of taper, 125 feet of storage, and 14 feet width.
- Provide new WB left-turn only lane with 75 feet of taper, 100 feet of storage, and 10 feet width.
- Provide second NB exit lane.
- Provide 11 foot wide inside and 12 foot wide outside travel lanes (10-foot travel lanes presently exist).

Route 30 and Ithan Avenue

- Optimize signal timings at the intersection during the studied peak hours in order to improve operations and queuing.
- Extend the existing EB left-turn only lane to provide a 75 feet of taper, 200 feet of storage, and 10 feet width.
- Extend the existing WB left-turn only lane 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 east of the PAC driveway measuring 100 feet with a 75-foot taper.
- Provide 11 foot wide inside and 12 foot wide outside travel lanes (10-foot travel lanes presently exist).
- Investigate reducing the existing 26-second long all-red ped-scramble phase.

Additional Site Access Points

- At the currently-existing exit-only unsignalized driveway along Route 30 just east of Ithan Avenue:
 - Modify the driveway to two-way operation (entry/exit).
 - Provide new WB left-turn only lane with 75 feet of taper, 100 feet of storage, and 10 feet width.
 - Prohibit exiting left turns.
- At the four (4) unsignalized driveways along Ithan Avenue just south of Route 30:
 - Eliminate one driveway along the west side of Ithan Avenue.
 - Relocate the remaining driveway further south along the west side of Ithan Avenue and convert to two-way operation (entry/exit).
 - Provide up to three (3) driveways on the east side of Ithan Avenue though two (2) will be limited access (i.e., emergencies, deliveries, etc.) subject to final garage design.
 - Locate the 3rd driveway will be the main garage access driveway along the east side of Ithan Avenue opposite the driveway along the west side of Ithan Avenue and provide two-way operation (entry/exit) and all-way stop-control (AWSC) with a pedestrian crosswalk connecting the garage and the resident halls.

Figures 9 and 10 provide added details.

CONCLUSIONS

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

- The project will result in a more equitable distribution of parking – and the traffic associated therewith – as compared with present day conditions.

- The project is forecasted to generate a small amount of net new vehicular traffic. Even with conservative assumptions and trip generation estimates, fewer than 100 trips during either the AM or PM weekday peak hour are predicted.
- The project includes access points which will adequately serve the projected weekday peak hour traffic volumes associated with the project.
- Many offered traffic improvements (pedestrian bridge construction, multiple driveway closures and consolidation, etc.) are not required to mitigate the impact of the site but are provided regardless.
- Available sight distances exceed requirements.
- Crash history investigations reveal no correctable patterns or significant roadway design elements which should be considered.
- The addition of a new exclusive EB right-turn lane on Lancaster Avenue at Ithan Avenue is of limited value during ordinary traffic conditions and not needed to satisfy SOL requirements. During special event conditions, its role is also likely to be insignificant since the project will result in fundamental changes to parking and circulation in the immediate vicinity of this intersection. Additional information relative to special event parking and traffic management is being addressed by other consultants.
- The intersection of Ithan Avenue and LAH/Garage Access should be designated as AWSC to benefit pedestrian mobility and garage entry/exit traffic (and related queue management).
- All other SOL-required / additional PennDOT-requested information to date (photo-documentation, pedestrian and bicycle facility descriptions, etc.) have been provided and no other deficiencies or concerns have been identified.

Study Area / Project Location

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

September 2014*



* figure preparation date

Site Plan Excerpt

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

September 2014*



PEDESTRIAN BRIDGE



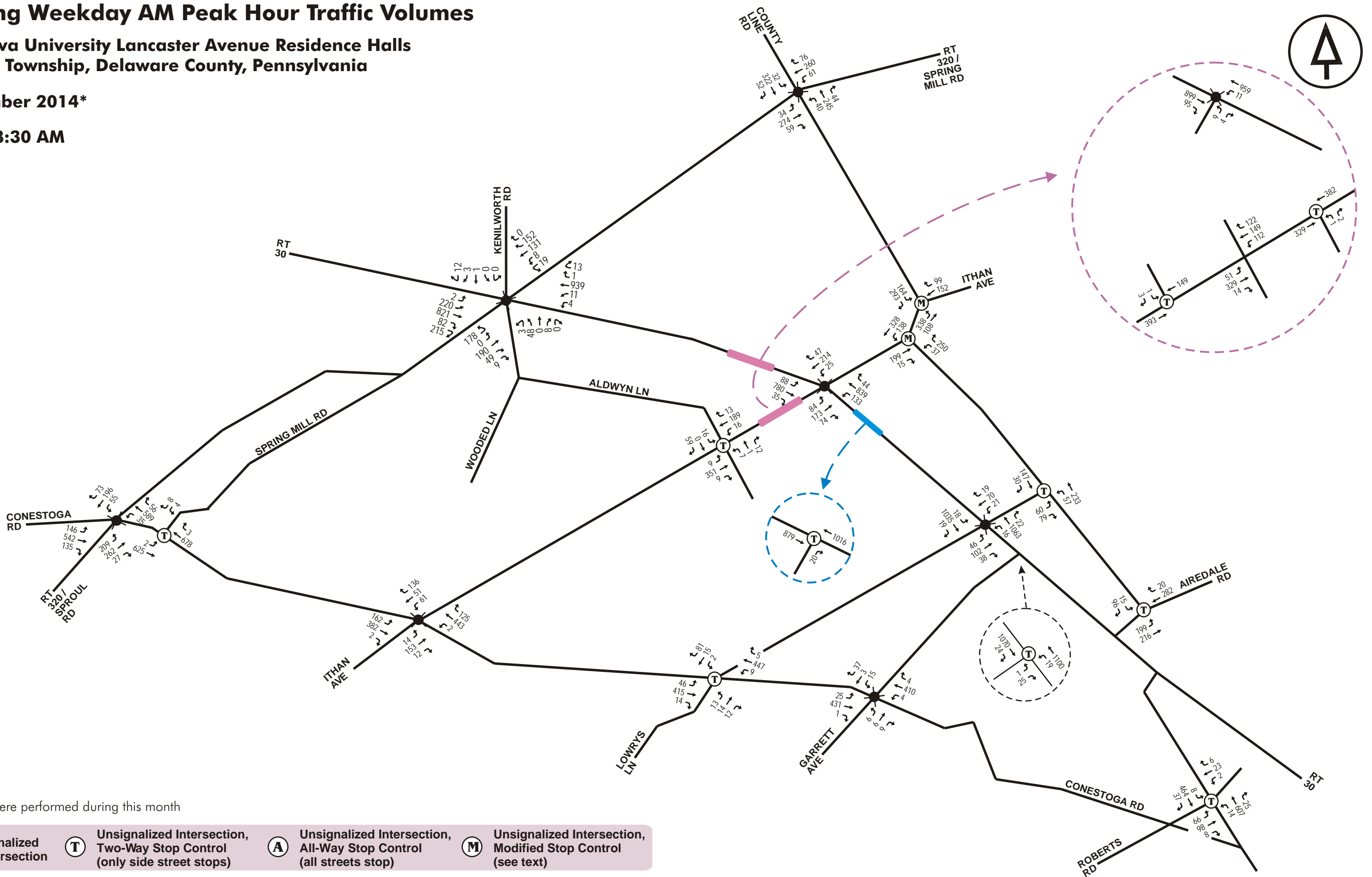
* figure preparation date

Existing Weekday AM Peak Hour Traffic Volumes

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

September 2014*

7:30 - 8:30 AM



* counts were performed during this month

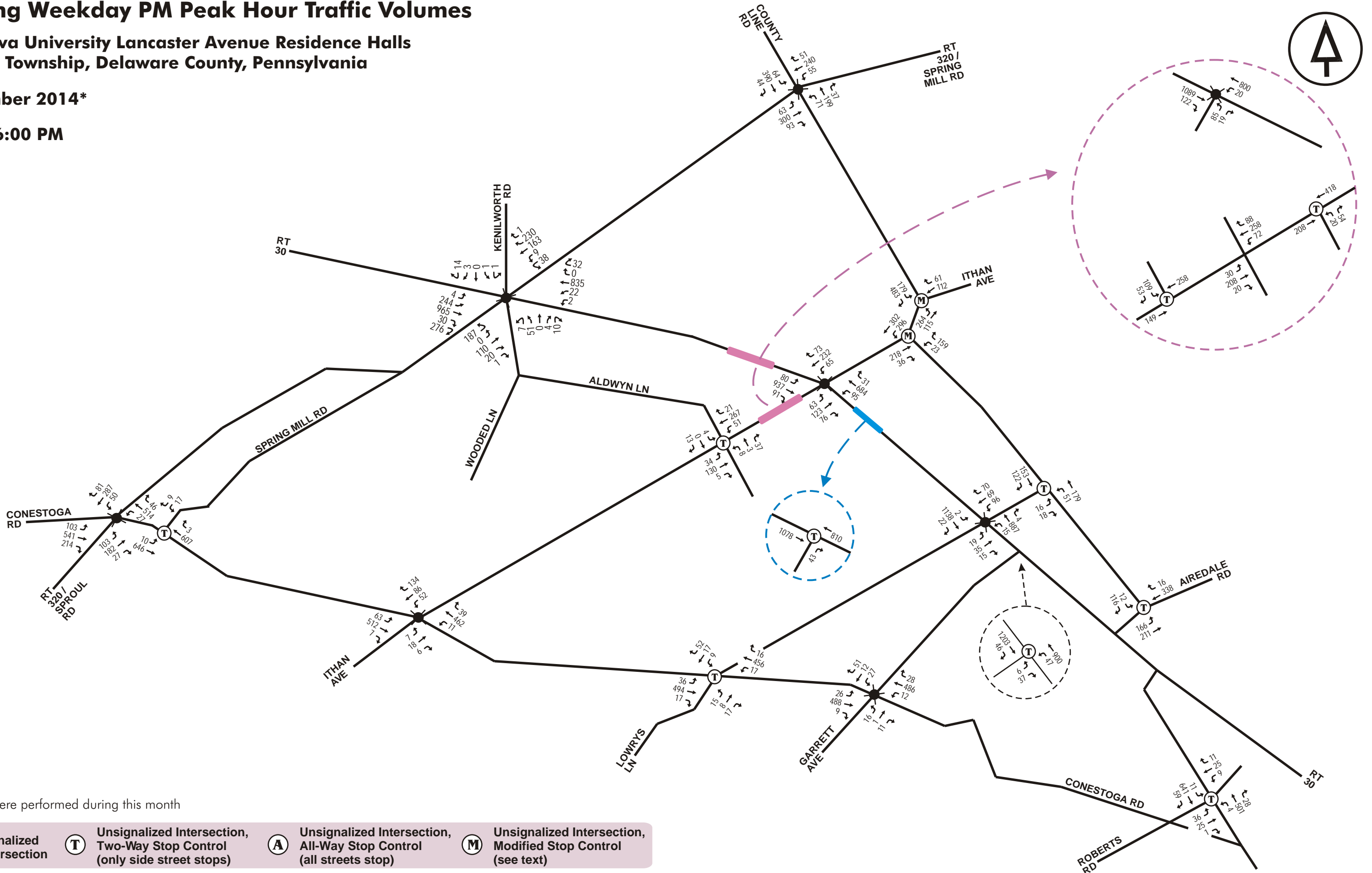
Signalized Intersection	Unsignalized Intersection, Two-Way Stop Control (only side street stops)	Unsignalized Intersection, All-Way Stop Control (all streets stop)	Unsignalized Intersection, Modified Stop Control (see text)
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Existing Weekday PM Peak Hour Traffic Volumes

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

September 2014*

5:00 - 6:00 PM



* counts were performed during this month

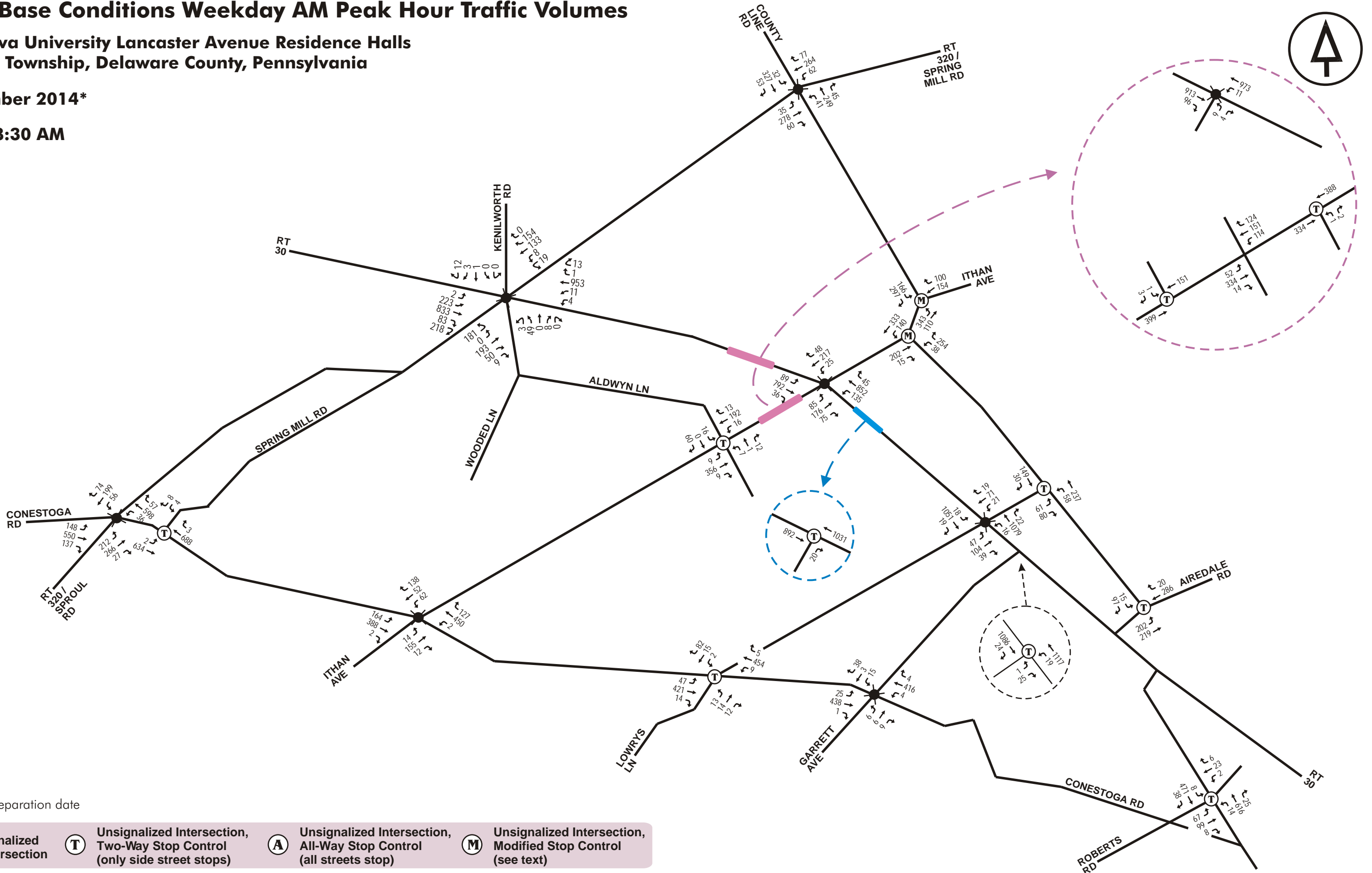
Signalized Intersection	Unsignalized Intersection, Two-Way Stop Control (only side street stops)	Unsignalized Intersection, All-Way Stop Control (all streets stop)	Unsignalized Intersection, Modified Stop Control (see text)
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2018 Base Conditions Weekday AM Peak Hour Traffic Volumes

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

September 2014*

7:30 - 8:30 AM



* figure preparation date

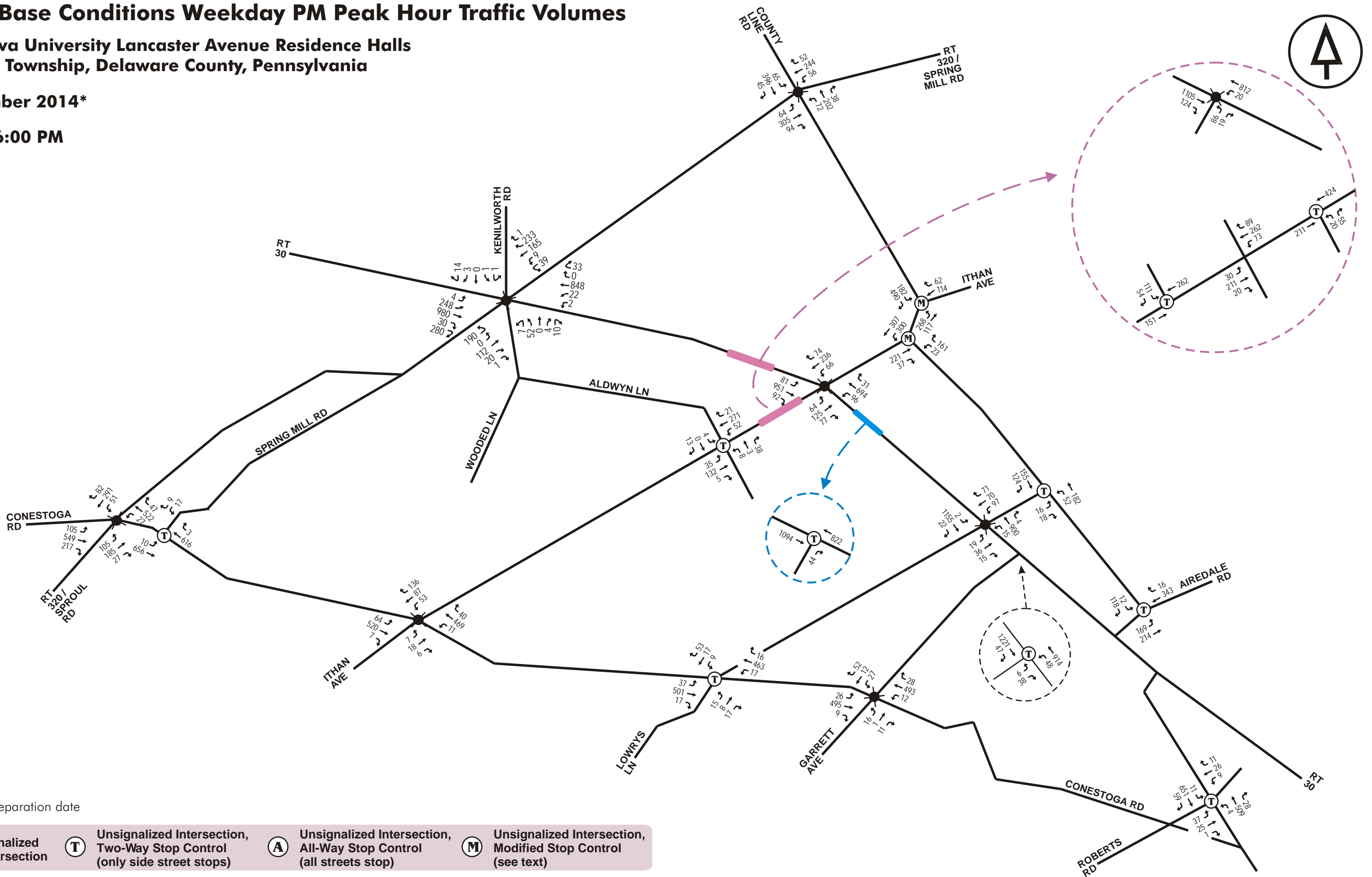
- Signalized Intersection
- Unsignalized Intersection, Two-Way Stop Control (only side street stops)
- Unsignalized Intersection, All-Way Stop Control (all streets stop)
- Unsignalized Intersection, Modified Stop Control (see text)

2018 Base Conditions Weekday PM Peak Hour Traffic Volumes

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

September 2014*

5:00 - 6:00 PM



* figure preparation date

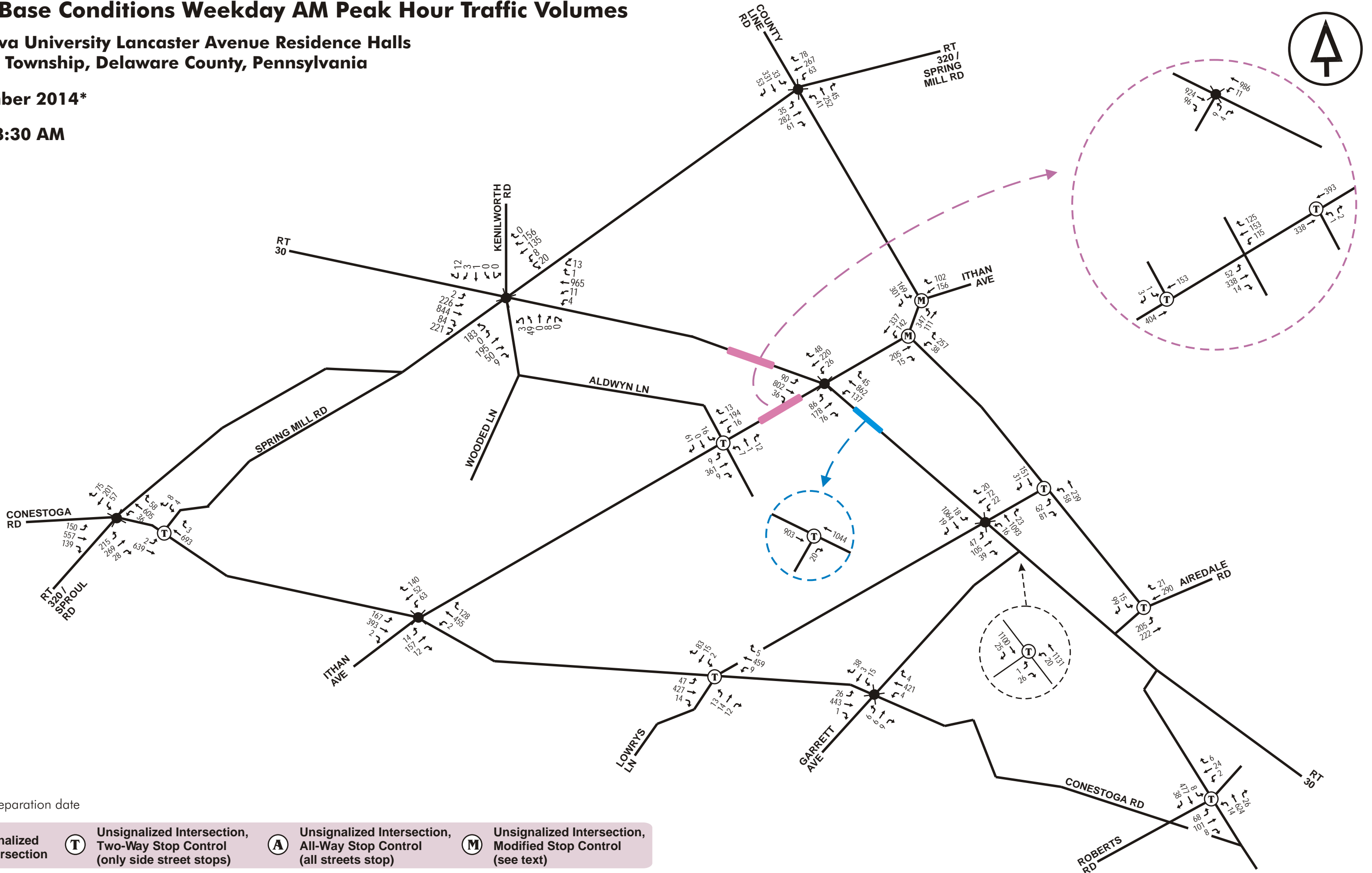
Signalized Intersection	Unsignalized Intersection, Two-Way Stop Control (only side street stops)	Unsignalized Intersection, All-Way Stop Control (all streets stop)	Unsignalized Intersection, Modified Stop Control (see text)
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2023 Base Conditions Weekday AM Peak Hour Traffic Volumes

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

September 2014*

7:30 - 8:30 AM



* figure preparation date

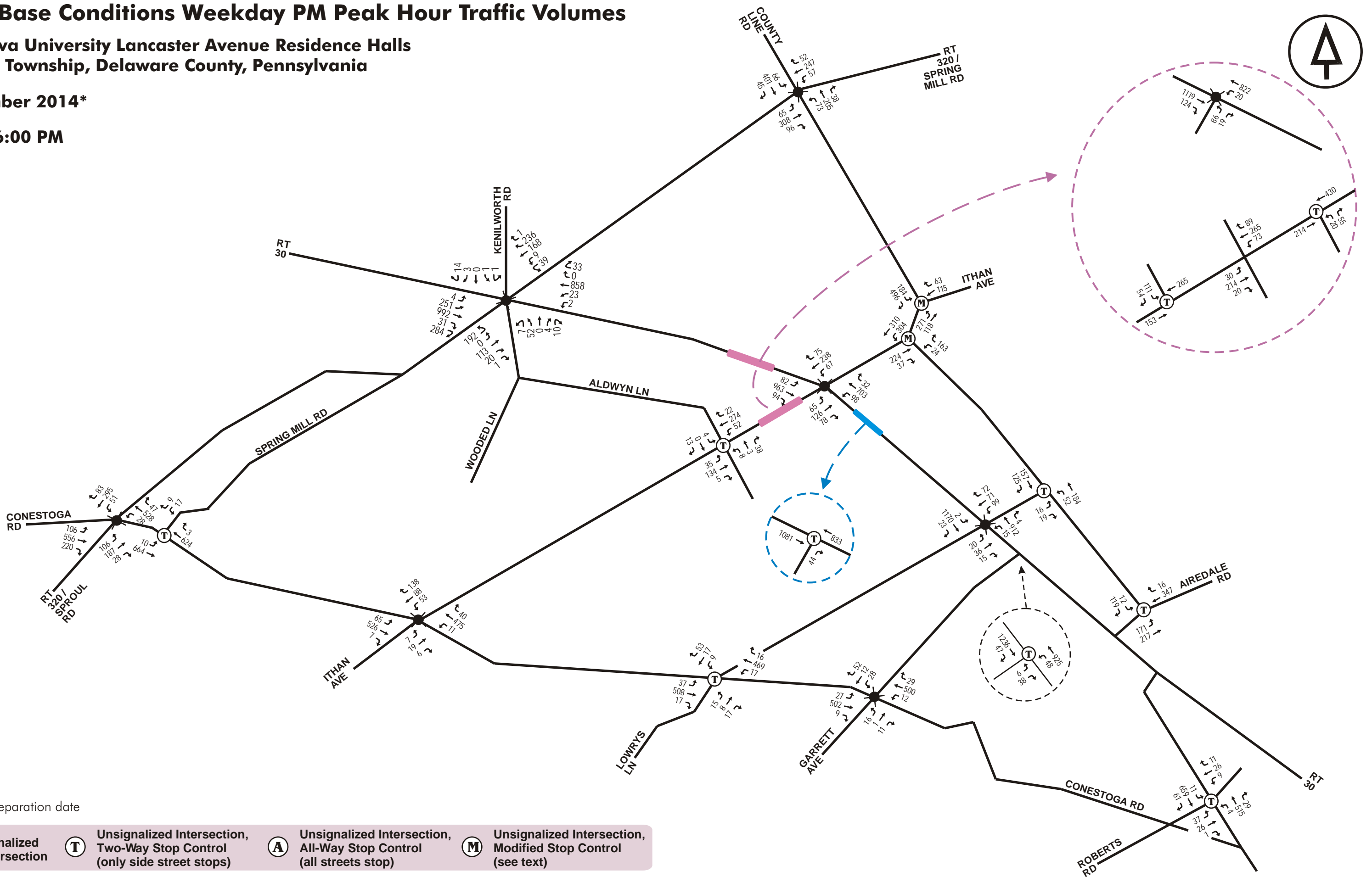
Signalized Intersection	Unsignalized Intersection, Two-Way Stop Control (only side street stops)	Unsignalized Intersection, All-Way Stop Control (all streets stop)	Unsignalized Intersection, Modified Stop Control (see text)
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2023 Base Conditions Weekday PM Peak Hour Traffic Volumes

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

September 2014*

5:00 - 6:00 PM



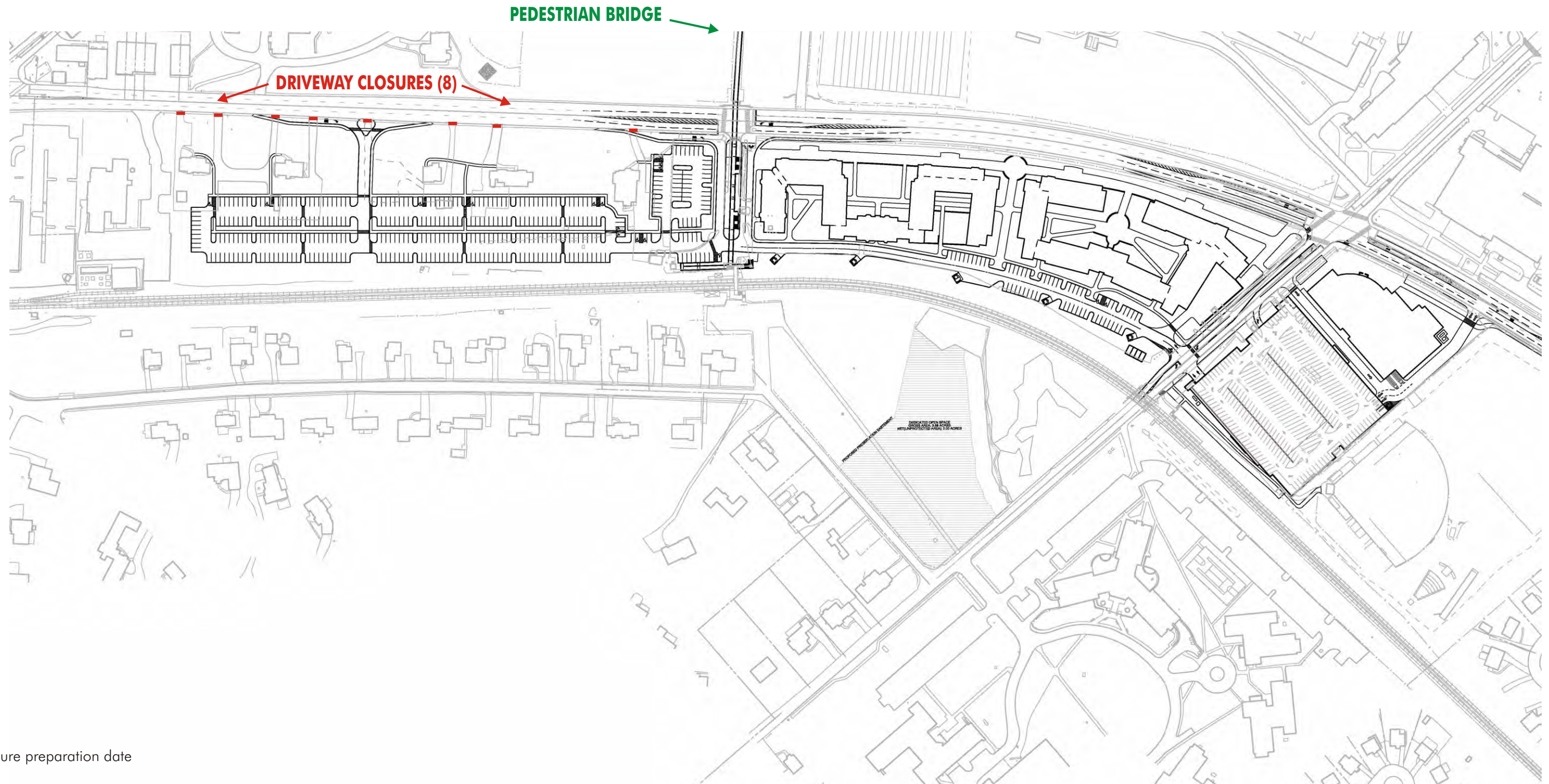
* figure preparation date

Signalized Intersection	Unsignalized Intersection, Two-Way Stop Control (only side street stops)	Unsignalized Intersection, All-Way Stop Control (all streets stop)	Unsignalized Intersection, Modified Stop Control (see text)
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Proposed Traffic Improvements 1

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

September 2014*

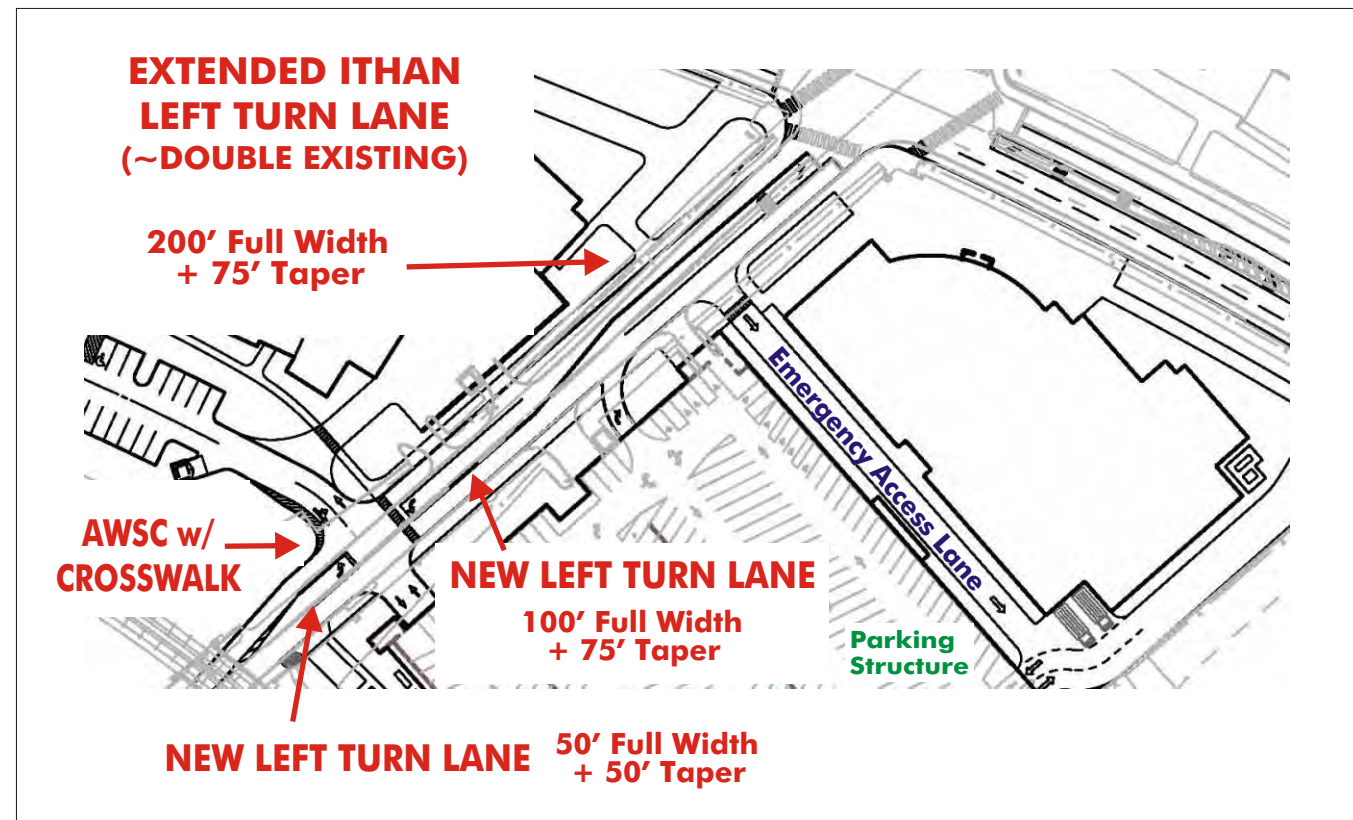
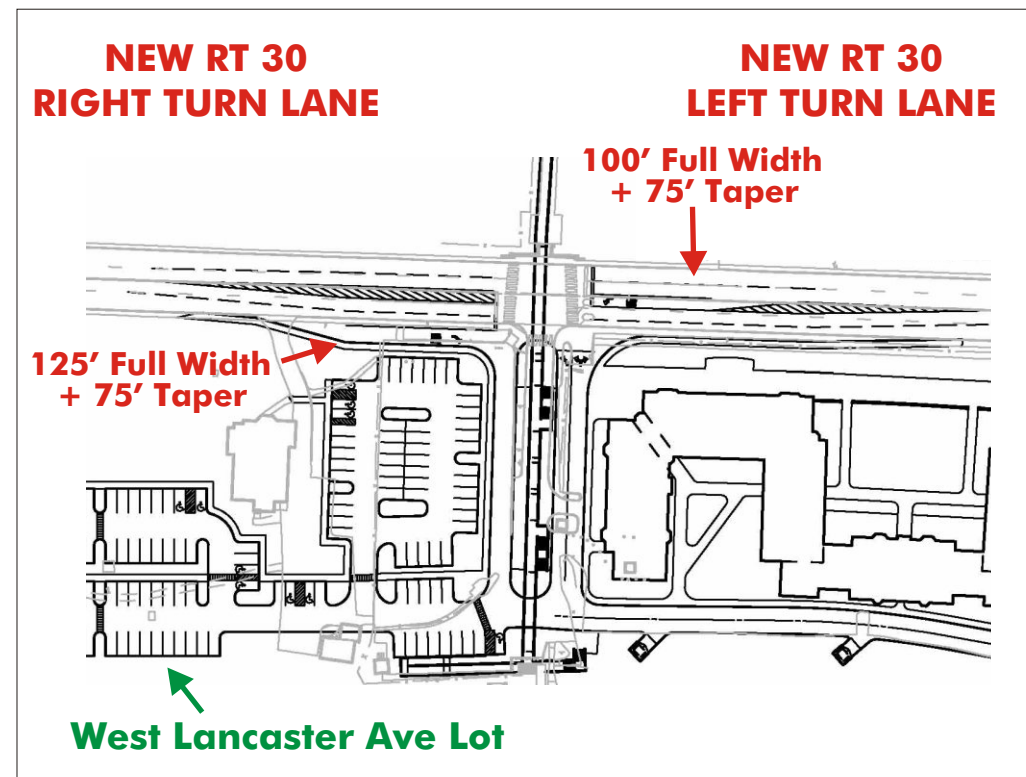
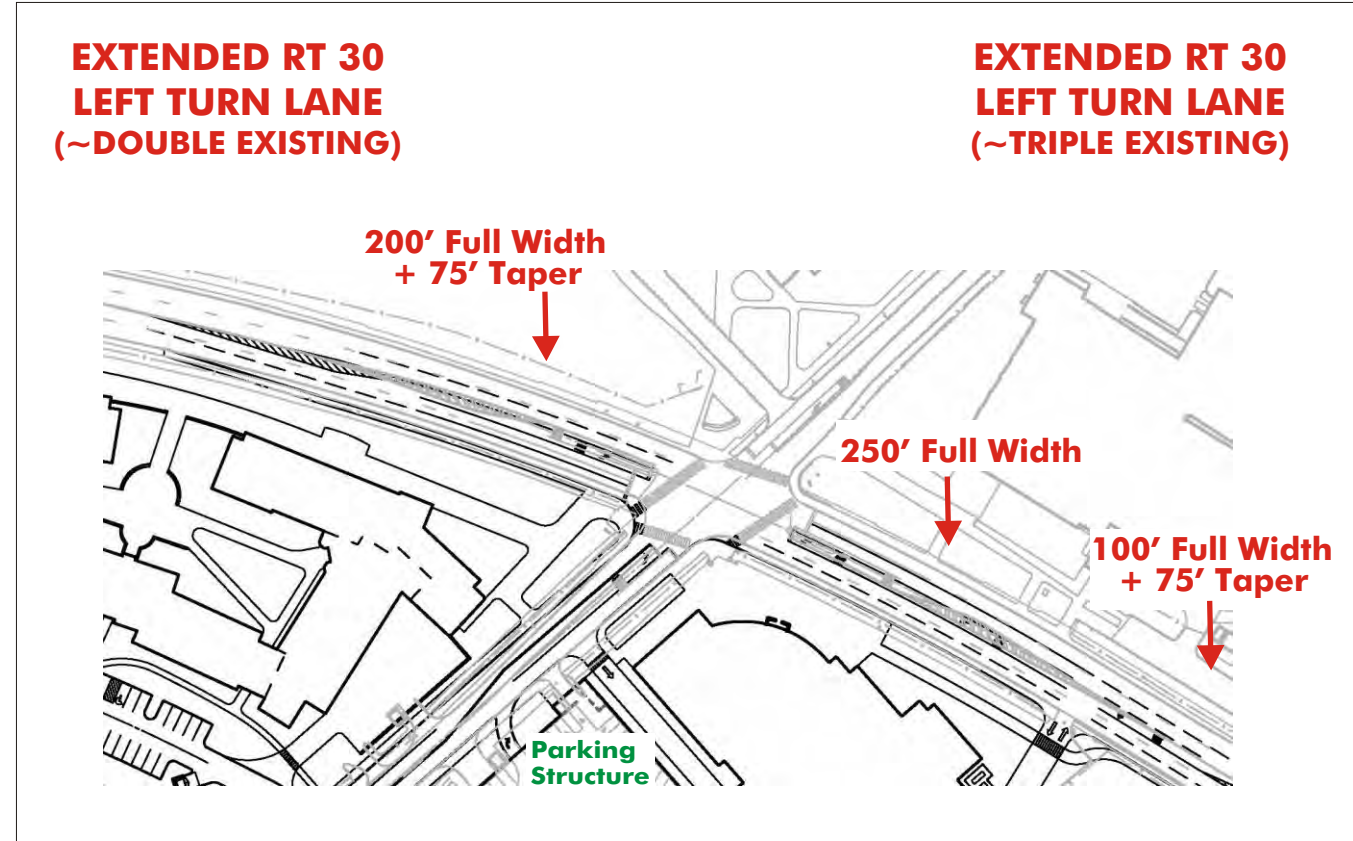
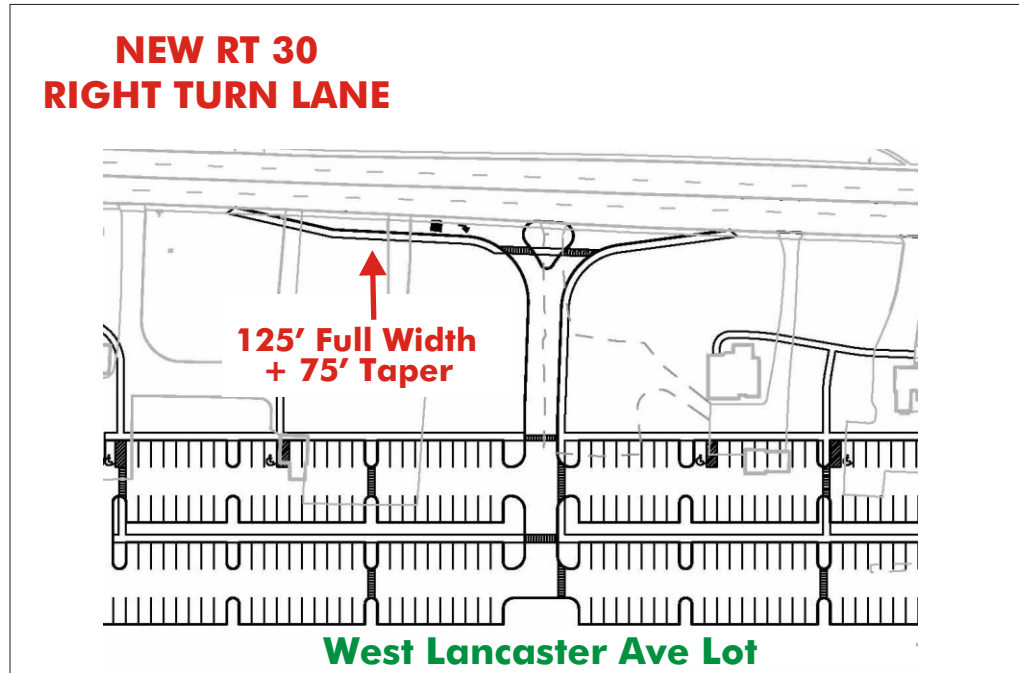


* figure preparation date

Proposed Traffic Improvements 2

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

September 2014*



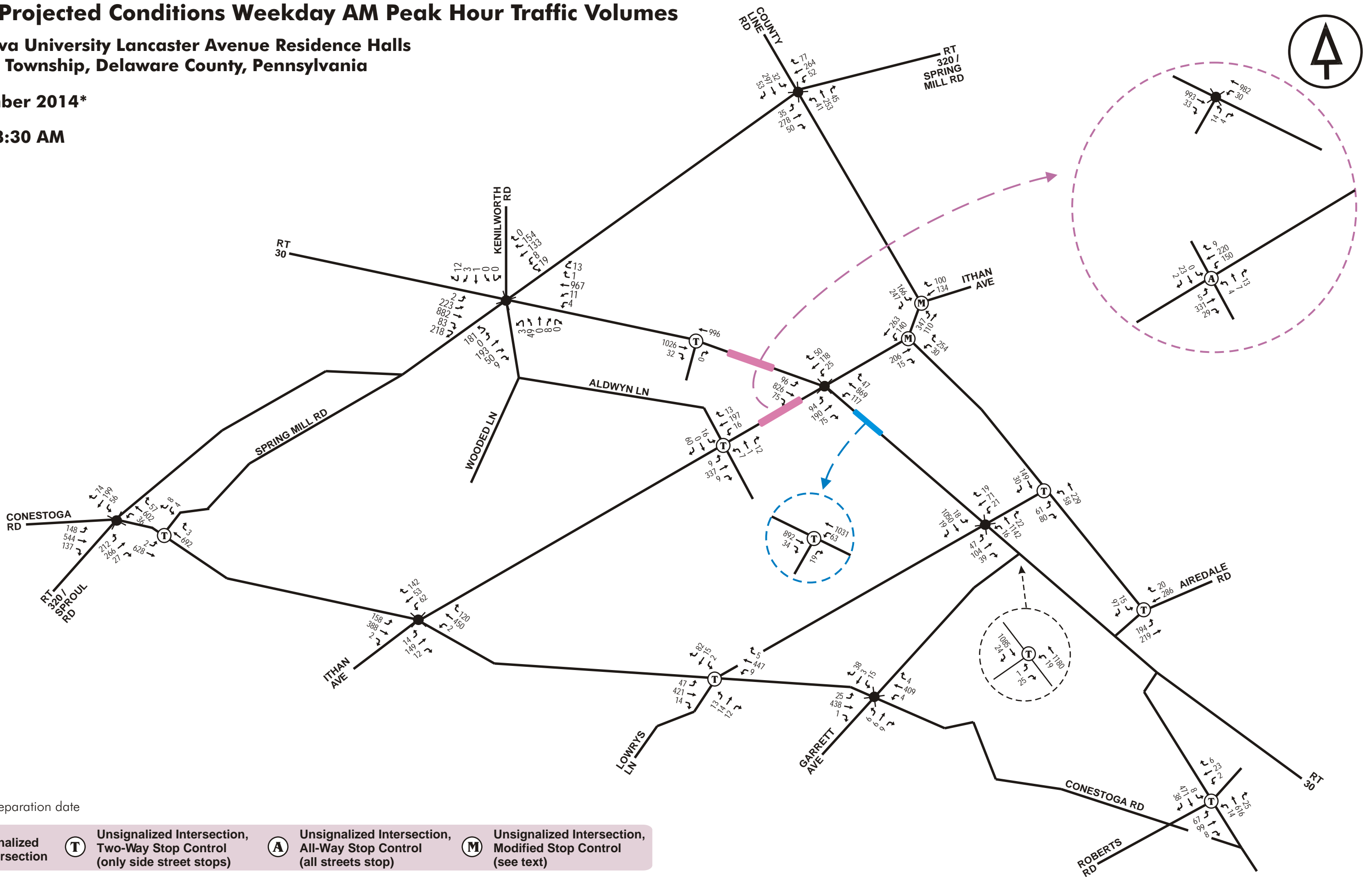
* figure preparation date

2018 Projected Conditions Weekday AM Peak Hour Traffic Volumes

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

September 2014*

7:30 - 8:30 AM



* figure preparation date

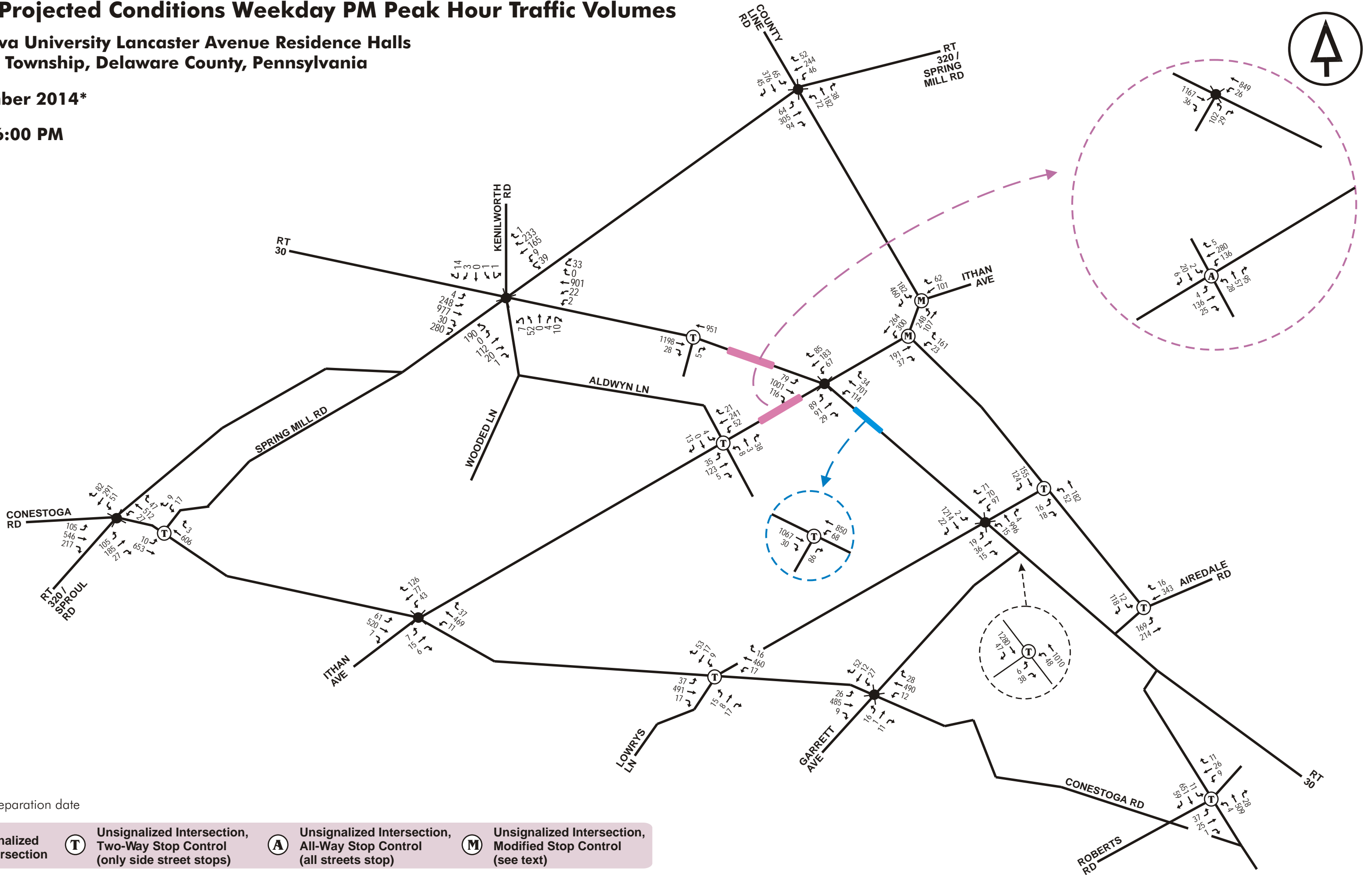
Signalized Intersection	Unsignalized Intersection, Two-Way Stop Control (only side street stops)	Unsignalized Intersection, All-Way Stop Control (all streets stop)	Unsignalized Intersection, Modified Stop Control (see text)
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2018 Projected Conditions Weekday PM Peak Hour Traffic Volumes

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

September 2014*

5:00 - 6:00 PM



* figure preparation date

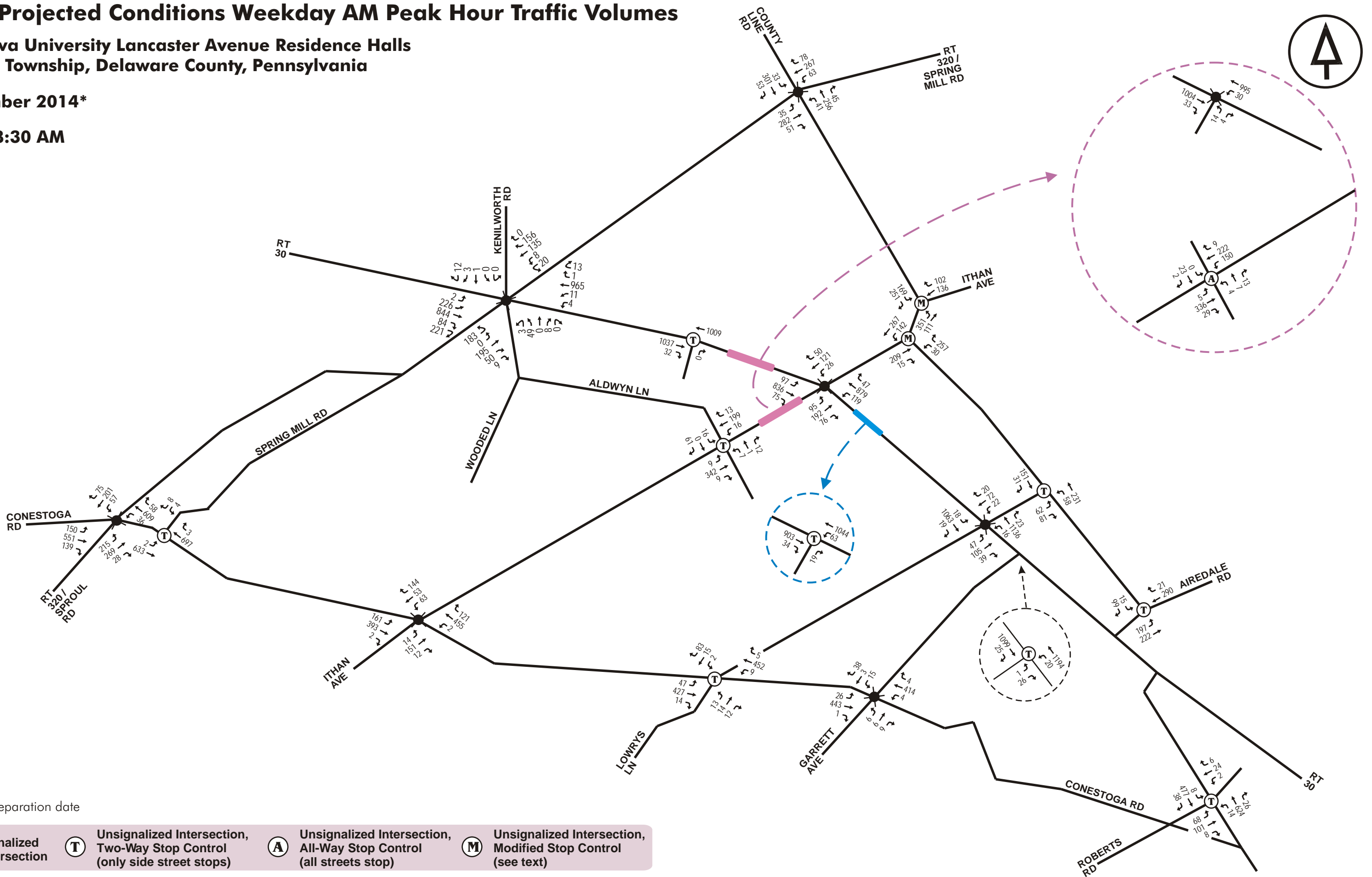
	Signalized Intersection		Unsignalized Intersection, Two-Way Stop Control (only side street stops)		Unsignalized Intersection, All-Way Stop Control (all streets stop)		Unsignalized Intersection, Modified Stop Control (see text)
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2023 Projected Conditions Weekday AM Peak Hour Traffic Volumes

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

September 2014*

7:30 - 8:30 AM



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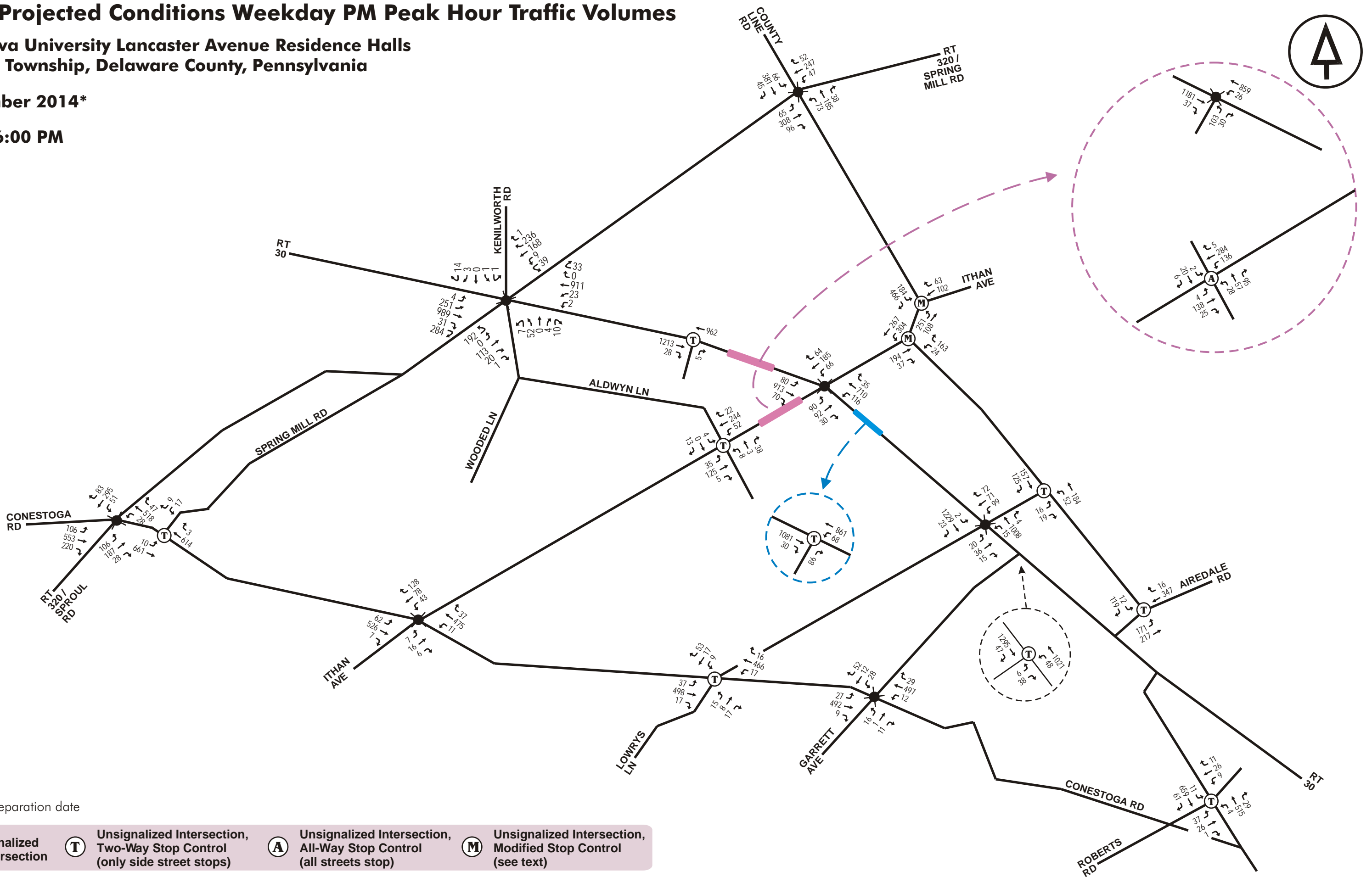
 Signalized Intersection	 Unsignalized Intersection, Two-Way Stop Control (only side street stops)	 Unsignalized Intersection, All-Way Stop Control (all streets stop)	 Unsignalized Intersection, Modified Stop Control (see text)
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2023 Projected Conditions Weekday PM Peak Hour Traffic Volumes

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

September 2014*

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* figure preparation date

	Signalized Intersection		Unsignalized Intersection, Two-Way Stop Control (only side street stops)		Unsignalized Intersection, All-Way Stop Control (all streets stop)		Unsignalized Intersection, Modified Stop Control (see text)
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APPENDIX A
Project Correspondence



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

<u>Name</u>	<u>Affiliation</u>
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 defensible.

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-intersection 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

Villanova Meeting Minutes

15 October 2012, revised 8 November 2012

Page 4 of 4

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.

**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

F. Tavani and Associates, Inc.
105 Kenilworth Street
Philadelphia, PA 19147

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

www.FTAVANIASSOCIATES.com

--- 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 embarrassed to only be mentioning this now -- but one of the things that occurred 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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Villanova University Lancaster Avenue Housing Initiative
Traffic meeting with Radnor Township
Meeting Minutes

14 November 2012
revised 27 November 2012

Attendees

<u>Name</u>	<u>Affiliation</u>		
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 ensued 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.*



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:

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

www.gilmore-assoc.com

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.

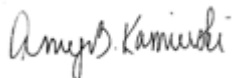
INTERSECTION:

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, 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.



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:

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

www.gilmore-assoc.com

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.

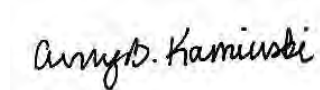
4. **Pike Parking Garage Location** Although perhaps premature as this is a land development comment, we recommend the Township consider having the applicant investigate altering the location of the Pike Garage to a more campus neutral site near the proposed pedestrian bridge. Moving the parking structure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



190 N INDEPENDENCE MALL WEST
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www.dvrpc.org

April 26, 2013

Mr. Francis Hanney
PennDOT, District 6.0
7000 Geerdes Blvd
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,

A handwritten signature in black ink, appearing to read "Matthew T. Gates". The signature is fluid and cursive, with a long horizontal stroke at the end.

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

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.

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

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- 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

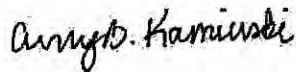
1. §280-135G(1)(c) indicates the Transportation Impact Assessment (TIA) must follow PennDOT SOL 470-09-4 Transportation Impact Study Guidelines, dated February 12, 2009, as amended, regarding *Policies and Procedures For Transportation Impact Studies*, the TIS should be revised to include the following:

- 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, P.E., PTOE
Department Manager of Transportation
Gilmore & Associates, Inc.

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:

<u>Applicant:</u>	Villanova University
<u>Requested Action/Use:</u>	CICD Conditional Use – Development Impact Statement Review
<u>Zoning District:</u>	PI – Planned Institutional; CO – Commercial Office
<u>Location and Size:</u>	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.
<u>Existing Use:</u>	Surface parking lots
<u>Proposed Use:</u>	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.

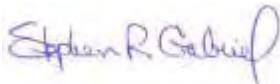
49. The report notes that the University is not subject to property taxes nor is it expected that the retail uses that are part of the project and the University’s core mission will pay any business taxes. The report goes on to say that roughly \$5.6 million dollars in one-time permit fees and gross 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

H:\Projects\10144\101442003\CivMun\Ltr-WBolla-CICD CU-Development Impact Statement-Rev_1_08-19-14(2).pdf

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.

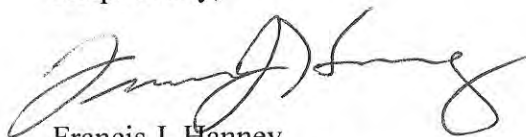
- k. The Synchro analyses should address the following:
 - i) Ensure that Future Build volumes are consistent with the submitted figures.
 - ii) Per the current Highway Capacity Manual the overall intersection peak hour factor should be used.
 - iii) Ensure that all turn lanes are coded appropriately.
 - 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

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

BUILDING ON A FOUNDATION OF EXCELLENCE

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 Exhibit.A.18 indicates 15,000 square feet of retail space.

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

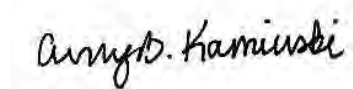
- J. Verify the 2023 PM Peak Hour traffic volumes for the eastbound right turn lane at the intersection of Lancaster Avenue and Ithan Avenue and revise as needed. It appears the PM Peak Hour 2023 traffic volumes are less than the existing conditions and the 2018 conditions; verify and revise as necessary.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

A handwritten signature in black ink that reads "Amy B. Kaminski". The signature is written in a cursive style.

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



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)

ALL VIA ELECTRONIC MAIL ONLY



22 October 2014

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

**RE: Villanova University – Crosswalk Lengths
Lancaster Avenue and Ithan Avenue
FTA Job # 211-027**

Dear Mr. Bolla:

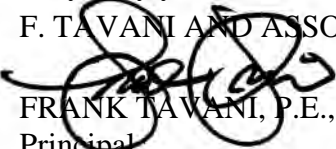
At the last conditional use hearing, some township exhibits made reference to pedestrian (ped) phase calculations at the intersection of Lancaster Avenue and Ithan Avenue. I write to you today to provide some clarification on this matter.

The township exhibits relied on PennDOT signal plan depictions of the existing crosswalks. Signal plans are intended to provide information on signal timing parameters. They sometimes do not accurately depict certain physical conditions as they are not intended to be “as built” documents.

In this instance field inspection of the subject intersection will reveal that the eastbound (EB) approach to the intersection features the longest crosswalk at the intersection. It is EB crosswalk which dictates the duration of the ped phase. Adding additional lanes – such as a new exclusive right-turn lane – will cause the EB crosswalk to be wider and the ped phase to be longer. A three-page exhibit is attached to this letter. It provides added clarification on the subject.

Please also bear in mind that the project will result in less – not more – traffic driving through the study area since the project results in currently-commuting students becoming campus-residing students. A-18 (the traffic study) conservatively assumes that all traffic continues to be peak-hour moving traffic, which it clearly will not be. If the LAH project is constructed, the EB right-turn movement will very likely feature lower peak hour traffic volumes than exist today, which are already relatively light (see attached). Additionally, “special event” traffic management is proposed to be significantly different than what presently exists since new parking will be introduced at several different locations throughout campus, all of which will serve to reduce the role of the EB right-turn movement as compared with the way it may function during special events today.

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

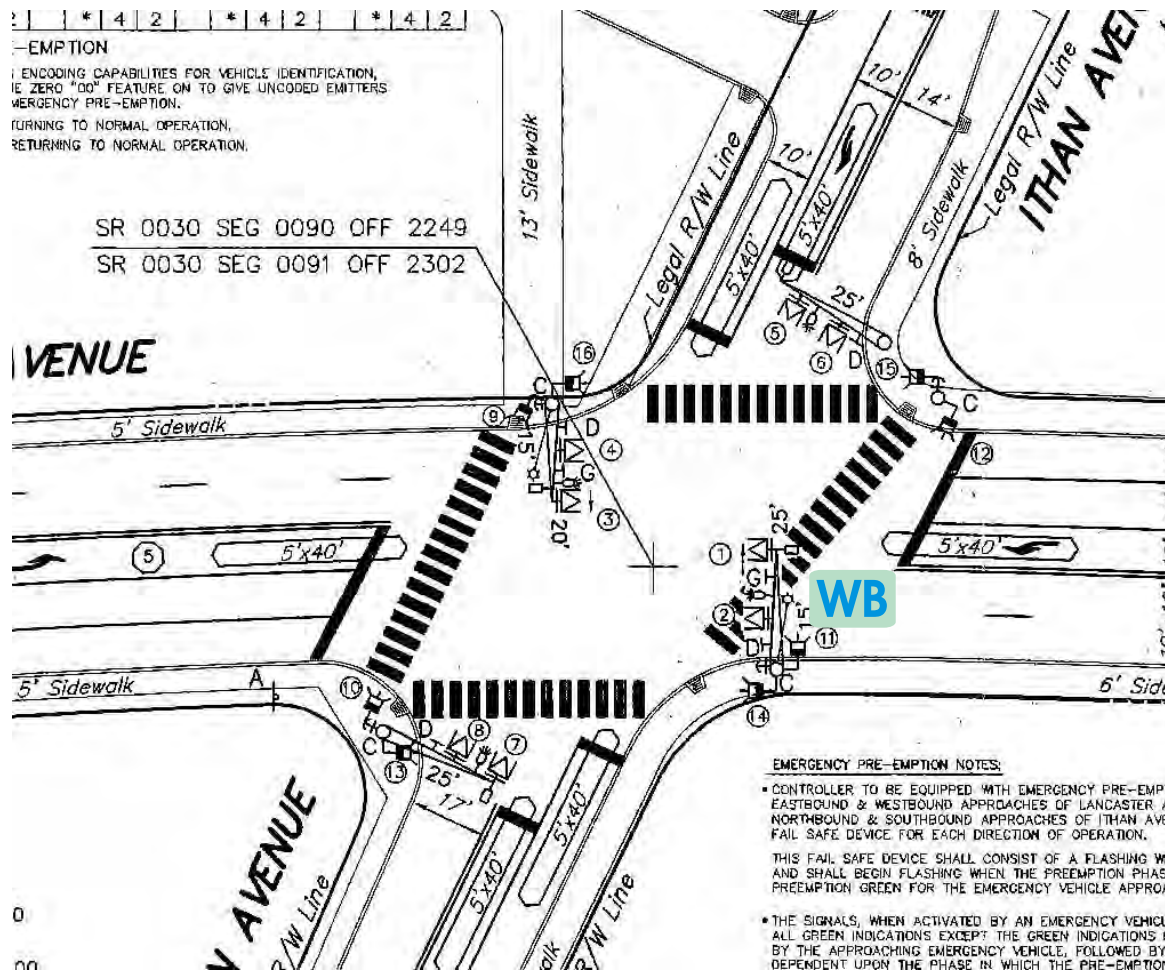
cc: Gilmore & Associates, Inc. (Amy Kaminski, P.E., PTOE)
Radnor Township (c/o Steve Norcini, P.E.)
Villanova University (c/o Marilou Smith)

LANCASTER / ITHAN

EXISTING CROSSWALKS, SIGNAL PLAN DEPICTION

The PennDOT-provided signal plans included in Appendix J of A-18 were provided as an aid in evaluating signal timing parameters used in the capacity analysis work sheets, not as a depiction of present-day crosswalk conditions.

The exhibits presented at the Conditional Use Hearing on 8 October 2014 appear to be based on crosswalk lengths as depicted in the signal plan. In particular the length of the WB crosswalk was utilized in the basis of many conclusions. Actual field conditions are different (see next page).



The signal plan depicts the **WB** crosswalk as the longest crosswalk at the intersection but actual field conditions are different.

LANCASTER / ITHAN

EXISTING CROSSWALKS, ACTUAL CONDITIONS

The image shown below is a Microsoft Bing image which depicts actual conditions with greater accuracy than the signal plan. As shown, the EB crosswalk is in fact the longest crosswalk. Field measurements which were conducted in October 2014 are provided to the right of the image.

The EB crosswalk dictates the duration of the all-red pedestrian phase. Increasing its length will increase the duration of the phase. Adding a new right-turn lane will increase its length.



CROSSWALK LENGTHS

EB	65 ft
WB	60 ft
NB	45 ft
SB	56 ft

EB crosswalk is longest and controls length of ped phase at intersection. Adding a right turn lane will increase the length of the ped phase.

LANCASTER / ITHAN

ADDITIONAL PED PHASE DETAILS

Township exhibits assert that current design guidelines will increase the ped phase duration. However, those exhibits also demonstrate some subjectivity (such as for the 'Walk' time) and earlier requests by RETTEW to reduce crosswalk lengths are also yet-to-be fully explored (and may result in reduced pedestrian phase duration).

For example, there may be an opportunity to realign the EB crosswalk as depicted below. Since the length of the EB crosswalk has a direct relationship with the ped phase duration, the realignment could result in reduced ped phase duration. However and as previously mentioned, adding a new right-turn lane will increase the length of the EB crosswalk, and so would increase the duration of the pedestrian phase.



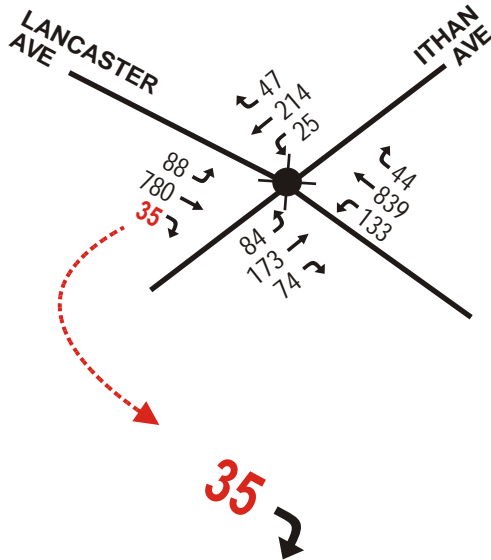
The duration of the existing ped phase can be maintained and possibly even shortened provided no new EB right turn lane is introduced.

Existing Weekday Traffic Volumes

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

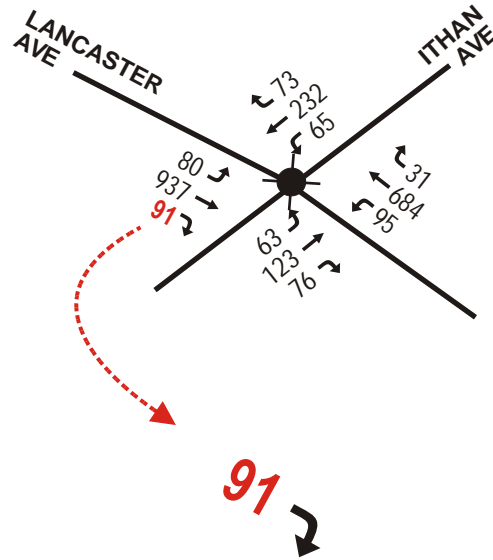
Excerpted from A-18

AM Peak Hour



35 vehicles per hour make a right turn under existing conditions during the AM peak hour.

PM Peak Hour



91 vehicles per hour make a right turn under existing conditions during the PM peak hour.



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

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www.FTAVANIASSOCIATES.COM

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 results 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)

ALL VIA ELECTRONIC MAIL ONLY

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

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.

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

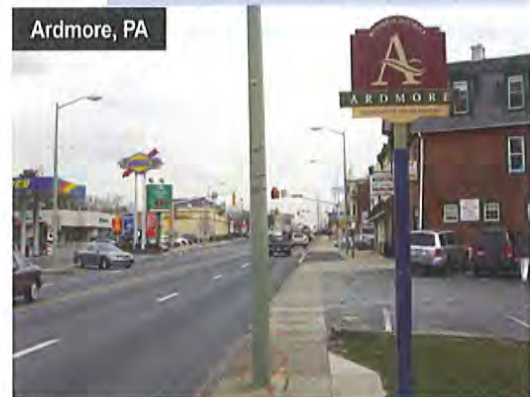
Understanding the land use context provides guidance on who will need to use the road and how. This understanding influences the geometric design of the roadway and the types of amenities required in the right-of-way.

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.



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.”

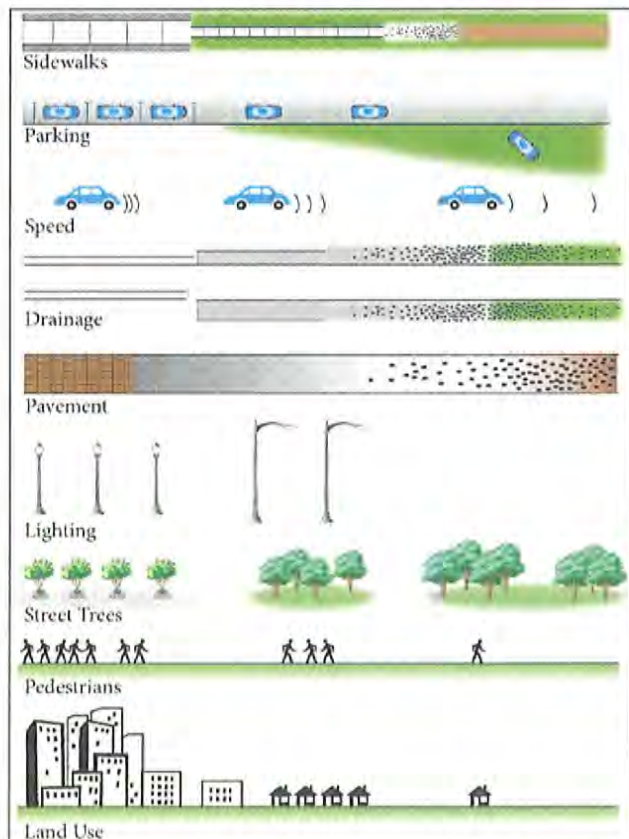


Figure 4.1 From Urban to Rural. As intensity and mix of uses along a roadway increase, there is a greater need to accommodate and prioritize other modes of travel, including bicyclists, pedestrians, and transit riders.

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 establishments 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.



Transportation Context

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

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.



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 consid-

ered 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

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.”



Route 27, Princeton

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.

RURAL _____ **to** _____

Rural Places

Suburban
Neighborhood

Suburban
Corridor

Suburban
Center

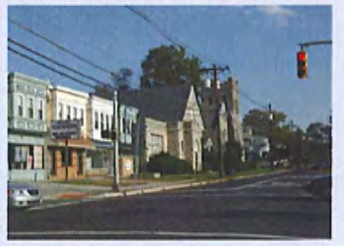


Figure 5.1 Roads in Context



URBAN

Town/Village Neighborhood

Town Center

Urban Core

REGIONAL

Regional Arterial

Community Arterial

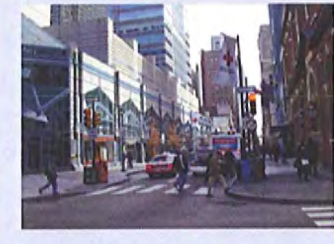
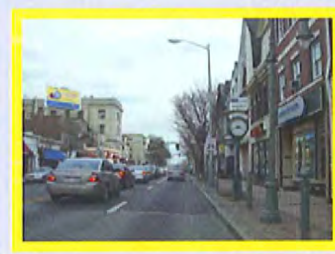
Community Collector

Neighborhood Collector

Local Road/ Street

to

LOCAL



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

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.

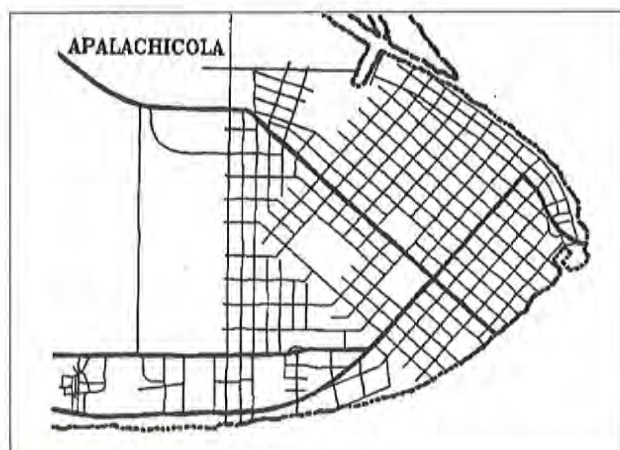
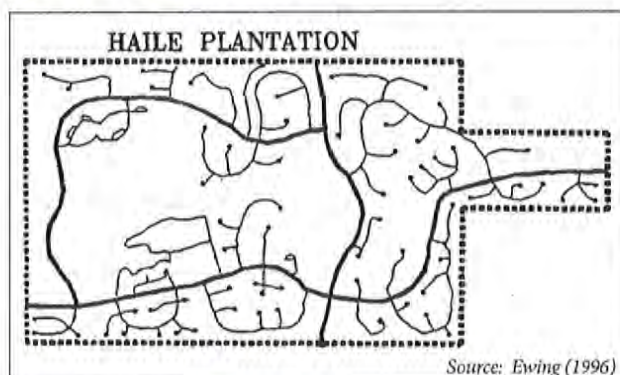


Figure 5.2. Traditional Urban Grid



Source: Ewing (1996)

Figure 5.3. Contemporary Branching Network

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 Harleyville, PA (top) and Lansdale, PA (bottom). Harleyville lies six miles northwest of Lansdale, with I-476 passing between the two municipalities. Motorists on Route 63 in Harleyville 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.

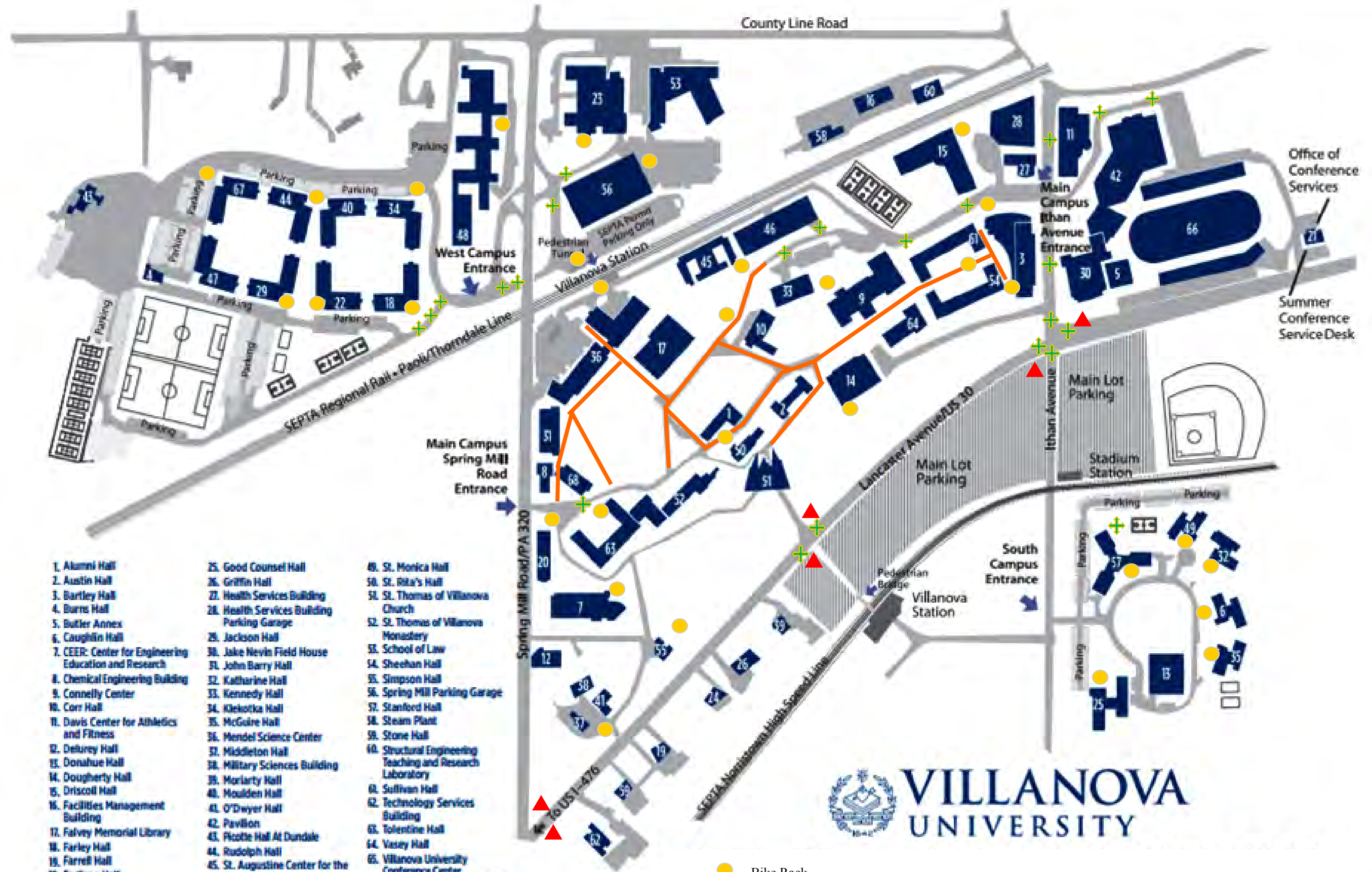
The spacing of traffic signals has a major influence on roadway operating speeds and capacity. Studies have found that a four lane divided arterial roadway with signal spacing of 2640 ft. carries the same amount of traffic as a six lane arterial with signals spaced at 1320 ft.⁸ Neither situation is optimal 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



- | | | |
|--|--|--|
| 1. Alumni Hall | 25. Good Counsel Hall | 48. St. Monica Hall |
| 2. Austin Hall | 26. Griffin Hall | 50. St. Rita's Hall |
| 3. Bartley Hall | 27. Health Services Building | 51. St. Thomas of Villanova Church |
| 4. Burns Hall | 28. Health Services Building Parking Garage | 52. St. Thomas of Villanova Monastery |
| 5. Butler Annex | 29. Jackson Hall | 53. School of Law |
| 6. Caughlin Hall | 30. Jake Nevin Field House | 54. Sheehan Hall |
| 7. CEER: Center for Engineering Education and Research | 31. John Barry Hall | 55. Simpson Hall |
| 8. Chemical Engineering Building | 32. Katharine Hall | 56. Spring Mill Parking Garage |
| 9. Connelly Center | 33. Kennedy Hall | 57. Stanford Hall |
| 10. Corr Hall | 34. Klekotka Hall | 58. Steam Plant |
| 11. Davis Center for Athletics and Fitness | 35. McGuire Hall | 59. Stone Hall |
| 12. DeLurey Hall | 36. Mendel Science Center | 60. Structural Engineering Teaching and Research Laboratory |
| 13. Donahue Hall | 37. Middleton Hall | 61. Sullivan Hall |
| 14. Dougherty Hall | 38. Military Sciences Building | 62. Technology Services Building |
| 15. Driscoll Hall | 39. Moriarty Hall | 63. Tolentine Hall |
| 16. Facilities Management Building | 40. Moulden Hall | 64. Vasey Hall |
| 17. Falvey Memorial Library | 41. O'Dwyer Hall | 65. Villanova University Conference Center (501 County Line Road, not shown) |
| 18. Farley Hall | 42. Pavilion | 66. Villanova Stadium |
| 19. Farrell Hall | 43. Picotte Hall At Dundale | 67. Webb Hall |
| 20. Fedigan Hall | 44. Rudolph Hall | 68. White Hall |
| 21. Galberry Hall | 45. St. Augustine Center for the Liberal Arts | |
| 22. Gallen Hall | 46. St. Augustine Center for the Liberal Arts Parking Garage | |
| 23. Garey Hall | 47. St. Clare Hall | |
| 24. Geraghty Hall | 48. St. Mary's Hall | |



- Bike Rack
- + Crosswalk
- Pedestrian Only Roads
- ▲ SEPTA Bus Stop (105 & 106 lines)

APPENDIX E

Data Collection

DATA COLLECTION DETAILS

(This appendix is based on a submittal entitled “Deliverable #1” which was shared with the township and PennDOT on or about 01-15-2013)

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 phenomena 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 begining				Sproul &	Conestoga &	Conestoga &	Spring Mill &	County Line	Conestoga &	Conestoga &	Ithan &	Ithan &	Ithan &	County Line	County Line		
	30 & Sproul	30 & Ithan	30 & Lowry	Conestoga	Spring Mill	Ithan	County Line	& Roberts	Garret	Lowrys	Aldwyn	County Line (North)	County Line (South)	& Lowrys	& 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)

Total Intersection Volume

time begining	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 begining	Total Intersection Volume						total	
	30 & Sproul	30 & Ithan	Sproul & Conestoga	Conestoga & Spring Mill	Conestoga & Ithan			
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 begining	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 begining	Total Intersection Volume						total	
	30 & Sproul	30 & Ithan	Sproul & Conestoga	Conestoga & Spring Mill	Conestoga & Ithan			
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	

F. Tavani and Associates, Inc.

105 Kenilworth Street
Philadelphia, PA 19147

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						Int. Total						
	L to Lan	L to Ald	T to Spr	R to Lan	R to Ken	App. Total	L to Ald	L to Spr	T to Lan	R to Ken	R to S M	App. Total	L to Spr	L to Lan	T to Ken	R to S M	R to Lan	App. Total	L to Lan	L to Ken	T to S M	R to Lan	R to Ald	App. Total	L to Ken	L to S M	T to Lan	R to Ald	R to Spr	App. Total	L to S M	L to Lan	T to Ald	R to Spr	R to Lan	App. Total							
07:00 AM	6	0	12	25	0	0	43	0	0	12	1	0	0	122	0	11	0	1	0	0	12	71	0	26	2	1	0	100	1	43	15	11	38	0	246	0	0	0	0	0	0	0	523
07:15 AM	5	5	27	40	0	0	77	0	1	18	0	2	0	191	1	22	0	0	0	0	23	69	1	36	7	3	0	116	0	48	15	16	47	0	265	0	0	0	1	4	0	5	677
07:30 AM	8	2	36	32	0	1	79	0	4	19	0	2	0	198	0	16	0	2	0	0	18	36	0	40	7	1	0	84	0	62	22	17	59	1	363	0	0	0	0	1	0	1	743
07:45 AM	4	3	28	28	0	2	65	1	1	22	0	2	0	225	2	7	0	2	0	0	11	50	0	51	17	2	0	120	0	54	23	39	62	0	386	0	0	1	1	4	0	6	813
Total	23	10	103	125	0	3	264	16	72	16	0	736	356	0	5	0	0	64	226	153	33	7	0	420	176	207	83	20	1	1260	0	0	1	2	9	0	12	2756					
08:00 AM	5	3	38	48	0	4	98	1	2	23	0	3	1	240	1	11	0	2	0	0	14	45	0	37	9	4	0	95	2	63	19	13	42	0	313	0	0	0	0	5	0	5	765
08:15 AM	2	0	29	44	0	1	76	2	4	29	1	6	1	307	0	14	0	2	0	0	16	47	0	62	16	2	0	127	0	41	17	13	52	0	279	0	0	0	2	2	0	4	809
08:30 AM	11	1	31	40	0	2	85	0	5	20	0	8	0	218	0	9	0	2	1	0	12	40	0	44	7	1	0	92	0	72	16	7	34	0	280	0	1	0	0	3	0	4	691
08:45 AM	5	2	16	31	0	1	55	0	3	25	0	3	2	263	2	6	0	0	0	0	8	46	1	44	8	1	0	100	0	59	21	14	42	0	332	0	0	0	1	1	0	2	760
Total	23	6	114	163	0	8	314	314	98	1	20	4	1028	340	0	6	1	0	50	178	187	40	8	0	414	250	235	47	17	0	1204	0	1	0	3	11	0	15	3025				
Grand Total	46	16	21	28	0	11	578	420	17	2	26	4	1764	696	0	11	1	0	114	404	24	73	15	0	834	344	15	13	37	1	2464	0	1	1	5	20	0	27	5781				
Approch %	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	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	18	27	0	11	523	419	16	2	22	4	1711	690	0	0	0	0	9	377	2	32	71	15	0	789	341	14	13	33	1	2349	0	1	1	4	20	0	26	5494			
% cars	82	10	85	94	0	10	90.5	10	95	97	10	84	10	97	10	93	0	0	0	0	84.2	93	10	95	97	10	0	94.6	10	93	96	10	90	10	95.3	0	10	10	80	10	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	2.8	0	15.4	0	3	0	6.2	0	10	10	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						Int. Total	
	L to Lan	L to Ald	T to Spr	R to Lan	R to Ken	App. Total	L to Ald	L to Spr	T to Lan	R to Ken	R to S M	App. Total	L to Spr	L to Lan	T to Ken	R to S M	R to Lan	App. Total	L to Lan	L to Ken	T to S M	R to Lan	R to Ald	App. Total	L to Ken	L to S M	T to Lan	R to Ald	R to Spr	App. Total	L to S M	L to Lan	T to Ald	R to Spr	R to Lan	App. 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	1.000	.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	

F. Tavani and Associates, Inc.

105 Kenilworth Street
Philadelphia, PA 19147

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

Start Time	North Spring Mill Road Southbound						Lancaster Avenue Westbound						Aldwyn Lane Northwestbound						Sproul Road Northbound						Lancaster Avenue Eastbound						Kenilworth Road Southeastbound						Int. Total						
	L to Ald	L to Spr	T to Ken	R to Lan	R to SM	App. Total	L to Ald	L to Spr	T to Ken	R to Lan	R to SM	App. Total	L to Ald	L to Spr	T to Ken	R to Lan	R to SM	App. Total	L to Ald	L to Spr	T to Ken	R to Lan	R to SM	App. Total	L to Ald	L to Spr	T to Ken	R to Lan	R to SM	App. Total	L to Ald	L to Spr	T to Ken	R to Lan	R to SM	App. 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
Approch %	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	10	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	

Start Time	North Spring Mill Road Southbound						Lancaster Avenue Westbound						Aldwyn Lane Northwestbound						Sproul Road Northbound						Lancaster Avenue Eastbound						Kenilworth Road Southeastbound						Int. Total
	L to Ald	L to Spr	T to Ken	R to Lan	R to SM	App. Total	L to Ald	L to Spr	T to Ken	R to Lan	R to SM	App. Total	L to Ald	L to Spr	T to Ken	R to Lan	R to SM	App. Total	L to Ald	L to Spr	T to Ken	R to Lan	R to SM	App. Total	L to Ald	L to Spr	T to Ken	R to Lan	R to SM	App. Total	L to Ald	L to Spr	T to Ken	R to Lan	R to SM	App. 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	1.000	.000	.750	.750	.000	.563	.250	.000	.786	.000	.567	.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

File Name : 02-30IthanAM

EB Peds = diag peds NE-SW

Site Code : 00000000

WB Peds = diag peds NW-SE

Start Date : 11/15/2012

Page No : 1

Groups Printed- cars - HV

Start Time	Ithan Avenue Southbound					Lancaster Avenue Westbound					Ithan Avenue Northbound					Lancaster Avenue Eastbound					Int. Total		
	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
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

Start Time	Ithan Avenue Southbound				Lancaster Avenue Westbound				Ithan Avenue Northbound				Lancaster Avenue Eastbound				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. 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

File Name : 02-30IthanAM

EB Peds = diag peds NE-SW

Site Code : 00000000

WB Peds = diag peds NW-SE

Start Date : 11/15/2012

Page No : 1

Groups Printed- HV

Start Time	Ithan Avenue Southbound					Lancaster Avenue Westbound					Ithan Avenue Northbound					Lancaster Avenue Eastbound					Int. Total		
	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
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	

Start Time	Ithan Avenue Southbound				Lancaster Avenue Westbound				Ithan Avenue Northbound				Lancaster Avenue Eastbound				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. 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

Start Time	Lowrys Lane Southbound					Lancaster Avenue Westbound					Lowrys Lane Northbound					Lancaster Avenue Eastbound					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
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	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

Start Time	Lowrys Lane Southbound				Lancaster Avenue Westbound				Lowrys Lane Northbound				Lancaster Avenue Eastbound				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. 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

Start Time	Lowrys Lane Southbound					Lancaster Avenue Westbound					Lowrys Lane Northbound					Lancaster Avenue Eastbound					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
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	

Start Time	Lowrys Lane Southbound				Lancaster Avenue Westbound				Lowrys Lane Northbound				Lancaster Avenue Eastbound				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. 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

Sproul & Conestoga Roads

File Name : 05-SprConAM
Site Code : 00000000
Start Date : 11/14/2012
Page No : 1

Groups Printed- cars - HV

Start Time	Sproul Road Southbound					Conestoga Road Westbound					Sproul Road Northbound					Conestoga Road Eastbound					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
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

Start Time	Sproul Road Southbound				Conestoga Road Westbound				Sproul Road Northbound				Conestoga Road Eastbound				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. 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

Start Time	Sproul Road Southbound					Conestoga Road Westbound					Sproul Road Northbound					Conestoga Road Eastbound					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
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	

Start Time	Sproul Road Southbound				Conestoga Road Westbound				Sproul Road Northbound				Conestoga Road Eastbound				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. 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

Start Time	Spring Mill Road Southbound				Conestoga Road Westbound				Conestoga Road Eastbound				Int. Total
	Left	Right	Peds	App. Total	Thru	Right	Peds	App. Total	Left	Thru	Peds	App. 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

Start Time	Spring Mill Road Southbound			Conestoga Road Westbound			Conestoga Road Eastbound			Int. Total
	Left	Right	App. Total	Thru	Right	App. Total	Left	Thru	App. 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

Start Time	Spring Mill Road Southbound				Conestoga Road Westbound				Conestoga Road Eastbound				Int. Total
	Left	Right	Peds	App. Total	Thru	Right	Peds	App. Total	Left	Thru	Peds	App. 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	

Start Time	Spring Mill Road Southbound			Conestoga Road Westbound			Conestoga Road Eastbound			Int. Total
	Left	Right	App. Total	Thru	Right	App. Total	Left	Thru	App. 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-ConlthAM
Site Code : 00000000
Start Date : 11/14/2012
Page No : 1

Groups Printed- cars - HV

Start Time	Ithan Avenue Southbound					Conestoga Road Westbound					Ithan Avenue Northbound					Conestoga Road Eastbound					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
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

Start Time	Ithan Avenue Southbound				Conestoga Road Westbound				Ithan Avenue Northbound				Conestoga Road Eastbound				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. 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-ConlthAM
Site Code : 00000000
Start Date : 11/14/2012
Page No : 1

Groups Printed- HV

Start Time	Ithan Avenue Southbound					Conestoga Road Westbound					Ithan Avenue Northbound					Conestoga Road Eastbound					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
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	

Start Time	Ithan Avenue Southbound					Conestoga Road Westbound					Ithan Avenue Northbound					Conestoga Road Eastbound					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
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
Page No : 1

Groups Printed- cars - HV

Start Time	Lowrys Lane Southbound					Conestoga Road Westbound					Strathmore Drive Northbound					Conestoga Road Eastbound					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
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

Start Time	Lowrys Lane Southbound				Conestoga Road Westbound				Strathmore Drive Northbound				Conestoga Road Eastbound				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. 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

Start Time	Lowrys Lane Southbound					Conestoga Road Westbound					Strathmore Drive Northbound					Conestoga Road Eastbound					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
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	

Start Time	Lowrys Lane Southbound				Conestoga Road Westbound				Strathmore Drive Northbound				Conestoga Road Eastbound				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. 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

Start Time	Garrett Avenue Southbound					Conestoga Road Westbound					Williams Road Northbound					Conestoga Road Eastbound					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
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

Start Time	Garrett Avenue Southbound				App. Total	Conestoga Road Westbound				App. Total	Williams Road Northbound				App. Total	Conestoga Road Eastbound				Int. Total	
	Left	Thru	Right	Peds		Left	Thru	Right	Peds		Left	Thru	Right	Peds		Left	Thru	Right	Peds		
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

Start Time	Garrett Avenue Southbound					Conestoga Road Westbound					Williams Road Northbound					Conestoga Road Eastbound					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
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 %																					

Start Time	Garrett Avenue Southbound				Conestoga Road Westbound				Williams Road Northbound				Conestoga Road Eastbound				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. 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

Start Time	County Line Road Southbound					Spring Mill Road Westbound					County Line Road Northbound					Spring Mill Road Eastbound					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
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

Start Time	County Line Road Southbound				Spring Mill Road Westbound				County Line Road Northbound				Spring Mill Road Eastbound				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. 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
Page No : 1

Groups Printed- HV

Start Time	County Line Road Southbound					Spring Mill Road Westbound					County Line Road Northbound					Spring Mill Road Eastbound					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
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	

Start Time	County Line Road Southbound					Spring Mill Road Westbound					County Line Road Northbound					Spring Mill Road Eastbound					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
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
Start Date : 11/15/2012
Page No : 1

Groups Printed- cars - HV

Start Time	Ithan Avenue Southbound				Ithan Avenue Northbound				County Line Road Eastbound				Int. Total
	Thru	Right	Peds	App. Total	Left	Thru	Peds	App. Total	Left	Right	Peds	App. 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

Start Time	Ithan Avenue Southbound			Ithan Avenue Northbound			County Line Road Eastbound			Int. Total
	Thru	Right	App. Total	Left	Thru	App. Total	Left	Right	App. 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
Start Date : 11/15/2012
Page No : 1

Groups Printed- HV

Start Time	Ithan Avenue Southbound				Ithan Avenue Northbound				County Line Road Eastbound				Int. Total
	Thru	Right	Peds	App. Total	Left	Thru	Peds	App. Total	Left	Right	Peds	App. 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	

Start Time	Ithan Avenue Southbound			Ithan Avenue Northbound			County Line Road Eastbound			Int. Total
	Thru	Right	App. Total	Left	Thru	App. Total	Left	Right	App. 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
Page No : 1

Groups Printed- cars - HV

Start Time	Ithan Avenue Southbound				County Line Road Westbound				Ithan Avenue Northbound				Int. Total
	Left	Thru	Peds	App. Total	Left	Right	Peds	App. Total	Thru	Right	Peds	App. 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

Start Time	Ithan Avenue Southbound			County Line Road Westbound			Ithan Avenue Northbound			Int. Total
	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. 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

File Name : 12-IthCoLSAM

Site Code : 00000000

Start Date : 11/15/2012

Page No : 1

Groups Printed- HV

Start Time	Ithan Avenue Southbound				County Line Road Westbound				Ithan Avenue Northbound				Int. Total
	Left	Thru	Peds	App. Total	Left	Right	Peds	App. Total	Thru	Right	Peds	App. 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	

Start Time	Ithan Avenue Southbound			County Line Road Westbound			Ithan Avenue Northbound			Int. Total
	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. 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 & Airdale Roads

File Name : 14-CoLAirAM
Site Code : 00000000
Start Date : 11/13/2012
Page No : 1

Groups Printed- cars - HV

Start Time	Airdale Road Southbound				County Line Road Westbound				Airdale Road Eastbound				Int. Total
	Left	Right	Peds	App. Total	Thru	Right	Peds	App. Total	Left	Thru	Peds	App. 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

Start Time	Airdale Road Southbound			County Line Road Westbound			Airdale Road Eastbound			Int. Total
	Left	Right	App. Total	Thru	Right	App. Total	Left	Thru	App. 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

Site Code : 00000000

Start Date : 11/13/2012

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Groups Printed- HV

Start Time	Airdale Road Southbound				County Line Road Westbound				Airdale Road Eastbound				Int. Total
	Left	Right	Peds	App. Total	Thru	Right	Peds	App. Total	Left	Thru	Peds	App. 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	

Start Time	Airdale Road Southbound			County Line Road Westbound			Airdale Road Eastbound			Int. Total
	Left	Right	App. Total	Thru	Right	App. Total	Left	Thru	App. 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

Start Time	County Line Road Southbound					Roberts Road Westbound					County Line Road Northbound					Roberts Road Eastbound					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
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

Start Time	County Line Road Southbound				Roberts Road Westbound				County Line Road Northbound				Roberts Road Eastbound				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. 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

Site Code : 00000000

Start Date : 11/13/2012

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Groups Printed- HV

Start Time	County Line Road Southbound					Roberts Road Westbound					County Line Road Northbound					Roberts Road Eastbound					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
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	6	0	0	0	0	0	0	14
08:30 AM	0	5	0	0	5	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	6
08:45 AM	0	9	0	0	9	0	1	0	0	1	0	2	0	2	1	0	0	0	0	1	13
Total	0	26	2	0	28	0	1	0	0	1	0	7	2	9	1	0	0	0	0	1	39
Grand Total	0	47	2	0	49	0	2	0	0	2	0	9	2	11	1	0	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	0		
Total %	0	74.6	3.2	0	77.8	0	3.2	0	0	3.2	0	14.3	3.2	17.5	1.6	0	0	0	0	1.6	

Start Time	County Line Road Southbound				Roberts Road Westbound				County Line Road Northbound				Roberts Road Eastbound				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. 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	0	4	2	6	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
Page No : 1

Groups Printed- cars - HV

Start Time	Ithan Avenue Southbound					South Campus Westbound					Ithan Avenue Northbound					Aldwyn Lane Eastbound					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
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

Start Time	Ithan Avenue Southbound				South Campus Westbound				Ithan Avenue Northbound				Aldwyn Lane Eastbound				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. 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
Site Code : 00000000
Start Date : 11/15/2012
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Groups Printed- HV

Start Time	Ithan Avenue Southbound					South Campus Westbound					Ithan Avenue Northbound					Aldwyn Lane Eastbound					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
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	

Start Time	Ithan Avenue Southbound				South Campus Westbound				Ithan Avenue Northbound				Aldwyn Lane Eastbound				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. 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

Start Time	North Spring Mill Road Southbound						Lancaster Avenue Westbound						Aldwyn Lane Northwestbound						Sproul Road Northbound						Lancaster Avenue Eastbound						Kenilworth Road Southeastbound						Int. Total									
	L to Lan	L to Ald	T to Spr	R to Lan	R to Ken	App. Total	L to Ald	L to Spr	T to Lan	R to Ken	R to S M	App. Total	L to Spr	L to Lan	T to Ken	R to S M	R to Lan	App. Total	L to Lan	L to Ken	T to S M	R to Lan	R to Ald	App. Total	L to Ken	L to S M	T to Lan	R to Ald	R to Spr	App. Total	L to S M	L to Lan	T to Ald	R to Spr	R to Lan	App. Total										
04:00 PM	5	1	33	59	0	2	100	1	9	23	8	0	4	1	253	2	7	0	1	2	0	12	63	0	34	3	0	0	100	1	43	16	6	8	49	0	267	0	0	0	1	2	0	3	735	
04:15 PM	7	1	30	59	0	2	99	1	2	20	6	0	5	0	214	1	20	0	1	3	0	25	37	1	24	3	0	0	65	1	47	19	2	11	69	0	320	0	0	0	3	3	0	6	729	
04:30 PM	8	0	32	52	0	3	95	0	5	19	9	0	3	0	207	1	20	0	1	3	0	25	57	1	31	7	2	0	98	0	44	16	9	3	60	0	276	0	0	0	0	1	0	1	702	
04:45 PM	10	1	54	50	0	5	120	0	2	18	8	0	4	0	194	3	14	0	2	2	0	21	49	0	26	6	0	0	81	0	53	18	5	7	67	0	312	0	0	0	2	2	0	4	732	
Total	30	3	14	22	0	12	414	2	18	83	1	0	16	1	868	7	61	0	5	10	0	83	20	2	11	5	19	2	0	344	2	18	71	2	29	24	0	1175	0	0	0	6	8	0	14	2898
05:00 PM	11	2	36	64	1	4	118	0	4	22	4	0	4	0	232	0	9	0	1	3	2	15	36	0	30	3	0	0	69	0	63	22	3	5	77	0	368	0	0	0	1	4	0	5	807	
05:15 PM	11	2	45	70	0	2	130	1	9	20	6	0	8	0	224	1	15	0	2	2	0	20	61	0	26	4	0	0	91	1	45	21	5	7	71	0	339	1	1	0	0	3	0	5	809	
05:30 PM	7	3	40	50	0	0	100	0	2	22	4	0	10	0	236	2	14	0	0	4	1	21	45	0	23	3	0	0	71	1	66	26	9	7	66	1	410	0	0	0	2	3	0	5	843	
05:45 PM	9	2	42	46	0	0	99	1	7	18	1	0	10	0	199	4	13	0	1	1	0	19	45	0	31	10	1	0	87	2	70	25	8	11	62	0	403	0	0	0	0	4	0	4	811	
Total	38	9	16	23	1	6	447	2	22	83	5	0	32	0	891	7	51	0	4	10	3	75	18	7	11	0	20	1	0	318	4	24	96	4	30	27	1	1520	1	1	0	3	14	0	19	3270
Grand Total	68	12	31	45	1	18	861	4	40	16	6	0	48	1	1759	14	11	0	9	20	3	158	39	2	22	5	39	3	0	662	6	43	16	1	59	52	1	2695	1	1	0	9	22	0	33	6168
Approch %	7.9	1.4	36	52	0.1	2.1		0.2	2.3	94	7	0	2.7	0.1		8.9	7	0	5.7	12	1.9		59	4	0.3	34	5.9	0.5	0		0.2	16	2	2.2	19	3	0		3	3	0	27	66	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	29	44	1	18	838	4	39	16	9	0	47	1	1715	14	10	0	7	19	3	150	37	2	21	8	39	3	0	640	6	42	16	2	59	51	1	2655	1	1	0	8	22	0	3	6030
% cars	100	100	95	97	100	100	97.3	100	97	97	0	97	100	97.5	100	95	0	77	95	100	94.9	96	10	96	10	100	0	96.7	100	97	98	10	99	100	98.5	100	100	0	88	100	100	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	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	0	0	3	2.2			

Start Time	North Spring Mill Road Southbound						Lancaster Avenue Westbound						Aldwyn Lane Northwestbound						Sproul Road Northbound						Lancaster Avenue Eastbound						Kenilworth Road Southeastbound						Int. Total
	L to Lan	L to Ald	T to Spr	R to Lan	R to Ken	App. Total	L to Ald	L to Spr	T to Lan	R to Ken	R to S M	App. Total	L to Spr	L to Lan	T to Ken	R to S M	R to Lan	App. Total	L to Lan	L to Ken	T to S M	R to Lan	R to Ald	App. Total	L to Ken	L to S M	T to Lan	R to Ald	R to Spr	App. Total	L to S M	L to Lan	T to Ald	R to Spr	R to Lan	App. 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	768	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	0	1.6			2.2	0	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.

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- HV

Start Time	North Spring Mill Road Southbound						Lancaster Avenue Westbound						Aldwyn Lane Northwestbound						Sproul Road Northbound						Lancaster Avenue Eastbound						Kenilworth Road Southeastbound						Int. Total					
	L to Ald	L to Spr	T to Ken	R to Lan	R to SM	App. Total	L to Ald	L to Spr	T to Ken	R to Lan	R to SM	App. Total	L to Spr	L to Ken	T to SM	R to Ald	R to Lan	App. Total	L to Ken	L to SM	T to Ald	R to Spr	R to Lan	App. Total	L to SM	L to Ald	T to Spr	R to Lan	R to SM	App. Total												
04:00 PM	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	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	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	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	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	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	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	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	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	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	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
Approch %	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	0	22.5	65	0	12.5	0	0	0	0	0	10	0	0	0			
Total %	0	0	9.4	7.2	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	

Start Time	North Spring Mill Road Southbound						Lancaster Avenue Westbound						Aldwyn Lane Northwestbound						Sproul Road Northbound						Lancaster Avenue Eastbound						Kenilworth Road Southeastbound						Int. Total			
	L to Ald	L to Spr	T to Ken	R to Lan	R to SM	App. Total	L to Ald	L to Spr	T to Ken	R to Lan	R to SM	App. Total	L to Spr	L to Ken	T to SM	R to Ald	R to Lan	App. Total	L to Ken	L to SM	T to Ald	R to Spr	R to Lan	App. Total	L to SM	L to Ald	T to Spr	R to Lan	R to SM	App. Total										
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	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	1	0	0	1	0	0	1	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	1	0	0	5	0	0	5	0	0	0	0	1	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	1	0	0	6	0	0	6	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 Volume	0	0	3	4	0	7	0	0	18	0	1	19	0	0	0	0	1	1	1	0	1	0	0	0	2	0	7	10	0	2	0	19	0	0	0	0	0	0	0	48
% App. Total			42.9	57.1	0				94.7	0	5.3						100		50	0	50	0	0	0			36.8	52.6	0	10.5										
PHF	.000	.000	.750	.333	.000	.438	.000	.000	.750	.000	.250	.679	.000	.000	.000	.000	.250	.250	.250	.000	.250	.000	.000	.000	.250	.000	.360	.625	.000	.250	.594	.000	.000	.000	.000	.000	.000	.000	.632	

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

F. Tavani and Associates, Inc.

105 Kenilworth Street
Philadelphia, PA 19147

Lancaster & Ithan Avenues

File Name : 02-30IthanPM

EB Peds = diag peds NE-SW

Site Code : 00000000

WB Peds = diag peds NW-SE

Start Date : 11/15/2012

Page No : 1

Groups Printed- cars - HV

Start Time	Ithan Avenue Southbound					Lancaster Avenue Westbound					Ithan Avenue Northbound					Lancaster Avenue Eastbound					Int. Total		
	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
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

Start Time	Ithan Avenue Southbound				Lancaster Avenue Westbound				Ithan Avenue Northbound				Lancaster Avenue Eastbound				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. 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

File Name : 02-30IthanPM

EB Peds = diag peds NE-SW

Site Code : 00000000

WB Peds = diag peds NW-SE

Start Date : 11/15/2012

Page No : 1

Groups Printed- HV

Start Time	Ithan Avenue Southbound					Lancaster Avenue Westbound					Ithan Avenue Northbound					Lancaster Avenue Eastbound					Int. Total		
	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
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	

Start Time	Ithan Avenue Southbound				Lancaster Avenue Westbound				Ithan Avenue Northbound				Lancaster Avenue Eastbound				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. 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

Start Time	Lowrys Lane Southbound					Lancaster Avenue Westbound					Lowrys Lane Northbound					Lancaster Avenue Eastbound					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
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

Start Time	Lowrys Lane Southbound				Lancaster Avenue Westbound				Lowrys Lane Northbound				Lancaster Avenue Eastbound				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. 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

Start Time	Lowrys Lane Southbound					Lancaster Avenue Westbound					Lowrys Lane Northbound					Lancaster Avenue Eastbound					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
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	0	100	0	0	100	60	0	40	0	60	3.3	83.3	13.3	0	33.3	
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	

Start Time	Lowrys Lane Southbound				Lancaster Avenue Westbound				Lowrys Lane Northbound				Lancaster Avenue Eastbound				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. 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	0	100	0	100	100	0	0	100	0	83.3	16.7	0	
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

Sproul & Conestoga Roads

File Name : 05-SprConPM
Site Code : 00000000
Start Date : 11/14/2012
Page No : 1

Groups Printed- cars - HV

Start Time	Spoul Road Southbound					Conestoga Road Westbound					Spoul Road Northbound					Conestoga Road Eastbound					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
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

Start Time	Spoul Road Southbound				Conestoga Road Westbound				Spoul Road Northbound				Conestoga Road Eastbound				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. 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
Page No : 1

Groups Printed- HV

Start Time	Spoul Road Southbound					Conestoga Road Westbound					Spoul Road Northbound					Conestoga Road Eastbound					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
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	

Start Time	Spoul Road Southbound				Conestoga Road Westbound				Spoul Road Northbound				Conestoga Road Eastbound				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. 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

Start Time	Spring Mill Road Southbound				Conestoga Road Westbound				Conestoga Road Eastbound				Int. Total
	Left	Right	Peds	App. Total	Thru	Right	Peds	App. Total	Left	Thru	Peds	App. 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

Start Time	Spring Mill Road Southbound			Conestoga Road Westbound			Conestoga Road Eastbound			Int. Total
	Left	Right	App. Total	Thru	Right	App. Total	Left	Thru	App. 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

Site Code : 00000000

Start Date : 11/14/2012

Page No : 1

Groups Printed- HV

Start Time	Spring Mill Road Southbound				Conestoga Road Westbound				Conestoga Road Eastbound				Int. Total
	Left	Right	Peds	App. Total	Thru	Right	Peds	App. Total	Left	Thru	Peds	App. 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	

Start Time	Spring Mill Road Southbound			Conestoga Road Westbound			Conestoga Road Eastbound			Int. Total
	Left	Right	App. Total	Thru	Right	App. Total	Left	Thru	App. 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-ConlthPM
Site Code : 00000000
Start Date : 11/14/2012
Page No : 1

Groups Printed- cars - HV

Start Time	Ithan Avenue Southbound					Conestoga Road Westbound					Ithan Avenue Northbound					Conestoga Road Eastbound					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
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

Start Time	Ithan Avenue Southbound				Conestoga Road Westbound				Ithan Avenue Northbound				Conestoga Road Eastbound				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. 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-ConlthPM

Site Code : 00000000

Start Date : 11/14/2012

Page No : 1

Groups Printed- HV

Start Time	Ithan Avenue Southbound					Conestoga Road Westbound					Ithan Avenue Northbound					Conestoga Road Eastbound					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
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	

Start Time	Ithan Avenue Southbound				Conestoga Road Westbound				Ithan Avenue Northbound				Conestoga Road Eastbound				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. 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	0	1	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
Page No : 1

Groups Printed- cars - HV

Start Time	Lowrys Lane Southbound					Conestoga Road Westbound					Strathmore Drive Northbound					Conestoga Road Eastbound					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
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

Start Time	Lowrys Lane Southbound				App. Total	Conestoga Road Westbound				App. Total	Strathmore Drive Northbound				App. Total	Conestoga Road Eastbound				Int. Total
	Left	Thru	Right	Peds		Left	Thru	Right	Peds		Left	Thru	Right	Peds		Left	Thru	Right	Peds	
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
Site Code : 00000000
Start Date : 11/14/2012
Page No : 1

Groups Printed- HV

Start Time	Lowrys Lane Southbound					Conestoga Road Westbound					Strathmore Drive Northbound					Conestoga Road Eastbound					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
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	

Start Time	Lowrys Lane Southbound				Conestoga Road Westbound				Strathmore Drive Northbound				Conestoga Road Eastbound				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. 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	
05:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	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- HV

Start Time	Garrett Avenue Southbound					Conestoga Road Westbound					Williams Road Northbound					Conestoga Road Eastbound					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
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 %																					

Start Time	Garrett Avenue Southbound				Conestoga Road Westbound				Williams Road Northbound				Conestoga Road Eastbound				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. 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

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Groups Printed- cars - HV

Start Time	County Line Road Southbound					Spring Mill Road Westbound					County Line Road Northbound					Spring Mill Road Eastbound					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
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

Start Time	County Line Road Southbound				Spring Mill Road Westbound				County Line Road Northbound				Spring Mill Road Eastbound				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. 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

Start Time	County Line Road Southbound					Spring Mill Road Westbound					County Line Road Northbound					Spring Mill Road Eastbound					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
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	

Start Time	County Line Road Southbound				Spring Mill Road Westbound				County Line Road Northbound				Spring Mill Road Eastbound				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. 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

Start Time	Ithan Avenue Southbound				Ithan Avenue Northbound				County Line Road Eastbound				Int. Total
	Thru	Right	Peds	App. Total	Left	Thru	Peds	App. Total	Left	Right	Peds	App. 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

Start Time	Ithan Avenue Southbound			Ithan Avenue Northbound			County Line Road Eastbound			Int. Total
	Thru	Right	App. Total	Left	Thru	App. Total	Left	Right	App. 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

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Groups Printed- HV

Start Time	Ithan Avenue Southbound				Ithan Avenue Northbound				County Line Road Eastbound				Int. Total
	Thru	Right	Peds	App. Total	Left	Thru	Peds	App. Total	Left	Right	Peds	App. 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	

Start Time	Ithan Avenue Southbound			Ithan Avenue Northbound			County Line Road Eastbound			Int. Total
	Thru	Right	App. Total	Left	Thru	App. Total	Left	Right	App. 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

Start Date : 11/15/2012

Page No : 1

Groups Printed- cars - HV

Start Time	Ithan Avenue Southbound				County Line Road Westbound				Ithan Avenue Northbound				Int. Total
	Left	Thru	Peds	App. Total	Left	Right	Peds	App. Total	Thru	Right	Peds	App. 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

Start Time	Ithan Avenue Southbound			County Line Road Westbound			Ithan Avenue Northbound			Int. Total
	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. 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

File Name : 12-IthCoLSPM

Site Code : 00000000

Start Date : 11/15/2012

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Groups Printed- HV

Start Time	Ithan Avenue Southbound				County Line Road Westbound				Ithan Avenue Northbound				Int. Total
	Left	Thru	Peds	App. Total	Left	Right	Peds	App. Total	Thru	Right	Peds	App. 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	

Start Time	Ithan Avenue Southbound			County Line Road Westbound			Ithan Avenue Northbound			Int. Total
	Left	Thru	App. Total	Left	Right	App. Total	Thru	Right	App. 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 & Airdale Roads

File Name : 14-CoLAirPM
Site Code : 00000000
Start Date : 11/13/2012
Page No : 1

Groups Printed- cars - HV

Start Time	County Line Road Southbound				Airdale Road Westbound				Airdale Road Eastbound				Int. Total
	Left	Right	Peds	App. Total	Thru	Right	Peds	App. Total	Left	Thru	Peds	App. 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

Start Time	County Line Road Southbound			Airdale Road Westbound			Airdale Road Eastbound			Int. Total
	Left	Right	App. Total	Thru	Right	App. Total	Left	Thru	App. 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

Site Code : 00000000

Start Date : 11/13/2012

Page No : 1

Groups Printed- HV

Start Time	County Line Road Southbound				Airdale Road Westbound				Airdale Road Eastbound				Int. Total
	Left	Right	Peds	App. Total	Thru	Right	Peds	App. Total	Left	Thru	Peds	App. 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	

Start Time	County Line Road Southbound			Airdale Road Westbound			Airdale Road Eastbound			Int. Total
	Left	Right	App. Total	Thru	Right	App. Total	Left	Thru	App. 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

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- cars - HV

Start Time	County Line Road Southbound					Roberts Road Westbound					County Line Road Northbound					Roberts Road Eastbound					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
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

Start Time	County Line Road Southbound				Roberts Road Westbound				County Line Road Northbound				Roberts Road Eastbound				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. 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

Start Time	County Line Road Southbound					Roberts Road Westbound					County Line Road Northbound					Roberts Road Eastbound					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
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	0	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	0	11
Grand Total	0	9	4	0	13	0	0	0	0	0	0	18	1	0	19	1	0	0	0	0	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	0	3

Start Time	County Line Road Southbound				Roberts Road Westbound				County Line Road Northbound				Roberts Road Eastbound				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. 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	0	2	0	2	0	0	0	3
05:15 PM	0	1	0	1	0	0	0	0	0	0	1	0	1	1	0	0	3
05:30 PM	0	0	0	0	0	0	0	0	0	0	3	0	3	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	0	6	0	6	1	0	0	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	.000	.500	.000	.500	.250	.000	.000	.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

Start Time	Ithan Avenue Southbound					South Campus Westbound					Ithan Avenue Northbound					Aldwyn Lane Eastbound					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
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

Start Time	Ithan Avenue Southbound				South Campus Westbound				Ithan Avenue Northbound				Aldwyn Lane Eastbound				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. 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

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- HV

Start Time	North Spring Mill Road Southbound						Lancaster Avenue Westbound						Aldwyn Lane Northwestbound						Sproul Road Northbound						Lancaster Avenue Eastbound						Kenilworth Road Southeastbound						Int. Total			
	L to Ald	L to Spr	T to Ken	R to Ken	R to Spr	App. Total	L to Ald	L to Spr	T to Ken	R to Ken	R to Spr	App. Total	L to Ald	L to Spr	T to Ken	R to Ken	R to Spr	App. Total	L to Ald	L to Spr	T to Ken	R to Ken	R to Spr	App. Total	L to Ald	L to Spr	T to Ken	R to Ken	R to Spr	App. Total										
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			
07:00 PM	0	0	1	0	0	1	0	0	3	0	1	4	0	0	0	0	1	1	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	1	0	0	2	0	0	2	0	2	0	0	0	2	1	0	0	0	0	1	0	0	1	0	0	1	0	0	0	0	0	0	7			
07:30 PM	0	0	1	5	0	6	0	0	4	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	2	0	0	0	0	0	0	12			
07:45 PM	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	3			
Total	0	0	2	6	0	8	0	0	9	0	1	11	0	3	0	0	1	4	1	0	0	0	0	1	0	2	2	0	0	4	0	0	0	0	0	0	28			
Grand Total	1	0	3	9	0	13	0	0	23	0	4	28	0	3	0	0	1	4	2	0	1	0	0	3	0	3	12	0	7	22	0	0	0	0	0	0	70			
Approch %	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	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	4.3	0	4.3	17.1	0	10	0	31.4	0	0	0	0	0	0	

Start Time	North Spring Mill Road Southbound						Lancaster Avenue Westbound						Aldwyn Lane Northwestbound						Sproul Road Northbound						Lancaster Avenue Eastbound						Kenilworth Road Southeastbound						Int. Total
	L to Ald	L to Spr	T to Ken	R to Ken	R to Spr	App. Total	L to Ald	L to Spr	T to Ken	R to Ken	R to Spr	App. Total	L to Ald	L to Spr	T to Ken	R to Ken	R to Spr	App. Total	L to Ald	L to Spr	T to Ken	R to Ken	R to Spr	App. Total	L to Ald	L to Spr	T to Ken	R to Ken	R to Spr	App. Total							
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 Volume	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
% 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	38.8		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

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

F. Tavani and Associates, Inc.

105 Kenilworth Street
Philadelphia, PA 19147

Lancaster & Ithan Avenues

File Name : 02-30IthanEve

EB Peds = diag peds NE-SW

Site Code : 00000000

WB Peds = diag peds NW-SE

Start Date : 12/11/2012

Page No : 1

Groups Printed- cars - HV

Start Time	Ithan Avenue Southbound					Lancaster Avenue Westbound					Ithan Avenue Northbound					Lancaster Avenue Eastbound					Int. Total		
	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
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

Start Time	Ithan Avenue Southbound				Lancaster Avenue Westbound				Ithan Avenue Northbound				Lancaster Avenue Eastbound				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. 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

File Name : 02-30IthanEve

EB Peds = diag peds NE-SW

Site Code : 00000000

WB Peds = diag peds NW-SE

Start Date : 12/11/2012

Page No : 1

Groups Printed- HV

Start Time	Ithan Avenue Southbound					Lancaster Avenue Westbound					Ithan Avenue Northbound					Lancaster Avenue Eastbound					Int. Total		
	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
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	

Start Time	Ithan Avenue Southbound				Lancaster Avenue Westbound				Ithan Avenue Northbound				Lancaster Avenue Eastbound				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. 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

Start Time	Sproul Road Southbound					Conestoga Road Westbound					Sproul Road Northbound					Conestoga Road Eastbound					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
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

Start Time	Sproul Road Southbound				Conestoga Road Westbound				Sproul Road Northbound				Conestoga Road Eastbound				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. 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

Start Time	Sproul Road Southbound					Conestoga Road Westbound					Sproul Road Northbound					Conestoga Road Eastbound					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
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	

Start Time	Sproul Road Southbound				Conestoga Road Westbound				Sproul Road Northbound				Conestoga Road Eastbound				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. 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
Page No : 1

Groups Printed- cars - HV

Start Time	Spring Mill Road Southbound				Conestoga Road Westbound				Conestoga Road Eastbound				Int. Total
	Left	Right	Peds	App. Total	Thru	Right	Peds	App. Total	Left	Thru	Peds	App. 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

Start Time	Spring Mill Road Southbound			Conestoga Road Westbound			Conestoga Road Eastbound			Int. Total
	Left	Right	App. Total	Thru	Right	App. Total	Left	Thru	App. 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
Start Date : 12/11/2012
Page No : 1

Groups Printed- HV

Start Time	Spring Mill Road Southbound				Conestoga Road Westbound				Conestoga Road Eastbound				Int. Total
	Left	Right	Peds	App. Total	Thru	Right	Peds	App. Total	Left	Thru	Peds	App. 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	0	100	0	0	100	0	100	0	100	
Total %	0	0	0	0	85.7	0	0	85.7	0	14.3	0	14.3	

Start Time	Spring Mill Road Southbound			Conestoga Road Westbound			Conestoga Road Eastbound			Int. Total
	Left	Right	App. Total	Thru	Right	App. Total	Left	Thru	App. 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	0	100	0	100	0	0	0	100
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

Start Time	Ithan Avenue Southbound					Conestoga Road Westbound					Ithan Avenue Northbound					Conestoga Road Eastbound					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
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

Start Time	Ithan Avenue Southbound				Conestoga Road Westbound				Ithan Avenue Northbound				Conestoga Road Eastbound				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. 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
Page No : 1

Groups Printed- HV

Start Time	Ithan Avenue Southbound					Conestoga Road Westbound					Ithan Avenue Northbound					Conestoga Road Eastbound					Int. Total	
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total		
06:00 PM	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	1	0	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	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	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	0
Total	0	0	3	0	3	0	2	0	0	2	0	0	0	0	0	1	0	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	0
07:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	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	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	0
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	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	0	2	7
Apprch %	0	0	100	0		0	100	0	0		0	0	0	0		100	0	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	0	28.6	

Start Time	Ithan Avenue Southbound					Conestoga Road Westbound					Ithan Avenue Northbound					Conestoga Road Eastbound					Int. Total	
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total		
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	0	1	0	0	0	0	0	0	0	0	0	0	1	0	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	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	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	0
Total Volume	0	0	3	0	3	0	2	0	0	2	0	0	0	0	0	1	0	0	0	0	1	6
% App. Total	0	0	100	0		0	100	0	0		0	0	0	0		100	0	0	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

Start Time	North Spring Mill Road Southbound							Lancaster Avenue Westbound							Aldwyn Lane Northwestbound							Sproul Road Northbound							Lancaster Avenue Eastbound							Kenilworth Road Southeastbound							Int. Total		
	Lt oL an c	Lt o Al d					App. Total	Lt o Al d	Lt o Spr					App. Total	Lt o Spr	Lt oL an c					App. Total	Lt oL an c	Lt o Ken					App. Total	Lt oL an c	Lt o S Mill					App. Total	Lt o S Mill	Lt oL an c					App. Total			
12:00 PM	10	0	28	42	0	0	80	0	4	17	9	0	8	0	191	1	10	0	0	3	0	14	44	0	31	1	0	0	76	1	52	23	0	21	51	0	355	0	1	0	1	3	0	5	721
12:15 PM	5	0	24	54	0	0	83	0	1	20	4	0	16	0	221	0	13	0	1	0	0	14	46	1	25	8	1	0	81	0	60	20	7	19	30	0	316	0	0	0	1	1	0	2	717
12:30 PM	14	0	20	52	0	0	86	0	2	17	4	0	5	0	181	2	5	0	1	0	0	8	51	0	26	5	2	0	84	0	66	18	8	11	35	0	300	0	0	0	0	4	0	4	663
12:45 PM	11	0	18	40	0	11	80	0	2	15	5	0	9	0	166	1	13	0	2	1	3	20	54	0	16	4	0	0	74	1	64	23	9	14	38	0	356	0	0	0	1	1	0	2	698
Total	40	0	90	188	0	11	329	0	9	71	2	0	38	0	759	4	41	0	4	4	3	56	195	1	98	18	3	0	315	2	24	86	2	65	15	0	1327	0	1	0	3	9	0	13	2799
01:00 PM	11	0	24	50	0	2	87	0	7	18	2	0	9	0	198	0	6	0	2	0	0	8	32	0	23	7	0	0	62	1	53	17	7	10	37	0	278	0	0	0	0	4	0	4	637
01:15 PM	17	0	20	41	0	6	84	0	2	16	2	0	7	0	171	0	11	0	2	0	0	13	37	0	21	8	5	0	71	2	45	20	3	13	32	0	295	0	0	0	1	4	0	5	639
01:30 PM	15	0	15	66	0	0	96	0	4	20	6	0	6	0	216	0	6	0	0	1	3	10	27	0	16	4	1	0	48	2	44	19	4	13	39	0	292	1	0	0	0	1	0	2	664
01:45 PM	15	0	21	60	0	2	98	0	2	17	3	0	7	0	182	0	5	0	2	1	0	8	29	0	18	5	1	0	53	3	56	19	1	11	27	0	288	0	0	0	1	1	0	2	631
Total	58	0	80	217	0	10	365	0	15	72	3	0	29	0	767	0	28	0	6	2	3	39	125	0	78	24	7	0	234	8	19	76	8	47	13	0	1153	1	0	0	2	10	0	13	2571
02:00 PM	27	0	24	59	0	5	115	0	7	17	7	0	9	0	193	0	10	0	0	0	0	10	33	0	23	2	1	0	59	2	43	15	9	19	31	0	254	0	0	0	0	3	0	3	634
02:15 PM	10	0	27	57	0	3	97	0	4	17	6	0	11	0	191	2	6	0	0	1	0	9	26	0	17	3	1	0	47	0	37	15	2	9	27	0	225	1	0	0	1	1	0	3	572
02:30 PM	7	0	23	73	0	0	103	0	3	17	9	0	7	0	189	0	10	0	0	0	0	10	30	0	16	3	0	0	49	3	45	17	0	11	34	0	263	0	1	0	0	5	0	6	620
02:45 PM	7	0	19	61	0	4	91	0	3	18	3	0	4	0	190	0	14	0	0	1	0	15	26	0	18	5	2	0	51	1	51	14	2	13	35	0	242	0	0	0	0	1	0	1	590
Total	51	0	93	250	0	12	406	0	17	71	5	0	31	0	763	2	40	0	0	2	0	44	115	0	74	13	4	0	206	6	17	62	6	52	12	0	984	1	1	0	1	10	0	13	2416
Grand Total	149	0	263	655	0	33	1100	0	41	215	0	98	0	2289	6	109	0	10	8	6	139	435	1	250	55	14	0	755	16	61	22	6	62	4	6	3464	2	2	0	6	29	0	39	7786	
Approch %	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	7.2	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	210	6	0	96	0	2243	6	109	0	10	7	6	138	426	1	243	51	14	0	735	16	61	22	6	60	4	9	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	100	99.3	97.9	100	97.2	92	100	0	97.4	100	99.8	100	98.8	100	98.8	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	0	16.7	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
Page No : 2

Start Time	North Spring Mill Road Southbound						Lancaster Avenue Westbound						Aldwyn Lane Northwestbound						Sproul Road Northbound						Lancaster Avenue Eastbound						Kenilworth Road Southeastbound						Int. Total
	L to Lan	L to Ald	T to Spr	R to Lan	R to Ken	App. Total	L to Ald	L to Spr	T to Lan	R to Ken	R to S M	App. Total	L to Spr	L to Lan	T to Ken	R to S M	R to Lan	App. Total	L to Lan	L to Ken	T to S M	R to Lan	R to Ald	App. Total	L to Ken	L to S M	T to Lan	R to Ald	R to Spr	App. Total	L to S M	L to Lan	T to Ald	R to Spr	R to Lan	App. Total	
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	0	2.5	0	0	1.8	0	2.6	1.8	0	0	0	0	0	0	2.6	0	3.1	5.6	0	2.9	0.8	1.4	0.6	1.1	0	0	33.3	0	0	7.7	0	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

Start Time	North Spring Mill Road Southbound						Lancaster Avenue Westbound						Aldwyn Lane Northwestbound						Sproul Road Northbound						Lancaster Avenue Eastbound						Kenilworth Road Southeastbound						Int. Total			
	L to Lan	L to Ald	T to Spr	R to Lan	R to Ken	App. Total	L to Ald	L to Spr	T to Lan	R to Ken	R to S M	App. Total	L to Spr	L to Lan	T to S M	R to Lan	R to Ald	App. Total	L to Ken	L to S M	T to Lan	R to Ald	R to Spr	App. Total	L to S M	L to Lan	T to Ald	R to Spr	R to Lan	App. Total										
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	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	0	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	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	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	0	15	0	0	0	1	0	1	47		
01:00 PM	0	0	0	2	0	2	0	0	6	0	0	6	0	0	0	0	0	0	1	0	0	0	0	1	0	1	3	0	1	0	5	0	0	0	0	0	0	14		
01:15 PM	0	0	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0	1	0	3	1	0	5	0	0	2	0	1	0	3	0	0	0	0	0	0	11		
01:30 PM	1	0	0	2	0	3	0	0	1	0	0	1	0	0	0	0	1	0	1	0	0	0	1	0	1	0	1	4	0	0	0	5	0	0	0	0	0	0	11	
01:45 PM	0	0	2	1	0	3	0	0	5	0	0	5	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	9		
Total	1	0	2	5	0	8	0	0	15	0	0	15	0	0	0	0	1	0	1	2	0	4	2	0	8	0	2	9	0	2	0	13	0	0	0	0	0	0	45	
02:00 PM	2	0	0	0	0	2	0	0	3	0	1	4	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	10		
02:15 PM	0	0	1	0	0	1	0	0	4	0	0	4	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	6		
02:30 PM	0	0	0	0	0	0	0	0	7	0	0	7	0	0	0	0	0	0	2	0	0	0	0	2	0	0	4	0	2	0	6	0	0	0	0	0	0	15		
02:45 PM	1	0	1	1	0	3	0	0	2	0	0	2	0	0	0	0	0	0	0	0	0	1	0	1	0	0	1	0	0	0	1	0	0	0	0	0	0	7		
Total	3	0	2	1	0	6	0	0	16	0	1	17	0	0	0	0	0	0	2	0	0	1	0	3	0	0	8	0	4	0	12	0	0	0	0	0	0	38		
Grand Total	4	0	6	12	0	22	0	0	44	0	2	46	0	0	0	0	1	0	1	9	0	7	4	0	20	0	4	29	0	7	0	40	0	0	0	1	0	0	1	130
Approach %	18.2	0	27.3	54.5	0	0	0	0	95.7	0	4.3	0	0	0	0	0	10	0	45	0	35	20	0	0	0	10	72.5	0	17.5	0	0	0	0	0	10	0	0			
Total %	3.1	0	4.6	9.2	0	16.9	0	0	33.8	0	1.5	35.4	0	0	0	0	0.8	0	0.8	6.9	0	5.4	3.1	0	15.4	0	3.1	22.3	0	5.4	0	30.8	0	0	0	0.8	0	0	0.8	

Start Time	North Spring Mill Road Southbound						Lancaster Avenue Westbound						Aldwyn Lane Northwestbound						Sproul Road Northbound						Lancaster Avenue Eastbound						Kenilworth Road Southeastbound						Int. Total		
	L to Lan	L to Ald	T to Spr	R to Lan	R to Ken	App. Total	L to Ald	L to Spr	T to Lan	R to Ken	R to S M	App. Total	L to Spr	L to Lan	T to S M	R to Lan	R to Ald	App. Total	L to Ken	L to S M	T to Lan	R to Ald	R to Spr	App. Total	L to S M	L to Lan	T to Ald	R to Spr	R to Lan	App. Total									
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	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	0	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	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	0	6	0	0	0	0	0	0	10	
Total Volume	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	0	15	0	0	0	1	0	1	47	
% App. Total			25	75	0		0	0	92.9	0	7.1				55.6	0	33.3	11.1	0			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		

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

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

Start Time	Ithan Avenue Southbound					Lacaster Avenue Westbound						Ithan Avenue Northbound					Lacaster Avenue Eastbound						Int. Total
	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	
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

Start Time	Ithan Avenue Southbound				Lacaster Avenue Westbound				Ithan Avenue Northbound				Lacaster Avenue Eastbound				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. 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

Start Time	Ithan Avenue Southbound					Lacaster Avenue Westbound					Ithan Avenue Northbound					Lacaster Avenue Eastbound					Int. Total		
	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
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	

Start Time	Ithan Avenue Southbound				Lacaster Avenue Westbound				Ithan Avenue Northbound				Lacaster Avenue Eastbound				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. 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

Start Time	Sproul Road Southbound					Conestoga Road Westbound					Sproul Road Northbound					Conestoga Road Eastbound					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
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

Start Time	Sproul Road Southbound				Conestoga Road Westbound				Sproul Road Northbound				Conestoga Road Eastbound				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. 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

File Name : SprConSat
Site Code : 00000000
Start Date : 10/27/2012
Page No : 1

Groups Printed- HV

Start Time	Sproul Road Southbound					Conestoga Road Westbound					Sproul Road Northbound					Conestoga Road Eastbound					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
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	

Start Time	Sproul Road Southbound				Conestoga Road Westbound				Sproul Road Northbound				Conestoga Road Eastbound				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. 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
Philadelphia, PA 19147

Spring Mill & Conestoga Roads
Homecoming

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Start Time	Spring Mill Road Southbound				Conestoga Road Westbound				Conestoga Road Eastbound				Int. Total
	Left	Right	Peds	App. Total	Thru	Right	Peds	App. Total	Left	Thru	Peds	App. 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

Start Time	Spring Mill Road Southbound			Conestoga Road Westbound			Conestoga Road Eastbound			Int. Total
	Left	Right	App. Total	Thru	Right	App. Total	Left	Thru	App. 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

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Start Time	Spring Mill Road Southbound				Conestoga Road Westbound				Conestoga Road Eastbound				Int. Total
	Left	Right	Peds	App. Total	Thru	Right	Peds	App. Total	Left	Thru	Peds	App. 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	0	100	0	0	0	0	100	0	0	0
Total %	0	0	0	0	50	0	0	50	0	50	0	50	0

Start Time	Spring Mill Road Southbound			Conestoga Road Westbound			Conestoga Road Eastbound			Int. Total
	Left	Right	App. Total	Thru	Right	App. Total	Left	Thru	App. 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	0	100	0	0	0	100	0	0
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
Homecoming

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Groups Printed- cars - HV

Start Time	Ithan Avenue Southbound					Conestoga Road Westbound					Ithan Avenue Northbound					Conestoga Road Eastbound					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
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

Start Time	Ithan Avenue Southbound				Conestoga Road Westbound				Ithan Avenue Northbound				Conestoga Road Eastbound				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. 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

F. Tavani and Associates, Inc.

105 Kenilworth Street
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Ithan & Conestoga Roads
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Start Time	Ithan Avenue Southbound					Conestoga Road Westbound					Ithan Avenue Northbound					Conestoga Road Eastbound					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
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	

Start Time	Ithan Avenue Southbound				Conestoga Road Westbound				Ithan Avenue Northbound				Conestoga Road Eastbound				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. 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	0	0	1	0	4
12:30 PM	0	0	0	0	1	0	0	1	0	0	0	0	0	1	1	2	3
12:45 PM	0	1	0	1	0	0	0	0	0	0	0	0	0	0	2	2	3
Total Volume	0	2	1	3	1	2	1	4	0	0	0	0	0	2	4	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			Findings / Summary	Excessive Unmet Demand			Findings / Summary
			Queues				Queues			
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		
	Unsignalized	SB	0	0	0			
Airedale Rd and County Line Rd	Unsignalized	EB	0	0	0	E		
	Unsignalized	SB	0	0	0			

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	3	4	1
	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	0	1	2
	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	0	2	1
	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		A, D
	Unsignalized	SB	0	0	0			
Airedale Rd and County Line Rd	Unsignalized	EB	0	0	0	E		E
	Unsignalized	SB	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.

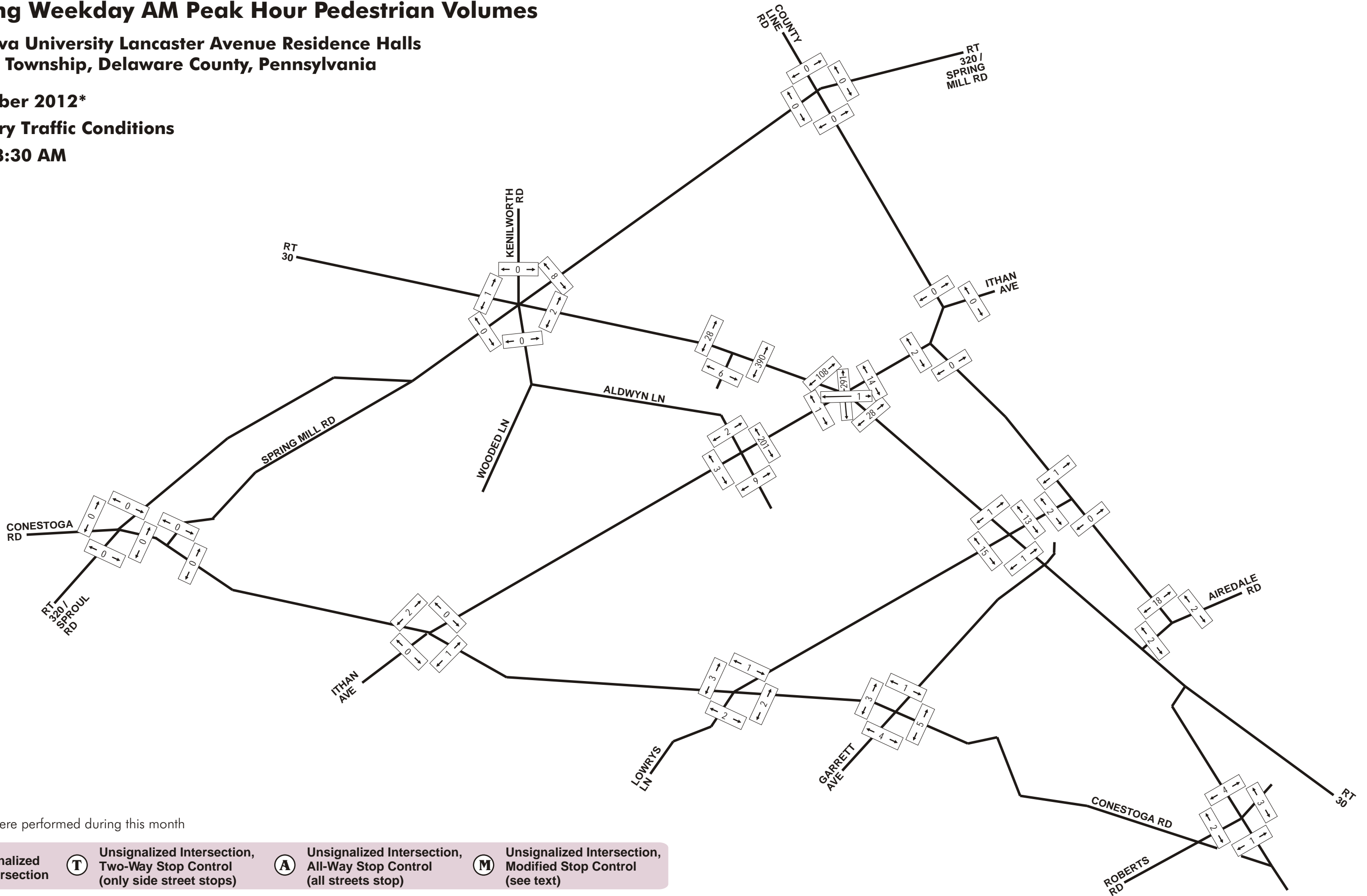
Summary Key

- 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	 Unsignalized Intersection, Two-Way Stop Control (only side street stops)	 Unsignalized Intersection, All-Way Stop Control (all streets stop)	 Unsignalized Intersection, Modified Stop Control (see text)
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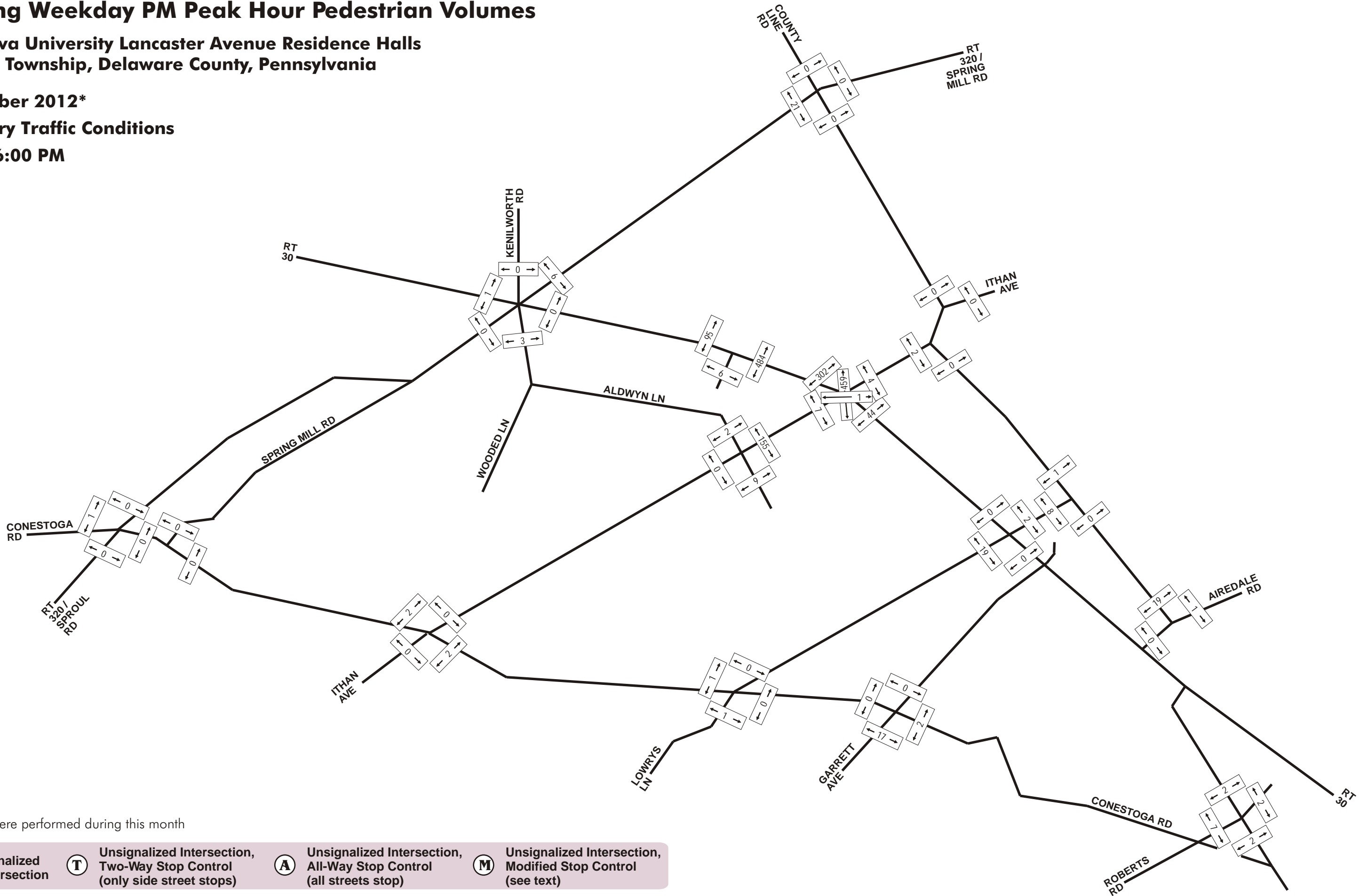
Existing Weekday PM Peak Hour Pedestrian Volumes

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	Unsignalized Intersection, Two-Way Stop Control (only side street stops)	Unsignalized Intersection, All-Way Stop Control (all streets stop)	Unsignalized Intersection, Modified Stop Control (see text)
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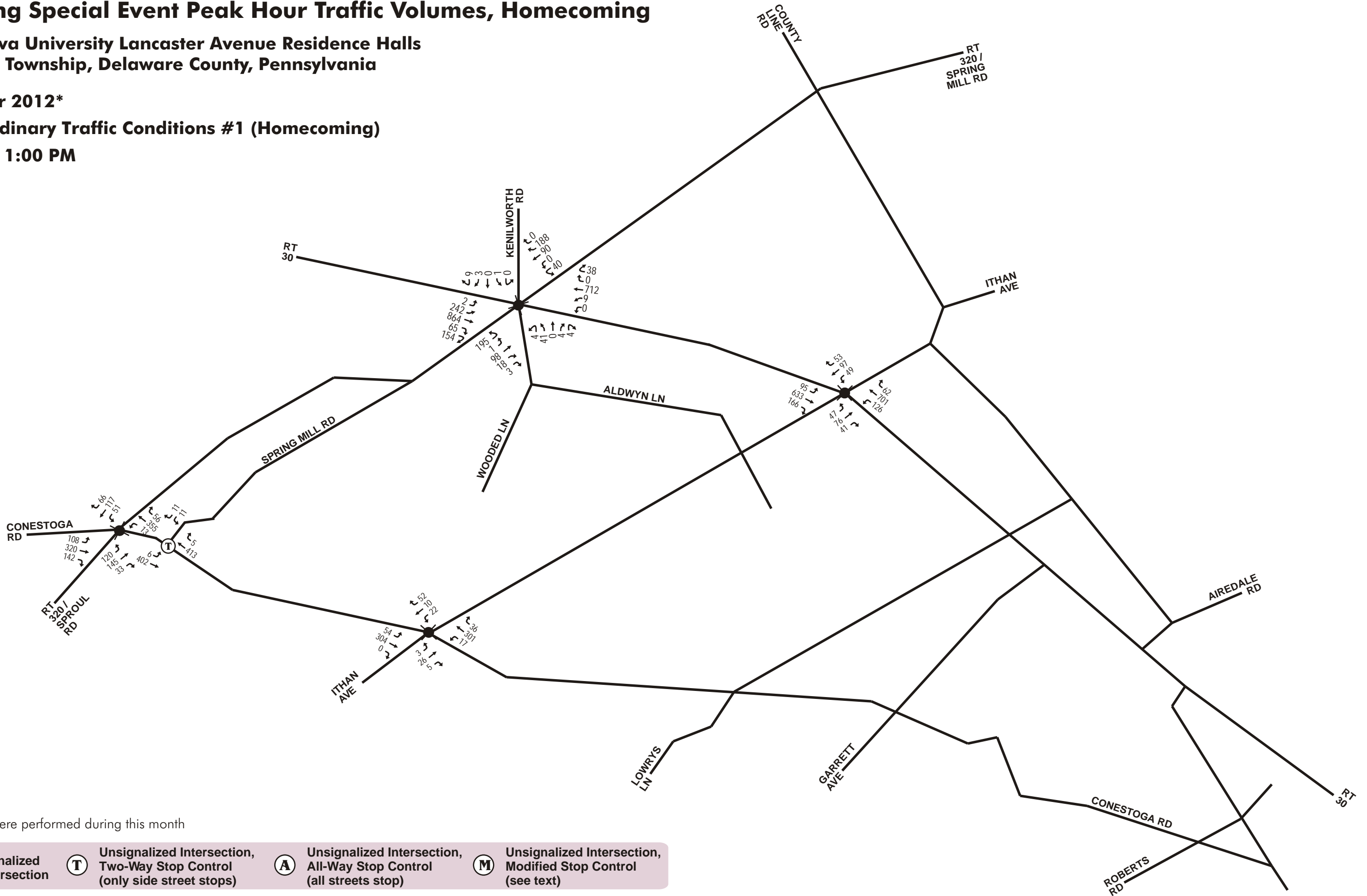
Existing Special Event Peak Hour Traffic Volumes, Homecoming

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	 Unsignalized Intersection, Two-Way Stop Control (only side street stops)	 Unsignalized Intersection, All-Way Stop Control (all streets stop)	 Unsignalized Intersection, Modified Stop Control (see text)
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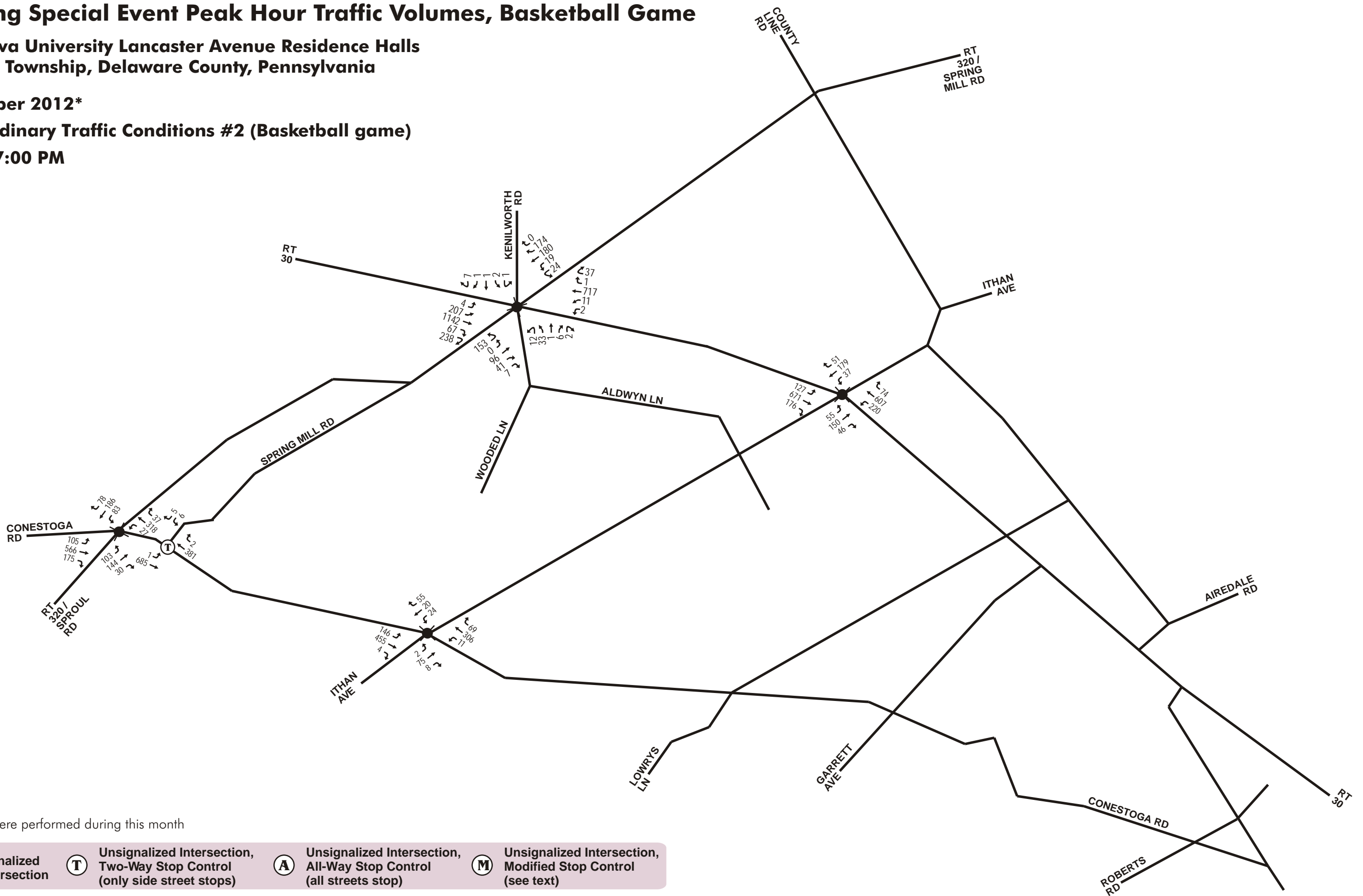
Existing Special Event Peak Hour Traffic Volumes, Basketball Game

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

December 2012*

Extraordinary Traffic Conditions #2 (Basketball game)

6:00 - 7:00 PM

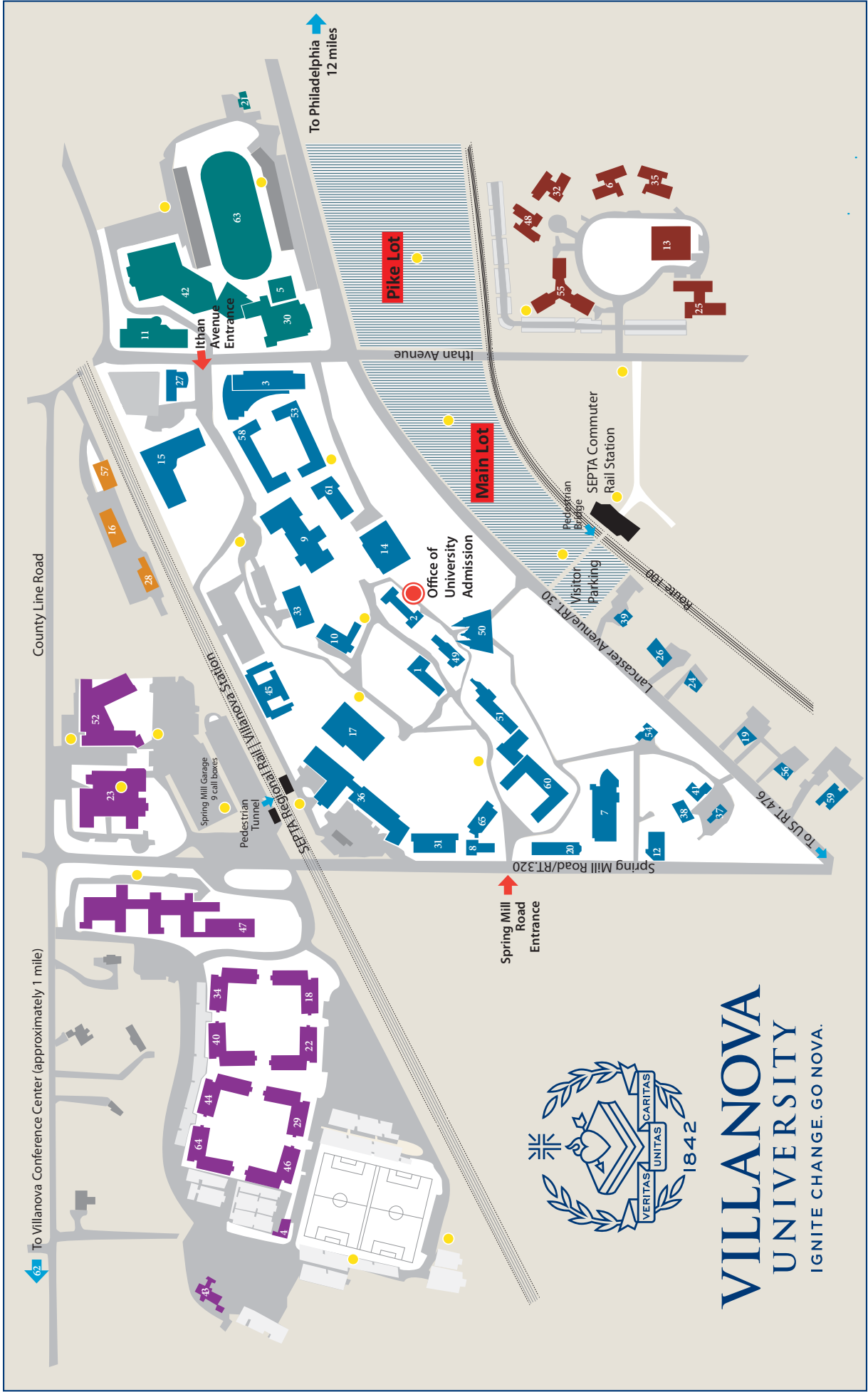


* counts were performed during this month

 Signalized Intersection	 Unsignalized Intersection, Two-Way Stop Control (only side street stops)	 Unsignalized Intersection, All-Way Stop Control (all streets stop)	 Unsignalized Intersection, Modified Stop Control (see text)
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APPENDIX F

Campus Key Map



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. **DELUROY 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 Communications: 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, 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 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 UNH: 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 Parttime 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

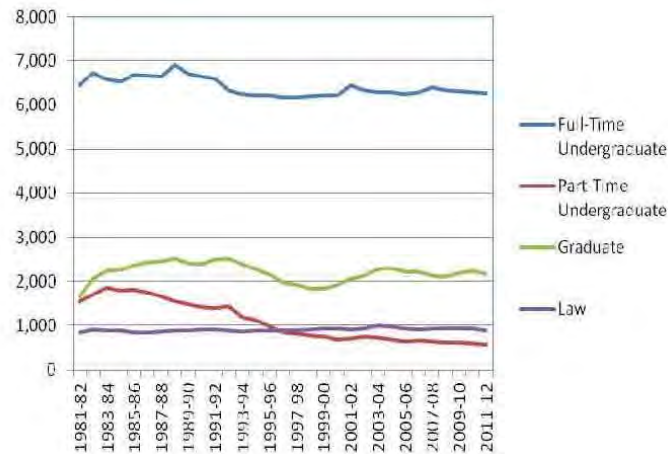
- Call Box indicators: Phones located at buildings with direct-dial to Public Safety are indicated on key; free-standing Call Boxes to Public Safety are indicated on map

APPENDIX G

Trip Generation

TRIP GENERATION

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 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 campus¹ 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.

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 Villanova (or 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 net reduction in total commuting 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

¹ Fall 2012 semester data.

(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		
	<u>IN</u>	<u>OUT</u>	<u>TOTAL</u>	<u>IN</u>	<u>OUT</u>	<u>TOTAL</u>
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 <u>TOTAL</u>
	<u>IN</u>	<u>OUT</u>	<u>TOTAL</u>	<u>IN</u>	<u>OUT</u>	<u>TOTAL</u>	
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.

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).

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

<u>TIME PERIOD</u>	<u>TOTAL TRIPS</u>	<u>PARKING SUPPLY FACTOR APPLIED</u>	<u>DIVIDED BY STUDENT BODY</u>
AM Peak Hour	455	1311	0.129
PM Peak Hour	756	2179	0.215

Table 4: Trip Generation Rate Comparison

<u>DATA SOURCE</u>	<u>TRIP GENERATION RATE (PER STUDENT)</u>		
	<u>AM Peak Hour</u>	<u>PM Peak Hour</u>	<u>AM + PM Combined</u>
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

<u>TIME PERIOD</u>	<u>TOTAL TRIPS</u>	<u>PARKING SPACES SERVED</u>	<u>TRIP GENERATION RATE PER SPACE</u>
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		
	<u>IN</u>	<u>OUT</u>	<u>TOTAL</u>	<u>IN</u>	<u>OUT</u>	<u>TOTAL</u>
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		
	<u>IN</u>	<u>OUT</u>	<u>TOTAL</u>	<u>IN</u>	<u>OUT</u>	<u>TOTAL</u>
	0.227	0.028	0.255	0.199	0.225	0.424

The project affects (i.e., increases or decreases) parking supply (and therefore traffic activity) at the HSB and SAC garages as well as at Pike Lot, Main Lot, and the several small lots west of Church Walk. The main exercise of the study is to reassign associated traffic demands to reflect parking supply increases and decreases with existing turning movement volumes at existing driveways scaled proportionately to the proposed increase or decrease in spaces. Likewise, subsequent downstream/upstream ‘feeder’ turning movements are also modified proportionately.

TRIP GENERATION – RETAIL SPACE

The project includes approximately 15,000 SF of retail space. The exact users of the space are not yet defined. The CICD ordinance allows “retail subordinate” uses of varying types, including restaurant, clothing store, bookstore, ice cream shop, etc. The majority of patrons of the stores are expected to be Villanova students, faculty, staff, employees, visitors, and related individuals who have already made a trip to or from the campus and thus the retail subordinate trip will be an internalized or captured trip, meaning a trip which is not a new external vehicular trip exclusively made for purposes of visiting the retail establishment. Quantification of “majority of patrons” is appropriate.

ITE TRIP GENERATION

ITE trip generation rates are not appropriate in the context of “retail subordinate” uses since the land use codes contained in Trip Generation Manual are chiefly derived from free-standing establishments which are often considerably larger than the ~3KSF to ~9 KSF building space which may be associated with an individual user in the LAH. More importantly, they are not subordinate to a larger institutional use, such as the case here. The best predictor of possible trip generation activity for the uses at Villanova are other comparable existing uses at other universities in the Delaware Valley.

ST JOE’S 54th STREET TRIP GENERATION

In 2004, St. Joe’s broke ground on a new parking garage which has a footprint of approximately 20,000 SF and three ground-floor retailers. The project is located along 54th Street, immediately south of City Avenue. Accounting for garage ramps, dumpster locations, common hallways, elevators, staircases, and the garage management office, it appears the three retail uses total about 15,000 SF of leaseable area – similar to the Villanova proposal. In addition, three uses are featured: the St. Joe’s Bookstore, a restaurant/bistro, and a Starbucks. The bookstore is the largest tenant and appears to occupy about 8 KSF with the remainder going to the remaining two uses with the restaurant being about twice the size of the Starbucks. The bookstore has a relatively small ‘book’ component – most (more than 50%) of the floor area is St. Joe’s branded apparel and related items and about 25% is a small convenience store having a broad range of products, similar to a small CVS/Wawa hybrid.

Since the exact users and SFage of each of Villanova’s site are not yet known, the total existing trip generation and capture rate of St. Joe’s is a good predictor of the potential combined sum of retail subordinate activity at Villanova.

St. Joe’s traffic activity was polled on several occasions during the weekday AM and PM peak hours defined in the September 2014 TIS (7:30 to 8:30 AM and 5:00 to 6:00 PM). Patrons (people) entering and exiting each storefront were tabulated and a select number of patrons were interviewed to determine if they were St. Joe’s students, faculty, staff, or employees. Additionally, the general manager of the bookstore and the restaurant were interviewed. The following table summarizes what was learned.

Table 8 – Retail Interviews and Visitor Counts

DAY/DATE	INTERVIEWS		AM PEAK HOUR (7:30-8:30)				PM PEAK HOUR (5:00-6:00)			
	TOTAL	YES(a)	USE	IN	OUT	TOTAL	USE	IN	OUT	TOTAL
FRIDAY 09/05/14	30	27	SBUX	38	30	68	SBUX	51	48	99
	LOCATION: STARBUCKS		BOOK	<i>Book opens 9 AM</i>			BOOK	30	33	63
			BISTRO	<i>Bistro opens 11 AM</i>			BISTRO	44	29	73
	TIME:	AM PK	TOTAL	38	30	68	TOTAL	125	110	235
TUESDAY 09/09/14	30	23	SBUX	42	44	86	SBUX	39	41	80
	LOCATION: STARBUCKS		BOOK				BOOK	44	46	90
			BISTRO				BISTRO	42	20	62
	TIME:	PM PK	TOTAL	42	44	86	TOTAL	125	107	232
THURSDAY 09/11/14	30	24	SBUX	40	35	75	SBUX	47	49	96
	LOCATION: BOOKSTORE		BOOK				BOOK	48	46	94
			BISTRO				BISTRO	40	25	65
	TIME:	PM PK	TOTAL	40	35	75	TOTAL	135	120	255

(a) Number who answered “yes” to being a St. Joe’s student, faculty, staff, or employee.

As shown in the above table, interviews were based on a sample of 30 random patrons on 3 different days and ranged from a low of 76% to a high of 90% of users answering “yes” to being a St. Joe’s student, faculty, staff, or employee (i.e., a captured trip). Chris Silenzi, manager of the restaurant, stated that the “St. Joe’s” patronage varies with day of the week and as well as with the season, but was also quick to point out that during breaks/summer months, while the St. Joe’s patronage percentage decreases, so also does total sales (and, therefore, total traffic). He stated that during most school days the percentage is “probably 80-90%”. David Towne, manager of the bookstore stated that he believed “less than 10% of my traffic is from outside the campus community”. Based on all this, using an estimate of 75% for ‘captured’ trips at Villanova seems conservative. Taking the highest data point for each peak hour from the above table and applying a 75% capture credit yield the following estimate of new vehicular based trips which could be generated by the retail space at Villanova:

**Table 9 – Net New Vehicular Trips
Retail Subordinate Uses at Villanova (Total)**

AM PEAK HOUR			PM PEAK HOUR		
IN	OUT	TOTAL	IN	OUT	TOTAL
11	11	22	34	30	64

Note that the numbers above assume each patron translates to a single-occupant vehicular trip, which is conservative.

Even though the township traffic engineer’s July 2014 letter did not explicitly state to include this traffic in the TIS (and even though the PennDOT review letter didn’t mention the subject at all), these traffic estimates were included in the Projected Conditions of the September 2014 TIS for Villanova’s project.

APPENDIX H

Site Volume Development Worksheets



Redistribution Worksheet # A1, RETAIL

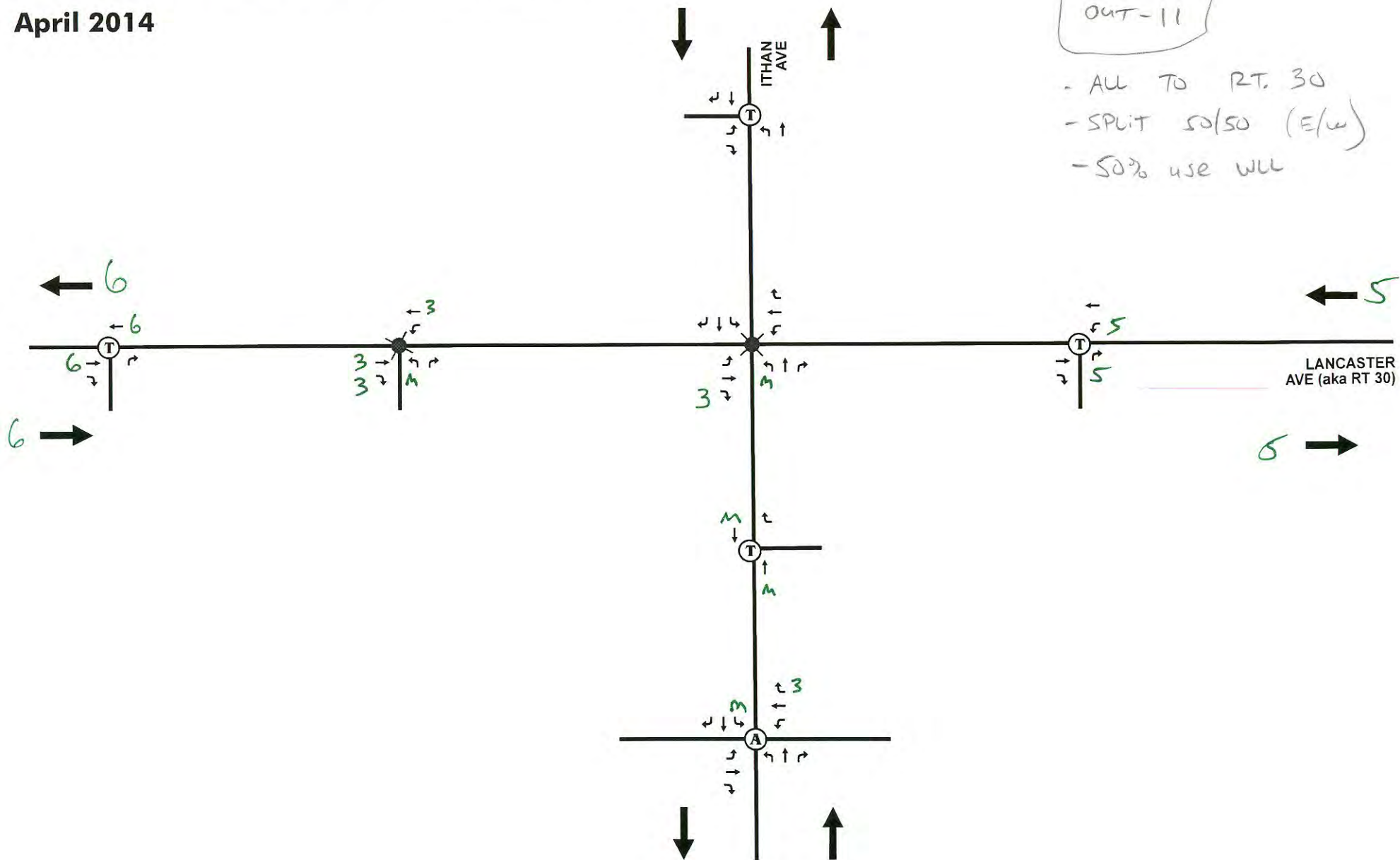
AM

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

April 2014

IN - 11
OUT - 11

- ALL TO RT. 30
- SPLIT 50/50 (E/W)
- 50% use WLL





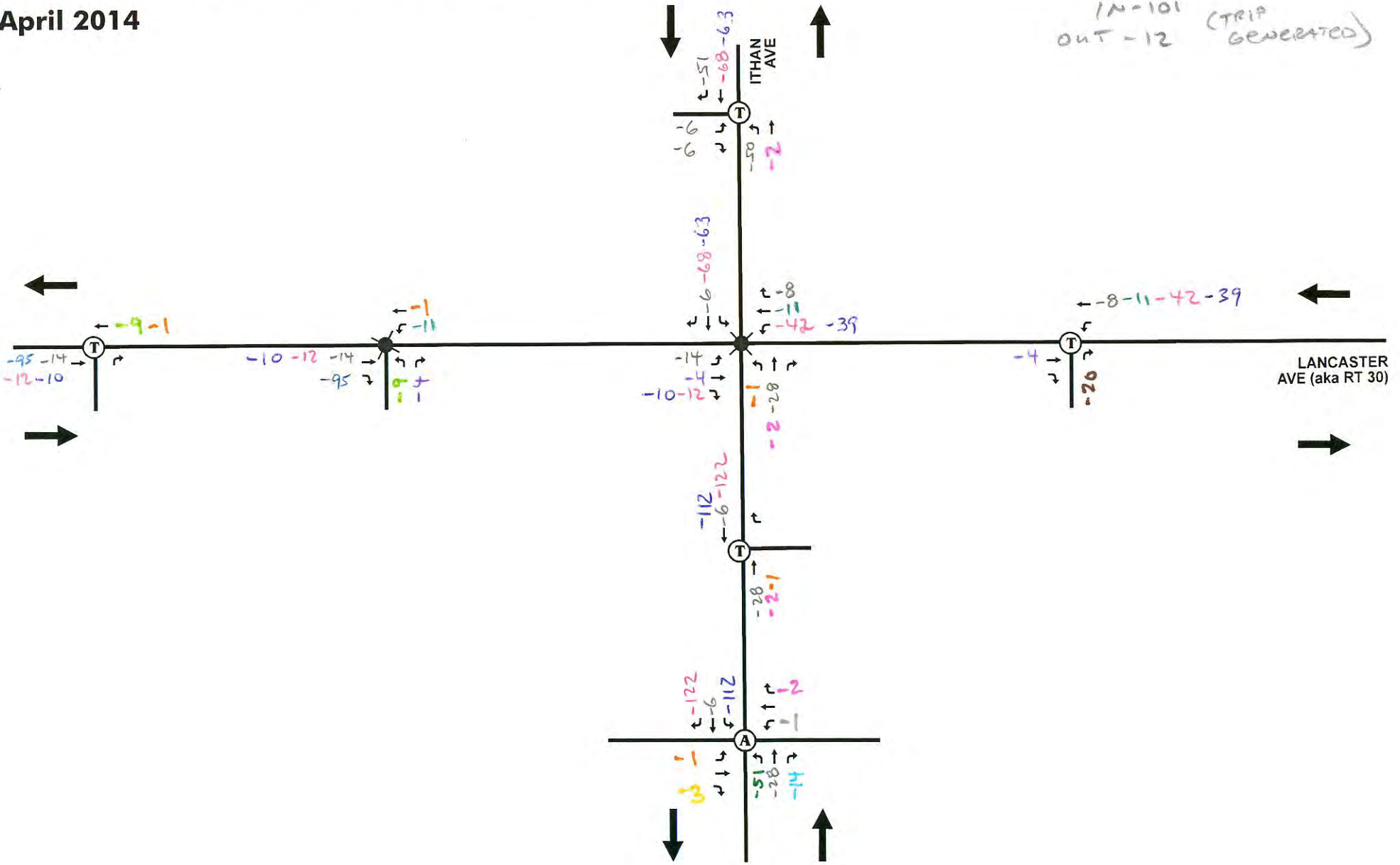
AM

HSB/SAE NOTES
IN=101
OUT=12 (TRIP GENERATED)

Redistribution Worksheet # 1, EXISTING VOLUME REMOVAL, ALL WORKSHEET

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

April 2014



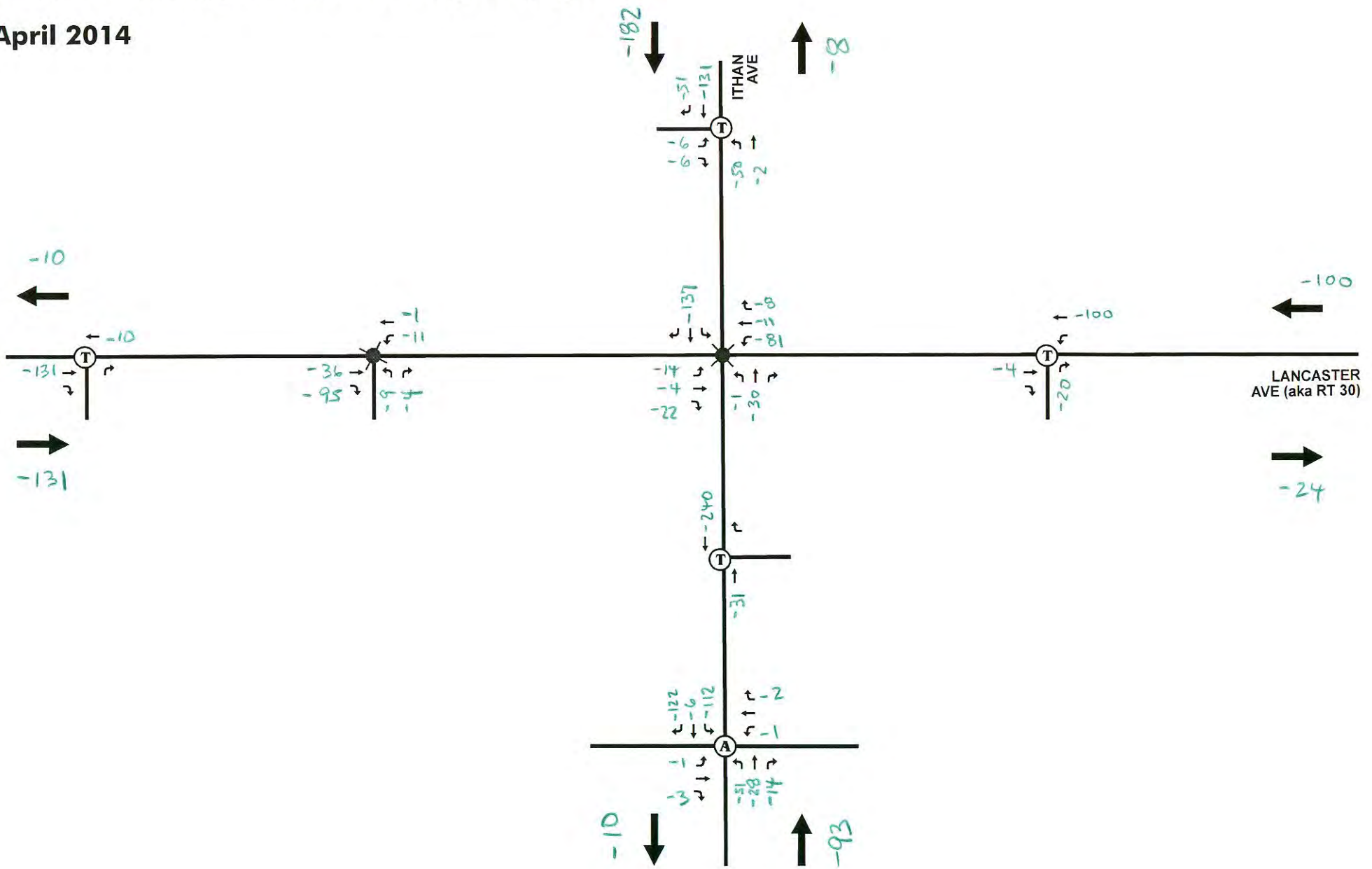


AM

Redistribution Worksheet #1A, EXISTING VOLUME REMOVAL, AM, Summary

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

April 2014





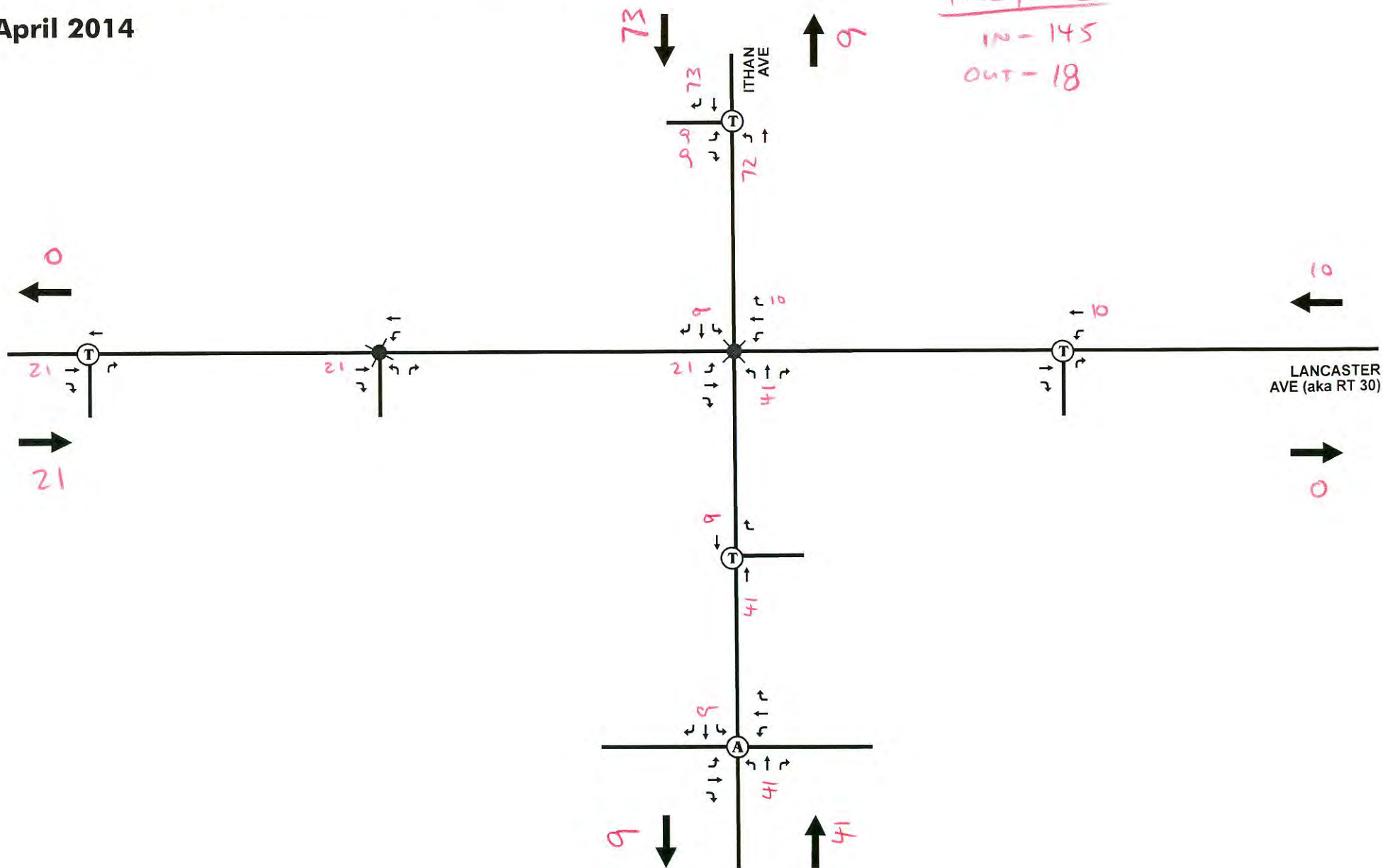
Redistribution Worksheet # 2, HSB/SAC ADD

AM

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

April 2014

HSB/SAC
IN - 145
OUT - 18



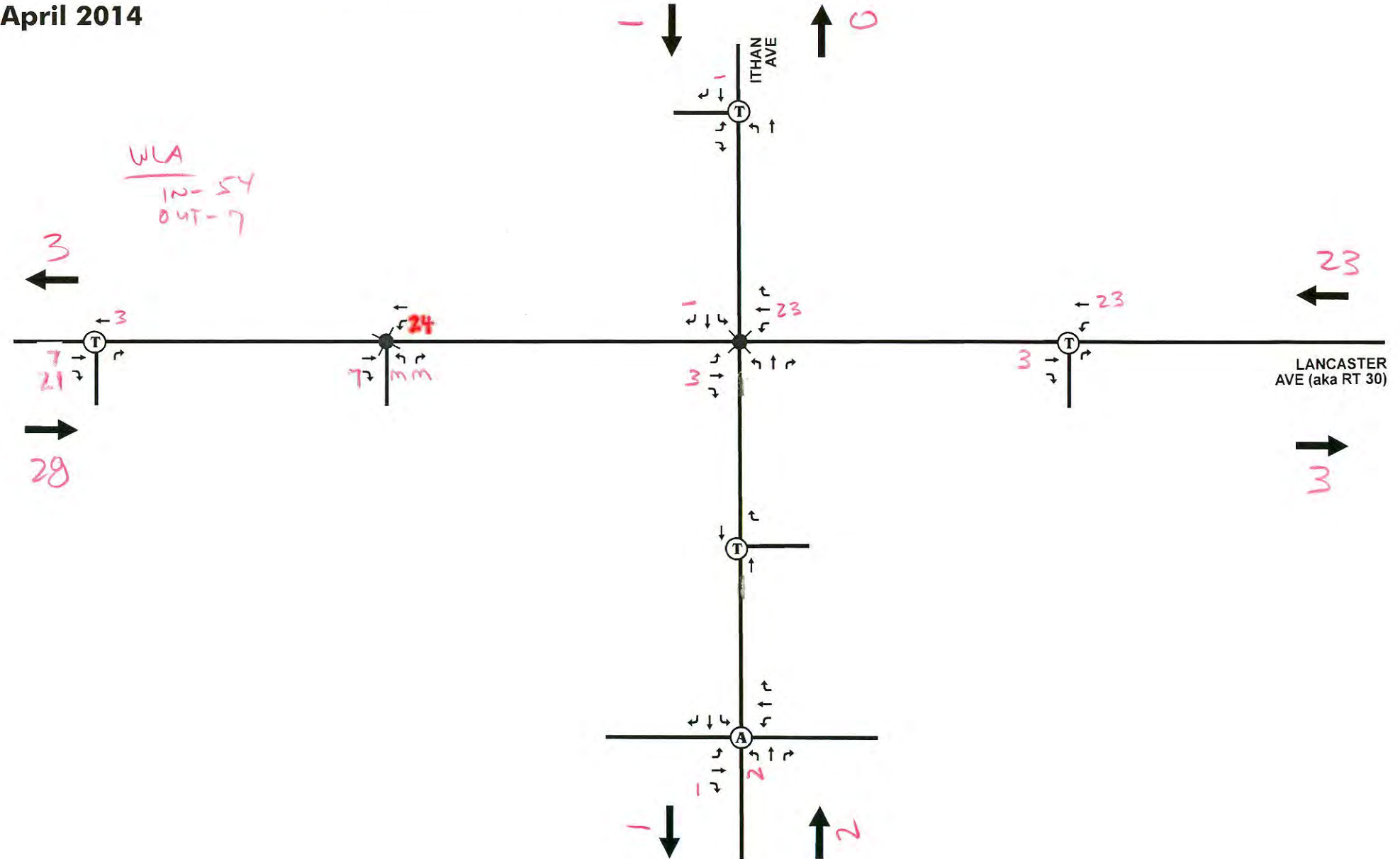


AM

Redistribution Worksheet # 3, WLA ADD

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

April 2014



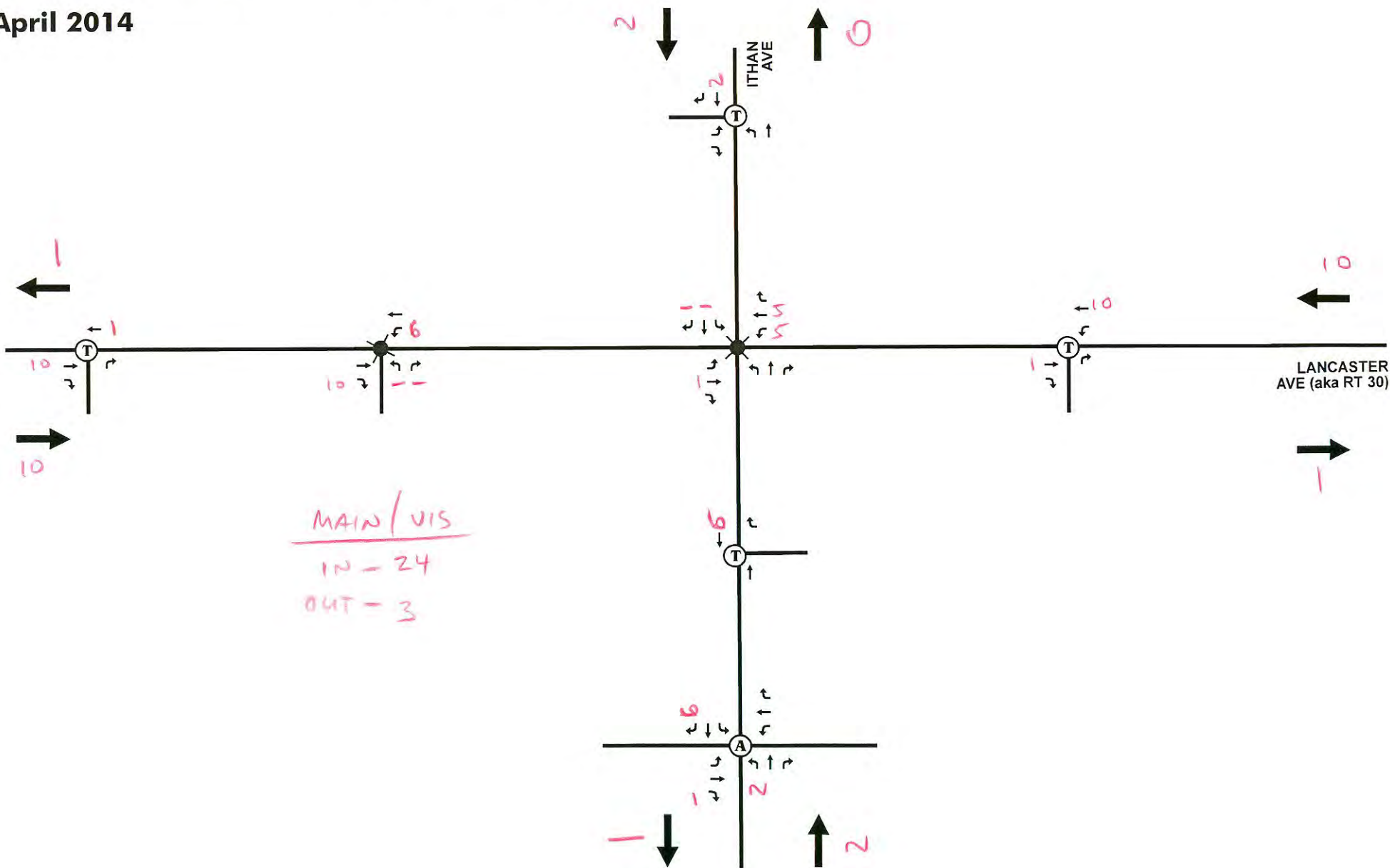


Redistribution Worksheet # 4, MAIN / VIS ADD

AM

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

April 2014



MAIN / VIS
IN - 24
OUT - 3

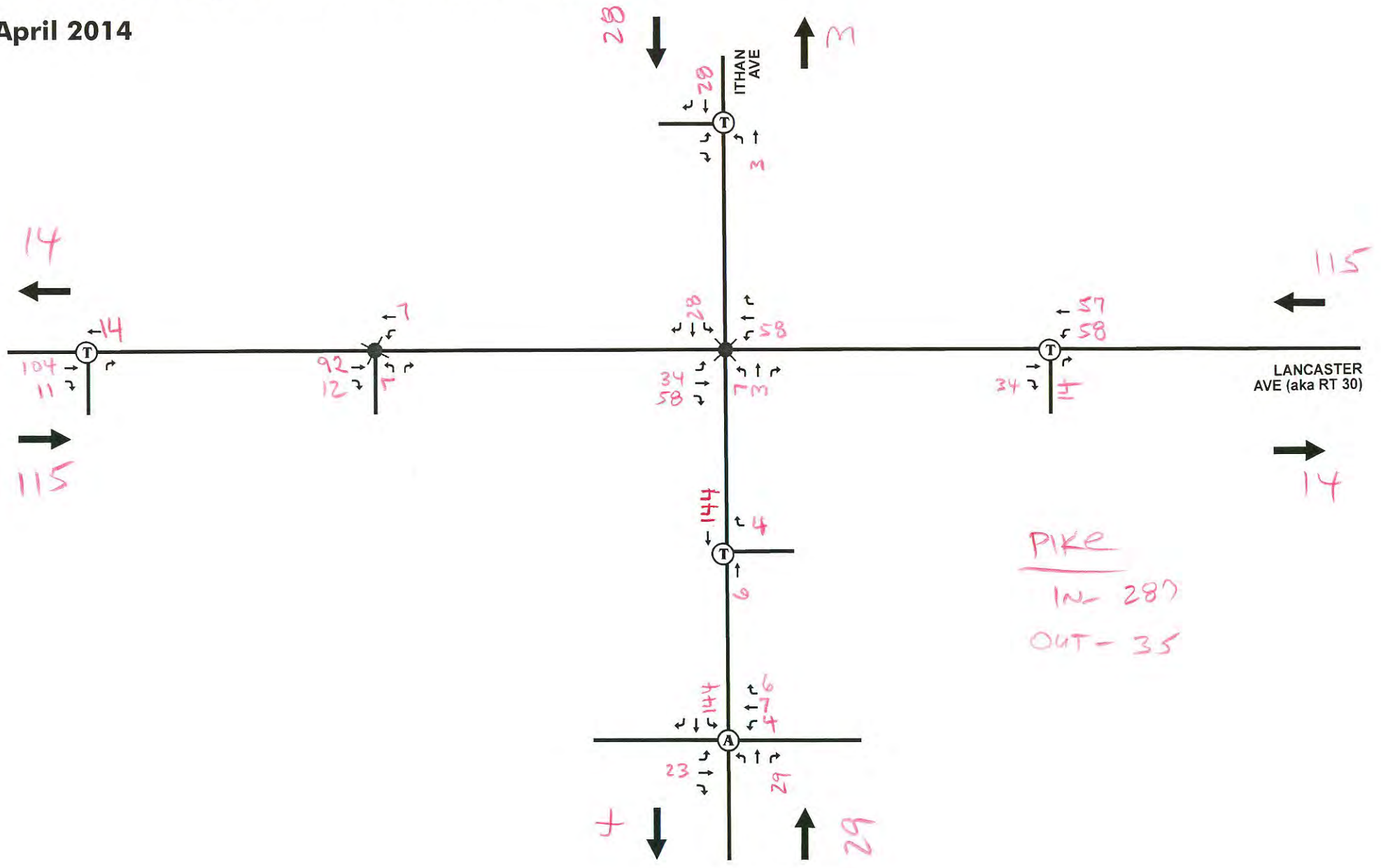


AM

Redistribution Worksheet # 5, Pike ADD

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

April 2014



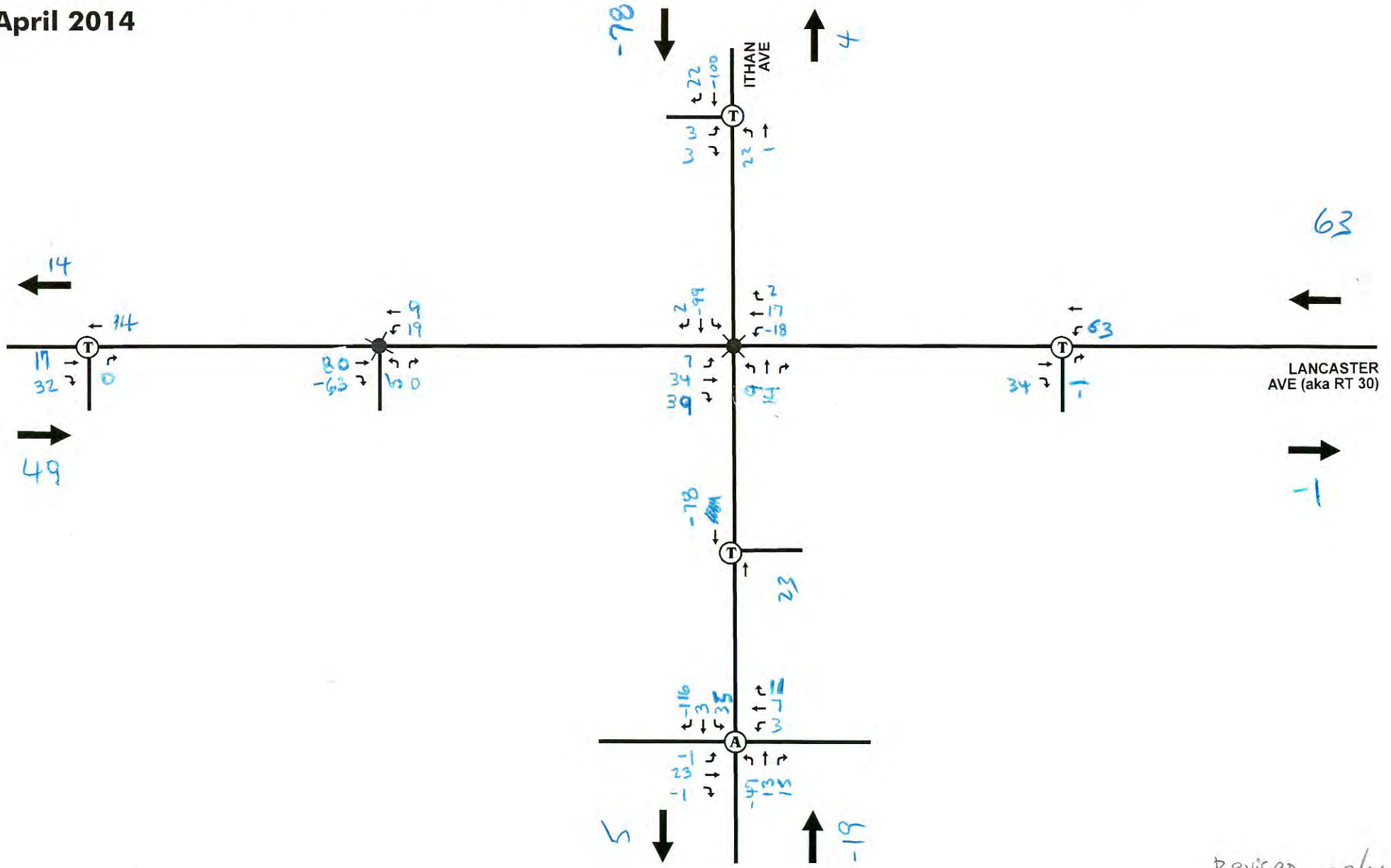


AM

Redistribution Worksheet # 6, AM TOTAL

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

April 2014



Revised 09/14



Redistribution Worksheet # A7, RETAIL

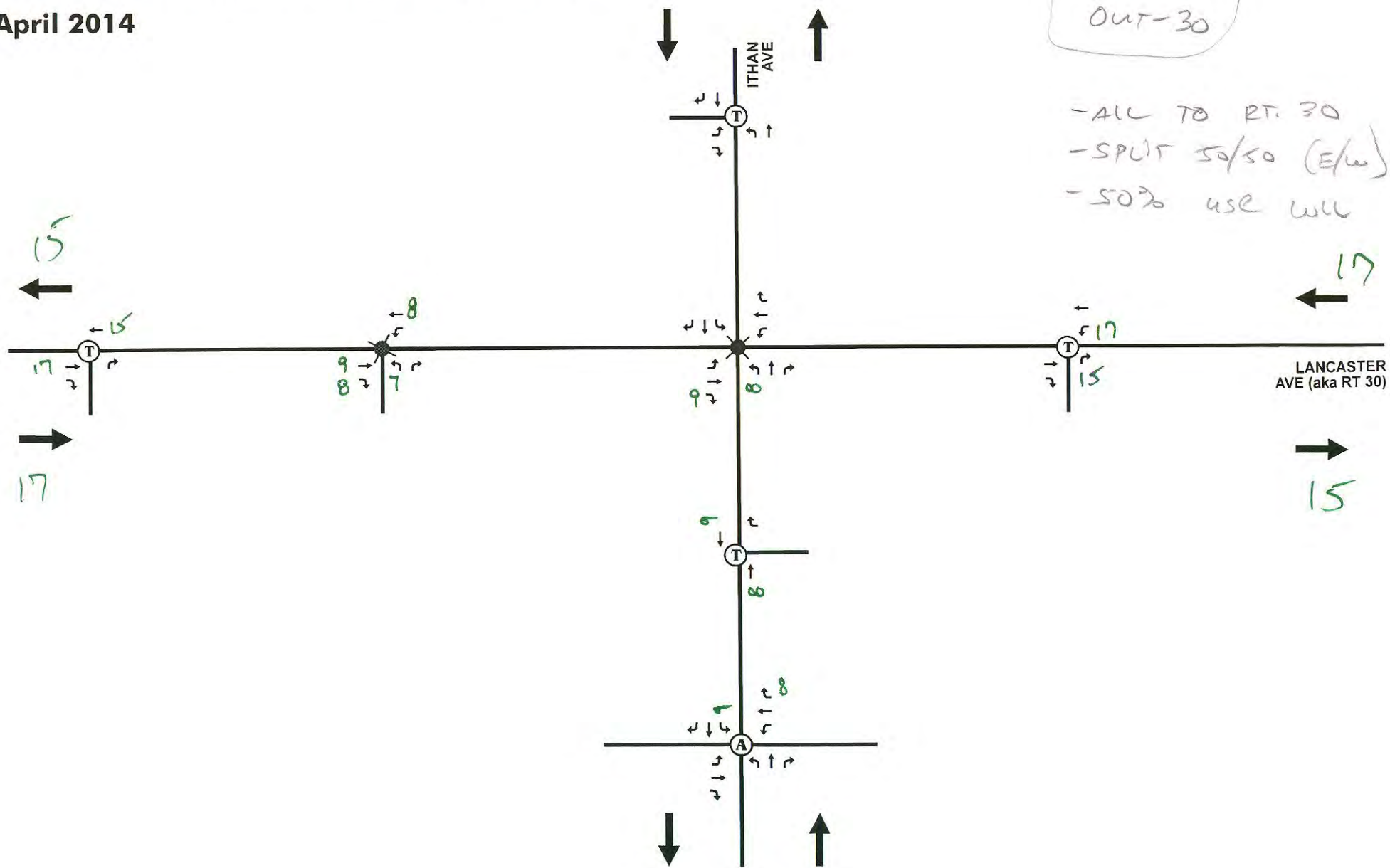
Villanova University Lancaster Avenue Residence Halls
Radnor Township, Delaware County, Pennsylvania

April 2014

PM

IN-34
OUT-30

- ALL TO RT. 30
- SPLIT 50/50 (E/W)
- 50% USE WLL





Redistribution Worksheet # 7, EXISTING Volume RECALC, ALL, WORKSHEET

PM

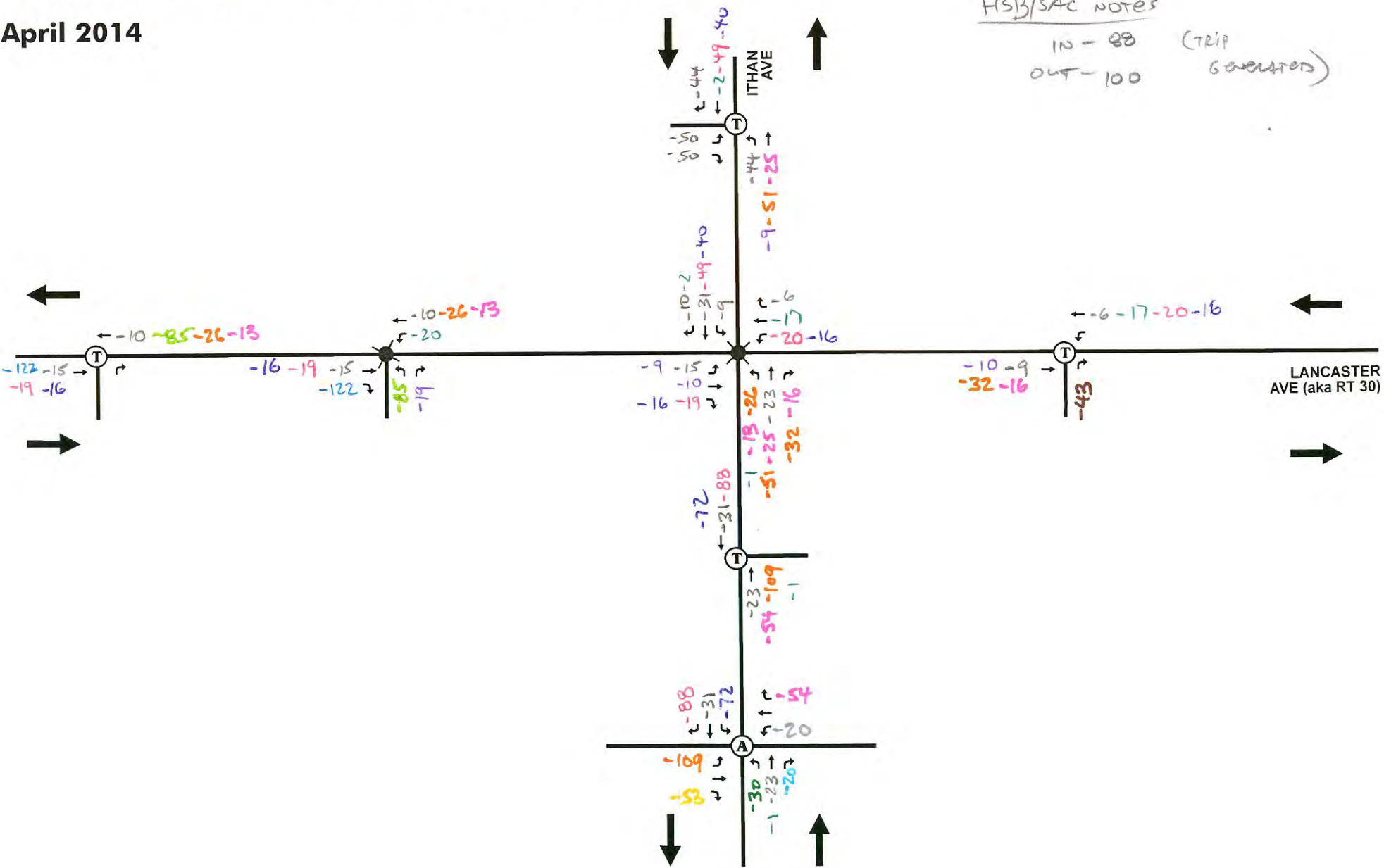
Villanova University Lancaster Avenue Residence Halls
Radnor Township, Delaware County, Pennsylvania

April 2014

HSB/SAC NOTES

IN - 88
OUT - 100

(TRIP
GENERATED)



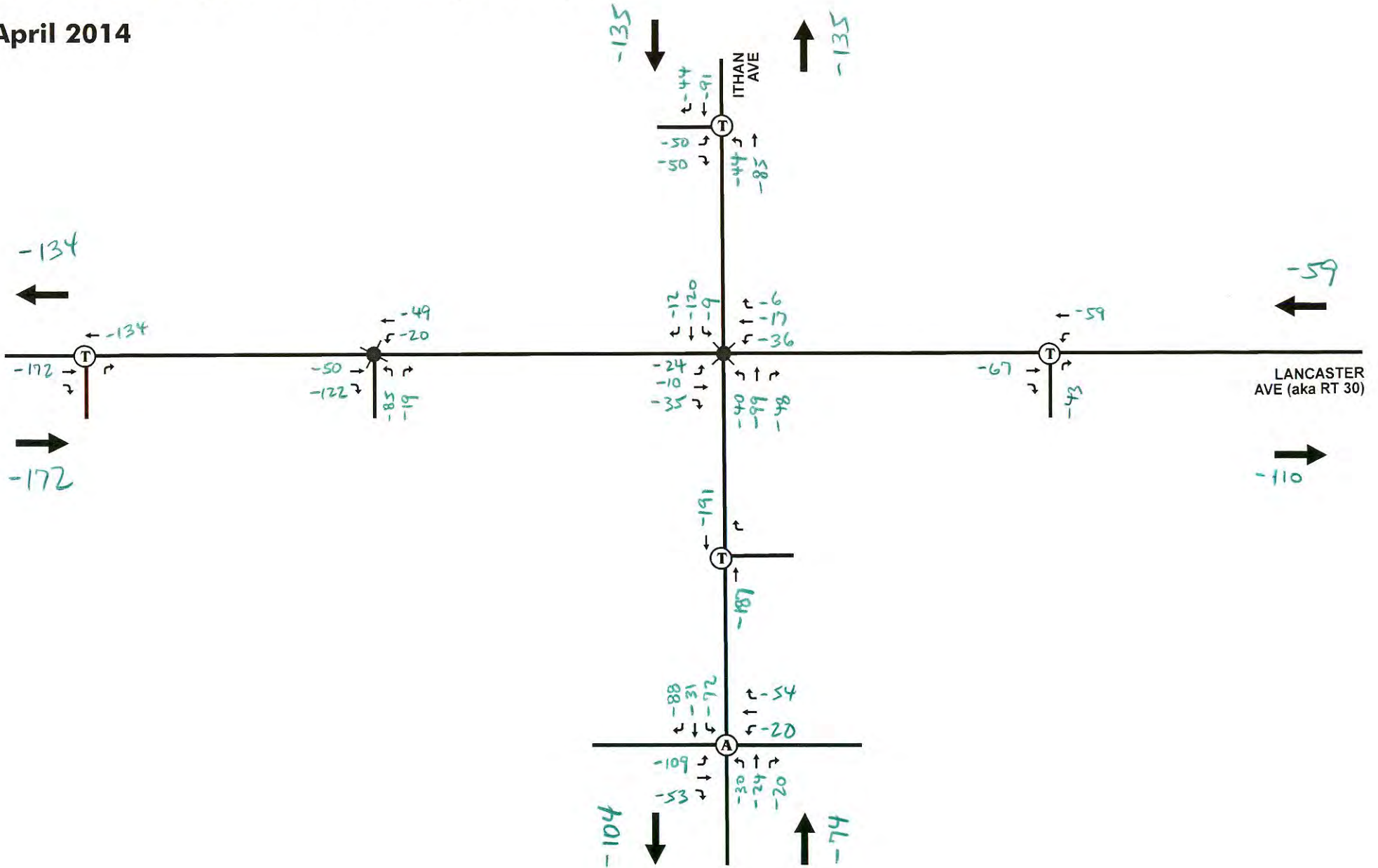


Redistribution Worksheet # 7A, EXISTING VOLUME REMOVAL, ALL, SUMMARY

PM

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

April 2014





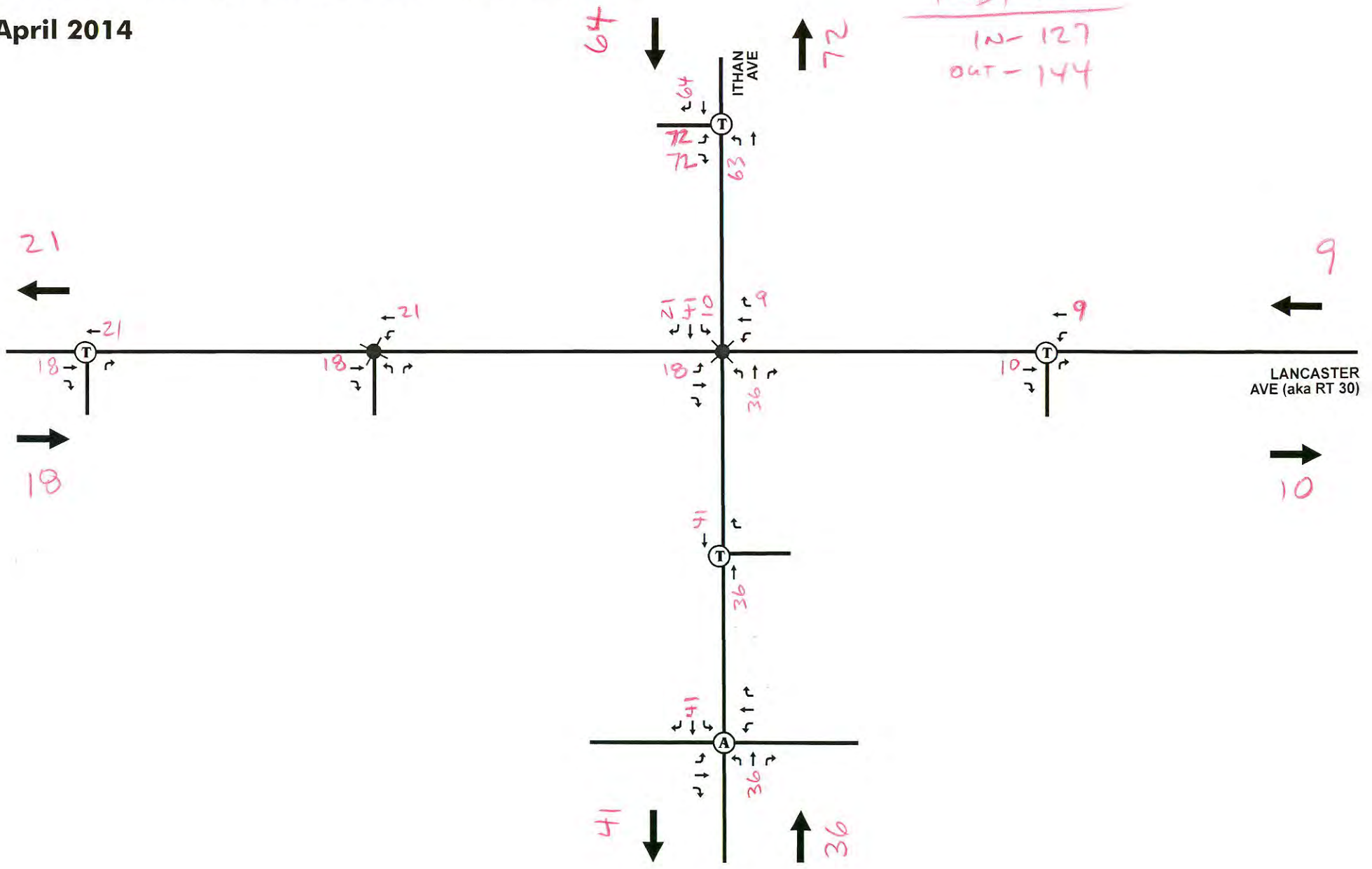
PM

Redistribution Worksheet # 8, HSB/SAC ADD

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

April 2014

HSB/SAC
IN - 127
OUT - 144



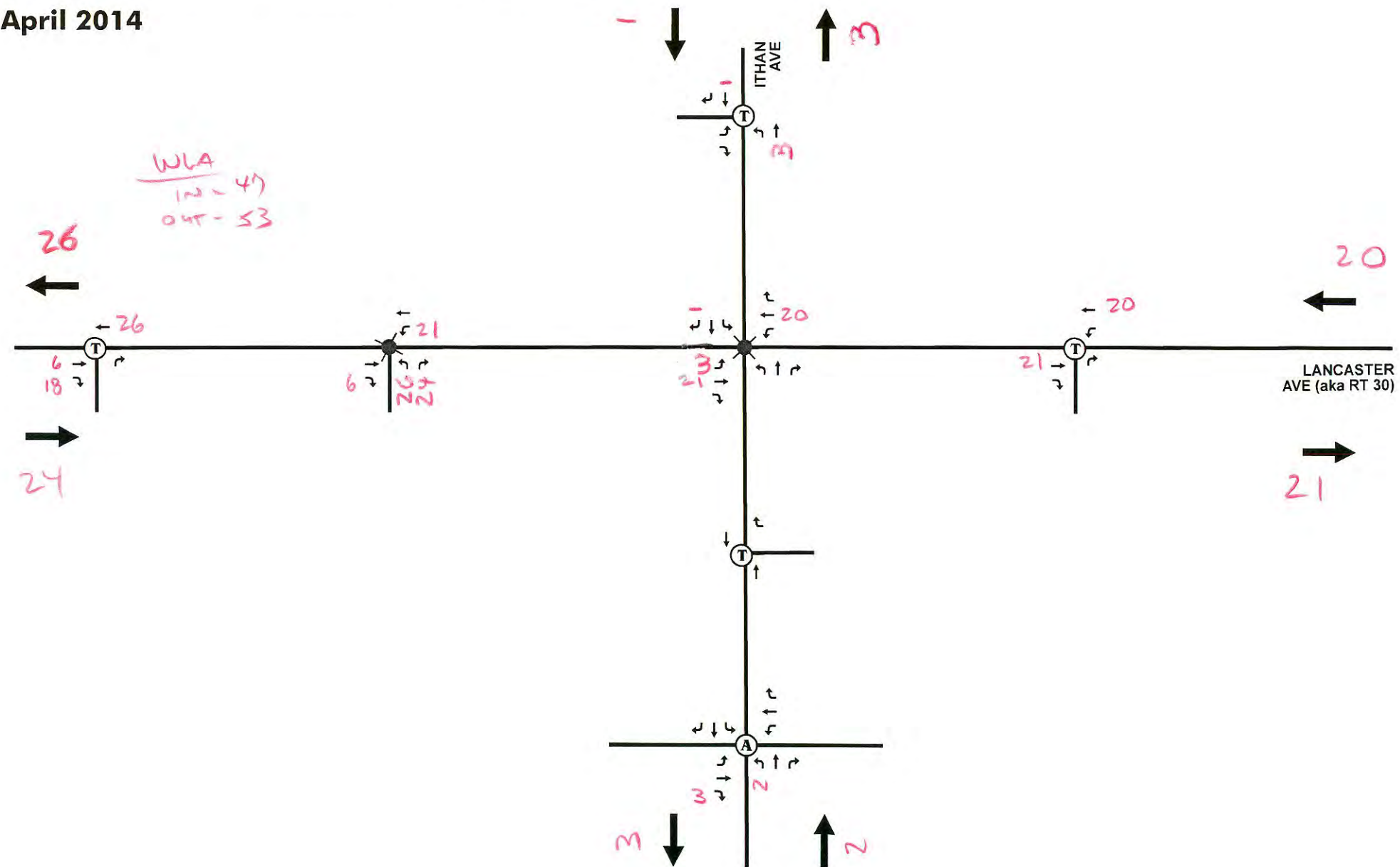


Redistribution Worksheet # 9, WLA ADD

PM

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

April 2014



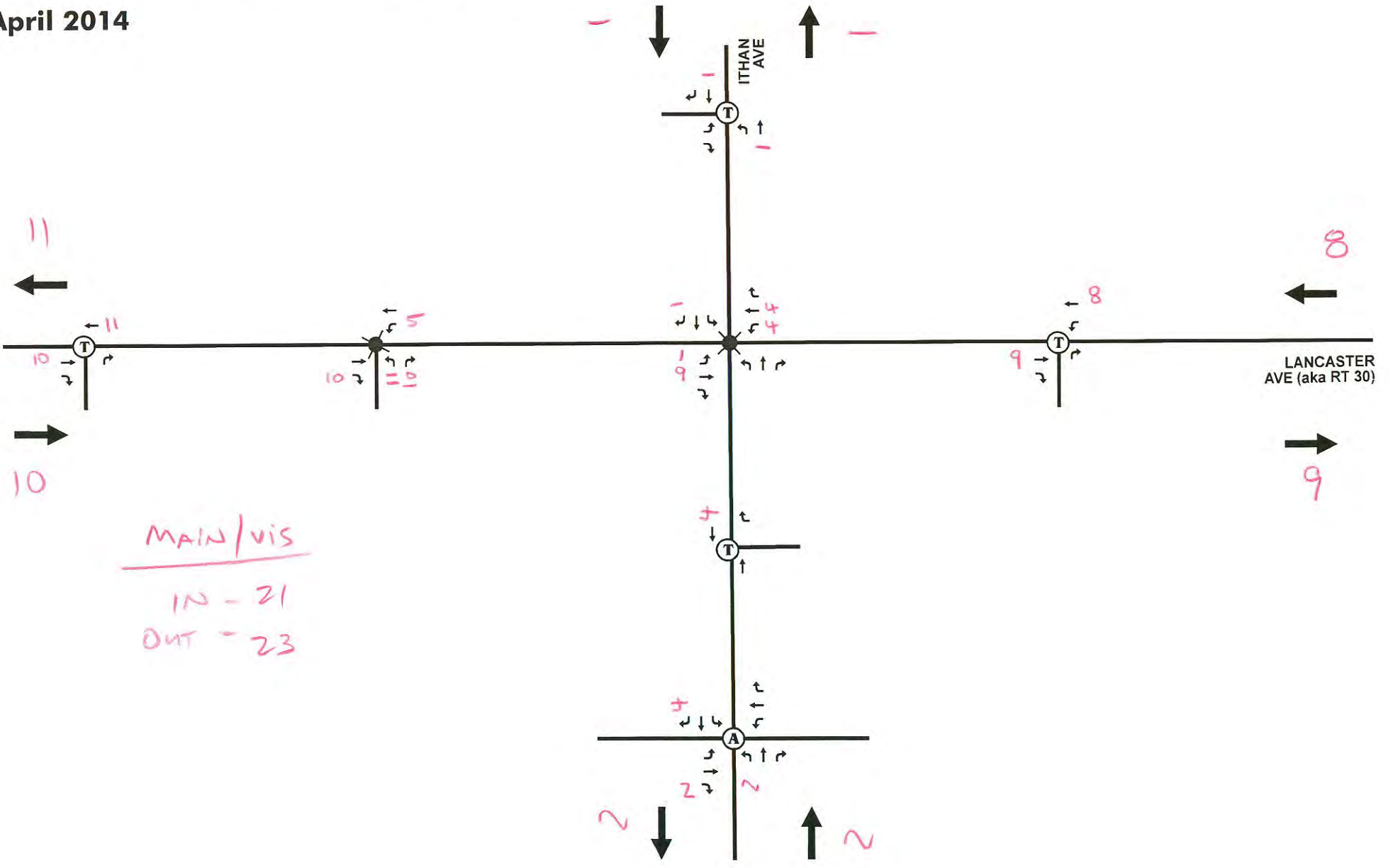


PM

Redistribution Worksheet # 10, MAIN / VIS ADD

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

April 2014



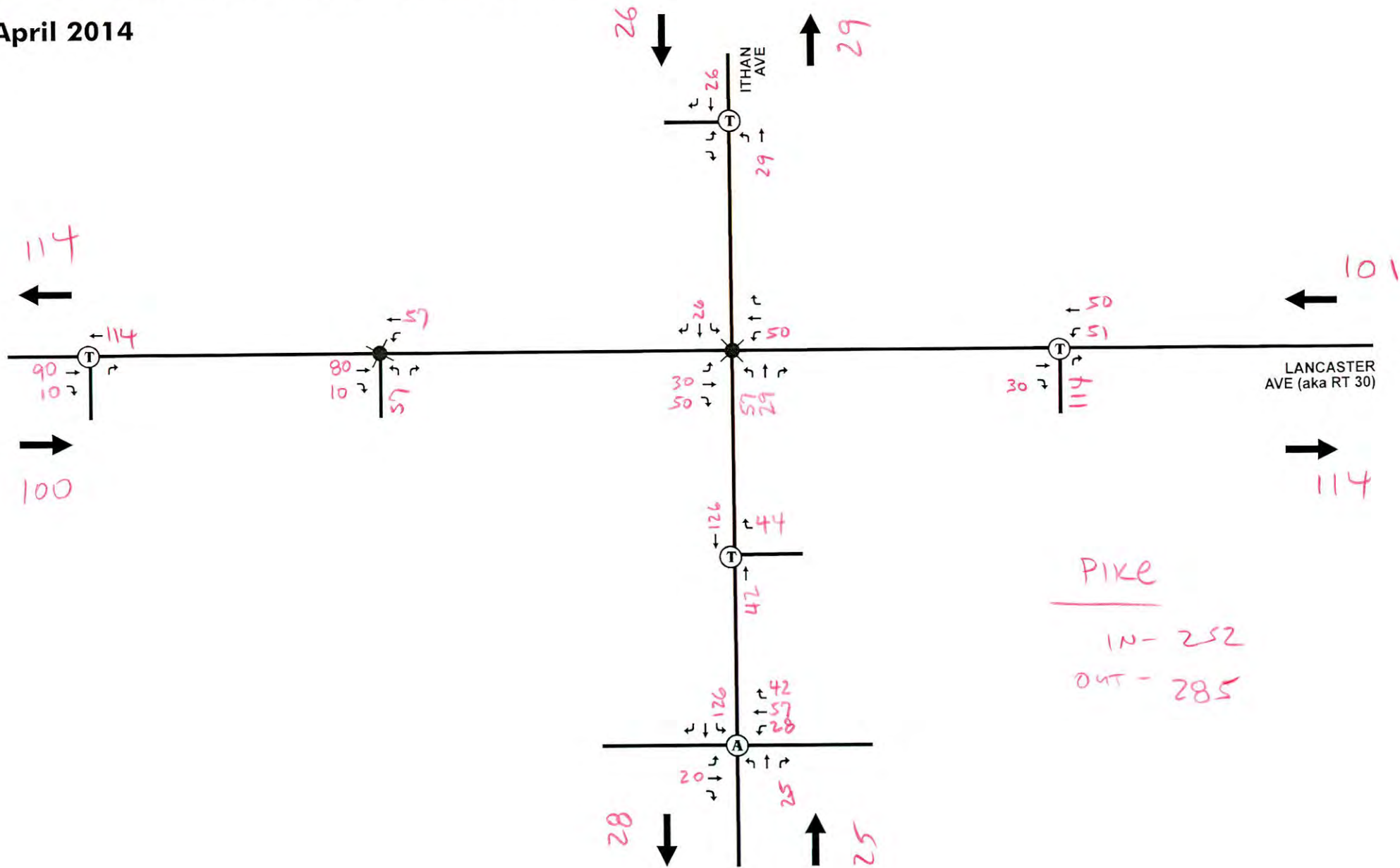


Redistribution Worksheet # 11, Pike ADD

PM

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

April 2014



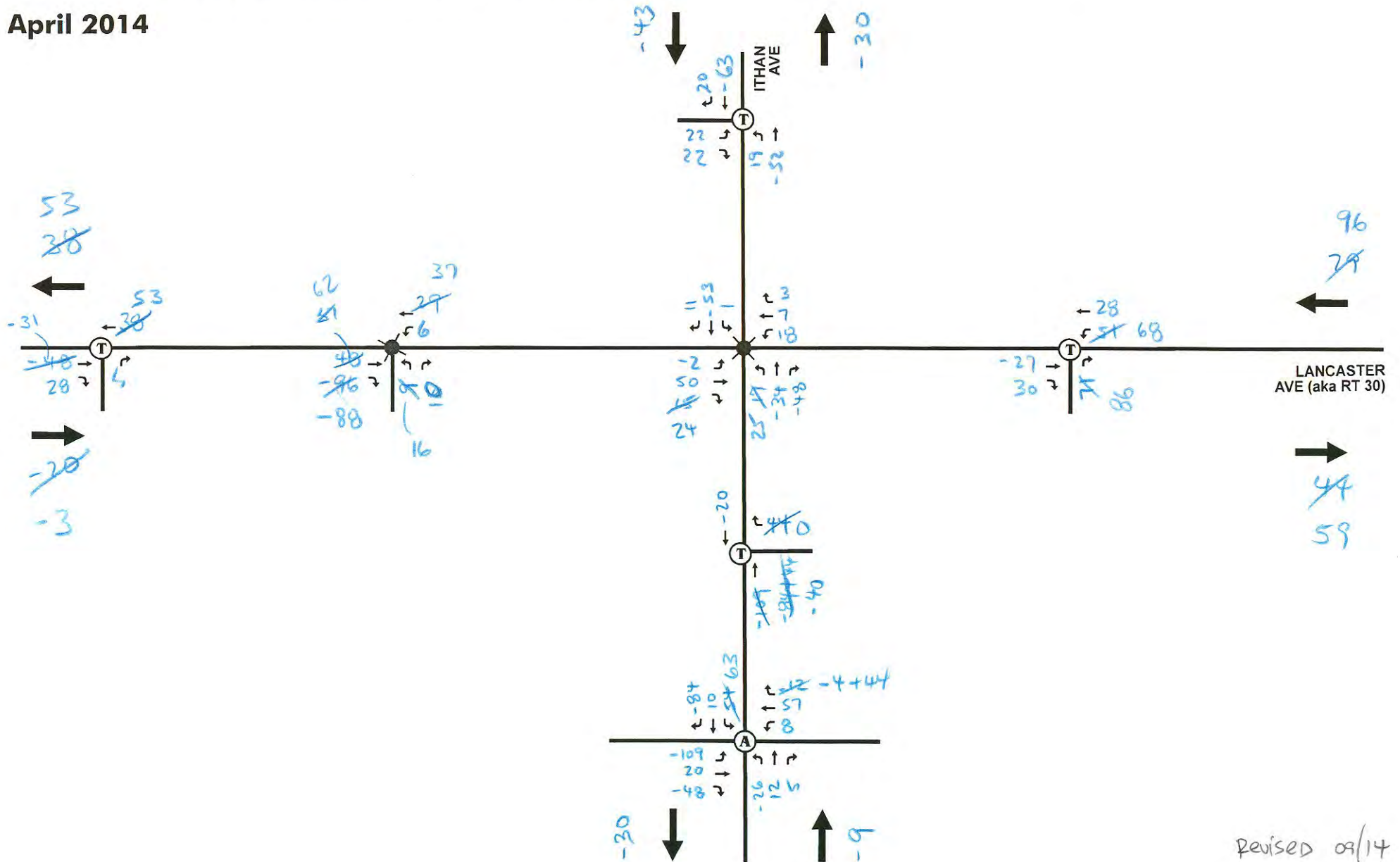


PA

Redistribution Worksheet # 12, PM TOTAL

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

April 2014



Revised 09/14

5 → 11
6 12
7 13
8 14

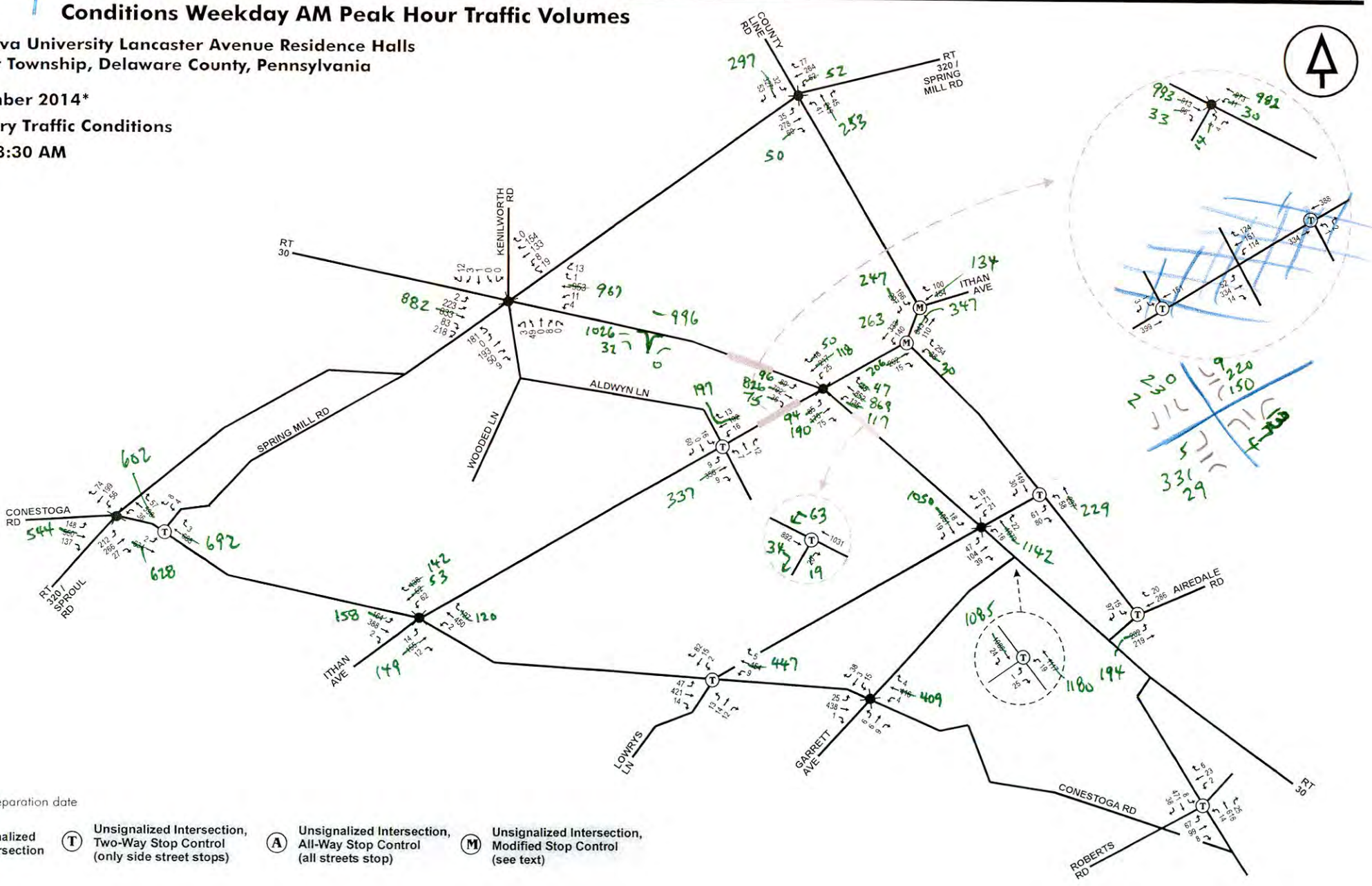
2018 Conditions Weekday AM Peak Hour Traffic Volumes

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

September 2014*

Ordinary Traffic Conditions

7:30 - 8:30 AM



* figure preparation date

PROJECTED



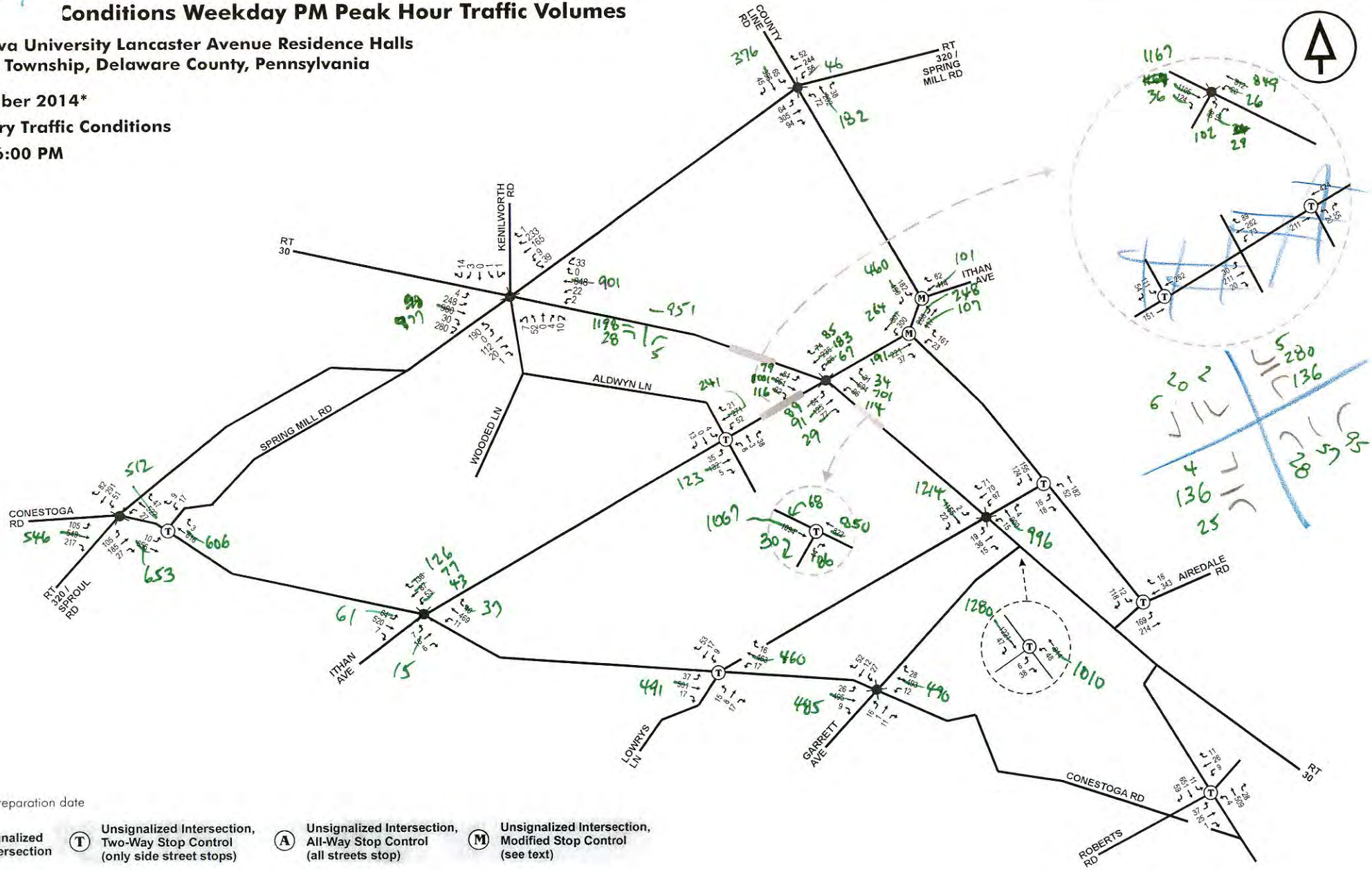
F. Tavani and Associates, Inc.
Traffic Engineering and Planning

12W
Figure 6

2018 Conditions Weekday PM Peak Hour Traffic Volumes

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

September 2014*
Ordinary Traffic Conditions
5:00 - 6:00 PM



* figure preparation date

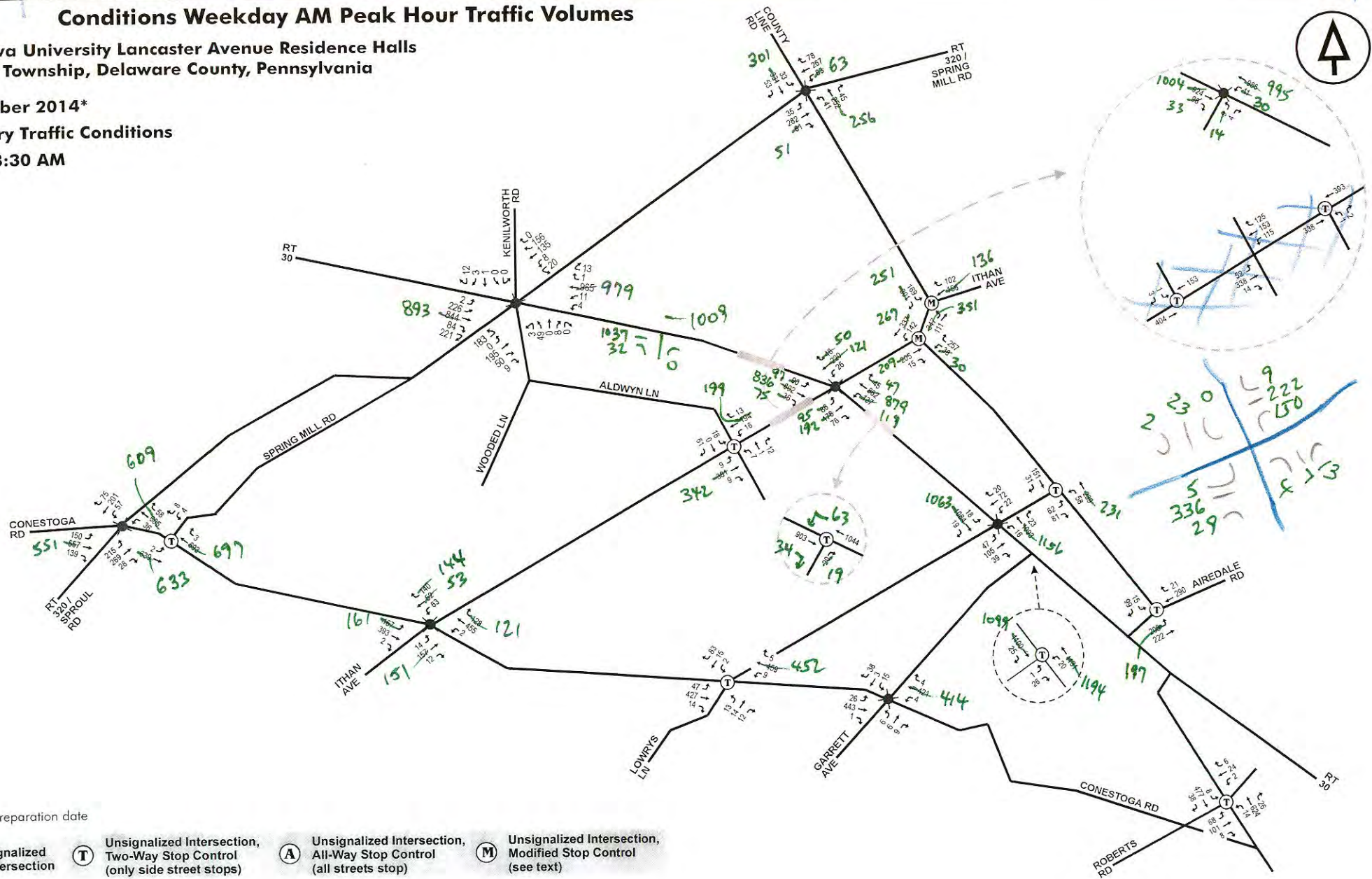
2023 Conditions Weekday AM Peak Hour Traffic Volumes

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





September 2014*

Ordinary Traffic Conditions

7:30 - 8:30 AM



* figure preparation date

-  Signalized Intersection
-  Unsignalized Intersection, Two-Way Stop Control (only side street stops)
-  Unsignalized Intersection, All-Way Stop Control (all streets stop)
-  Unsignalized Intersection, Modified Stop Control (see text)

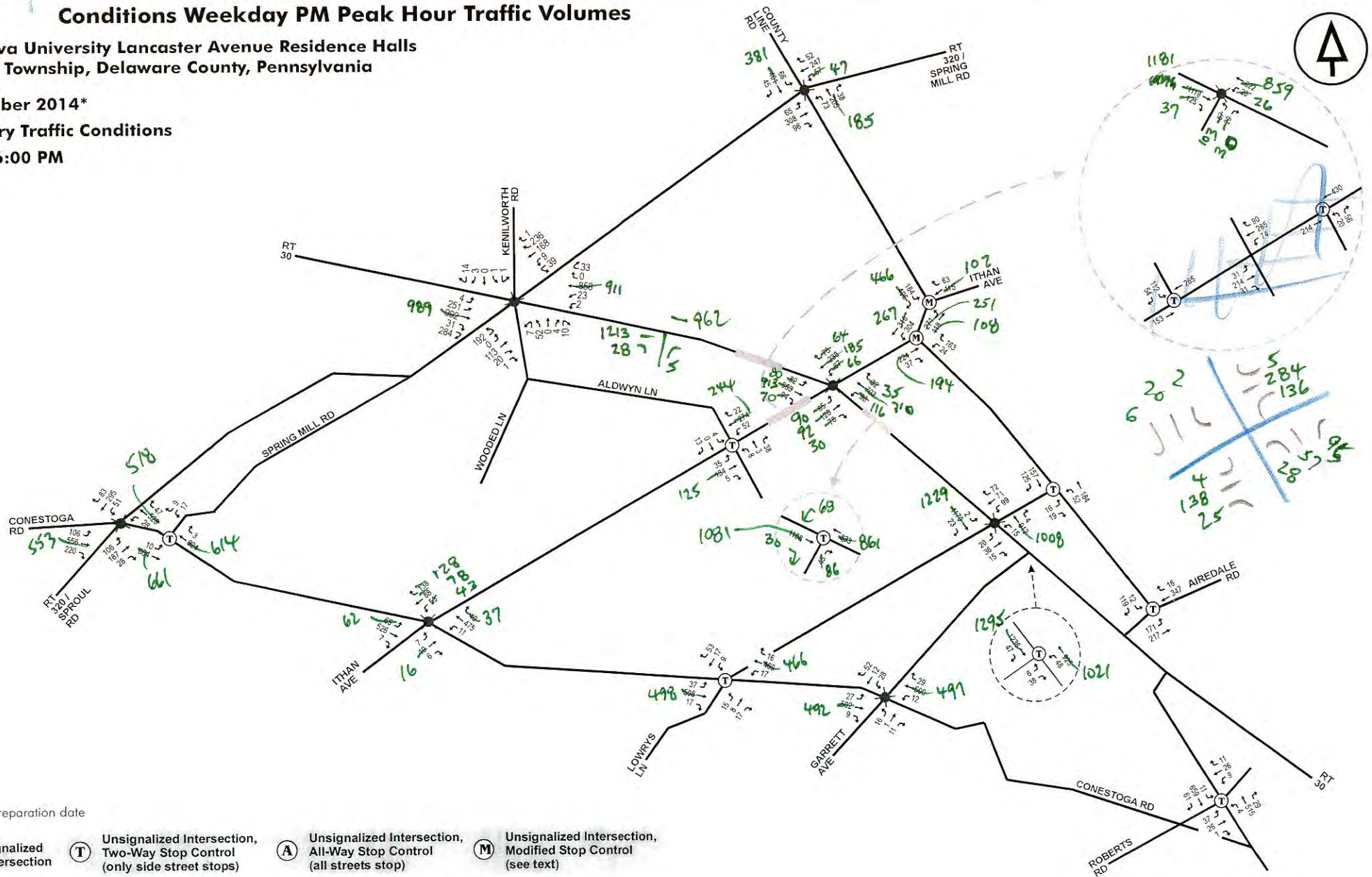
2023 Conditions Weekday PM Peak Hour Traffic Volumes

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

September 2014*

Ordinary Traffic Conditions

5:00 - 6:00 PM



* figure preparation date

- Signalized Intersection
- Unsignalized Intersection, Two-Way Stop Control (only side street stops)
- Unsignalized Intersection, All-Way Stop Control (all streets stop)
- Unsignalized Intersection, Modified Stop Control (see text)

APPENDIX I

Capacity Analyses

HCM 2010 Signalized Intersection Summary
 3: County Line Rd & Spring Mill Rd

9/15/2014

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 (Ob), 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	180.0	163.0	180.0	180.0	173.1	180.0	180.0	173.1	180.0	180.0	173.1	180.0
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	121	460	93	156	429	115	130	403	67	115	430	66
Arrive On Green	0.37	0.37	0.37	0.37	0.37	0.37	0.31	0.31	0.31	0.31	0.31	0.31
Sat Flow, veh/h	70	1226	248	148	1146	306	104	1296	215	66	1382	214
Grp Volume(v), veh/h	386	0	0	418	0	0	346	0	0	428	0	0
Grp Sat Flow(s),veh/h/ln	1544	0	0	1600	0	0	1614	0	0	1662	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	2.2	0.0	0.0
Cycle Q Clear(g_c), s	8.3	0.0	0.0	8.6	0.0	0.0	7.5	0.0	0.0	9.8	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	674	0	0	700	0	0	600	0	0	611	0	0
V/C Ratio(X)	0.57	0.00	0.00	0.60	0.00	0.00	0.58	0.00	0.00	0.70	0.00	0.00
Avail Cap(c_a), veh/h	674	0	0	700	0	0	1371	0	0	1415	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	10.7	0.0	0.0	10.8	0.0	0.0	12.4	0.0	0.0	13.1	0.0	0.0
Incr Delay (d2), s/veh	1.0	0.0	0.0	3.7	0.0	0.0	0.3	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(50%),veh/ln	3.7	0.0	0.0	4.7	0.0	0.0	3.4	0.0	0.0	4.5	0.0	0.0
LnGrp Delay(d),s/veh	11.7	0.0	0.0	14.5	0.0	0.0	12.7	0.0	0.0	13.7	0.0	0.0
LnGrp LOS	B			B			B			B		
Approach Vol, veh/h	386			418			346			428		
Approach Delay, s/veh	11.7			14.5			12.7			13.7		
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	42.6		19.4		42.6		19.4					
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	10.3		11.8		10.6		9.5					
Green Ext Time (p_c), s	1.8		1.6		1.7		1.6					
Intersection Summary												
HCM 2010 Ctrl Delay				13.2								
HCM 2010 LOS				B								

HCM 2010 Signalized Intersection Summary
 7: Sproul Rd/Spring Mill Rd & Aldwyn Ln/Kenilworth Rd & Lancaster Ave

9/15/2014

HCM 2010 methodology does not support more than 4 approaches.

HCM 2010 Signalized Intersection Summary
11: Chapel Dr & Lancaster Ave

9/15/2014

HCM 2010 Computation does not support turning movement with Shared and Exclusive lanes.

HCM 2010 Signalized Intersection Summary
16: Sproul Rd & Conestoga Rd

9/15/2014

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 (Ob), 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	174.8	174.8	180.0	179.1	179.1	184.5	173.9	173.9	179.1	180.9	175.6	180.9
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	209	822	0	247	593	0	243	613	64	97	256	88
Arrive On Green	0.08	0.47	0.00	0.33	0.33	0.00	0.08	0.40	0.40	0.25	0.25	0.25
Sat Flow, veh/h	1664	1748	0	831	1791	0	1656	1549	161	192	1021	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	1566	0	0
Q Serve(g_s), s	5.2	23.6	0.0	3.3	28.5	0.0	6.5	0.0	11.9	13.3	0.0	0.0
Cycle Q Clear(g_c), s	5.2	23.6	0.0	14.9	28.5	0.0	6.5	0.0	11.9	18.8	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	209	822	0	247	593	0	243	0	677	441	0	0
V/C Ratio(X)	0.76	0.72	0.00	0.15	1.09	0.00	0.95	0.00	0.47	0.80	0.00	0.00
Avail Cap(c_a), veh/h	209	822	0	247	593	0	243	0	755	511	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	20.9	18.3	0.0	29.1	28.8	0.0	28.2	0.0	19.3	31.0	0.0	0.0
Incr Delay (d2), s/veh	15.4	5.5	0.0	1.3	64.2	0.0	43.2	0.0	0.5	8.0	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(50%),veh/ln	3.2	12.5	0.0	0.9	24.6	0.0	5.4	0.0	5.7	9.1	0.0	0.0
LnGrp Delay(d),s/veh	36.2	23.8	0.0	30.4	92.9	0.0	71.4	0.0	19.8	39.0	0.0	0.0
LnGrp LOS	D	C		C	F		E		B	D		
Approach Vol, veh/h	756		685			548		355				
Approach Delay, s/veh	26.5		89.5			41.5		39.0				
Approach LOS	C		F			D		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	27.6		49.9		40.1	12.0	37.9				
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	20.8		25.6		13.9	7.2	30.5				
Green Ext Time (p_c), s	0.0	1.3		7.3		2.4	0.0	0.0				
Intersection Summary												
HCM 2010 Ctrl Delay			50.3									
HCM 2010 LOS			D									

HCM 2010 Signalized Intersection Summary
25: S Ithan Ave & Conestoga Rd

9/15/2014

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 (Ob), 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	185.4	178.3	185.4	176.4	169.6	176.4	176.3	169.5	176.3	184.4	177.3	184.4
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	198	372	1	65	676	190	82	356	27	146	99	200
Arrive On Green	0.53	0.53	0.53	0.53	0.53	0.53	0.24	0.24	0.24	0.24	0.24	0.24
Sat Flow, veh/h	217	704	3	1	1281	360	54	1488	112	273	414	836
Grp Volume(v), veh/h	674	0	0	703	0	0	221	0	0	306	0	0
Grp Sat Flow(s),veh/h/ln	923	0	0	1642	0	0	1654	0	0	1523	0	0
Q Serve(g_s), s	9.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.1	0.0	0.0
Cycle Q Clear(g_c), s	29.5	0.0	0.0	19.9	0.0	0.0	6.5	0.0	0.0	10.5	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	571	0	0	931	0	0	465	0	0	445	0	0
V/C Ratio(X)	1.18	0.00	0.00	0.75	0.00	0.00	0.47	0.00	0.00	0.69	0.00	0.00
Avail Cap(c_a), veh/h	571	0	0	931	0	0	642	0	0	604	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	10.9	0.0	0.0	18.6	0.0	0.0	20.0	0.0	0.0
Incr Delay (d2), s/veh	98.3	0.0	0.0	3.5	0.0	0.0	0.8	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(50%),veh/ln	24.2	0.0	0.0	9.7	0.0	0.0	3.0	0.0	0.0	4.7	0.0	0.0
LnGrp Delay(d),s/veh	114.1	0.0	0.0	14.5	0.0	0.0	19.4	0.0	0.0	22.0	0.0	0.0
LnGrp LOS	F			B			B			C		
Approach Vol, veh/h		674			703			221			306	
Approach Delay, s/veh		114.1			14.5			19.4			22.0	
Approach LOS		F			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		19.9		36.0		19.9				
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		21.9		8.5		31.5		12.5				
Green Ext Time (p_c), s		4.2		1.7		0.0		1.4				
Intersection Summary												
HCM 2010 Ctrl Delay				51.5								
HCM 2010 LOS				D								

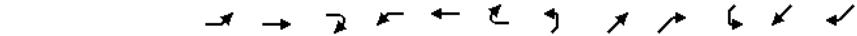
HCM 2010 Signalized Intersection Summary
27: S Ithan Ave/N Ithan Ave & Lancaster Ave

9/15/2014

HCM 2010 methodology does not support exclusive ped or hold phases.

HCM 2010 Signalized Intersection Summary
 33: Williams Rd/Garrett Ave & Conestoga Rd

9/15/2014

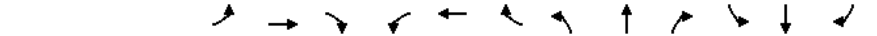


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↕			↕			↕				↕
Volume (veh/h)	25	431	1	4	410	4	6	6	9	15	3	37
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Ob), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	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	187.2	187.2	187.2	187.2	187.2	187.2	180.0	180.0	180.0	172.8	172.8	172.8
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	102	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	343	643	704	335	143	1005
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	1690	0	0	1484	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	180	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	592	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(50%),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
 51: Lowrys Ln & Lancaster Ave

9/15/2014



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 (Ob), 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	180.0	174.8	180.0	177.3	172.1	177.3	190.0	184.5	190.0	188.1	182.7	188.1
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	91	1851	33	89	1824	38	144	171	56	124	204	48
Arrive On Green	1.00	1.00	1.00	0.58	0.58	0.58	0.16	0.16	0.16	0.16	0.16	0.16
Sat Flow, veh/h	17	3208	57	14	3160	66	288	1061	348	185	1263	295
Grp Volume(v), veh/h	598	0	554	617	0	567	200	0	0	118	0	0
Grp Sat Flow(s),veh/h/ln	1702	0	1580	1685	0	1555	1697	0	0	1743	0	0
Q Serve(g_s), s	0.0	0.0	0.0	0.0	0.0	11.2	2.3	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	0.0	0.0	0.0	10.8	0.0	11.2	5.1	0.0	0.0	2.7	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	1063	0	912	1053	0	897	372	0	0	375	0	0
V/C Ratio(X)	0.56	0.00	0.61	0.59	0.00	0.63	0.54	0.00	0.00	0.31	0.00	0.00
Avail Cap(c_a), veh/h	1063	0	912	1053	0	897	875	0	0	878	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)	0.86	0.00	0.86	1.00	0.00	1.00	0.00	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	6.5	18.2	0.0	0.0	17.3	0.0	0.0
Incr Delay (d2), s/veh	1.8	0.0	2.6	2.4	0.0	3.4	1.2	0.0	0.0	0.5	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.5	0.0	0.7	5.7	0.0	5.6	2.5	0.0	0.0	1.4	0.0	0.0
LnGrp Delay(d),s/veh	1.8	0.0	2.6	8.8	0.0	9.8	19.4	0.0	0.0	17.8	0.0	0.0
LnGrp LOS	A		A	A		A	B			B		
Approach Vol, veh/h	1152				1184			200		118		
Approach Delay, s/veh	2.2				9.3			19.4		17.8		
Approach LOS	A				A			B		B		
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	2		4		6		8					
Phs Duration (G+Y+Rc), s	47.1		12.9		47.1		12.9					
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	2.0		4.7		13.2		7.1					
Green Ext Time (p_c), s	11.8		1.1		8.4		1.0					

Intersection Summary	
HCM 2010 Ctrl Delay	7.4
HCM 2010 LOS	A

Lanes, Volumes, Timings

7: Sproul Rd/Spring Mill Rd & Aldwyn Ln/Kenilworth Rd & Lancaster Ave

9/15/2014

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

Lanes, Volumes, Timings

7: Sproul Rd/Spring Mill Rd & Aldwyn Ln/Kenilworth Rd & Lancaster Ave

9/15/2014

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 (%)			-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	15	15		9	9	15	15
Number of Detectors	1	1	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

Lanes, Volumes, Timings

7: Sproul Rd/Spring Mill Rd & Aldwyn Ln/Kenilworth Rd & Lancaster Ave

9/15/2014



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	CI+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	

Lanes, Volumes, Timings

7: Sproul Rd/Spring Mill Rd & Aldwyn Ln/Kenilworth Rd & Lancaster Ave

9/15/2014



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				
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

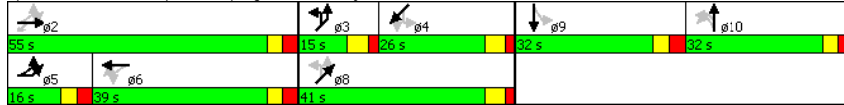
Area Type:	Other
Cycle Length:	160
Actuated Cycle Length:	117.2
Natural Cycle:	150
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	1.31
Intersection Signal Delay:	79.4
Intersection LOS:	E
Intersection Capacity Utilization:	105.6%
ICU Level of Service:	G
Analysis Period (min):	15
-	Volume exceeds 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

9/15/2014

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

9/15/2014

	↑	↖	↓	↙	↘	↗	↖	↗	↘	↙	↘	
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	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				
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												

Lanes, Volumes, Timings

7: Sproul Rd/Spring Mill Rd & Aldwyn Ln/Kenilworth Rd & Lancaster Ave

9/15/2014



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	
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		

Lanes, Volumes, Timings
11: Chapel Dr & Lancaster Ave

9/15/2014

	→	↖	↙	←	↗	↘
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	CI+Ex		CI+Ex	CI+Ex	CI+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	

EX am Baseline
EX am

Synchro 8 Report
Page 1

Lanes, Volumes, Timings
11: Chapel Dr & Lancaster Ave

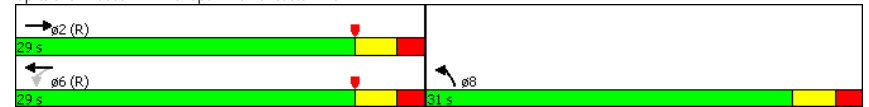
9/15/2014

	→	↖	↙	←	↗	↘
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			1.2	22.5	
Queue Delay	0.0			0.0	0.0	
Total Delay	1.5			1.2	22.5	
LOS	A			A	C	
Approach Delay	1.5			1.2	22.5	
Approach LOS	A			A	C	
Queue Length 50th (ft)	0			0	3	
Queue Length 95th (ft)	97			147	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: 1.5
 Intersection Capacity Utilization 48.7%
 Analysis Period (min) 15
 Intersection LOS: A
 ICU Level of Service A

Splits and Phases: 11: Chapel Dr & Lancaster Ave



EX am Baseline
EX am

Synchro 8 Report
Page 2

Lanes, Volumes, Timings

27: S Ithan Ave/N Ithan Ave & Lancaster Ave

9/15/2014



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	

Lanes, Volumes, Timings

27: S Ithan Ave/N Ithan Ave & Lancaster Ave

9/15/2014

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

Lanes, Volumes, Timings

27: S Ithan Ave/N Ithan Ave & Lancaster Ave

9/15/2014



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	
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

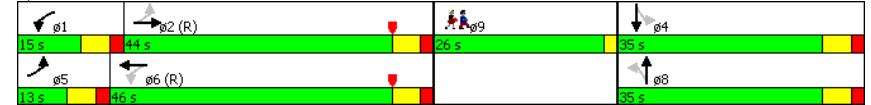
Area Type: Other
 Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow, Master Intersection
 Natural Cycle: 95
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.86
 Intersection Signal Delay: 43.3
 Intersection Capacity Utilization 77.6%
 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.

Lanes, Volumes, Timings

27: S Ithan Ave/N Ithan Ave & Lancaster Ave

9/15/2014

Splits and Phases: 27: S Ithan Ave/N Ithan Ave & Lancaster Ave



Lanes, Volumes, Timings

27: S Ithan Ave/N Ithan Ave & Lancaster Ave

9/15/2014

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	

Intersection

Int Delay, s/veh 0

Movement	EBL	EBR	SBL	SBR	NWL	NWR
Vol, veh/h	199	15	138	328	37	250
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	0	-	0	-
Veh in Median Storage, #	0	-	0	-	0	-
Grade, %	0	-	0	-	0	-
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	212	16	147	349	39	266

Major/Minor	Minor2	Major2	Minor1
Conflicting Flow All	133	0	8
Stage 1	0	-	0
Stage 2	133	-	8
Critical Hdwy	-	-	-
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	-	-	-
Pot Cap-1 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	-	-
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach

HCM Control Delay, s 0

HCM LOS -

Minor Lane/Major Mvmt	NWLn1	EBLn1	SBL	SBR
Capacity (veh/h)	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-
HCM Control Delay (s)	-	-	-	-
HCM Lane LOS	-	-	-	-
HCM 95th %tile Q(veh)	-	-	-	-

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	1521
Stage 1	-	-	790
Stage 2	-	-	731
Critical Hdwy	4.14	-	6.44
Critical Hdwy Stg 1	-	-	5.44
Critical Hdwy Stg 2	-	-	5.44
Follow-up Hdwy	2.236	-	3.536
Pot Cap-1 Maneuver	820	-	129
Stage 1	-	-	444
Stage 2	-	-	473
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	820	-	128
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
Vol, veh/h	46	415	14	9	447	5	13	14	12
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-
Peak Hour Factor	80	80	80	80	80	80	80	80	80
Heavy Vehicles, %	3	3	3	3	3	3	3	3	3
Mvmt Flow	58	519	18	11	559	6	16	18	15

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	565	0	0
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	4.13	-	-
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	2.227	-	-
Pot Cap-1 Maneuver	1002	-	-
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	1002	-	-
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0.9	0.2	37.6
HCM LOS			E

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

Intersection

Int Delay, s/veh

Movement	SBL	SBT	SBR
Vol, veh/h	2	15	81
Conflicting Peds, #/hr	0	0	0
Sign Control	Stop	Stop	Stop
RT Channelized	-	-	None
Storage Length	-	-	-
Veh in Median Storage, #	-	0	-
Grade, %	-	0	-
Peak Hour Factor	80	80	80
Heavy Vehicles, %	3	3	3
Mvmt Flow	2	19	101

Major/Minor

	Minor2		
Conflicting Flow All	1243	1235	562
Stage 1	584	584	-
Stage 2	659	651	-
Critical Hdwy	7.13	6.53	6.23
Critical Hdwy Stg 1	6.13	5.53	-
Critical Hdwy Stg 2	6.13	5.53	-
Follow-up Hdwy	3.527	4.027	3.327
Pot Cap-1 Maneuver	151	176	525
Stage 1	496	496	-
Stage 2	451	463	-
Platoon blocked, %			
Mov Cap-1 Maneuver	125	159	525
Mov Cap-2 Maneuver	125	159	-
Stage 1	455	488	-
Stage 2	386	425	-

Approach

	SB
HCM Control Delay, s	19.5
HCM LOS	C

Minor Lane/Major Mvmt

Intersection

Int Delay, s/veh 24.3

Movement	NBT	NBR	SBL	SBT	SWL	SWR
Vol, veh/h	338	108	164	293	152	99
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Stop	Stop	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	91	91	91	91	91	91
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	371	119	180	322	167	109

Major/Minor	Major1	Minor2	Minor1
Conflicting Flow All	0	485	592
Stage 1	-	0	431
Stage 2	-	485	161
Critical Hdwy	-	6.42	6.42
Critical Hdwy Stg 1	-	-	5.42
Critical Hdwy Stg 2	-	5.42	-
Follow-up Hdwy	-	3.518	3.518
Pot Cap-1 Maneuver	-	541	469
Stage 1	-	-	655
Stage 2	-	619	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	541	469
Mov Cap-2 Maneuver	-	541	469
Stage 1	-	-	655
Stage 2	-	619	-

Approach	NB	SB	SW
HCM Control Delay, s	0	50.7	19.5
HCM LOS		F	C

Minor Lane/Major Mvmt	NBT	NBR	SBLn1	SWLn1
Capacity (veh/h)	-	-	541	520
HCM Lane V/C Ratio	-	-	0.928	0.53
HCM Control Delay (s)	-	-	50.7	19.5
HCM Lane LOS	-	-	F	C
HCM 95th %tile Q(veh)	-	-	11.5	3.1

Intersection

Int Delay, s/veh 23.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR
Vol, veh/h	66	98	8	2	23	6	14	607	25
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2
Mvmt Flow	75	111	9	2	26	7	16	690	28

Major/Minor	Minor2			Minor1			Major1		
Conflicting Flow All	956	1316	285	1074	1324	359	569	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	-	-
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	-	-
Pot Cap-1 Maneuver	213	156	712	174	155	638	999	-	-
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	-	-
Mov Cap-2 Maneuver	177	150	-	66	149	-	-	-	-
Stage 1	463	498	-	367	412	-	-	-	-
Stage 2	546	406	-	491	487	-	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	181	33.7	0.3
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	-	-

Intersection

Int Delay, s/veh

Movement	SBL	SBT	SBR
Vol, veh/h	8	464	37
Conflicting Peds, #/hr	0	0	0
Sign Control	Free	Free	Free
RT Channelized	-	-	None
Storage Length	-	-	-
Veh in Median Storage, #	-	0	-
Grade, %	-	0	-
Peak Hour Factor	88	88	88
Heavy Vehicles, %	2	2	2
Mvmt Flow	9	527	42

Major/Minor Major2

Conflicting Flow All	718	0	0
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	4.14	-	-
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	2.22	-	-
Pot Cap-1 Maneuver	879	-	-
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %		-	-
Mov Cap-1 Maneuver	879	-	-
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach SB

HCM Control Delay, s	0.2
HCM LOS	

Minor Lane/Major Mvmt

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	1030
Stage 1	-	-	332
Stage 2	-	-	698
Critical Hdwy	4.11	-	6.41
Critical Hdwy Stg 1	-	-	5.41
Critical Hdwy Stg 2	-	-	5.41
Follow-up Hdwy	2.209	-	3.509
Pot Cap-1 Maneuver	1222	-	260
Stage 1	-	-	729
Stage 2	-	-	495
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	1222	-	204
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 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
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 2.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR
Vol, veh/h	9	351	9	16	189	13	7	1	12
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-
Peak Hour Factor	81	81	81	81	81	81	81	81	81
Heavy Vehicles, %	4	4	4	4	4	4	4	4	4
Mvmt Flow	11	433	11	20	233	16	9	1	15

Major/Minor	Major1	Major2	Minor1						
Conflicting Flow All	249	0	0	444	0	0	778	750	439
Stage 1	-	-	-	-	-	-	461	461	-
Stage 2	-	-	-	-	-	-	317	289	-
Critical Hdwy	4.14	-	-	4.14	-	-	7.14	6.54	6.24
Critical Hdwy Stg 1	-	-	-	-	-	-	6.14	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.14	5.54	-
Follow-up Hdwy	2.236	-	-	2.236	-	-	3.536	4.036	3.336
Pot Cap-1 Maneuver	1305	-	-	1106	-	-	311	338	614
Stage 1	-	-	-	-	-	-	577	562	-
Stage 2	-	-	-	-	-	-	690	669	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	1305	-	-	1106	-	-	276	327	614
Mov Cap-2 Maneuver	-	-	-	-	-	-	276	327	-
Stage 1	-	-	-	-	-	-	571	556	-
Stage 2	-	-	-	-	-	-	613	655	-

Approach	EB	WB	NB
HCM Control Delay, s	0.2	0.6	14.2
HCM LOS			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

Intersection

Int Delay, s/veh

Movement	SBL	SBT	SBR
Vol, veh/h	16	0	59
Conflicting Peds, #/hr	0	0	0
Sign Control	Stop	Stop	Stop
RT Channelized	-	-	None
Storage Length	-	-	-
Veh in Median Storage, #	-	0	-
Grade, %	-	0	-
Peak Hour Factor	81	81	81
Heavy Vehicles, %	4	4	4
Mvmt Flow	20	0	73

Major/Minor

	Minor2		
Conflicting Flow All	750	748	241
Stage 1	281	281	-
Stage 2	469	467	-
Critical Hdwy	7.14	6.54	6.24
Critical Hdwy Stg 1	6.14	5.54	-
Critical Hdwy Stg 2	6.14	5.54	-
Follow-up Hdwy	3.536	4.036	3.336
Pot Cap-1 Maneuver	325	339	793
Stage 1	721	675	-
Stage 2	571	558	-
Platoon blocked, %			
Mov Cap-1 Maneuver	309	328	793
Mov Cap-2 Maneuver	309	328	-
Stage 1	713	661	-
Stage 2	550	552	-

Approach

Approach	SB
HCM Control Delay, s	12.2
HCM LOS	B

Minor Lane/Major Mvmt

HCM research expects at least one 'Stop' controlled approach at the intersection.

Intersection

Int Delay, s/veh 0.1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	0	393	149	0	1	3
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	1	-1	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	427	162	0	1	3

Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	162	0	589
Stage 1	-	-	162
Stage 2	-	-	427
Critical Hdwy	4.12	-	6.42
Critical Hdwy Stg 1	-	-	5.42
Critical Hdwy Stg 2	-	-	5.42
Follow-up Hdwy	2.218	-	3.518
Pot Cap-1 Maneuver	1417	-	471
Stage 1	-	-	867
Stage 2	-	-	658
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	1417	-	471
Mov Cap-2 Maneuver	-	-	471
Stage 1	-	-	867
Stage 2	-	-	658

Approach	EB	WB	SB
HCM Control Delay, s	0	0	10
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1417	-	-	-	725
HCM Lane V/C Ratio	-	-	-	-	0.006
HCM Control Delay (s)	0	-	-	-	10
HCM Lane LOS	A	-	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0

Intersection

Int Delay, s/veh 0

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	329	0	0	382	1	2
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	1	-	-	-1	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	358	0	0	415	1	2

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	358
Stage 1	-	-	358
Stage 2	-	-	415
Critical Hdwy	-	-	4.12
Critical Hdwy Stg 1	-	-	5.42
Critical Hdwy Stg 2	-	-	5.42
Follow-up Hdwy	-	-	2.218
Pot Cap-1 Maneuver	-	-	1201
Stage 1	-	-	707
Stage 2	-	-	666
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	-	1201
Mov Cap-2 Maneuver	-	-	367
Stage 1	-	-	707
Stage 2	-	-	666

Approach	EB	WB	NB
HCM Control Delay, s	0	0	11.8
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	532	-	-	1201	-
HCM Lane V/C Ratio	0.006	-	-	-	-
HCM Control Delay (s)	11.8	-	-	0	-
HCM Lane LOS	B	-	-	A	-
HCM 95th %tile Q(veh)	0	-	-	0	-

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
Stage 1	-	-	1615
Stage 2	-	-	878
Critical Hdwy	-	-	4.1
Critical Hdwy Stg 1	-	-	6.8
Critical Hdwy Stg 2	-	-	5.8
Follow-up Hdwy	-	-	5.8
Follow-up Hdwy	-	-	2.2
Pot Cap-1 Maneuver	-	-	3.5
Stage 1	-	-	403
Stage 2	-	-	25
Platoon blocked, %	-	-	151
Mov Cap-1 Maneuver	-	-	372
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	403
Stage 2	-	-	5
Stage 1	-	-	5
Stage 2	-	-	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	-

Lanes, Volumes, Timings
 2: County Line Rd & N Ithan Ave

9/15/2014



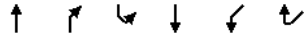
Lane Group	EBL	EBR	SBL	SBR	NWL	NWR
Lane Configurations	W		W		W	
Volume (vph)	199	15	138	328	37	250
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.991		0.905		0.882	
Flt Protected	0.956		0.985		0.994	
Satd. Flow (prot)	1765	0	1660	0	1633	0
Flt Permitted	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

Lanes, Volumes, Timings

38: County Line Rd & N Ithaca Ave

9/15/2014



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	
Frt Protected				0.982	0.971	
Satd. Flow (prot)	1801	0	0	1829	1713	0
Frt 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

HCM 2010 Signalized Intersection Summary
3: County Line Rd & Spring Mill Rd

9/17/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Volume (veh/h)	35	278	60	62	264	77	41	249	45	32	327	53
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Ob), 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	180.0	163.0	180.0	180.0	173.1	180.0	180.0	173.1	180.0	180.0	173.1	180.0
Adj Flow Rate, veh/h	37	293	63	65	278	81	43	262	47	34	344	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	105	565	114	145	522	140	104	366	61	91	410	64
Arrive On Green	0.46	0.46	0.46	0.46	0.46	0.46	0.30	0.30	0.30	0.30	0.30	0.30
Sat Flow, veh/h	73	1215	246	150	1123	301	102	1226	205	68	1373	214
Grp Volume(v), veh/h	393	0	0	424	0	0	352	0	0	434	0	0
Grp Sat Flow(s),veh/h/ln	1534	0	0	1574	0	0	1534	0	0	1655	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	2.4	0.0	0.0
Cycle Q Clear(g_c), s	9.7	0.0	0.0	10.0	0.0	0.0	11.2	0.0	0.0	13.6	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	784	0	0	807	0	0	531	0	0	565	0	0
V/C Ratio(X)	0.50	0.00	0.00	0.53	0.00	0.00	0.66	0.00	0.00	0.77	0.00	0.00
Avail Cap(c_a), veh/h	784	0	0	807	0	0	732	0	0	774	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)	0.54	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	10.5	0.0	0.0	10.5	0.0	0.0	17.2	0.0	0.0	18.2	0.0	0.0
Incr Delay (d2), s/veh	1.2	0.0	0.0	2.4	0.0	0.0	0.5	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(50%),veh/ln	4.4	0.0	0.0	5.1	0.0	0.0	4.9	0.0	0.0	6.5	0.0	0.0
LnGrp Delay(d),s/veh	11.7	0.0	0.0	13.0	0.0	0.0	17.7	0.0	0.0	20.2	0.0	0.0
LnGrp LOS	B			B			B			C		
Approach Vol, veh/h		393			424			352			434	
Approach Delay, s/veh		11.7			13.0			17.7			20.2	
Approach LOS		B			B			B			C	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		39.1		22.9		39.1		22.9				
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		11.7		15.6		12.0		13.2				
Green Ext Time (p_c), s		3.1		1.3		3.1		1.4				
Intersection Summary												
HCM 2010 Ctrl Delay				15.7								
HCM 2010 LOS				B								

HCM 2010 Signalized Intersection Summary
7: Sproul Rd/Spring Mill Rd & Aldwyn Ln/Kenilworth Rd & Lancaster Ave

9/17/2014

HCM 2010 methodology does not support more than 4 approaches.

HCM 2010 Signalized Intersection Summary
11: Chapel Dr & Lancaster Ave

9/17/2014

HCM 2010 Computation does not support turning movement with Shared and Exclusive lanes.

HCM 2010 Signalized Intersection Summary
16: Sproul Rd & Conestoga Rd

9/17/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (veh/h)	148	550	137	36	598	57	212	266	27	56	199	74
Number	7	4	14	3	8	18	1	6	16	5	2	12
Initial Q (Ob), 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	174.8	174.8	180.0	179.1	179.1	184.5	173.9	173.9	179.1	180.9	175.6	180.9
Adj Flow Rate, veh/h	163	604	0	40	657	0	233	292	30	62	219	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	275	657	0	201	577	59	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	825	1791	0	1656	1551	159	199	1012	349
Grp Volume(v), veh/h	163	604	0	40	657	0	233	0	322	362	0	0
Grp Sat Flow(s),veh/h/ln	1664	1748	0	825	1791	0	1656	0	1711	1560	0	0
Q Serve(g_s), s	5.3	23.8	0.0	3.5	33.0	0.0	6.5	0.0	13.1	15.9	0.0	0.0
Cycle Q Clear(g_c), s	5.3	23.8	0.0	15.3	33.0	0.0	6.5	0.0	13.1	20.8	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	275	657	0	201	0	637	411	0	0
V/C Ratio(X)	0.81	0.69	0.00	0.15	1.00	0.00	1.16	0.00	0.51	0.88	0.00	0.00
Avail Cap(c_a), veh/h	200	874	0	275	657	0	201	0	637	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	17.2	0.0	27.6	28.5	0.0	29.4	0.0	21.8	34.2	0.0	0.0
Incr Delay (d2), s/veh	22.1	4.5	0.0	1.1	35.2	0.0	112.0	0.0	0.6	19.4	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(50%),veh/ln	3.6	12.5	0.0	0.9	22.7	0.0	6.3	0.0	6.3	11.2	0.0	0.0
LnGrp Delay(d),s/veh	43.4	21.7	0.0	28.7	63.7	0.0	141.4	0.0	22.5	53.6	0.0	0.0
LnGrp LOS	D	C		C	F		F		C	D		
Approach Vol, veh/h	767		697				555			362		
Approach Delay, s/veh	26.3		61.7				72.4			53.6		
Approach LOS	C		E				E			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	22.8		25.8		15.1	7.3	35.0				
Green Ext Time (p_c), s	0.0	0.0		8.4		2.4	0.0	0.0				
Intersection Summary												
HCM 2010 Ctrl Delay			51.6									
HCM 2010 LOS			D									

HCM 2010 Signalized Intersection Summary
25: S Ithan Ave & Conestoga Rd

9/17/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Volume (veh/h)	164	388	2	2	450	127	14	155	12	62	51	138
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Ob), 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	185.4	178.3	185.4	176.4	169.6	176.4	176.3	169.5	176.3	184.4	177.3	184.4
Adj Flow Rate, veh/h	202	479	2	2	556	157	17	191	15	77	63	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	200	389	2	60	708	199	76	343	26	139	92	190
Arrive On Green	0.55	0.55	0.55	0.55	0.55	0.55	0.23	0.23	0.23	0.23	0.23	0.23
Sat Flow, veh/h	223	703	3	1	1280	360	54	1477	110	277	397	819
Grp Volume(v), veh/h	683	0	0	715	0	0	223	0	0	310	0	0
Grp Sat Flow(s),veh/h/ln	928	0	0	1641	0	0	1641	0	0	1493	0	0
Q Serve(g_s), s	12.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.0	0.0	0.0
Cycle Q Clear(g_c), s	33.5	0.0	0.0	21.1	0.0	0.0	7.1	0.0	0.0	12.1	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	590	0	0	967	0	0	446	0	0	421	0	0
V/C Ratio(X)	1.16	0.00	0.00	0.74	0.00	0.00	0.50	0.00	0.00	0.74	0.00	0.00
Avail Cap(c_a), veh/h	590	0	0	967	0	0	483	0	0	455	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	16.6	0.0	0.0	10.8	0.0	0.0	20.6	0.0	0.0	22.4	0.0	0.0
Incr Delay (d2), s/veh	88.6	0.0	0.0	3.0	0.0	0.0	0.9	0.0	0.0	5.7	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(50%),veh/ln	24.2	0.0	0.0	10.2	0.0	0.0	3.4	0.0	0.0	5.7	0.0	0.0
LnGrp Delay(d),s/veh	105.2	0.0	0.0	13.8	0.0	0.0	21.5	0.0	0.0	28.0	0.0	0.0
LnGrp LOS	F			B			C			C		
Approach Vol, veh/h		683			715			223			310	
Approach Delay, s/veh		105.2			13.8			21.5			28.0	
Approach LOS		F			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		20.6		40.0		20.6				
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		23.1		9.1		35.5		14.1				
Green Ext Time (p_c), s		5.3		1.3		0.0		0.5				
Intersection Summary												
HCM 2010 Ctrl Delay				49.3								
HCM 2010 LOS				D								

HCM 2010 Signalized Intersection Summary
27: S Ithan Ave/N Ithan Ave & Lancaster Ave

9/17/2014

HCM 2010 methodology does not support exclusive ped or hold phases.

HCM 2010 Signalized Intersection Summary
33: Williams Rd/Garrett Ave & Conestoga Rd

9/17/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↔			↔			↔				↔
Volume (veh/h)	25	438	1	4	416	4	6	6	9	15	3	38
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Ob), 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	187.2	187.2	187.2	187.2	187.2	187.2	180.0	180.0	180.0	172.8	172.8	172.8
Adj Flow Rate, veh/h	28	498	1	5	473	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	91	1337	3	58	1381	14	88	35	38	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	44	1782	3	4	1842	19	337	658	711	325	147	1015
Grp Volume(v), veh/h	527	0	0	483	0	0	24	0	0	63	0	0
Grp Sat Flow(s),veh/h/ln	1830	0	0	1865	0	0	1706	0	0	1487	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	5.7	0.0	0.0	0.9	0.0	0.0	2.7	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	1430	0	0	1454	0	0	161	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	1430	0	0	1454	0	0	302	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(l)	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(50%),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		527			483			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		7.7		2.9				
Green Ext Time (p_c), s		4.5		0.1		4.5		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
51: Lowrys Ln & Lancaster Ave

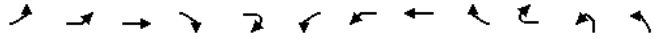
9/17/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔				↔
Volume (veh/h)	18	1051	19	16	1079	22	47	104	39	21	71	19
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Ob), 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	180.0	174.8	180.0	177.3	172.1	177.3	190.0	184.5	190.0	188.1	182.7	188.1
Adj Flow Rate, veh/h	19	1130	20	17	1160	24	51	112	42	23	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	78	2037	36	75	2008	41	126	157	52	104	187	43
Arrive On Green	1.00	1.00	1.00	0.64	0.64	0.64	0.15	0.15	0.15	0.15	0.15	0.15
Sat Flow, veh/h	18	3205	56	15	3159	65	307	1049	349	184	1252	290
Grp Volume(v), veh/h	606	0	563	625	0	576	205	0	0	119	0	0
Grp Sat Flow(s),veh/h/ln	1699	0	1580	1683	0	1555	1705	0	0	1726	0	0
Q Serve(g_s), s	0.0	0.0	0.0	0.0	0.0	12.0	3.0	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	0.0	0.0	0.0	11.6	0.0	12.0	6.4	0.0	0.0	3.4	0.0	0.0
Prop In Lane	0.03		0.04	0.03		0.04	0.25		0.20	0.19		0.17
Lane Grp Cap(c), veh/h	1146	0	1004	1136	0	988	336	0	0	335	0	0
V/C Ratio(X)	0.53	0.00	0.56	0.55	0.00	0.58	0.61	0.00	0.00	0.36	0.00	0.00
Avail Cap(c_a), veh/h	1146	0	1004	1136	0	988	457	0	0	457	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(l)	0.62	0.00	0.62	1.00	0.00	1.00	0.00	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	22.9	0.0	0.0	21.6	0.0	0.0
Incr Delay (d2), s/veh	1.1	0.0	1.4	1.9	0.0	2.5	1.8	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(50%),veh/ln	0.3	0.0	0.4	6.0	0.0	5.6	3.2	0.0	0.0	1.7	0.0	0.0
LnGrp Delay(d),s/veh	1.1	0.0	1.4	7.7	0.0	8.4	24.7	0.0	0.0	22.3	0.0	0.0
LnGrp LOS	A		A	A		A	C			C		
Approach Vol, veh/h		1169			1201			205			119	
Approach Delay, s/veh		1.2			8.1			24.7			22.3	
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		46.1		13.9		46.1		13.9				
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		5.4		14.0		8.4				
Green Ext Time (p_c), s		13.6		0.7		11.3		0.5				
Intersection Summary												
HCM 2010 Ctrl Delay				7.0								
HCM 2010 LOS				A								
Notes												
User approved pedestrian interval to be less than phase max green.												

Lanes, Volumes, Timings

7: Sproul Rd/Spring Mill Rd & Aldwyn Ln/Kenilworth Rd & Lancaster Ave

9/17/2014

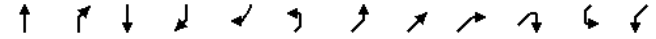


Lane Group	EBL2	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR	WBR2	NBL2	NBL
Lane Configurations												
Volume (vph)	2	223	833	83	218	4	11	953	1	13	3	49
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Width (ft)	10	10	11	11	14	10	12	12	12	12	10	10
Grade (%)			3%					-2%				
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		0.075					0.293					
Satd. Flow (perm)	0	118	3058	0	1531	0	507	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	232	868	86	227	4	11	993	1	14	3	51
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	234	954	0	227	0	15	1008	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

9/17/2014



Lane Group	NBT	NBR	SBT	SBR	SBR2	NEL2	NEL	NET	NER	NER2	SWL2	SWL
Lane Configurations												
Volume (vph)	0	8	1	3	12	181	0	193	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 (%)			-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				0.189					0.597
Satd. Flow (perm)	1161	0	1418	0	0	0	319	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	189	0	201	52	9	20	8
Shared Lane Traffic (%)												
Lane Group Flow (vph)	62	0	16	0	0	0	189	262	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
Number of Detectors	1	1	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

Lanes, Volumes, Timings

7: Sproul Rd/Spring Mill Rd & Aldwyn Ln/Kenilworth Rd & Lancaster Ave

9/17/2014



Lane Group	SWT	SWR
Lane Configurations		
Volume (vph)	133	154
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)	139	160
Shared Lane Traffic (%)		
Lane Group Flow (vph)	299	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	

Base 18 am 9/15/2014 Baseline

Synchro 8 Report
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Lanes, Volumes, Timings

7: Sproul Rd/Spring Mill Rd & Aldwyn Ln/Kenilworth Rd & Lancaster Ave

9/17/2014



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		1.05	0.66		0.27		0.10	1.00				
Control Delay		116.8	34.5		5.5		42.4	81.0				
Queue Delay		0.0	0.0		0.0		0.0	0.0				
Total Delay		116.8	34.5		5.5		42.4	81.0				
LOS		F	C		A		D	F				
Approach Delay			43.5					80.4				
Approach LOS			D					F				
Queue Length 50th (ft)			-188		12		10	502				
Queue Length 95th (ft)			#419		501		33	#746				
Internal Link Dist (ft)			497					1529				
Turn Bay Length (ft)			300				75					
Base Capacity (vph)		223	1439		827		155	1005				
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	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:	1.05
Intersection Signal Delay:	67.7
Intersection LOS:	E
Intersection Capacity Utilization:	106.7%
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.

Base 18 am 9/15/2014 Baseline

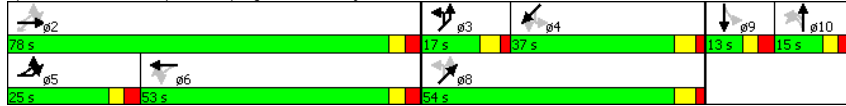
Synchro 8 Report
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Lanes, Volumes, Timings

7: Sproul Rd/Spring Mill Rd & Aldwyn Ln/Kenilworth Rd & Lancaster Ave

9/17/2014

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

9/17/2014



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	0.95		0.29				1.01	0.53				0.14
Control Delay	170.3		86.1				111.7	48.9				54.4
Queue Delay	0.0		0.0				0.0	0.0				0.0
Total Delay	170.3		86.1				111.7	48.9				54.4
LOS	F		F				F	D				D
Approach Delay	170.3		86.1					75.2				
Approach LOS	F		F					E				
Queue Length 50th (ft)	60		15				139	204				22
Queue Length 95th (ft)	#174		44				#300	332				57
Internal Link Dist (ft)	412		517					1256				
Turn Bay Length (ft)							200					150
Base Capacity (vph)	65		60				188	492				198
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				1.01	0.53				0.14

Intersection Summary

Lanes, Volumes, Timings

7: Sproul Rd/Spring Mill Rd & Aldwyn Ln/Kenilworth Rd & Lancaster Ave

9/17/2014



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	0.98	
Control Delay	105.9	
Queue Delay	0.0	
Total Delay	105.9	
LOS	F	
Approach Delay	101.5	
Approach LOS	F	
Queue Length 50th (ft)	286	
Queue Length 95th (ft)	#533	
Internal Link Dist (ft)	3088	
Turn Bay Length (ft)		
Base Capacity (vph)	306	
Starvation Cap Reductn	0	
Spillback Cap Reductn	0	
Storage Cap Reductn	0	
Reduced v/c Ratio	0.98	
Intersection Summary		

Lanes, Volumes, Timings
11: Chapel Dr & Lancaster Ave

9/17/2014

	→	↖	↙	←	↗	↘
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑	↘	↘
Volume (vph)	913	96	11	973	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)	24				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)	992	104	12	1058	10	4
Shared Lane Traffic (%)						
Lane Group Flow (vph)	1096	0	0	1070	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	CI+Ex		CI+Ex	CI+Ex	CI+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	

Base 18 am 9/15/2014 Baseline

Synchro 8 Report
Page 1

Lanes, Volumes, Timings
11: Chapel Dr & Lancaster Ave

9/17/2014

	→	↖	↙	←	↗	↘
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			3.2	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)	99			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	0.36			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:WBT, Start of Yellow
 Natural Cycle: 60
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.37
 Intersection Signal Delay: 2.5
 Intersection Capacity Utilization 49.1%
 Analysis Period (min) 15
 Intersection LOS: A
 ICU Level of Service A

Splits and Phases: 11: Chapel Dr & Lancaster Ave



Base 18 am 9/15/2014 Baseline

Synchro 8 Report
Page 2

Lanes, Volumes, Timings

27: S Ithan Ave/N Ithan Ave & Lancaster Ave

9/17/2014



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↕	↔	↔	↕	↔	↔	↕	↔	↔	↕	↔
Volume (vph)	89	792	35	135	852	45	85	176	75	25	217	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	0.178			0.185			0.311			0.343		
Satd. Flow (perm)	285	3022	0	292	2970	0	495	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)	95	843	37	144	906	48	90	187	80	27	231	51
Shared Lane Traffic (%)												
Lane Group Flow (vph)	95	880	0	144	954	0	90	267	0	27	282	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	

Base 18 am 9/15/2014 Baseline

Synchro 8 Report
Page 1

Lanes, Volumes, Timings

27: S Ithan Ave/N Ithan Ave & Lancaster Ave

9/17/2014

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

Base 18 am 9/15/2014 Baseline

Synchro 8 Report
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Lanes, Volumes, Timings

27: S Ithan Ave/N Ithan Ave & Lancaster Ave

9/17/2014



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	47.4		57.6	49.3		24.1	24.1		24.1	24.1	
Actuated g/C Ratio	0.45	0.40		0.48	0.41		0.20	0.20		0.20	0.20	
v/c Ratio	0.49	0.74		0.65	0.78		0.91	0.88		0.25	0.91	
Control Delay	26.9	36.9		28.4	31.0		116.2	74.7		46.0	78.8	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	26.9	36.9		28.4	31.0		116.2	74.7		46.0	78.8	
LOS	C	D		C	C		F	E		D	E	
Approach Delay		35.9			30.6			85.2			75.9	
Approach LOS		D			C			F			E	
Queue Length 50th (ft)	41	333		64	352		68	199		18	212	
Queue Length 95th (ft)	77	#430		m#108	#488		#170	#341		47	#362	
Internal Link Dist (ft)		1205			1955			103			893	
Turn Bay Length (ft)	140			70			105			65		
Base Capacity (vph)	194	1193		225	1219		105	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	0.49	0.74		0.64	0.78		0.86	0.83		0.23	0.85	

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:	0.91
Intersection Signal Delay:	44.7
Intersection Capacity Utilization:	78.0%
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.

Lanes, Volumes, Timings

27: S Ithan Ave/N Ithan Ave & Lancaster Ave

9/17/2014

Splits and Phases: 27: S Ithan Ave/N Ithan Ave & Lancaster Ave



Lanes, Volumes, Timings

27: S Ithan Ave/N Ithan Ave & Lancaster Ave

9/17/2014

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 TWSC
2: County Line Rd & N Ithan Ave

9/17/2014

Intersection						
Int Delay, s/veh	0					
Movement	EBL	EBR	SBL	SBR	NWL	NWR
Vol, veh/h	202	15	140	333	38	254
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	0	-	0	-
Veh in Median Storage, #	0	-	0	-	0	-
Grade, %	0	-	0	-	0	-
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	215	16	149	354	40	270

Major/Minor	Minor2	Major2	Minor1
Conflicting Flow All	135	0	8
Stage 1	0	-	0
Stage 2	135	-	8
Critical Hdwy	-	-	-
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	-	-	-
Pot Cap-1 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	-	-
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	EB	SB	NW
HCM Control Delay, s	0		
HCM LOS	-		

Minor Lane/Major Mvmt	NWLn1	EBLn1	SBL	SBR
Capacity (veh/h)	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-
HCM Control Delay (s)	-	-	-	-
HCM Lane LOS	-	-	-	-
HCM 95th %tile Q(veh)	-	-	-	-

HCM 2010 TWSC
15: Conestoga Rd & Spring Mill Rd

9/17/2014

Intersection						
Int Delay, s/veh	0.2					
Movement	EBL	EBT	WBT	WBR	SWL	SWR
Vol, veh/h	2	634	688	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	737	800	3	5	9

Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	803	0	1544
Stage 1	-	-	802
Stage 2	-	-	742
Critical Hdwy	4.14	-	6.44
Critical Hdwy Stg 1	-	-	5.44
Critical Hdwy Stg 2	-	-	5.44
Follow-up Hdwy	2.236	-	3.536
Pot Cap-1 Maneuver	812	-	125
Stage 1	-	-	438
Stage 2	-	-	467
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	812	-	125
Mov Cap-2 Maneuver	-	-	125
Stage 1	-	-	438
Stage 2	-	-	465

Approach	EB	WB	SW
HCM Control Delay, s	0	0	22
HCM LOS	-	-	C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SWLn1
Capacity (veh/h)	812	-	-	-	226
HCM Lane V/C Ratio	0.003	-	-	-	0.062
HCM Control Delay (s)	9.4	0	-	-	22
HCM Lane LOS	A	A	-	-	C
HCM 95th %tile Q(veh)	0	-	-	-	0.2

HCM 2010 TWSC
29: Strathmore Dr/Lowrys Ln & Conestoga Rd

9/17/2014

Intersection									
Int Delay, s/veh	3.7								
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR
Vol, veh/h	47	421	14	9	454	5	13	14	12
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-
Peak Hour Factor	80	80	80	80	80	80	80	80	80
Heavy Vehicles, %	3	3	3	3	3	3	3	3	3
Mvmt Flow	59	526	18	11	568	6	16	18	15
Major/Minor	Major1			Major2			Minor1		
Conflicting Flow All	574	0	0	544	0	0	1307	1249	535
Stage 1	-	-	-	-	-	-	653	653	-
Stage 2	-	-	-	-	-	-	654	596	-
Critical Hdwy	4.13	-	-	4.13	-	-	7.13	6.53	6.23
Critical Hdwy Stg 1	-	-	-	-	-	-	6.13	5.53	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.13	5.53	-
Follow-up Hdwy	2.227	-	-	2.227	-	-	3.527	4.027	3.327
Pot Cap-1 Maneuver	994	-	-	1020	-	-	136	172	543
Stage 1	-	-	-	-	-	-	455	462	-
Stage 2	-	-	-	-	-	-	454	490	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	994	-	-	1020	-	-	92	155	543
Mov Cap-2 Maneuver	-	-	-	-	-	-	92	155	-
Stage 1	-	-	-	-	-	-	416	423	-
Stage 2	-	-	-	-	-	-	344	482	-
Approach	EB			WB			NB		
HCM Control Delay, s	0.9			0.2			38.8		
HCM LOS	E			E			E		
Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	
Capacity (veh/h)	154	994	-	-	1020	-	-	363	
HCM Lane V/C Ratio	0.317	0.059	-	-	0.011	-	-	0.341	
HCM Control Delay (s)	38.8	8.8	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	

HCM 2010 TWSC
29: Strathmore Dr/Lowrys Ln & Conestoga Rd

9/17/2014

Intersection			
Int Delay, s/veh			
Movement	SBL	SBT	SBR
Vol, veh/h	2	15	82
Conflicting Peds, #/hr	0	0	0
Sign Control	Stop	Stop	Stop
RT Channelized	-	-	None
Storage Length	-	-	-
Veh in Median Storage, #	-	0	-
Grade, %	-	0	-
Peak Hour Factor	80	80	80
Heavy Vehicles, %	3	3	3
Mvmt Flow	2	19	102
Major/Minor	Minor2		
Conflicting Flow All	1262	1254	571
Stage 1	593	593	-
Stage 2	669	661	-
Critical Hdwy	7.13	6.53	6.23
Critical Hdwy Stg 1	6.13	5.53	-
Critical Hdwy Stg 2	6.13	5.53	-
Follow-up Hdwy	3.527	4.027	3.327
Pot Cap-1 Maneuver	146	171	518
Stage 1	490	492	-
Stage 2	445	458	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	120	154	518
Mov Cap-2 Maneuver	120	154	-
Stage 1	448	484	-
Stage 2	380	419	-
Approach	SB		
HCM Control Delay, s	20		
HCM LOS	C		
Minor Lane/Major Mvmt			

HCM 2010 TWSC
38: County Line Rd & N Ithan Ave

9/17/2014

Intersection						
Int Delay, s/veh	26.1					

Movement	NBT	NBR	SBL	SBT	SWL	SWR
Vol, veh/h	343	110	166	297	154	100
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Stop	Stop	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	91	91	91	91	91	91
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	377	121	182	326	169	110

Major/Minor	Major1	Minor2	Minor1	Major1
Conflicting Flow All	0	0	492	498
Stage 1	-	-	0	0
Stage 2	-	-	492	498
Critical Hdwy	-	-	6.42	6.52
Critical Hdwy Stg 1	-	-	-	-
Critical Hdwy Stg 2	-	-	5.42	5.52
Follow-up Hdwy	-	-	3.518	4.018
Pot Cap-1 Maneuver	-	-	536	474
Stage 1	-	-	-	651
Stage 2	-	-	615	544
Platoon blocked, %	-	-	-	-
Mov Cap-1 Maneuver	-	-	536	0
Mov Cap-2 Maneuver	-	-	536	0
Stage 1	-	-	-	651
Stage 2	-	-	615	0

Approach	NB	SB	SW
HCM Control Delay, s	0	55.1	20
HCM LOS		F	C

Minor Lane/Major Mvmt	NBT	NBR	SBLn1	SWLn1
Capacity (veh/h)	-	-	536	515
HCM Lane V/C Ratio	-	-	0.949	0.542
HCM Control Delay (s)	-	-	55.1	20
HCM Lane LOS	-	-	F	C
HCM 95th %tile Q(veh)	-	-	12.2	3.2

HCM 2010 TWSC
43: County Line Rd & Roberts Rd

9/17/2014

Intersection										
Int Delay, s/veh	26.4									

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR
Vol, veh/h	67	99	8	2	23	6	14	616	25
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2
Mvmt Flow	76	112	9	2	26	7	16	700	28

Major/Minor	Minor2	Minor1	Major1
Conflicting Flow All	970	1335	289
Stage 1	575	575	-
Stage 2	395	760	-
Critical Hdwy	7.54	6.54	6.94
Critical Hdwy Stg 1	6.54	5.54	-
Critical Hdwy Stg 2	6.54	5.54	-
Follow-up Hdwy	3.52	4.02	3.32
Pot Cap-1 Maneuver	208	152	708
Stage 1	470	501	-
Stage 2	602	413	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	172	146	708
Mov Cap-2 Maneuver	172	146	-
Stage 1	457	493	-
Stage 2	542	402	-

Approach	EB	WB	NB
HCM Control Delay, s	201.1	35.2	0.3
HCM LOS	F	E	

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	992	-	-	161	154	871	-	-
HCM Lane V/C Ratio	0.016	-	-	1.228	0.229	0.01	-	-
HCM Control Delay (s)	8.7	0.1	-	201.1	35.2	9.2	0.1	-
HCM Lane LOS	A	A	-	F	E	A	A	-
HCM 95th %tile Q(veh)	0	-	-	11.2	0.8	0	-	-

HCM 2010 TWSC
43: County Line Rd & Roberts Rd

9/17/2014

Intersection			
Int Delay, s/veh			
Movement	SBL	SBT	SBR
Vol, veh/h	8	471	38
Conflicting Peds, #/hr	0	0	0
Sign Control	Free	Free	Free
RT Channelized	-	-	None
Storage Length	-	-	-
Veh in Median Storage, #	-	0	-
Grade, %	-	0	-
Peak Hour Factor	88	88	88
Heavy Vehicles, %	2	2	2
Mvmt Flow	9	535	43
Major/Minor	Major2		
Conflicting Flow All	728	0	0
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	4.14	-	-
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	2.22	-	-
Pot Cap-1 Maneuver	871	-	-
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	871	-	-
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-
Approach	SB		
HCM Control Delay, s	0.2		
HCM LOS			
Minor Lane/Major Mvmt			

HCM 2010 TWSC
52: Airdale Rd & County Line Rd

9/17/2014

Intersection						
Int Delay, s/veh	3.9					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	202	219	286	20	15	97
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	230	249	325	23	17	110
Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	348	0	-	0	1044	336
Stage 1	-	-	-	-	336	-
Stage 2	-	-	-	-	708	-
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	1216	-	-	-	255	708
Stage 1	-	-	-	-	726	-
Stage 2	-	-	-	-	490	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	1216	-	-	-	199	708
Mov Cap-2 Maneuver	-	-	-	-	199	-
Stage 1	-	-	-	-	726	-
Stage 2	-	-	-	-	383	-
Approach	EB		WB		SB	
HCM Control Delay, s	4.1		0		14	
HCM LOS					B	
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	
Capacity (veh/h)	1216	-	-	-	527	
HCM Lane V/C Ratio	0.189	-	-	-	0.242	
HCM Control Delay (s)	8.6	0	-	-	14	
HCM Lane LOS	A	A	-	-	B	
HCM 95th %tile Q(veh)	0.7	-	-	-	0.9	

HCM 2010 TWSC
53: County Line Rd & Lowrys Ln

9/17/2014

Intersection						
Int Delay, s/veh	3.7					

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	61	80	58	237	149	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	92	67	272	171	34

Major/Minor	Minor2	Major1	Major2
Conflicting Flow All	595	189	206
Stage 1	189	-	-
Stage 2	406	-	-
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	470	858	1377
Stage 1	848	-	-
Stage 2	677	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	443	858	1377
Mov Cap-2 Maneuver	443	-	-
Stage 1	848	-	-
Stage 2	638	-	-

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)	1377	-	611	-	-
HCM Lane V/C Ratio	0.048	-	0.265	-	-
HCM Control Delay (s)	7.7	0	13	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0.2	-	1.1	-	-

HCM 2010 TWSC
61: Dwy/Aldwyn Ln & S Ithan Ave

9/17/2014

Intersection										
Int Delay, s/veh	2.1									

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR
Vol, veh/h	9	356	9	16	192	13	7	1	12
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-
Peak Hour Factor	81	81	81	81	81	81	81	81	81
Heavy Vehicles, %	4	4	4	4	4	4	4	4	4
Mvmt Flow	11	440	11	20	237	16	9	1	15

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	253	0	0
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	4.14	-	4.14
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	2.236	-	2.236
Pot Cap-1 Maneuver	1301	-	1099
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	1301	-	1099
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0.2	0.6	14.3
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	411	1301	-	-	1099	-	-	591
HCM Lane V/C Ratio	0.06	0.009	-	-	0.018	-	-	0.159
HCM Control Delay (s)	14.3	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	-	-	0.6

Intersection

Int Delay, s/veh

Movement	SBL	SBT	SBR
Vol, veh/h	16	0	60
Conflicting Peds, #/hr	0	0	0
Sign Control	Stop	Stop	Stop
RT Channelized	-	-	None
Storage Length	-	-	-
Veh in Median Storage, #	-	0	-
Grade, %	-	0	-
Peak Hour Factor	81	81	81
Heavy Vehicles, %	4	4	4
Mvmt Flow	20	0	74

Major/Minor

	Minor2		
Conflicting Flow All	760	758	245
Stage 1	285	285	-
Stage 2	475	473	-
Critical Hdwy	7.14	6.54	6.24
Critical Hdwy Stg 1	6.14	5.54	-
Critical Hdwy Stg 2	6.14	5.54	-
Follow-up Hdwy	3.536	4.036	3.336
Pot Cap-1 Maneuver	320	334	789
Stage 1	718	672	-
Stage 2	567	555	-
Platoon blocked, %			
Mov Cap-1 Maneuver	304	323	789
Mov Cap-2 Maneuver	304	323	-
Stage 1	710	658	-
Stage 2	546	549	-

Approach

	SB
HCM Control Delay, s	12.2
HCM LOS	B

Minor Lane/Major Mvmt

HCM research expects at least one 'Stop' controlled approach at the intersection.

HCM 2010 TWSC
76: S Ithan Ave & Dwy

9/17/2014

Intersection						
Int Delay, s/veh	0.1					

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	0	399	151	0	1	3
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	1	-1	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	434	164	0	1	3

Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	164	0	598
Stage 1	-	-	164
Stage 2	-	-	434
Critical Hdwy	4.12	-	6.42
Critical Hdwy Stg 1	-	-	5.42
Critical Hdwy Stg 2	-	-	5.42
Follow-up Hdwy	2.218	-	3.518
Pot Cap-1 Maneuver	1414	-	465
Stage 1	-	-	865
Stage 2	-	-	653
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	1414	-	465
Mov Cap-2 Maneuver	-	-	465
Stage 1	-	-	865
Stage 2	-	-	653

Approach	EB	WB	SB
HCM Control Delay, s	0	0	10
HCM LOS	-	-	B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1414	-	-	-	720
HCM Lane V/C Ratio	-	-	-	-	0.006
HCM Control Delay (s)	0	-	-	-	10
HCM Lane LOS	A	-	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0

HCM 2010 TWSC
78: Dwy & S Ithan Ave

9/17/2014

Intersection						
Int Delay, s/veh	0					

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	334	388	0	382	1	2
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	1	-	-	-1	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	363	422	0	415	1	2

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	989
Stage 1	-	-	574
Stage 2	-	-	415
Critical Hdwy	-	4.12	6.42
Critical Hdwy Stg 1	-	-	5.42
Critical Hdwy Stg 2	-	-	5.42
Follow-up Hdwy	-	2.218	3.518
Pot Cap-1 Maneuver	-	834	274
Stage 1	-	-	563
Stage 2	-	-	666
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	834	274
Mov Cap-2 Maneuver	-	-	274
Stage 1	-	-	563
Stage 2	-	-	666

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)	399	-	-	834	-
HCM Lane V/C Ratio	0.008	-	-	-	-
HCM Control Delay (s)	14.1	-	-	0	-
HCM Lane LOS	B	-	-	A	-
HCM 95th %tile Q(veh)	0	-	-	0	-

Intersection	
Int Delay, s/veh	3.7

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	1086	24	19	1117	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	1621	36	28	1667	0	37

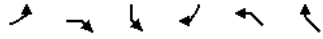
Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	2529
Stage 1	-	-	1639
Stage 2	-	-	890
Critical Hdwy	-	4.1	6.8
Critical Hdwy Stg 1	-	-	5.8
Critical Hdwy Stg 2	-	-	5.8
Follow-up Hdwy	-	2.2	3.5
Pot Cap-1 Maneuver	-	394	23
Stage 1	-	-	147
Stage 2	-	-	366
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	394	1
Mov Cap-2 Maneuver	-	-	1
Stage 1	-	-	147
Stage 2	-	-	14

Approach	EB	WB	NB
HCM Control Delay, s	0	7	17.8
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	318	-	-	394	-
HCM Lane V/C Ratio	0.117	-	-	0.072	-
HCM Control Delay (s)	17.8	-	-	14.8	6.9
HCM Lane LOS	C	-	-	B	A
HCM 95th %tile Q(veh)	0.4	-	-	0.2	-

Lanes, Volumes, Timings
 2: County Line Rd & N Ithan Ave

9/17/2014



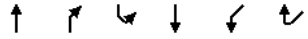
Lane Group	EBL	EBR	SBL	SBR	NWL	NWR
Lane Configurations	W		W		W	
Volume (vph)	202	15	140	333	38	254
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.991		0.905		0.882	
Flt Protected	0.956		0.985		0.994	
Satd. Flow (prot)	1765	0	1660	0	1633	0
Flt Permitted	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)	215	16	149	354	40	270
Shared Lane Traffic (%)						
Lane Group Flow (vph)	231	0	503	0	310	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	68.1%
ICU Level of Service	C
Analysis Period (min)	15

Lanes, Volumes, Timings

38: County Line Rd & N Ithaca Ave

9/17/2014



Lane Group	NBT	NBR	SBL	SBT	SWL	SWR
Lane Configurations	↑			↑	↑	
Volume (vph)	343	110	166	297	154	100
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)	377	121	182	326	169	110
Shared Lane Traffic (%)						
Lane Group Flow (vph)	498	0	0	508	279	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	74.2%
ICU Level of Service	D
Analysis Period (min)	15

HCM 2010 Signalized Intersection Summary
3: County Line Rd & Spring Mill Rd

9/17/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		+			+			+			+	
Volume (veh/h)	35	278	50	52	264	77	41	253	45	32	297	53
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Ob), 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	180.0	164.3	180.0	180.0	173.1	180.0	180.0	173.1	180.0	180.0	173.1	180.0
Adj Flow Rate, veh/h	37	293	53	55	278	81	43	266	47	34	313	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	109	598	102	134	548	147	105	353	58	93	380	65
Arrive On Green	0.47	0.47	0.47	0.47	0.47	0.47	0.28	0.28	0.28	0.28	0.28	0.28
Sat Flow, veh/h	75	1262	215	122	1155	311	104	1244	205	73	1339	228
Grp Volume(v), veh/h	383	0	0	414	0	0	356	0	0	403	0	0
Grp Sat Flow(s),veh/h/ln	1551	0	0	1589	0	0	1553	0	0	1640	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	1.1	0.0	0.0
Cycle Q Clear(g_c), s	8.9	0.0	0.0	9.3	0.0	0.0	11.3	0.0	0.0	12.5	0.0	0.0
Prop In Lane	0.10		0.14	0.13		0.20	0.12		0.13	0.08		0.14
Lane Grp Cap(c), veh/h	809	0	0	829	0	0	516	0	0	538	0	0
V/C Ratio(X)	0.47	0.00	0.00	0.50	0.00	0.00	0.69	0.00	0.00	0.75	0.00	0.00
Avail Cap(c_a), veh/h	809	0	0	829	0	0	754	0	0	784	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)	0.54	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	9.9	0.0	0.0	17.6	0.0	0.0	18.2	0.0	0.0
Incr Delay (d2), s/veh	1.1	0.0	0.0	2.1	0.0	0.0	0.6	0.0	0.0	1.1	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(50%),veh/ln	4.1	0.0	0.0	4.7	0.0	0.0	4.9	0.0	0.0	5.8	0.0	0.0
LnGrp Delay(d),s/veh	10.8	0.0	0.0	12.0	0.0	0.0	18.2	0.0	0.0	19.2	0.0	0.0
LnGrp LOS	B			B			B			B		
Approach Vol, veh/h	383			414			356			403		
Approach Delay, s/veh	10.8			12.0			18.2			19.2		
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	40.2		21.8		40.2		21.8					
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	10.9		14.5		11.3		13.3					
Green Ext Time (p_c), s	3.0		1.3		3.0		1.4					
Intersection Summary												
HCM 2010 Ctrl Delay				15.0								
HCM 2010 LOS				B								

HCM 2010 Signalized Intersection Summary
7: Sproul Rd/Spring Mill Rd & Aldwyn Ln/Kenilworth Rd & Lancaster Ave

9/17/2014

HCM 2010 methodology does not support more than 4 approaches.

HCM 2010 Signalized Intersection Summary
11: Chapel Dr & Lancaster Ave

9/17/2014

Movement	EBT	EBR	WBL	WBT	NBL	NBR		
Lane Configurations								
Volume (veh/h)	993	33	30	982	14	4		
Number	2	12	1	6	3	18		
Initial Q (Ob), veh	0	0	0	0	0	0		
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00		
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00		
Adj Sat Flow, veh/h/ln	176.5	176.5	176.5	176.5	176.5	176.5		
Adj Flow Rate, veh/h	1079	36	33	1067	15	4		
Adj No. of Lanes	2	1	1	2	1	1		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92		
Percent Heavy Veh, %	2	2	2	2	2	2		
Cap, veh/h	2355	1054	473	2355	10	9		
Arrive On Green	0.70	0.70	0.70	0.70	0.01	0.01		
Sat Flow, veh/h	3441	1500	503	3441	1681	1500		
Grp Volume(v), veh/h	1079	36	33	1067	15	4		
Grp Sat Flow(s),veh/h/ln	1676	1500	503	1676	1681	1500		
Q Serve(g_s), s	5.3	0.3	1.2	5.2	0.2	0.1		
Cycle Q Clear(g_c), s	5.3	0.3	6.5	5.2	0.2	0.1		
Prop In Lane		1.00	1.00		1.00	1.00		
Lane Grp Cap(c), veh/h	2355	1054	473	2355	10	9		
V/C Ratio(X)	0.46	0.03	0.07	0.45	1.52	0.45		
Avail Cap(c_a), veh/h	2355	1054	473	2355	1002	895		
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00		
Upstream Filter(I)	1.00	1.00	0.54	0.54	1.00	1.00		
Uniform Delay (d), s/veh	2.5	1.7	3.9	2.4	18.8	18.7		
Incr Delay (d2), s/veh	0.6	0.1	0.2	0.3	316.8	32.2		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	53.1	0.0		
%ile BackOfQ(50%),veh/ln	2.6	0.1	0.2	2.5	1.0	0.1		
LnGrp Delay(d),s/veh	3.1	1.8	4.0	2.8	388.6	50.9		
LnGrp LOS	A	A	A	A	F	D		
Approach Vol, veh/h	1115			1100	19			
Approach Delay, s/veh	3.1			2.8	317.5			
Approach LOS	A			A	F			
Timer	1	2	3	4	5	6	7	8
Assigned Phs		2				6		8
Phs Duration (G+Y+Rc), s		54.3				54.3		5.7
Change Period (Y+Rc), s		5.0				5.0		5.0
Max Green Setting (Gmax), s		27.0				27.0		23.0
Max Q Clear Time (g_c+I1), s		7.3				8.5		2.2
Green Ext Time (p_c), s		10.9				10.5		0.0
Intersection Summary								
HCM 2010 Ctrl Delay				5.6				
HCM 2010 LOS				A				

HCM 2010 Signalized Intersection Summary
16: Sproul Rd & Conestoga Rd

9/17/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (veh/h)	148	544	137	36	602	57	212	266	27	56	199	74
Number	7	4	14	3	8	18	1	6	16	5	2	12
Initial Q (Ob), 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	174.8	174.8	180.0	179.1	179.1	184.5	173.9	173.9	179.1	180.9	175.6	180.9
Adj Flow Rate, veh/h	163	598	0	40	662	0	233	292	30	62	219	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	192	874	0	279	677	0	201	577	59	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	829	1791	0	1656	1551	159	199	1012	349
Grp Volume(v), veh/h	163	598	0	40	662	0	233	0	322	362	0	0
Grp Sat Flow(s),veh/h/ln	1664	1748	0	829	1791	0	1656	0	1711	1560	0	0
Q Serve(g_s), s	5.3	23.4	0.0	3.5	32.8	0.0	6.5	0.0	13.1	15.9	0.0	0.0
Cycle Q Clear(g_c), s	5.3	23.4	0.0	15.9	32.8	0.0	6.5	0.0	13.1	20.8	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	192	874	0	279	677	0	201	0	637	411	0	0
V/C Ratio(X)	0.85	0.68	0.00	0.14	0.98	0.00	1.16	0.00	0.51	0.88	0.00	0.00
Avail Cap(c_a), veh/h	192	874	0	279	677	0	201	0	637	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	21.7	17.1	0.0	27.3	27.6	0.0	29.4	0.0	21.8	34.2	0.0	0.0
Incr Delay (d2), s/veh	28.7	4.3	0.0	1.1	29.7	0.0	112.0	0.0	0.6	19.4	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(50%),veh/ln	3.9	12.2	0.0	0.9	21.8	0.0	6.3	0.0	6.3	11.2	0.0	0.0
LnGrp Delay(d),s/veh	50.3	21.4	0.0	28.4	57.3	0.0	141.4	0.0	22.5	53.6	0.0	0.0
LnGrp LOS	D	C		C	E		F		C	D		
Approach Vol, veh/h		761			702			555				362
Approach Delay, s/veh		27.6			55.7			72.4				53.6
Approach LOS		C			E			E				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	22.8		25.4		15.1	7.3	34.8				
Green Ext Time (p_c), s	0.0	0.0		8.5		2.4	0.0	0.0				
Intersection Summary												
HCM 2010 Ctrl Delay				50.3								
HCM 2010 LOS				D								

HCM 2010 Signalized Intersection Summary
25: S Ithan Ave & Conestoga Rd

9/17/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Volume (veh/h)	158	388	2	2	450	120	14	149	12	62	53	142
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Ob), 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	185.4	178.3	185.4	176.4	169.6	176.4	176.3	169.5	176.3	184.4	177.3	184.4
Adj Flow Rate, veh/h	195	479	2	2	556	148	17	184	15	77	65	175
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	200	406	2	60	716	190	77	344	27	138	94	195
Arrive On Green	0.55	0.55	0.55	0.55	0.55	0.55	0.23	0.23	0.23	0.23	0.23	0.23
Sat Flow, veh/h	224	736	3	1	1298	345	55	1469	114	274	401	832
Grp Volume(v), veh/h	676	0	0	706	0	0	216	0	0	317	0	0
Grp Sat Flow(s),veh/h/ln	963	0	0	1644	0	0	1638	0	0	1507	0	0
Q Serve(g_s), s	12.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.4	0.0	0.0
Cycle Q Clear(g_c), s	33.5	0.0	0.0	20.7	0.0	0.0	6.9	0.0	0.0	12.3	0.0	0.0
Prop In Lane	0.29		0.00	0.00		0.21	0.08		0.07	0.24		0.55
Lane Grp Cap(c), veh/h	608	0	0	966	0	0	448	0	0	427	0	0
V/C Ratio(X)	1.11	0.00	0.00	0.73	0.00	0.00	0.48	0.00	0.00	0.74	0.00	0.00
Avail Cap(c_a), veh/h	608	0	0	966	0	0	481	0	0	457	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	16.5	0.0	0.0	10.7	0.0	0.0	20.4	0.0	0.0	22.4	0.0	0.0
Incr Delay (d2), s/veh	71.4	0.0	0.0	2.9	0.0	0.0	0.8	0.0	0.0	6.0	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(50%),veh/ln	22.0	0.0	0.0	10.0	0.0	0.0	3.3	0.0	0.0	5.8	0.0	0.0
LnGrp Delay(d),s/veh	87.9	0.0	0.0	13.6	0.0	0.0	21.2	0.0	0.0	28.4	0.0	0.0
LnGrp LOS	F			B			C			C		
Approach Vol, veh/h		676			706			216			317	
Approach Delay, s/veh		87.9			13.6			21.2			28.4	
Approach LOS		F			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		20.7		40.0		20.7				
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		22.7		8.9		35.5		14.3				
Green Ext Time (p_c), s		5.3		1.3		0.0		0.4				
Intersection Summary												
HCM 2010 Ctrl Delay				43.1								
HCM 2010 LOS				D								

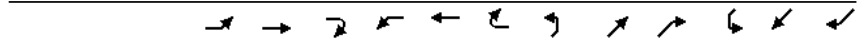
HCM 2010 Signalized Intersection Summary
27: S Ithan Ave/N Ithan Ave & Lancaster Ave

9/17/2014

HCM 2010 methodology does not support exclusive ped or hold phases.

HCM 2010 Signalized Intersection Summary
 33: Williams Rd/Garrett Ave & Conestoga Rd

9/17/2014



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↔			↔			↔			↔	
Volume (veh/h)	25	438	1	4	409	4	6	6	9	15	3	38
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Ob), 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	187.2	187.2	187.2	187.2	187.2	187.2	180.0	180.0	180.0	172.8	172.8	172.8
Adj Flow Rate, veh/h	28	498	1	5	465	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	91	1338	3	58	1381	15	88	35	38	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	44	1783	3	4	1841	20	337	658	711	325	147	1015
Grp Volume(v), veh/h	527	0	0	475	0	0	24	0	0	63	0	0
Grp Sat Flow(s), veh/h/ln	1831	0	0	1865	0	0	1706	0	0	1487	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	5.6	0.0	0.0	0.9	0.0	0.0	2.7	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	1431	0	0	1454	0	0	161	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	1431	0	0	1454	0	0	302	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(50%), veh/ln	3.5	0.0	0.0	3.0	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		527			475			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		7.6		2.9				
Green Ext Time (p_c), s		4.5		0.1		4.5		0.2				

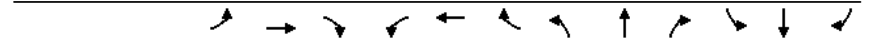
Intersection Summary

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
 51: Lowrys Ln & Lancaster Ave

9/17/2014



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Volume (veh/h)	18	1050	19	16	1142	22	47	104	39	21	71	19
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Ob), 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	180.0	174.8	180.0	177.3	172.1	177.3	190.0	184.5	190.0	188.1	182.7	188.1
Adj Flow Rate, veh/h	19	1129	20	17	1228	24	51	112	42	23	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	78	2034	36	75	2012	39	126	157	52	104	187	43
Arrive On Green	0.64	0.64	0.64	0.64	0.64	0.64	0.15	0.15	0.15	0.15	0.15	0.15
Sat Flow, veh/h	18	3201	56	14	3165	61	307	1049	349	184	1252	290
Grp Volume(v), veh/h	605	0	563	661	0	608	205	0	0	119	0	0
Grp Sat Flow(s), veh/h/ln	1694	0	1580	1685	0	1556	1705	0	0	1726	0	0
Q Serve(g_s), s	0.0	0.0	11.3	0.0	0.0	13.1	3.0	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	10.8	0.0	11.3	12.7	0.0	13.1	6.4	0.0	0.0	3.4	0.0	0.0
Prop In Lane	0.03		0.04	0.03		0.04	0.25		0.20	0.19		0.17
Lane Grp Cap(c), veh/h	1143	0	1004	1137	0	989	336	0	0	335	0	0
V/C Ratio(X)	0.53	0.00	0.56	0.58	0.00	0.62	0.61	0.00	0.00	0.36	0.00	0.00
Avail Cap(c_a), veh/h	1143	0	1004	1137	0	989	457	0	0	457	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	0.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	5.7	0.0	5.8	6.0	0.0	6.1	22.9	0.0	0.0	21.6	0.0	0.0
Incr Delay (d2), s/veh	1.8	0.0	2.3	2.2	0.0	2.9	1.8	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(50%), veh/ln	5.6	0.0	5.5	6.6	0.0	6.2	3.2	0.0	0.0	1.7	0.0	0.0
LnGrp Delay(d), s/veh	7.4	0.0	8.0	8.2	0.0	9.0	24.7	0.0	0.0	22.3	0.0	0.0
LnGrp LOS	A		A	A		A	C			C		
Approach Vol, veh/h		1168			1269			205			119	
Approach Delay, s/veh		7.7			8.6			24.7			22.3	
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		46.1		13.9		46.1		13.9				
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		13.3		5.4		15.1		8.4				
Green Ext Time (p_c), s		11.9		0.7		11.4		0.5				

Intersection Summary

HCM 2010 Ctrl Delay	10.0
HCM 2010 LOS	A

Notes
 User approved pedestrian interval to be less than phase max green.

Lanes, Volumes, Timings

7: Sproul Rd/Spring Mill Rd & Aldwyn Ln/Kenilworth Rd & Lancaster Ave

9/17/2014



Lane Group	EBL2	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR	WBR2	NBL2	NBL
Lane Configurations		↔	↕	↔	↕	↔	↕	↕	↔	↕	↔	↕
Volume (vph)	2	223	882	83	218	4	11	967	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			0.987		0.850			0.998				
Flt Protected		0.950					0.950					
Satd. Flow (prot)	0	1497	3061	0	1531	0	1645	3283	0	0	0	0
Flt Permitted		0.075					0.263					
Satd. Flow (perm)	0	118	3061	0	1531	0	455	3283	0	0	0	0
Right Turn on Red					Yes				Yes			
Satd. Flow (RTOR)					192			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	232	919	86	227	4	11	1007	1	14	3	51
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	234	1005	0	227	0	15	1022	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

Projected 18 am 9/15/2014 Baseline

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Lanes, Volumes, Timings

7: Sproul Rd/Spring Mill Rd & Aldwyn Ln/Kenilworth Rd & Lancaster Ave

9/17/2014



Lane Group	NBT	NBR	SBT	SBR	SBR2	NEL2	NEL	NET	NER	NER2	SWL2	SWL
Lane Configurations	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕
Volume (vph)	0	8	1	3	12	181	0	193	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					0.189					0.597
Satd. Flow (perm)	1161	0	1418	0	0	0	319	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	189	0	201	52	9	20	8
Shared Lane Traffic (%)												
Lane Group Flow (vph)	62	0	16	0	0	0	189	262	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	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

Projected 18 am 9/15/2014 Baseline

Synchro 8 Report
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Lanes, Volumes, Timings

7: Sproul Rd/Spring Mill Rd & Aldwyn Ln/Kenilworth Rd & Lancaster Ave

9/17/2014



Lane Group	SWT	SWR
Lane Configurations		
Volume (vph)	133	154
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)	139	160
Shared Lane Traffic (%)		
Lane Group Flow (vph)	299	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	

Projected 18 am 9/15/2014 Baseline

Synchro 8 Report
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Lanes, Volumes, Timings

7: Sproul Rd/Spring Mill Rd & Aldwyn Ln/Kenilworth Rd & Lancaster Ave

9/17/2014



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		1.05	0.70		0.28		0.11	1.02				
Control Delay		116.8	35.7		6.2		43.1	84.0				
Queue Delay		0.0	0.0		0.0		0.0	0.0				
Total Delay		116.8	35.7		6.2		43.1	84.0				
LOS		F	D		A		D	F				
Approach Delay			44.1					83.4				
Approach LOS			D					F				
Queue Length 50th (ft)			-188		380		17	10		512		
Queue Length 95th (ft)			#419		537		76	34		#762		
Internal Link Dist (ft)			497					823				
Turn Bay Length (ft)			300					75				
Base Capacity (vph)		223	1440		822		139	1005				
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	0.70		0.28		0.11	1.02				

Intersection Summary

Area Type:	Other
Cycle Length:	160
Actuated Cycle Length:	152.2
Natural Cycle:	150
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	1.05
Intersection Signal Delay:	68.5
Intersection LOS:	E
Intersection Capacity Utilization:	107.1%
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.

Projected 18 am 9/15/2014 Baseline

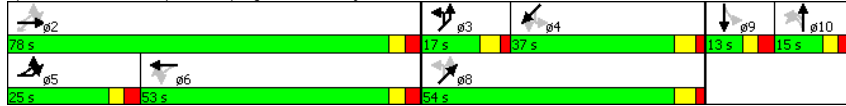
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Lanes, Volumes, Timings

7: Sproul Rd/Spring Mill Rd & Aldwyn Ln/Kenilworth Rd & Lancaster Ave

9/17/2014

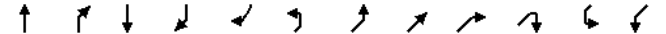
Splits and Phases: 7: Sproul Rd/Spring Mill Rd & Aldwyn Ln/Kenilworth Rd & Lancaster Ave



Lanes, Volumes, Timings

7: Sproul Rd/Spring Mill Rd & Aldwyn Ln/Kenilworth Rd & Lancaster Ave

9/17/2014



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	0.95		0.29				1.01	0.53				0.14
Control Delay	170.3		86.1				111.7	48.9				54.4
Queue Delay	0.0		0.0				0.0	0.0				0.0
Total Delay	170.3		86.1				111.7	48.9				54.4
LOS	F		F				F	D				D
Approach Delay	170.3		86.1					75.2				
Approach LOS	F		F					E				
Queue Length 50th (ft)	60		15				139	204				22
Queue Length 95th (ft)	#174		44				#300	332				57
Internal Link Dist (ft)	412		517					1256				
Turn Bay Length (ft)							200					150
Base Capacity (vph)	65		60				188	492				198
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				1.01	0.53				0.14

Intersection Summary

Lanes, Volumes, Timings

7: Sproul Rd/Spring Mill Rd & Aldwyn Ln/Kenilworth Rd & Lancaster Ave

9/17/2014



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	0.98	
Control Delay	105.9	
Queue Delay	0.0	
Total Delay	105.9	
LOS	F	
Approach Delay	101.5	
Approach LOS	F	
Queue Length 50th (ft)	286	
Queue Length 95th (ft)	#533	
Internal Link Dist (ft)	3088	
Turn Bay Length (ft)		
Base Capacity (vph)	306	
Starvation Cap Reductn	0	
Spillback Cap Reductn	0	
Storage Cap Reductn	0	
Reduced v/c Ratio	0.98	
Intersection Summary		

Lanes, Volumes, Timings
11: Chapel Dr & Lancaster Ave

9/17/2014

	→	↘	↙	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑	↘	↙	↖	↗
Volume (vph)	993	33	30	982	14	4
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width (ft)	11	11	11	11	12	12
Storage Length (ft)		125	100		0	0
Storage Lanes		1	1		1	1
Taper Length (ft)			25		25	
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	1.00
Frt		0.850				0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	3241	1450	1621	3241	1676	1500
Flt Permitted			0.265		0.950	
Satd. Flow (perm)	3241	1450	452	3241	1676	1500
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		36				4
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)	1079	36	33	1067	15	4
Shared Lane Traffic (%)						
Lane Group Flow (vph)	1079	36	33	1067	15	4
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	11			11	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	1	1
Detector Template	Thru	Right	Left	Thru	Left	Right
Leading Detector (ft)	37	20	20	37	37	20
Trailing Detector (ft)	-3	0	0	-3	-3	0
Detector 1 Position(ft)	-3	0	0	-3	-3	0
Detector 1 Size(ft)	40	20	20	40	40	20
Detector 1 Type	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+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	NA	Perm	Perm	NA	Prot	Perm
Protected Phases	2			6	8	
Permitted Phases		2	6			8
Detector Phase	2	2	6	6	8	8
Switch Phase						
Minimum Initial (s)	10.0	10.0	10.0	10.0	4.0	4.0
Minimum Split (s)	21.0	21.0	21.0	21.0	28.0	28.0
Total Split (s)	32.0	32.0	32.0	32.0	28.0	28.0

Projected 18 am 9/15/2014 Baseline

Synchro 8 Report
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Lanes, Volumes, Timings
11: Chapel Dr & Lancaster Ave

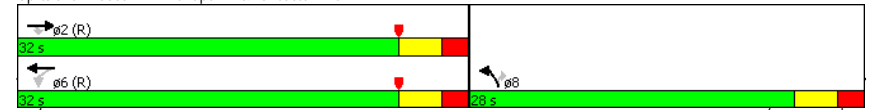
9/17/2014

	→	↘	↙	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Total Split (%)	53.3%	53.3%	53.3%	53.3%	46.7%	46.7%
Maximum Green (s)	27.0	27.0	27.0	27.0	23.0	23.0
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	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
Total Lost Time (s)	5.5	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	3.0
Recall Mode	C-Max	C-Max	C-Max	C-Max	None	None
Walk Time (s)	10.0	10.0	10.0	10.0	7.0	7.0
Flash Dont Walk (s)	0.0	0.0	0.0	0.0	16.0	16.0
Pedestrian Calls (#/hr)	0	0	0	0	0	0
Act Effect Green (s)	56.4	56.4	56.4	56.4	5.8	5.8
Actuated g/C Ratio	0.94	0.94	0.94	0.94	0.10	0.10
v/c Ratio	0.35	0.03	0.08	0.35	0.09	0.03
Control Delay	1.5	0.8	2.8	2.9	25.6	17.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	1.5	0.8	2.8	2.9	25.6	17.0
LOS	A	A	A	A	C	B
Approach Delay	1.5			2.9	23.8	
Approach LOS	A			A	C	
Queue Length 50th (ft)	0	0	0	0	5	0
Queue Length 95th (ft)	100	6	m11	315	20	7
Internal Link Dist (ft)	626			1205	239	
Turn Bay Length (ft)		125	100			
Base Capacity (vph)	3048	1366	425	3048	628	565
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	0.35	0.03	0.08	0.35	0.02	0.01

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: 0.35
 Intersection Signal Delay: 2.4 Intersection LOS: A
 Intersection Capacity Utilization 41.5% 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



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Lanes, Volumes, Timings

27: S Ithan Ave/N Ithan Ave & Lancaster Ave

9/17/2014



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↕	↔	↔	↕	↔	↔	↕	↔	↔	↕	↔
Volume (vph)	96	826	75	117	869	47	94	190	75	25	118	50
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		0.987			0.992			0.957			0.956	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1520	3000	0	1497	2970	0	1512	1524	0	1520	1530	0
Flt Permitted	0.164			0.169			0.533			0.306		
Satd. Flow (perm)	262	3000	0	266	2970	0	849	1524	0	490	1530	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)	102	879	80	124	924	50	100	202	80	27	126	53
Shared Lane Traffic (%)												
Lane Group Flow (vph)	102	959	0	124	974	0	100	282	0	27	179	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	

Projected 18 am 9/15/2014 Baseline

Synchro 8 Report
Page 1

Lanes, Volumes, Timings

27: S Ithan Ave/N Ithan Ave & Lancaster Ave

9/17/2014

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

Projected 18 am 9/15/2014 Baseline

Synchro 8 Report
Page 2

Lanes, Volumes, Timings

27: S Ithan Ave/N Ithan Ave & Lancaster Ave

9/17/2014



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)	55.9	49.4		56.0	49.5		23.8	23.8		23.8	23.8	
Actuated g/C Ratio	0.47	0.41		0.47	0.41		0.20	0.20		0.20	0.20	
v/c Ratio	0.54	0.78		0.65	0.80		0.60	0.93		0.28	0.59	
Control Delay	30.0	36.8		28.5	30.7		59.4	85.3		49.0	52.4	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	30.0	36.8		28.5	30.7		59.4	85.3		49.0	52.4	
LOS	C	D		C	C		E	F		D	D	
Approach Delay		36.1			30.4			78.5			51.9	
Approach LOS		D			C			E			D	
Queue Length 50th (ft)	44	363		54	330		70	215		18	126	
Queue Length 95th (ft)	88	#484		m83	#491		133	#378		48	204	
Internal Link Dist (ft)		1205			231			264			893	
Turn Bay Length (ft)	200			250			200			65		
Base Capacity (vph)	190	1236		190	1225		173	311		100	312	
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	0.54	0.78		0.65	0.80		0.58	0.91		0.27	0.57	

Intersection Summary

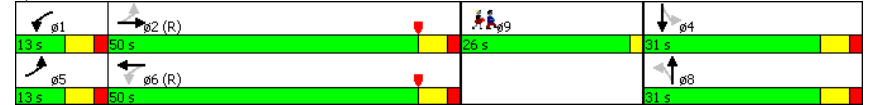
Area Type: Other
 Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow, Master Intersection
 Natural Cycle: 105
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.93
 Intersection Signal Delay: 40.9
 Intersection Capacity Utilization 75.6%
 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.

Lanes, Volumes, Timings

27: S Ithan Ave/N Ithan Ave & Lancaster Ave

9/17/2014

Splits and Phases: 27: S Ithan Ave/N Ithan Ave & Lancaster Ave



Lanes, Volumes, Timings

27: S Ithan Ave/N Ithan Ave & Lancaster Ave

9/17/2014

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 TWSC
2: County Line Rd & N Ithan Ave

9/17/2014

Intersection						
Int Delay, s/veh	0					
Movement	EBL	EBR	SBL	SBR	NWL	NWR
Vol, veh/h	206	15	140	263	30	254
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	0	-	0	-
Veh in Median Storage, #	0	-	0	-	0	-
Grade, %	0	-	0	-	0	-
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	219	16	149	280	32	270
Major/Minor	Minor2	Major2		Minor1		
Conflicting Flow All	135	0	0	8	0	0
Stage 1	0	-	-	0	-	-
Stage 2	135	-	-	8	-	-
Critical Hdwy	-	-	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	-
Pot Cap-1 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Approach	EB	SB		NW		
HCM Control Delay, s	-	0		-		
HCM LOS	-			-		
Minor Lane/Major Mvmt	NWLn1	EBLn1	SBL	SBR		
Capacity (veh/h)	-	-	-	-		
HCM Lane V/C Ratio	-	-	-	-		
HCM Control Delay (s)	-	-	-	-		
HCM Lane LOS	-	-	-	-		
HCM 95th %tile Q(veh)	-	-	-	-		

HCM 2010 TWSC
15: Conestoga Rd & Spring Mill Rd

9/17/2014

Intersection							
Int Delay, s/veh	0.2						
Movement	EBL	EBT	WBT	WBR	SWL	SWR	
Vol, veh/h	2	628	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	730	805	3	5	9	
Major/Minor	Major1	Major2		Minor2			
Conflicting Flow All	808	0	0	1541	806	806	
Stage 1	-	-	-	806	-	-	
Stage 2	-	-	-	735	-	-	
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	-	-	125	379	-	
Stage 1	-	-	-	436	-	-	
Stage 2	-	-	-	471	-	-	
Platoon blocked, %	-	-	-	-	-	-	
Mov Cap-1 Maneuver	809	-	-	125	379	-	
Mov Cap-2 Maneuver	-	-	-	125	-	-	
Stage 1	-	-	-	436	-	-	
Stage 2	-	-	-	469	-	-	
Approach	EB	WB		SW			
HCM Control Delay, s	0	0		22			
HCM LOS	-			C			
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SWLn1		
Capacity (veh/h)	809	-	-	-	226		
HCM Lane V/C Ratio	0.003	-	-	-	0.062		
HCM Control Delay (s)	9.5	0	-	-	22		
HCM Lane LOS	A	A	-	-	C		
HCM 95th %tile Q(veh)	0	-	-	-	0.2		

HCM 2010 TWSC
29: Strathmore Dr/Lowrys Ln & Conestoga Rd

9/17/2014

Intersection									
Int Delay, s/veh	3.7								
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR
Vol, veh/h	47	421	14	9	447	5	13	14	12
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-
Peak Hour Factor	80	80	80	80	80	80	80	80	80
Heavy Vehicles, %	3	3	3	3	3	3	3	3	3
Mvmt Flow	59	526	18	11	559	6	16	18	15
Major/Minor	Major1			Major2			Minor1		
Conflicting Flow All	565	0	0	544	0	0	1298	1241	535
Stage 1	-	-	-	-	-	-	653	653	-
Stage 2	-	-	-	-	-	-	645	588	-
Critical Hdwy	4.13	-	-	4.13	-	-	7.13	6.53	6.23
Critical Hdwy Stg 1	-	-	-	-	-	-	6.13	5.53	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.13	5.53	-
Follow-up Hdwy	2.227	-	-	2.227	-	-	3.527	4.027	3.327
Pot Cap-1 Maneuver	1002	-	-	1020	-	-	138	174	543
Stage 1	-	-	-	-	-	-	455	462	-
Stage 2	-	-	-	-	-	-	459	494	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	1002	-	-	1020	-	-	93	157	543
Mov Cap-2 Maneuver	-	-	-	-	-	-	93	157	-
Stage 1	-	-	-	-	-	-	416	423	-
Stage 2	-	-	-	-	-	-	350	486	-
Approach	EB			WB			NB		
HCM Control Delay, s	0.9			0.2			38.5		
HCM LOS	E			E			E		
Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	
Capacity (veh/h)	155	1002	-	-	1020	-	-	368	
HCM Lane V/C Ratio	0.315	0.059	-	-	0.011	-	-	0.336	
HCM Control Delay (s)	38.5	8.8	0	-	8.6	0	-	19.7	
HCM Lane LOS	E	A	A	-	A	A	-	C	
HCM 95th %tile Q(veh)	1.3	0.2	-	-	0	-	-	1.5	

HCM 2010 TWSC
29: Strathmore Dr/Lowrys Ln & Conestoga Rd

9/17/2014

Intersection			
Int Delay, s/veh			
Movement	SBL	SBT	SBR
Vol, veh/h	2	15	82
Conflicting Peds, #/hr	0	0	0
Sign Control	Stop	Stop	Stop
RT Channelized	-	-	None
Storage Length	-	-	-
Veh in Median Storage, #	-	0	-
Grade, %	-	0	-
Peak Hour Factor	80	80	80
Heavy Vehicles, %	3	3	3
Mvmt Flow	2	19	102
Major/Minor	Minor2		
Conflicting Flow All	1253	1245	562
Stage 1	584	584	-
Stage 2	669	661	-
Critical Hdwy	7.13	6.53	6.23
Critical Hdwy Stg 1	6.13	5.53	-
Critical Hdwy Stg 2	6.13	5.53	-
Follow-up Hdwy	3.527	4.027	3.327
Pot Cap-1 Maneuver	148	173	525
Stage 1	496	496	-
Stage 2	445	458	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	122	156	525
Mov Cap-2 Maneuver	122	156	-
Stage 1	454	488	-
Stage 2	380	419	-
Approach	SB		
HCM Control Delay, s	19.7		
HCM LOS	C		
Minor Lane/Major Mvmt			

HCM 2010 TWSC
38: County Line Rd & N Ithan Ave

9/17/2014

Intersection						
Int Delay, s/veh	18.6					

Movement	NBT	NBR	SBL	SBT	SWL	SWR
Vol, veh/h	347	110	166	247	134	100
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Stop	Stop	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	91	91	91	91	91	91
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	381	121	182	271	147	110

Major/Minor	Major1	Minor2	Minor1	Major1
Conflicting Flow All	0	0	497	502
Stage 1	-	-	0	0
Stage 2	-	-	497	502
Critical Hdwy	-	-	6.42	6.52
Critical Hdwy Stg 1	-	-	-	-
Critical Hdwy Stg 2	-	-	5.42	5.52
Follow-up Hdwy	-	-	3.518	4.018
Pot Cap-1 Maneuver	-	-	532	471
Stage 1	-	-	-	-
Stage 2	-	-	611	542
Platoon blocked, %	-	-	-	-
Mov Cap-1 Maneuver	-	-	532	0
Mov Cap-2 Maneuver	-	-	532	0
Stage 1	-	-	-	0
Stage 2	-	-	611	0

Approach	NB	SB	SW
HCM Control Delay, s	0	39.5	18.1
HCM LOS		E	C

Minor Lane/Major Mvmt	NBT	NBR	SBLn1	SWLn1
Capacity (veh/h)	-	-	532	528
HCM Lane V/C Ratio	-	-	0.853	0.487
HCM Control Delay (s)	-	-	39.5	18.1
HCM Lane LOS	-	-	E	C
HCM 95th %tile Q(veh)	-	-	9	2.6

HCM 2010 TWSC
43: County Line Rd & Roberts Rd

9/17/2014

Intersection										
Int Delay, s/veh	26.4									

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR
Vol, veh/h	67	99	8	2	23	6	14	616	25
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	88	88	88	88	88	88
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2
Mvmt Flow	76	112	9	2	26	7	16	700	28

Major/Minor	Minor2	Minor1	Major1
Conflicting Flow All	970	1335	289
Stage 1	575	575	-
Stage 2	395	760	-
Critical Hdwy	7.54	6.54	6.94
Critical Hdwy Stg 1	6.54	5.54	-
Critical Hdwy Stg 2	6.54	5.54	-
Follow-up Hdwy	3.52	4.02	3.32
Pot Cap-1 Maneuver	208	152	708
Stage 1	470	501	-
Stage 2	602	413	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	172	146	708
Mov Cap-2 Maneuver	172	146	-
Stage 1	457	493	-
Stage 2	542	402	-

Approach	EB	WB	NB
HCM Control Delay, s	201.1	35.2	0.3
HCM LOS	F	E	

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	992	-	-	161	154	871	-	-
HCM Lane V/C Ratio	0.016	-	-	1.228	0.229	0.01	-	-
HCM Control Delay (s)	8.7	0.1	-	201.1	35.2	9.2	0.1	-
HCM Lane LOS	A	A	-	F	E	A	A	-
HCM 95th %tile Q(veh)	0	-	-	11.2	0.8	0	-	-

HCM 2010 TWSC
43: County Line Rd & Roberts Rd

9/17/2014

Intersection			
Int Delay, s/veh			
Movement	SBL	SBT	SBR
Vol, veh/h	8	471	38
Conflicting Peds, #/hr	0	0	0
Sign Control	Free	Free	Free
RT Channelized	-	-	None
Storage Length	-	-	-
Veh in Median Storage, #	-	0	-
Grade, %	-	0	-
Peak Hour Factor	88	88	88
Heavy Vehicles, %	2	2	2
Mvmt Flow	9	535	43
Major/Minor	Major2		
Conflicting Flow All	728	0	0
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	4.14	-	-
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	2.22	-	-
Pot Cap-1 Maneuver	871	-	-
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	871	-	-
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-
Approach	SB		
HCM Control Delay, s	0.2		
HCM LOS			
Minor Lane/Major Mvmt			

HCM 2010 TWSC
52: Airdale Rd & County Line Rd

9/17/2014

Intersection						
Int Delay, s/veh	3.8					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	194	219	286	20	15	97
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	220	249	325	23	17	110
Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	348	0	-	0	1026	336
Stage 1	-	-	-	-	336	-
Stage 2	-	-	-	-	690	-
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	1216	-	-	-	261	708
Stage 1	-	-	-	-	726	-
Stage 2	-	-	-	-	500	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	1216	-	-	-	206	708
Mov Cap-2 Maneuver	-	-	-	-	206	-
Stage 1	-	-	-	-	726	-
Stage 2	-	-	-	-	395	-
Approach	EB		WB		SB	
HCM Control Delay, s	4		0		13.8	
HCM LOS					B	
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	
Capacity (veh/h)	1216	-	-	-	534	
HCM Lane V/C Ratio	0.181	-	-	-	0.238	
HCM Control Delay (s)	8.6	0	-	-	13.8	
HCM Lane LOS	A	A	-	-	B	
HCM 95th %tile Q(veh)	0.7	-	-	-	0.9	

HCM 2010 TWSC
53: County Line Rd & Lowrys Ln

9/17/2014

Intersection						
Int Delay, s/veh	3.8					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	61	80	58	229	149	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	92	67	263	171	34
Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	586	189	206	0	-	0
Stage 1	189	-	-	-	-	-
Stage 2	397	-	-	-	-	-
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	476	858	1377	-	-	-
Stage 1	848	-	-	-	-	-
Stage 2	683	-	-	-	-	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	449	858	1377	-	-	-
Mov Cap-2 Maneuver	449	-	-	-	-	-
Stage 1	848	-	-	-	-	-
Stage 2	644	-	-	-	-	-
Approach	EB		NB		SB	
HCM Control Delay, s	12.9		1.6		0	
HCM LOS	B					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR	
Capacity (veh/h)	1377	-	615	-	-	
HCM Lane V/C Ratio	0.048	-	0.264	-	-	
HCM Control Delay (s)	7.7	0	12.9	-	-	
HCM Lane LOS	A	A	B	-	-	
HCM 95th %tile Q(veh)	0.2	-	1.1	-	-	

HCM 2010 TWSC
61: Dwy/Aldwyn Ln & S Ithan Ave

9/17/2014

Intersection										
Int Delay, s/veh	2.1									
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	
Vol, veh/h	9	337	9	16	197	13	7	1	12	
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	
RT Channelized	-	-	None	-	-	None	-	-	None	
Storage Length	-	-	-	-	-	-	-	-	-	
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	
Grade, %	-	0	-	-	0	-	-	0	-	
Peak Hour Factor	81	81	81	81	81	81	81	81	81	
Heavy Vehicles, %	4	4	4	4	4	4	4	4	4	
Mvmt Flow	11	416	11	20	243	16	9	1	15	
Major/Minor	Major1			Major2			Minor1			
Conflicting Flow All	259	0	0	427	0	0	772	743	422	
Stage 1	-	-	-	-	-	-	444	444	-	
Stage 2	-	-	-	-	-	-	328	299	-	
Critical Hdwy	4.14	-	-	4.14	-	-	7.14	6.54	6.24	
Critical Hdwy Stg 1	-	-	-	-	-	-	6.14	5.54	-	
Critical Hdwy Stg 2	-	-	-	-	-	-	6.14	5.54	-	
Follow-up Hdwy	2.236	-	-	2.236	-	-	3.536	4.036	3.336	
Pot Cap-1 Maneuver	1294	-	-	1122	-	-	314	341	627	
Stage 1	-	-	-	-	-	-	589	572	-	
Stage 2	-	-	-	-	-	-	681	663	-	
Platoon blocked, %	-	-	-	-	-	-	-	-	-	
Mov Cap-1 Maneuver	1294	-	-	1122	-	-	277	330	627	
Mov Cap-2 Maneuver	-	-	-	-	-	-	277	330	-	
Stage 1	-	-	-	-	-	-	583	566	-	
Stage 2	-	-	-	-	-	-	604	649	-	
Approach	EB			WB			NB			
HCM Control Delay, s	0.2			0.6			14.1			
HCM LOS	B						B			
Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1		
Capacity (veh/h)	422	1294	-	-	1122	-	-	595		
HCM Lane V/C Ratio	0.059	0.009	-	-	0.018	-	-	0.158		
HCM Control Delay (s)	14.1	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	-	-	0.6		

HCM 2010 TWSC
61: Dwy/Aldwyn Ln & S Ithan Ave

9/17/2014

Intersection			
Int Delay, s/veh			
Movement	SBL	SBT	SBR
Vol, veh/h	16	0	60
Conflicting Peds, #/hr	0	0	0
Sign Control	Stop	Stop	Stop
RT Channelized	-	-	None
Storage Length	-	-	-
Veh in Median Storage, #	-	0	-
Grade, %	-	0	-
Peak Hour Factor	81	81	81
Heavy Vehicles, %	4	4	4
Mvmt Flow	20	0	74
Major/Minor	Minor2		
Conflicting Flow All	743	740	251
Stage 1	291	291	-
Stage 2	452	449	-
Critical Hdwy	7.14	6.54	6.24
Critical Hdwy Stg 1	6.14	5.54	-
Critical Hdwy Stg 2	6.14	5.54	-
Follow-up Hdwy	3.536	4.036	3.336
Pot Cap-1 Maneuver	329	342	783
Stage 1	713	668	-
Stage 2	583	569	-
Platoon blocked, %			
Mov Cap-1 Maneuver	313	331	783
Mov Cap-2 Maneuver	313	331	-
Stage 1	705	654	-
Stage 2	562	563	-
Approach	SB		
HCM Control Delay, s	12.2		
HCM LOS	B		
Minor Lane/Major Mvmt			

HCM 2010 TWSC
76: S Ithan Ave & Dwy

9/17/2014

Intersection								
Int Delay, s/veh	2.8							
Movement	EBL	EBT	EBR	WBL	WBT	WBR	SBL	SBR
Vol, veh/h	5	331	29	150	220	9	23	2
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	None
Storage Length	50	-	-	100	-	-	0	-
Veh in Median Storage, #	-	0	-	-	0	-	0	-
Grade, %	-	1	-	-	-1	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2
Mvmt Flow	5	360	32	163	239	10	25	2
Major/Minor	Major1		Major2			Minor2		
Conflicting Flow All	249	0	0	391	0	0	967	244
Stage 1	-	-	-	-	-	-	570	-
Stage 2	-	-	-	-	-	-	397	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	3.318
Pot Cap-1 Maneuver	1317	-	-	1168	-	-	234	795
Stage 1	-	-	-	-	-	-	506	-
Stage 2	-	-	-	-	-	-	629	-
Platoon blocked, %								
Mov Cap-1 Maneuver	1317	-	-	1168	-	-	199	795
Mov Cap-2 Maneuver	-	-	-	-	-	-	199	-
Stage 1	-	-	-	-	-	-	504	-
Stage 2	-	-	-	-	-	-	606	-
Approach	EB		WB			SB		
HCM Control Delay, s	0.1		3.4			22.8		
HCM LOS						C		
Minor Lane/Major Mvmt	NWLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	419	1317	-	-	1168	-	-	229
HCM Lane V/C Ratio	0.044	0.004	-	-	0.14	-	-	0.119
HCM Control Delay (s)	14	7.7	-	-	8.6	-	-	22.8
HCM Lane LOS	B	A	-	-	A	-	-	C
HCM 95th %tile Q(veh)	0.1	0	-	-	0.5	-	-	0.4

HCM 2010 TWSC
76: S Ithan Ave & Dwy

9/17/2014

Intersection		
Int Delay, s/veh		
Movement	NWL	NWR
Vol, veh/h	4	7
Conflicting Peds, #/hr	0	0
Sign Control	Stop	Stop
RT Channelized	-	-
Storage Length	0	-
Veh in Median Storage, #	0	-
Grade, %	0	-
Peak Hour Factor	92	92
Heavy Vehicles, %	2	2
Mvmt Flow	4	8
Major/Minor	Minor1	
Conflicting Flow All	970	376
Stage 1	386	-
Stage 2	584	-
Critical Hdwy	7.12	6.22
Critical Hdwy Stg 1	6.12	-
Critical Hdwy Stg 2	6.12	-
Follow-up Hdwy	3.518	3.318
Pot Cap-1 Maneuver	233	670
Stage 1	637	-
Stage 2	498	-
Platoon blocked, %	-	-
Mov Cap-1 Maneuver	189	670
Mov Cap-2 Maneuver	189	-
Stage 1	635	-
Stage 2	403	-
Approach	NW	
HCM Control Delay, s	14	
HCM LOS	B	
Minor Lane/Major Mvmt		

HCM 2010 TWSC
79: Garrett Rd & Lancaster Ave

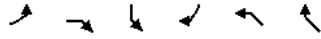
9/17/2014

Intersection						
Int Delay, s/veh	3.9					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	1085	24	19	1180	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	1619	36	28	1761	0	37
Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	1655	0	2574	828
Stage 1	-	-	-	-	1637	-
Stage 2	-	-	-	-	937	-
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	-	-	395	-	22	318
Stage 1	-	-	-	-	147	-
Stage 2	-	-	-	-	346	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	395	-	22	318
Mov Cap-2 Maneuver	-	-	-	-	22	-
Stage 1	-	-	-	-	147	-
Stage 2	-	-	-	-	346	-
Approach	EB		WB		NB	
HCM Control Delay, s	0		7.3		17.8	
HCM LOS					C	
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	
Capacity (veh/h)	318	-	-	395	-	
HCM Lane V/C Ratio	0.117	-	-	0.072	-	
HCM Control Delay (s)	17.8	-	-	14.8	7.2	
HCM Lane LOS	C	-	-	B	A	
HCM 95th %tile Q(veh)	0.4	-	-	0.2	-	

Lanes, Volumes, Timings

2: County Line Rd & N Ithan Ave

9/17/2014



Lane Group	EBL	EBR	SBL	SBR	NWL	NWR
Lane Configurations	W		W		W	
Volume (vph)	206	15	140	263	30	254
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		0.912		0.879	
Flt Protected	0.955		0.983		0.995	
Satd. Flow (prot)	1763	0	1670	0	1629	0
Flt Permitted	0.955		0.983		0.995	
Satd. Flow (perm)	1763	0	1670	0	1629	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	149	280	32	270
Shared Lane Traffic (%)						
Lane Group Flow (vph)	235	0	429	0	302	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	63.6%
ICU Level of Service	B
Analysis Period (min)	15

Lanes, Volumes, Timings

38: County Line Rd & N Ithaca Ave

9/17/2014



Lane Group	NBT	NBR	SBL	SBT	SWL	SWR
Lane Configurations	↑			↑	↑	
Volume (vph)	347	110	166	247	134	100
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				0.942	
Flt Protected				0.980	0.972	
Satd. Flow (prot)	1801	0	0	1825	1706	0
Flt Permitted				0.980	0.972	
Satd. Flow (perm)	1801	0	0	1825	1706	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	121	182	271	147	110
Shared Lane Traffic (%)						
Lane Group Flow (vph)	502	0	0	453	257	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	70.7%
ICU Level of Service	C
Analysis Period (min)	15

HCM 2010 Signalized Intersection Summary
3: County Line Rd & Spring Mill Rd

9/17/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Volume (veh/h)	35	282	61	63	267	78	41	252	45	33	331	53
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Ob), 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	180.0	163.0	180.0	180.0	173.1	180.0	180.0	173.1	180.0	180.0	173.1	180.0
Adj Flow Rate, veh/h	37	297	64	66	281	82	43	265	47	35	348	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	105	562	114	146	519	139	104	370	61	92	414	64
Arrive On Green	0.46	0.46	0.46	0.46	0.46	0.46	0.30	0.30	0.30	0.30	0.30	0.30
Sat Flow, veh/h	72	1215	247	152	1122	301	101	1228	203	70	1371	211
Grp Volume(v), veh/h	398	0	0	429	0	0	355	0	0	439	0	0
Grp Sat Flow(s),veh/h/ln	1533	0	0	1576	0	0	1532	0	0	1652	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	2.5	0.0	0.0
Cycle Q Clear(g_c), s	9.9	0.0	0.0	10.2	0.0	0.0	11.3	0.0	0.0	13.8	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	781	0	0	804	0	0	535	0	0	569	0	0
V/C Ratio(X)	0.51	0.00	0.00	0.53	0.00	0.00	0.66	0.00	0.00	0.77	0.00	0.00
Avail Cap(c_a), veh/h	781	0	0	804	0	0	728	0	0	770	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	17.1	0.0	0.0	18.2	0.0	0.0
Incr Delay (d2), s/veh	1.2	0.0	0.0	2.5	0.0	0.0	0.5	0.0	0.0	2.2	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.6	0.0	0.0	5.2	0.0	0.0	4.9	0.0	0.0	6.6	0.0	0.0
LnGrp Delay(d),s/veh	11.9	0.0	0.0	13.2	0.0	0.0	17.7	0.0	0.0	20.4	0.0	0.0
LnGrp LOS	B			B			B			C		
Approach Vol, veh/h		398			429			355			439	
Approach Delay, s/veh		11.9			13.2			17.7			20.4	
Approach LOS		B			B			B			C	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		38.9		23.1		38.9		23.1				
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		11.9		15.8		12.2		13.3				
Green Ext Time (p_c), s		3.1		1.3		3.1		1.4				
Intersection Summary												
HCM 2010 Ctrl Delay			15.8									
HCM 2010 LOS			B									

HCM 2010 Signalized Intersection Summary
7: Sproul Rd/Spring Mill Rd & Aldwyn Ln/Kenilworth Rd & Lancaster Ave

9/17/2014

HCM 2010 methodology does not support more than 4 approaches.

HCM 2010 Signalized Intersection Summary
11: Chapel Dr & Lancaster Ave

9/17/2014

HCM 2010 Computation does not support turning movement with Shared and Exclusive lanes.

HCM 2010 Signalized Intersection Summary
16: Sproul Rd & Conestoga Rd

9/17/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (veh/h)	150	557	139	36	605	58	215	269	28	57	201	75
Number	7	4	14	3	8	18	1	6	16	5	2	12
Initial Q (Ob), 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	174.8	174.8	180.0	179.1	179.1	184.5	173.9	173.9	179.1	180.9	175.6	180.9
Adj Flow Rate, veh/h	165	612	0	40	665	0	236	296	31	63	221	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	190	874	0	269	677	0	200	576	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	819	1791	0	1656	1548	162	201	1008	349
Grp Volume(v), veh/h	165	612	0	40	665	0	236	0	327	366	0	0
Grp Sat Flow(s),veh/h/ln	1664	1748	0	819	1791	0	1656	0	1710	1557	0	0
Q Serve(g_s), s	5.3	24.3	0.0	3.6	33.1	0.0	6.5	0.0	13.4	16.2	0.0	0.0
Cycle Q Clear(g_c), s	5.3	24.3	0.0	16.8	33.1	0.0	6.5	0.0	13.4	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	190	874	0	269	677	0	200	0	637	410	0	0
V/C Ratio(X)	0.87	0.70	0.00	0.15	0.98	0.00	1.18	0.00	0.51	0.89	0.00	0.00
Avail Cap(c_a), veh/h	190	874	0	269	677	0	200	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	17.3	0.0	28.0	27.7	0.0	29.3	0.0	21.9	34.4	0.0	0.0
Incr Delay (d2), s/veh	32.6	4.7	0.0	1.2	30.6	0.0	121.5	0.0	0.7	21.0	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(50%),veh/ln	4.1	12.7	0.0	0.9	22.0	0.0	6.7	0.0	6.4	11.4	0.0	0.0
LnGrp Delay(d),s/veh	54.2	22.0	0.0	29.2	58.3	0.0	150.8	0.0	22.6	55.4	0.0	0.0
LnGrp LOS	D	C		C	E		F		C	E		
Approach Vol, veh/h		777			705			563				366
Approach Delay, s/veh		28.8			56.7			76.4				55.4
Approach LOS		C			E			E				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		26.3		15.4	7.3	35.1				
Green Ext Time (p_c), s	0.0	0.0		8.5		2.4	0.0	0.0				
Intersection Summary												
HCM 2010 Ctrl Delay				52.1								
HCM 2010 LOS				D								

HCM 2010 Signalized Intersection Summary
25: S Ithan Ave & Conestoga Rd

9/17/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Volume (veh/h)	167	393	2	2	455	128	14	157	12	63	52	140
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Ob), 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	185.4	178.3	185.4	176.4	169.6	176.4	176.3	169.5	176.3	184.4	177.3	184.4
Adj Flow Rate, veh/h	206	485	2	2	562	158	17	194	15	78	64	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	196	374	1	60	706	198	76	348	26	139	93	193
Arrive On Green	0.55	0.55	0.55	0.55	0.55	0.55	0.24	0.24	0.24	0.24	0.24	0.24
Sat Flow, veh/h	217	679	3	1	1282	359	53	1478	109	276	396	818
Grp Volume(v), veh/h	693	0	0	722	0	0	226	0	0	315	0	0
Grp Sat Flow(s),veh/h/ln	899	0	0	1642	0	0	1640	0	0	1489	0	0
Q Serve(g_s), s	11.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.2	0.0	0.0
Cycle Q Clear(g_c), s	33.5	0.0	0.0	21.7	0.0	0.0	7.3	0.0	0.0	12.4	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	572	0	0	963	0	0	450	0	0	424	0	0
V/C Ratio(X)	1.21	0.00	0.00	0.75	0.00	0.00	0.50	0.00	0.00	0.74	0.00	0.00
Avail Cap(c_a), veh/h	572	0	0	963	0	0	481	0	0	453	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	16.9	0.0	0.0	11.0	0.0	0.0	20.5	0.0	0.0	22.4	0.0	0.0
Incr Delay (d2), s/veh	110.6	0.0	0.0	3.3	0.0	0.0	0.9	0.0	0.0	6.1	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(50%),veh/ln	27.0	0.0	0.0	10.5	0.0	0.0	3.4	0.0	0.0	5.8	0.0	0.0
LnGrp Delay(d),s/veh	127.5	0.0	0.0	14.3	0.0	0.0	21.4	0.0	0.0	28.5	0.0	0.0
LnGrp LOS	F			B			C			C		
Approach Vol, veh/h	693			722			226			315		
Approach Delay, s/veh	127.5			14.3			21.4			28.5		
Approach LOS	F			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		20.8		40.0		20.8					
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	23.7		9.3		35.5		14.4					
Green Ext Time (p_c), s	5.2		1.3		0.0		0.4					
Intersection Summary												
HCM 2010 Ctrl Delay	57.5											
HCM 2010 LOS	E											

HCM 2010 Signalized Intersection Summary
27: S Ithan Ave/N Ithan Ave & Lancaster Ave

9/17/2014

HCM 2010 methodology does not support exclusive ped or hold phases.

HCM 2010 Signalized Intersection Summary
33: Williams Rd/Garrett Ave & Conestoga Rd

9/17/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations	↔ ↔ ↔ ↔ ↔ ↔ ↔ ↔ ↔ ↔ ↔ ↔ ↔											
Volume (veh/h)	26	443	1	4	421	4	6	6	9	15	3	38
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Ob), 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	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	187.2	187.2	187.2	187.2	187.2	187.2	180.0	180.0	180.0	172.8	172.8	172.8
Adj Flow Rate, veh/h	30	503	1	5	478	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	1331	3	58	1382	14	88	35	38	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	1774	3	4	1842	19	337	658	711	325	147	1015
Grp Volume(v), veh/h	534	0	0	488	0	0	24	0	0	63	0	0
Grp Sat Flow(s), veh/h/ln	1826	0	0	1865	0	0	1706	0	0	1487	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	5.8	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	0.00	0.00	0.00	0.00
Lane Grp Cap(c), veh/h	1427	0	0	1454	0	0	161	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	302	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(50%),veh/ln	3.6	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	534			488			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		7.8		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
51: Lowrys Ln & Lancaster Ave

9/17/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔ ↔ ↔ ↔ ↔ ↔ ↔ ↔ ↔ ↔ ↔ ↔ ↔											
Volume (veh/h)	18	1064	19	16	1093	23	47	105	39	22	72	20
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Ob), 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	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	180.0	174.8	180.0	177.3	172.1	177.3	190.0	184.5	190.0	188.1	182.7	188.1
Adj Flow Rate, veh/h	19	1144	20	17	1175	25	51	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	78	2036	35	75	2005	42	126	158	52	105	184	46
Arrive On Green	1.00	1.00	1.00	0.64	0.64	0.64	0.15	0.15	0.15	0.15	0.15	0.15
Sat Flow, veh/h	18	3206	56	14	3157	67	306	1054	348	187	1225	308
Grp Volume(v), veh/h	614	0	569	633	0	584	206	0	0	123	0	0
Grp Sat Flow(s), veh/h/ln	1698	0	1580	1683	0	1555	1708	0	0	1720	0	0
Q Serve(g_s), s	0.0	0.0	0.0	0.0	0.0	12.3	2.9	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	0.0	0.0	0.0	11.9	0.0	12.3	6.4	0.0	0.0	3.5	0.0	0.0
Prop In Lane	0.03	0.04	0.03	0.04	0.25	0.20	0.20	0.18	0.00	0.00	0.00	0.00
Lane Grp Cap(c), veh/h	1145	0	1004	1135	0	988	337	0	0	335	0	0
V/C Ratio(X)	0.54	0.00	0.57	0.56	0.00	0.59	0.61	0.00	0.00	0.37	0.00	0.00
Avail Cap(c_a), veh/h	1145	0	1004	1135	0	988	457	0	0	455	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)	0.60	0.00	0.60	1.00	0.00	1.00	0.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	0.0	0.0	0.0	5.9	0.0	6.0	22.8	0.0	0.0	21.7	0.0	0.0
Incr Delay (d2), s/veh	1.1	0.0	1.4	2.0	0.0	2.6	1.8	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(50%),veh/ln	0.3	0.0	0.4	6.1	0.0	5.9	3.2	0.0	0.0	1.8	0.0	0.0
LnGrp Delay(d),s/veh	1.1	0.0	1.4	7.9	0.0	8.6	24.7	0.0	0.0	22.4	0.0	0.0
LnGrp LOS	A		A	A		A	C			C		
Approach Vol, veh/h	1183			1217			206			123		
Approach Delay, s/veh	1.2			8.2			24.7			22.4		
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	46.1		13.9		46.1		13.9					
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		5.5		14.3		8.4					
Green Ext Time (p_c), s	13.9		0.7		11.4		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.

Lanes, Volumes, Timings

7: Sproul Rd/Spring Mill Rd & Aldwyn Ln/Kenilworth Rd & Lancaster Ave

9/17/2014



Lane Group	EBL2	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR	WBR2	NBL2	NBL
Lane Configurations												
Volume (vph)	2	226	844	84	221	4	11	965	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		0.075					0.285					
Satd. Flow (perm)	0	118	3058	0	1531	0	493	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	235	879	88	230	4	11	1005	1	14	3	51
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	237	967	0	230	0	15	1020	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

9/17/2014



Lane Group	NBT	NBR	SBT	SBR	SBR2	NEL2	NEL	NET	NER	NER2	SWL2	SWL
Lane Configurations												
Volume (vph)	0	8	1	3	12	183	0	195	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						0.182					0.596
Satd. Flow (perm)	1161	0	1418	0	0	0	307	1575	0	0	0	987
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	191	0	203	52	9	20	8
Shared Lane Traffic (%)												
Lane Group Flow (vph)	62	0	16	0	0	0	191	264	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)	15	15		9	9	15	15		9	9	15	15
Number of Detectors	1	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

Lanes, Volumes, Timings

7: Sproul Rd/Spring Mill Rd & Aldwyn Ln/Kenilworth Rd & Lancaster Ave

9/17/2014



Lane Group	SWT	SWR
Lane Configurations		
Volume (vph)	135	156
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)	141	162
Shared Lane Traffic (%)		
Lane Group Flow (vph)	303	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	

Base 23 am 9/15/2014 Baseline

Synchro 8 Report
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Lanes, Volumes, Timings

7: Sproul Rd/Spring Mill Rd & Aldwyn Ln/Kenilworth Rd & Lancaster Ave

9/17/2014



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		1.06	0.67		0.28		0.10	1.01				
Control Delay		120.5	34.8		5.6		42.6	83.6				
Queue Delay		0.0	0.0		0.0		0.0	0.0				
Total Delay		120.5	34.8		5.6		42.6	83.6				
LOS		F	C		A		D	F				
Approach Delay			44.3					83.0				
Approach LOS			D					F				
Queue Length 50th (ft)			-198		359		14	10		510		
Queue Length 95th (ft)			#425		510		69	33		#760		
Internal Link Dist (ft)			497					1529				
Turn Bay Length (ft)			300					75				
Base Capacity (vph)		223	1439		827		150	1005				
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		1.06	0.67		0.28		0.10	1.01				

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:	69.5
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.

Base 23 am 9/15/2014 Baseline

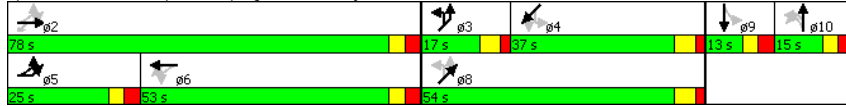
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Lanes, Volumes, Timings

7: Sproul Rd/Spring Mill Rd & Aldwyn Ln/Kenilworth Rd & Lancaster Ave

9/17/2014

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

9/17/2014



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	0.95		0.29				1.03	0.54				0.14
Control Delay	170.3		86.1				118.6	49.0				54.4
Queue Delay	0.0		0.0				0.0	0.0				0.0
Total Delay	170.3		86.1				118.6	49.0				54.4
LOS	F		F				F	D				D
Approach Delay	170.3		86.1					78.2				
Approach LOS	F		F					E				
Queue Length 50th (ft)	60		15				141	206				22
Queue Length 95th (ft)	#174		44				#313	335				57
Internal Link Dist (ft)	412		517					1256				
Turn Bay Length (ft)							200					150
Base Capacity (vph)	65		60				185	492				198
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				1.03	0.54				0.14

Intersection Summary

Lanes, Volumes, Timings

7: Sproul Rd/Spring Mill Rd & Aldwyn Ln/Kenilworth Rd & Lancaster Ave

9/17/2014



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	0.99	
Control Delay	109.0	
Queue Delay	0.0	
Total Delay	109.0	
LOS	F	
Approach Delay	104.4	
Approach LOS	F	
Queue Length 50th (ft)	290	
Queue Length 95th (ft)	#541	
Internal Link Dist (ft)	3088	
Turn Bay Length (ft)		
Base Capacity (vph)	306	
Starvation Cap Reductn	0	
Spillback Cap Reductn	0	
Storage Cap Reductn	0	
Reduced v/c Ratio	0.99	
Intersection Summary		

Lanes, Volumes, Timings
11: Chapel Dr & Lancaster Ave

9/17/2014

	→	↖	↙	←	↘	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑	↘	↗
Volume (vph)	924	96	11	986	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)	1004	104	12	1072	10	4
Shared Lane Traffic (%)						
Lane Group Flow (vph)	1108	0	0	1084	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	CI+Ex		CI+Ex	CI+Ex	CI+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	

Base 23 am 9/15/2014 Baseline

Synchro 8 Report
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Lanes, Volumes, Timings
11: Chapel Dr & Lancaster Ave

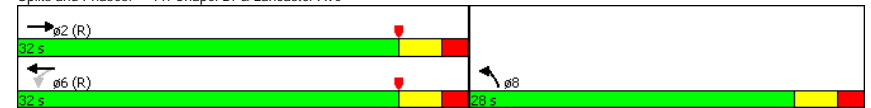
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	→	↖	↙	←	↘	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
All-Red Time (s)	2.0		2.0	2.0	2.0	
Lost Time Adjust (s)	0.5			0.5	0.5	
Total Lost Time (s)	5.5			5.5	5.5	
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Recall Mode	C-Max		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			3.2	22.5	
Queue Delay	0.0			0.0	0.0	
Total Delay	1.6			3.2	22.5	
LOS	A			A	C	
Approach Delay	1.6			3.2	22.5	
Approach LOS	A			A	C	
Queue Length 50th (ft)	0			0	3	
Queue Length 95th (ft)	101			m329	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

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 49.4% 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



Base 23 am 9/15/2014 Baseline

Synchro 8 Report
Page 2

Lanes, Volumes, Timings

27: S Ithan Ave/N Ithan Ave & Lancaster Ave

9/17/2014



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↕	↔	↔	↕	↔	↔	↕	↔	↔	↕	↔
Volume (vph)	90	802	36	137	862	45	86	178	76	26	220	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			0.993			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	0.172			0.180			0.306			0.338		
Satd. Flow (perm)	275	3022	0	284	2973	0	487	1520	0	541	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	853	38	146	917	48	91	189	81	28	234	51
Shared Lane Traffic (%)												
Lane Group Flow (vph)	96	891	0	146	965	0	91	270	0	28	285	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	

Base 23 am 9/15/2014 Baseline

Synchro 8 Report
Page 1

Lanes, Volumes, Timings

27: S Ithan Ave/N Ithan Ave & Lancaster Ave

9/17/2014

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

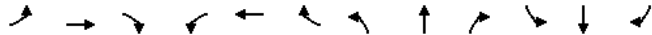
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Synchro 8 Report
Page 2

Lanes, Volumes, Timings

27: S Ithan Ave/N Ithan Ave & Lancaster Ave

9/17/2014



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)	53.6	47.2		57.5	49.2		24.2	24.2		24.2	24.2	
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	0.75		0.66	0.79		0.93	0.88		0.26	0.91	
Control Delay	28.3	37.5		29.9	31.3		122.2	75.4		46.6	79.5	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	28.3	37.5		29.9	31.3		122.2	75.4		46.6	79.5	
LOS	C	D		C	C		F	E		D	E	
Approach Delay		36.6			31.1			87.2			76.6	
Approach LOS		D			C			F			E	
Queue Length 50th (ft)	42	339		65	360		69	202		18	214	
Queue Length 95th (ft)	80	#453		m#112	#496		#173	#346		48	#367	
Internal Link Dist (ft)		1205			1955			103			893	
Turn Bay Length (ft)	140			70			105			65		
Base Capacity (vph)	190	1188		222	1217		103	323		114	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	0.51	0.75		0.66	0.79		0.88	0.84		0.25	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: 45.5
 Intersection Capacity Utilization 78.3%
 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.

Lanes, Volumes, Timings

27: S Ithan Ave/N Ithan Ave & Lancaster Ave

9/17/2014

Splits and Phases: 27: S Ithan Ave/N Ithan Ave & Lancaster Ave



Lanes, Volumes, Timings

27: S Ithan Ave/N Ithan Ave & Lancaster Ave

9/17/2014

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 TWSC
2: County Line Rd & N Ithan Ave

9/17/2014

Intersection						
Int Delay, s/veh	0					
Movement	EBL	EBR	SBL	SBR	NWL	NWR
Vol, veh/h	205	15	142	337	38	257
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	0	-	0	-
Veh in Median Storage, #	0	-	0	-	0	-
Grade, %	0	-	0	-	0	-
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	218	16	151	359	40	273

Major/Minor	Minor2	Major2	Minor1
Conflicting Flow All	137	0	8
Stage 1	0	-	0
Stage 2	137	-	8
Critical Hdwy	-	-	-
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	-	-	-
Pot Cap-1 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	-	-
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	EB	SB	NW
HCM Control Delay, s	0		
HCM LOS	-		

Minor Lane/Major Mvmt	NWLn1	EBLn1	SBL	SBR
Capacity (veh/h)	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-
HCM Control Delay (s)	-	-	-	-
HCM Lane LOS	-	-	-	-
HCM 95th %tile Q(veh)	-	-	-	-

HCM 2010 TWSC
15: Conestoga Rd & Spring Mill Rd

9/17/2014

Intersection						
Int Delay, s/veh	0.2					
Movement	EBL	EBT	WBT	WBR	SWL	SWR
Vol, veh/h	2	639	693	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	743	806	3	5	9

Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	809	0	1556
Stage 1	-	-	808
Stage 2	-	-	748
Critical Hdwy	4.14	-	6.44
Critical Hdwy Stg 1	-	-	5.44
Critical Hdwy Stg 2	-	-	5.44
Follow-up Hdwy	2.236	-	3.536
Pot Cap-1 Maneuver	808	-	123
Stage 1	-	-	435
Stage 2	-	-	464
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	808	-	123
Mov Cap-2 Maneuver	-	-	123
Stage 1	-	-	435
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)	808	-	-	-	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

9/17/2014

Intersection									
Int Delay, s/veh	3.7								

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR
Vol, veh/h	47	427	14	9	459	5	13	14	12
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-
Peak Hour Factor	80	80	80	80	80	80	80	80	80
Heavy Vehicles, %	3	3	3	3	3	3	3	3	3
Mvmt Flow	59	534	18	11	574	6	16	18	15

Major/Minor	Major1	Major2	Minor1	Minor2
Conflicting Flow All	580	0	0	551
Stage 1	-	-	-	660
Stage 2	-	-	-	661
Critical Hdwy	4.13	-	-	4.13
Critical Hdwy Stg 1	-	-	-	6.13
Critical Hdwy Stg 2	-	-	-	6.13
Follow-up Hdwy	2.227	-	-	2.227
Pot Cap-1 Maneuver	989	-	-	1014
Stage 1	-	-	-	450
Stage 2	-	-	-	450
Platoon blocked, %	-	-	-	-
Mov Cap-1 Maneuver	989	-	-	1014
Mov Cap-2 Maneuver	-	-	-	89
Stage 1	-	-	-	89
Stage 2	-	-	-	411

Approach	EB	WB	NB
HCM Control Delay, s	0.9	0.2	40.1
HCM LOS	E	E	E

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	150	989	-	-	1014	-	-	360
HCM Lane V/C Ratio	0.325	0.059	-	-	0.011	-	-	0.347
HCM Control Delay (s)	40.1	8.9	0	-	8.6	0	-	20.2
HCM Lane LOS	E	A	A	-	A	A	-	C
HCM 95th %tile Q(veh)	1.3	0.2	-	-	0	-	-	1.5

HCM 2010 TWSC
29: Strathmore Dr/Lowrys Ln & Conestoga Rd

9/17/2014

Intersection			
Int Delay, s/veh			

Movement	SBL	SBT	SBR
Vol, veh/h	2	15	83
Conflicting Peds, #/hr	0	0	0
Sign Control	Stop	Stop	Stop
RT Channelized	-	-	None
Storage Length	-	-	-
Veh in Median Storage, #	-	0	-
Grade, %	-	0	-
Peak Hour Factor	80	80	80
Heavy Vehicles, %	3	3	3
Mvmt Flow	2	19	104

Major/Minor	Minor2	Minor3	Minor4
Conflicting Flow All	1275	1268	577
Stage 1	599	599	-
Stage 2	676	669	-
Critical Hdwy	7.13	6.53	6.23
Critical Hdwy Stg 1	6.13	5.53	-
Critical Hdwy Stg 2	6.13	5.53	-
Follow-up Hdwy	3.527	4.027	3.327
Pot Cap-1 Maneuver	143	168	514
Stage 1	487	489	-
Stage 2	441	454	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	117	151	514
Mov Cap-2 Maneuver	117	151	-
Stage 1	445	481	-
Stage 2	376	415	-

Approach	SB
HCM Control Delay, s	20.2
HCM LOS	C

Minor Lane/Major Mvmt

HCM 2010 TWSC
38: County Line Rd & N Ithan Ave

9/17/2014

Intersection						
Int Delay, s/veh	28.2					
Movement	NBT	NBR	SBL	SBT	SWL	SWR
Vol, veh/h	347	111	169	301	156	102
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Stop	Stop	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	91	91	91	91	91	91
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	381	122	186	331	171	112
Major/Minor	Major1	Minor2	Minor1			
Conflicting Flow All	0	0	498	503	607	442
Stage 1	-	-	0	0	442	-
Stage 2	-	-	498	503	165	-
Critical Hdwy	-	-	6.42	6.52	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	5.42	5.52	-	-
Follow-up Hdwy	-	-	3.518	4.018	3.518	3.318
Pot Cap-1 Maneuver	-	-	532	471	460	615
Stage 1	-	-	-	-	648	-
Stage 2	-	-	611	541	-	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	532	0	460	615
Mov Cap-2 Maneuver	-	-	532	0	460	-
Stage 1	-	-	-	0	648	-
Stage 2	-	-	611	0	-	-
Approach	NB	SB	SW			
HCM Control Delay, s	0	60	20.5			
HCM LOS		F	C			
Minor Lane/Major Mvmt	NBT	NBR	SBLn1	SWLn1		
Capacity (veh/h)	-	-	532	511		
HCM Lane V/C Ratio	-	-	0.971	0.555		
HCM Control Delay (s)	-	-	60	20.5		
HCM Lane LOS	-	-	F	C		
HCM 95th %tile Q(veh)	-	-	13	3.3		

HCM 2010 TWSC
43: County Line Rd & Roberts Rd

9/17/2014

Intersection										
Int Delay, s/veh	29.3									
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	
Vol, veh/h	68	101	8	2	24	6	14	624	25	
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	
RT Channelized	-	-	None	-	-	None	-	-	None	
Storage Length	-	-	-	-	-	-	-	-	-	
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	
Grade, %	-	0	-	-	0	-	-	0	-	
Peak Hour Factor	88	88	88	88	88	88	88	88	88	
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	
Mvmt Flow	77	115	9	2	27	7	16	709	28	
Major/Minor	Minor2	Minor1	Major1							
Conflicting Flow All	982	1351	293	1102	1358	369	585	0	0	
Stage 1	582	582	-	755	755	-	-	-	-	
Stage 2	400	769	-	347	603	-	-	-	-	
Critical Hdwy	7.54	6.54	6.94	7.54	6.54	6.94	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	-	-	
Pot Cap-1 Maneuver	203	149	703	166	148	628	986	-	-	
Stage 1	466	497	-	367	415	-	-	-	-	
Stage 2	597	409	-	642	487	-	-	-	-	
Platoon blocked, %	-	-	-	-	-	-	-	-	-	
Mov Cap-1 Maneuver	166	143	703	53	142	628	986	-	-	
Mov Cap-2 Maneuver	166	143	-	53	142	-	-	-	-	
Stage 1	453	489	-	357	403	-	-	-	-	
Stage 2	535	398	-	477	479	-	-	-	-	
Approach	EB	WB	NB							
HCM Control Delay, s	222.4	37.1	0.3							
HCM LOS	F	E								
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR		
Capacity (veh/h)	986	-	-	157	148	864	-	-		
HCM Lane V/C Ratio	0.016	-	-	1.281	0.246	0.011	-	-		
HCM Control Delay (s)	8.7	0.1	-	222.4	37.1	9.2	0.1	-		
HCM Lane LOS	A	A	-	F	E	A	A	-		
HCM 95th %tile Q(veh)	0	-	-	11.9	0.9	0	-	-		

HCM 2010 TWSC
43: County Line Rd & Roberts Rd

9/17/2014

Intersection			
Int Delay, s/veh			
Movement	SBL	SBT	SBR
Vol, veh/h	8	477	38
Conflicting Peds, #/hr	0	0	0
Sign Control	Free	Free	Free
RT Channelized	-	-	None
Storage Length	-	-	-
Veh in Median Storage, #	-	0	-
Grade, %	-	0	-
Peak Hour Factor	88	88	88
Heavy Vehicles, %	2	2	2
Mvmt Flow	9	542	43
Major/Minor	Major2		
Conflicting Flow All	738	0	0
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	4.14	-	-
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	2.22	-	-
Pot Cap-1 Maneuver	864	-	-
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	864	-	-
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-
Approach	SB		
HCM Control Delay, s	0.2		
HCM LOS			
Minor Lane/Major Mvmt			

HCM 2010 TWSC
52: Airdale Rd & County Line Rd

9/17/2014

Intersection						
Int Delay, s/veh	4					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	205	222	290	20	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	233	252	330	23	17	112
Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	352	0	-	0	1059	341
Stage 1	-	-	-	-	341	-
Stage 2	-	-	-	-	718	-
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	1212	-	-	-	250	704
Stage 1	-	-	-	-	722	-
Stage 2	-	-	-	-	485	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	1212	-	-	-	194	704
Mov Cap-2 Maneuver	-	-	-	-	194	-
Stage 1	-	-	-	-	722	-
Stage 2	-	-	-	-	376	-
Approach	EB		WB		SB	
HCM Control Delay, s	4.2		0		14.1	
HCM LOS					B	
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	
Capacity (veh/h)	1212	-	-	-	523	
HCM Lane V/C Ratio	0.192	-	-	-	0.248	
HCM Control Delay (s)	8.7	0	-	-	14.1	
HCM Lane LOS	A	A	-	-	B	
HCM 95th %tile Q(veh)	0.7	-	-	-	1	

HCM 2010 TWSC
53: County Line Rd & Lowrys Ln

9/17/2014

Intersection						
Int Delay, s/veh	3.7					

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	62	81	58	239	151	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	93	67	275	174	36

Major/Minor	Minor2	Major1	Major2	Minor1
Conflicting Flow All	599	191	209	0
Stage 1	191	-	-	-
Stage 2	408	-	-	-
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	468	856	1374	-
Stage 1	846	-	-	-
Stage 2	676	-	-	-
Platoon blocked, %	-	-	-	-
Mov Cap-1 Maneuver	441	856	1374	-
Mov Cap-2 Maneuver	441	-	-	-
Stage 1	846	-	-	-
Stage 2	637	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	13.1	1.5	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1374	-	608	-	-
HCM Lane V/C Ratio	0.049	-	0.27	-	-
HCM Control Delay (s)	7.8	0	13.1	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0.2	-	1.1	-	-

HCM 2010 TWSC
61: Dwy/Aldwyn Ln & S Ithan Ave

9/17/2014

Intersection										
Int Delay, s/veh	2.1									

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR
Vol, veh/h	9	361	9	16	194	13	7	1	12
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-
Peak Hour Factor	81	81	81	81	81	81	81	81	81
Heavy Vehicles, %	4	4	4	4	4	4	4	4	4
Mvmt Flow	11	446	11	20	240	16	9	1	15

Major/Minor	Major1	Major2	Minor1	Minor2
Conflicting Flow All	256	0	0	457
Stage 1	-	-	-	798
Stage 2	-	-	-	768
Critical Hdwy	4.14	-	-	4.14
Critical Hdwy Stg 1	-	-	-	7.14
Critical Hdwy Stg 2	-	-	-	6.54
Follow-up Hdwy	2.236	-	-	2.236
Pot Cap-1 Maneuver	1297	-	-	1093
Stage 1	-	-	-	302
Stage 2	-	-	-	330
Platoon blocked, %	-	-	-	568
Mov Cap-1 Maneuver	1297	-	-	1093
Mov Cap-2 Maneuver	-	-	-	266
Stage 1	-	-	-	320
Stage 2	-	-	-	604

Approach	EB	WB	NB
HCM Control Delay, s	0.2	0.6	14.4
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	406	1297	-	-	1093	-	-	588
HCM Lane V/C Ratio	0.061	0.009	-	-	0.018	-	-	0.162
HCM Control Delay (s)	14.4	7.8	0	-	8.4	0	-	12.3
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			
Movement	SBL	SBT	SBR
Vol, veh/h	16	0	61
Conflicting Peds, #/hr	0	0	0
Sign Control	Stop	Stop	Stop
RT Channelized	-	-	None
Storage Length	-	-	-
Veh in Median Storage, #	-	0	-
Grade, %	-	0	-
Peak Hour Factor	81	81	81
Heavy Vehicles, %	4	4	4
Mvmt Flow	20	0	75
Major/Minor	Minor2		
Conflicting Flow All	768	766	248
Stage 1	287	287	-
Stage 2	481	479	-
Critical Hdwy	7.14	6.54	6.24
Critical Hdwy Stg 1	6.14	5.54	-
Critical Hdwy Stg 2	6.14	5.54	-
Follow-up Hdwy	3.536	4.036	3.336
Pot Cap-1 Maneuver	316	331	786
Stage 1	716	671	-
Stage 2	562	552	-
Platoon blocked, %			
Mov Cap-1 Maneuver	300	320	786
Mov Cap-2 Maneuver	300	320	-
Stage 1	708	657	-
Stage 2	541	546	-
Approach	SB		
HCM Control Delay, s	12.3		
HCM LOS	B		
Minor Lane/Major Mvmt			

HCM research expects at least one 'Stop' controlled approach at the intersection.

HCM 2010 TWSC
76: S Ithan Ave & Dwy

9/17/2014

Intersection						
Int Delay, s/veh	0.1					

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	0	404	153	0	1	3
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	1	-1	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	439	166	0	1	3

Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	166	0	605
Stage 1	-	-	166
Stage 2	-	-	439
Critical Hdwy	4.12	-	6.42
Critical Hdwy Stg 1	-	-	5.42
Critical Hdwy Stg 2	-	-	5.42
Follow-up Hdwy	2.218	-	3.518
Pot Cap-1 Maneuver	1412	-	461
Stage 1	-	-	863
Stage 2	-	-	650
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	1412	-	461
Mov Cap-2 Maneuver	-	-	461
Stage 1	-	-	863
Stage 2	-	-	650

Approach	EB	WB	SB
HCM Control Delay, s	0	0	10.1
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1412	-	-	-	716
HCM Lane V/C Ratio	-	-	-	-	0.006
HCM Control Delay (s)	0	-	-	-	10.1
HCM Lane LOS	A	-	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0

HCM 2010 TWSC
78: Dwy & S Ithan Ave

9/17/2014

Intersection						
Int Delay, s/veh	0					

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	338	0	0	393	1	2
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	1	-	-	-1	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	367	0	0	427	1	2

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	794
Stage 1	-	-	367
Stage 2	-	-	427
Critical Hdwy	-	4.12	6.42
Critical Hdwy Stg 1	-	-	5.42
Critical Hdwy Stg 2	-	-	5.42
Follow-up Hdwy	-	2.218	3.518
Pot Cap-1 Maneuver	-	1192	357
Stage 1	-	-	701
Stage 2	-	-	658
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	1192	357
Mov Cap-2 Maneuver	-	-	357
Stage 1	-	-	701
Stage 2	-	-	658

Approach	EB	WB	NB
HCM Control Delay, s	0	0	11.9
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	522	-	-	1192	-
HCM Lane V/C Ratio	0.006	-	-	-	-
HCM Control Delay (s)	11.9	-	-	0	-
HCM Lane LOS	B	-	-	A	-
HCM 95th %tile Q(veh)	0	-	-	0	-

HCM 2010 TWSC
79: Garrett Rd & Lancaster Ave

9/17/2014

Intersection	
Int Delay, s/veh	3.9

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	1100	25	20	1131	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	1642	37	30	1688	0	39

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	2564
Stage 1	-	-	1660
Stage 2	-	-	904
Critical Hdwy	-	4.1	6.8
Critical Hdwy Stg 1	-	-	5.8
Critical Hdwy Stg 2	-	-	5.8
Follow-up Hdwy	-	2.2	3.5
Pot Cap-1 Maneuver	-	387	22
Stage 1	-	-	143
Stage 2	-	-	360
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	387	22
Mov Cap-2 Maneuver	-	-	22
Stage 1	-	-	143
Stage 2	-	-	360

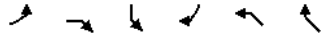
Approach	EB	WB	NB
HCM Control Delay, s	0	7.4	18.1
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	313	-	-	387	-
HCM Lane V/C Ratio	0.124	-	-	0.077	-
HCM Control Delay (s)	18.1	-	-	15.1	7.3
HCM Lane LOS	C	-	-	C	A
HCM 95th %tile Q(veh)	0.4	-	-	0.2	-

Lanes, Volumes, Timings

2: County Line Rd & N Ithan Ave

9/17/2014



Lane Group	EBL	EBR	SBL	SBR	NWL	NWR
Lane Configurations	W		W		W	
Volume (vph)	205	15	142	337	38	257
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)	218	16	151	359	40	273
Shared Lane Traffic (%)						
Lane Group Flow (vph)	234	0	510	0	313	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	68.9%
ICU Level of Service	C
Analysis Period (min)	15

Lanes, Volumes, Timings

38: County Line Rd & N Ithaca Ave

9/17/2014

	↑	↖	↗	↓	↙	↘
Lane Group	NBT	NBR	SBL	SBT	SWL	SWR
Lane Configurations	↑			↖	↘	
Volume (vph)	347	111	169	301	156	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)	381	122	186	331	171	112
Shared Lane Traffic (%)						
Lane Group Flow (vph)	503	0	0	517	283	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	75.1%		ICU Level of Service D			
Analysis Period (min)	15					

HCM 2010 Signalized Intersection Summary
3: County Line Rd & Spring Mill Rd

9/17/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		+			+			+			+	
Volume (veh/h)	35	282	51	63	267	78	41	256	45	33	301	53
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Ob), 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	180.0	164.3	180.0	180.0	173.1	180.0	180.0	173.1	180.0	180.0	173.1	180.0
Adj Flow Rate, veh/h	37	297	54	66	281	82	43	269	47	35	317	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	108	595	102	148	529	142	104	357	58	94	384	65
Arrive On Green	0.47	0.47	0.47	0.47	0.47	0.47	0.29	0.29	0.29	0.29	0.29	0.29
Sat Flow, veh/h	74	1261	216	150	1120	300	103	1245	203	75	1338	225
Grp Volume(v), veh/h	388	0	0	429	0	0	359	0	0	408	0	0
Grp Sat Flow(s),veh/h/ln	1550	0	0	1570	0	0	1551	0	0	1637	0	0
Q Serve(g_s), s	0.0	0.0	0.0	0.8	0.0	0.0	0.0	0.0	0.0	1.2	0.0	0.0
Cycle Q Clear(g_c), s	9.1	0.0	0.0	9.9	0.0	0.0	11.5	0.0	0.0	12.7	0.0	0.0
Prop In Lane	0.10		0.14	0.15		0.19	0.12		0.13	0.09		0.14
Lane Grp Cap(c), veh/h	805	0	0	818	0	0	520	0	0	542	0	0
V/C Ratio(X)	0.48	0.00	0.00	0.52	0.00	0.00	0.69	0.00	0.00	0.75	0.00	0.00
Avail Cap(c_a), veh/h	805	0	0	818	0	0	750	0	0	779	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	9.9	0.0	0.0	10.1	0.0	0.0	17.6	0.0	0.0	18.2	0.0	0.0
Incr Delay (d2), s/veh	1.1	0.0	0.0	2.4	0.0	0.0	0.6	0.0	0.0	1.2	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(50%),veh/ln	4.2	0.0	0.0	5.1	0.0	0.0	5.0	0.0	0.0	5.9	0.0	0.0
LnGrp Delay(d),s/veh	11.0	0.0	0.0	12.5	0.0	0.0	18.2	0.0	0.0	19.4	0.0	0.0
LnGrp LOS	B			B			B			B		
Approach Vol, veh/h	388			429			359			408		
Approach Delay, s/veh	11.0			12.5			18.2			19.4		
Approach LOS	B			B			B			B		
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	2		4		6		8					
Phs Duration (G+Y+Rc), s	40.0		22.0		40.0		22.0					
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	11.1		14.7		11.9		13.5					
Green Ext Time (p_c), s	3.1		1.3		3.1		1.4					
Intersection Summary												
HCM 2010 Ctrl Delay	15.2											
HCM 2010 LOS	B											

HCM 2010 Signalized Intersection Summary
7: Sproul Rd/Spring Mill Rd & Aldwyn Ln/Kenilworth Rd & Lancaster Ave

9/17/2014

HCM 2010 methodology does not support more than 4 approaches.

HCM 2010 Signalized Intersection Summary
11: Chapel Dr & Lancaster Ave

9/17/2014

	→	↘	↙	←	↖	↗		
Movement	EBT	EBR	WBL	WBT	NBL	NBR		
Lane Configurations	↑↑	↑	↘	↑↑	↘	↑		
Volume (veh/h)	1004	33	30	995	14	4		
Number	2	12	1	6	3	18		
Initial Q (Ob), veh	0	0	0	0	0	0		
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00		
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00		
Adj Sat Flow, veh/h/ln	176.5	176.5	176.5	176.5	176.5	176.5		
Adj Flow Rate, veh/h	1091	36	33	1082	15	4		
Adj No. of Lanes	2	1	1	2	1	1		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92		
Percent Heavy Veh, %	2	2	2	2	2	2		
Cap, veh/h	2355	1054	469	2355	10	9		
Arrive On Green	0.70	0.70	0.70	0.70	0.01	0.01		
Sat Flow, veh/h	3441	1500	498	3441	1681	1500		
Grp Volume(v), veh/h	1091	36	33	1082	15	4		
Grp Sat Flow(s),veh/h/ln	1676	1500	498	1676	1681	1500		
Q Serve(g_s), s	5.4	0.3	1.2	5.3	0.2	0.1		
Cycle Q Clear(g_c), s	5.4	0.3	6.6	5.3	0.2	0.1		
Prop In Lane		1.00	1.00		1.00	1.00		
Lane Grp Cap(c), veh/h	2355	1054	469	2355	10	9		
V/C Ratio(X)	0.46	0.03	0.07	0.46	1.52	0.45		
Avail Cap(c_a), veh/h	2355	1054	469	2355	1002	895		
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00		
Upstream Filter(l)	1.00	1.00	0.52	0.52	1.00	1.00		
Uniform Delay (d), s/veh	2.5	1.7	3.9	2.5	18.8	18.7		
Incr Delay (d2), s/veh	0.7	0.1	0.2	0.3	316.8	32.2		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	53.1	0.0		
%ile BackOfQ(50%),veh/ln	2.6	0.1	0.2	2.5	1.0	0.1		
LnGrp Delay(d),s/veh	3.1	1.8	4.1	2.8	388.6	50.9		
LnGrp LOS	A	A	A	A	F	D		
Approach Vol, veh/h	1127			1115	19			
Approach Delay, s/veh	3.1			2.8	317.5			
Approach LOS	A			A	F			
Timer	1	2	3	4	5	6	7	8
Assigned Phs		2				6		8
Phs Duration (G+Y+Rc), s		54.3				54.3		5.7
Change Period (Y+Rc), s		5.0				5.0		5.0
Max Green Setting (Gmax), s		27.0				27.0		23.0
Max Q Clear Time (g_c+I1), s		7.4				8.6		2.2
Green Ext Time (p_c), s		11.0				10.6		0.0
Intersection Summary								
HCM 2010 Ctrl Delay				5.6				
HCM 2010 LOS				A				

Projected 23 am 9/15/2014 Baseline

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HCM 2010 Signalized Intersection Summary
16: Sproul Rd & Conestoga Rd

9/17/2014

	↘	→	↙	↖	←	↗	↘	↙	↖	↗	↘	↙	↖	↗
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR		
Lane Configurations	↘	↘	↘	↘	↘	↘	↘	↘	↘	↘	↘	↘		
Volume (veh/h)	150	551	139	36	609	58	215	269	28	57	201	75		
Number	7	4	14	3	8	18	1	6	16	5	2	12		
Initial Q (Ob), 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	174.8	174.8	180.0	179.1	179.1	184.5	173.9	173.9	179.1	180.9	175.6	180.9		
Adj Flow Rate, veh/h	165	605	0	40	669	0	236	296	31	63	221	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	187	874	0	274	677	0	200	576	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	824	1791	0	1656	1548	162	201	1008	349		
Grp Volume(v), veh/h	165	605	0	40	669	0	236	0	327	366	0	0		
Grp Sat Flow(s),veh/h/ln	1664	1748	0	824	1791	0	1656	0	1710	1557	0	0		
Q Serve(g_s), s	5.3	23.8	0.0	3.5	33.4	0.0	6.5	0.0	13.4	16.2	0.0	0.0		
Cycle Q Clear(g_c), s	5.3	23.8	0.0	16.3	33.4	0.0	6.5	0.0	13.4	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	187	874	0	274	677	0	200	0	637	410	0	0		
V/C Ratio(X)	0.88	0.69	0.00	0.15	0.99	0.00	1.18	0.00	0.51	0.89	0.00	0.00		
Avail Cap(c_a), veh/h	187	874	0	274	677	0	200	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(l)	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	17.2	0.0	27.7	27.8	0.0	29.3	0.0	21.9	34.4	0.0	0.0		
Incr Delay (d2), s/veh	35.4	4.5	0.0	1.1	31.9	0.0	121.5	0.0	0.7	21.0	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(50%),veh/ln	4.2	12.5	0.0	0.9	22.4	0.0	6.7	0.0	6.4	11.4	0.0	0.0		
LnGrp Delay(d),s/veh	57.1	21.7	0.0	28.8	59.7	0.0	150.8	0.0	22.6	55.4	0.0	0.0		
LnGrp LOS	E	C		C	E		F		C	E				
Approach Vol, veh/h		770			709			563				366		
Approach Delay, s/veh		29.3			58.0			76.4				55.4		
Approach LOS		C			E			E				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		25.8		15.4	7.3	35.4						
Green Ext Time (p_c), s	0.0	0.0		8.5		2.4	0.0	0.0						
Intersection Summary														
HCM 2010 Ctrl Delay				52.7										
HCM 2010 LOS				D										

Projected 23 am 9/15/2014 Baseline

Synchro 8 Report
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HCM 2010 Signalized Intersection Summary
25: S Ithan Ave & Conestoga Rd

9/17/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Volume (veh/h)	161	393	2	2	455	121	14	151	12	63	53	144
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Ob), 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	185.4	178.3	185.4	176.4	169.6	176.4	176.3	169.5	176.3	184.4	177.3	184.4
Adj Flow Rate, veh/h	199	485	2	2	562	149	17	186	15	78	65	178
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	197	392	1	60	715	189	77	348	27	138	94	197
Arrive On Green	0.55	0.55	0.55	0.55	0.55	0.55	0.24	0.24	0.24	0.24	0.24	0.24
Sat Flow, veh/h	219	713	3	1	1300	344	55	1470	113	274	396	834
Grp Volume(v), veh/h	686	0	0	713	0	0	218	0	0	321	0	0
Grp Sat Flow(s),veh/h/ln	935	0	0	1644	0	0	1637	0	0	1503	0	0
Q Serve(g_s), s	12.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.6	0.0	0.0
Cycle Q Clear(g_c), s	33.5	0.0	0.0	21.2	0.0	0.0	7.0	0.0	0.0	12.5	0.0	0.0
Prop In Lane	0.29		0.00	0.00		0.21	0.08		0.07	0.24		0.55
Lane Grp Cap(c), veh/h	591	0	0	963	0	0	451	0	0	429	0	0
V/C Ratio(X)	1.16	0.00	0.00	0.74	0.00	0.00	0.48	0.00	0.00	0.75	0.00	0.00
Avail Cap(c_a), veh/h	591	0	0	963	0	0	480	0	0	455	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	16.7	0.0	0.0	10.9	0.0	0.0	20.4	0.0	0.0	22.4	0.0	0.0
Incr Delay (d2), s/veh	90.4	0.0	0.0	3.1	0.0	0.0	0.8	0.0	0.0	6.3	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(50%),veh/ln	24.7	0.0	0.0	10.1	0.0	0.0	3.3	0.0	0.0	5.9	0.0	0.0
LnGrp Delay(d),s/veh	107.1	0.0	0.0	14.0	0.0	0.0	21.2	0.0	0.0	28.7	0.0	0.0
LnGrp LOS	F			B			C			C		
Approach Vol, veh/h		686			713			218			321	
Approach Delay, s/veh		107.1			14.0			21.2			28.7	
Approach LOS		F			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		20.9		40.0		20.9				
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		23.2		9.0		35.5		14.5				
Green Ext Time (p_c), s		5.2		1.3		0.0		0.4				
Intersection Summary												
HCM 2010 Ctrl Delay				50.2								
HCM 2010 LOS				D								

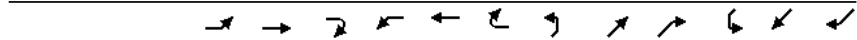
HCM 2010 Signalized Intersection Summary
27: S Ithan Ave/N Ithan Ave & Lancaster Ave

9/17/2014

HCM 2010 methodology does not support exclusive ped or hold phases.

HCM 2010 Signalized Intersection Summary
33: Williams Rd/Garrett Ave & Conestoga Rd

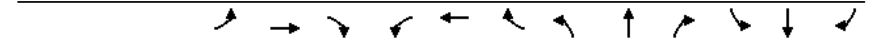
9/17/2014



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↕			↕			↕				↕
Volume (veh/h)	25	443	1	4	414	4	6	6	9	15	3	38
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Ob), 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	187.2	187.2	187.2	187.2	187.2	187.2	180.0	180.0	180.0	172.8	172.8	172.8
Adj Flow Rate, veh/h	28	503	1	5	470	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	90	1338	3	58	1381	15	88	35	38	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	44	1783	3	4	1841	19	337	658	711	325	147	1015
Grp Volume(v), veh/h	532	0	0	480	0	0	24	0	0	63	0	0
Grp Sat Flow(s), veh/h/ln	1831	0	0	1865	0	0	1706	0	0	1487	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	5.7	0.0	0.0	0.9	0.0	0.0	2.7	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	1431	0	0	1454	0	0	161	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	1431	0	0	1454	0	0	302	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(50%),veh/ln	3.5	0.0	0.0	3.0	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			480			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		7.7		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
51: Lowrys Ln & Lancaster Ave

9/17/2014



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕				↕
Volume (veh/h)	19	1063	18	16	1156	23	47	105	39	22	72	20
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Ob), 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	180.0	174.8	180.0	177.3	172.1	177.3	190.0	184.5	190.0	188.1	182.7	188.1
Adj Flow Rate, veh/h	20	1143	19	17	1243	25	51	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	79	2032	33	75	2009	40	126	158	52	105	184	46
Arrive On Green	0.64	0.64	0.64	0.64	0.64	0.64	0.15	0.15	0.15	0.15	0.15	0.15
Sat Flow, veh/h	19	3199	53	14	3163	63	306	1054	348	187	1225	308
Grp Volume(v), veh/h	612	0	570	669	0	616	206	0	0	123	0	0
Grp Sat Flow(s), veh/h/ln	1690	0	1581	1685	0	1555	1708	0	0	1720	0	0
Q Serve(g_s), s	0.0	0.0	11.5	0.0	0.0	13.4	2.9	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	11.0	0.0	11.5	13.0	0.0	13.4	6.4	0.0	0.0	3.5	0.0	0.0
Prop In Lane	0.03		0.03	0.03		0.04	0.25		0.20	0.20		0.18
Lane Grp Cap(c), veh/h	1140	0	1004	1136	0	988	337	0	0	335	0	0
V/C Ratio(X)	0.54	0.00	0.57	0.59	0.00	0.62	0.61	0.00	0.00	0.37	0.00	0.00
Avail Cap(c_a), veh/h	1140	0	1004	1136	0	988	457	0	0	455	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	0.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	5.7	0.0	5.8	6.1	0.0	6.2	22.8	0.0	0.0	21.7	0.0	0.0
Incr Delay (d2), s/veh	1.8	0.0	2.3	2.2	0.0	3.0	1.8	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(50%),veh/ln	5.7	0.0	5.6	6.7	0.0	6.5	3.2	0.0	0.0	1.8	0.0	0.0
LnGrp Delay(d),s/veh	7.5	0.0	8.1	8.3	0.0	9.1	24.7	0.0	0.0	22.4	0.0	0.0
LnGrp LOS	A		A	A		A	C			C		
Approach Vol, veh/h		1182			1285			206				123
Approach Delay, s/veh		7.8			8.7			24.7				22.4
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		46.1		13.9		46.1		13.9				
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		13.5		5.5		15.4		8.4				
Green Ext Time (p_c), s		12.1		0.7		11.5		0.5				
Intersection Summary												
HCM 2010 Ctrl Delay		10.1										
HCM 2010 LOS		B										
Notes												
User approved pedestrian interval to be less than phase max green.												

Lanes, Volumes, Timings

7: Sproul Rd/Spring Mill Rd & Aldwyn Ln/Kenilworth Rd & Lancaster Ave

9/17/2014



Lane Group	EBL2	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR	WBR2	NBL2	NBL
Lane Configurations		↔	↕	↔	↕		↔	↕	↔	↕		↔
Volume (vph)	2	226	893	84	221	4	11	979	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			0.987		0.850			0.998				
Flt Protected		0.950					0.950					
Satd. Flow (prot)	0	1497	3061	0	1531	0	1645	3283	0	0	0	0
Flt Permitted		0.075					0.256					
Satd. Flow (perm)	0	118	3061	0	1531	0	443	3283	0	0	0	0
Right Turn on Red					Yes				Yes			
Satd. Flow (RTOR)					192			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	235	930	88	230	4	11	1020	1	14	3	51
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	237	1018	0	230	0	15	1035	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

Projected 23 am 9/15/2014 Baseline

Synchro 8 Report Page 1

Lanes, Volumes, Timings

7: Sproul Rd/Spring Mill Rd & Aldwyn Ln/Kenilworth Rd & Lancaster Ave

9/17/2014



Lane Group	NBT	NBR	SBT	SBR	SBR2	NEL2	NEL	NET	NER	NER2	SWL2	SWL
Lane Configurations	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕	↕
Volume (vph)	0	8	1	3	12	183	0	195	50	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						0.182					0.596
Satd. Flow (perm)	1161	0	1418	0	0	0	307	1575	0	0	0	987
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	191	0	203	52	9	21	8
Shared Lane Traffic (%)												
Lane Group Flow (vph)	62	0	16	0	0	0	191	264	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

Projected 23 am 9/15/2014 Baseline

Synchro 8 Report Page 2

Lanes, Volumes, Timings

7: Sproul Rd/Spring Mill Rd & Aldwyn Ln/Kenilworth Rd & Lancaster Ave

9/17/2014



Lane Group	SWT	SWR
Lane Configurations		
Volume (vph)	135	156
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)	141	162
Shared Lane Traffic (%)		
Lane Group Flow (vph)	303	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	

Projected 23 am 9/15/2014 Baseline

Synchro 8 Report
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Lanes, Volumes, Timings

7: Sproul Rd/Spring Mill Rd & Aldwyn Ln/Kenilworth Rd & Lancaster Ave

9/17/2014



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		1.06	0.71		0.28		0.11	1.03				
Control Delay		120.5	36.1		6.3		43.2	87.1				
Queue Delay		0.0	0.0		0.0		0.0	0.0				
Total Delay		120.5	36.1		6.3		43.2	87.1				
LOS		F	D		A		D	F				
Approach Delay			44.9					86.5				
Approach LOS			D					F				
Queue Length 50th (ft)			-198		387		19	10		522		
Queue Length 95th (ft)			#425		547		77	34		#777		
Internal Link Dist (ft)			497					823				
Turn Bay Length (ft)			300					75				
Base Capacity (vph)		223	1440		822		135	1005				
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		1.06	0.71		0.28		0.11	1.03				

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:	70.5
Intersection LOS:	E
Intersection Capacity Utilization:	108.0%
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.

Projected 23 am 9/15/2014 Baseline

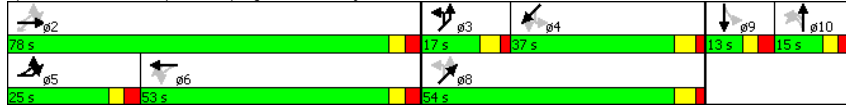
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Lanes, Volumes, Timings

7: Sproul Rd/Spring Mill Rd & Aldwyn Ln/Kenilworth Rd & Lancaster Ave

9/17/2014

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

9/17/2014



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	0.95		0.29				1.03	0.54				0.15
Control Delay	170.3		86.1				118.6	49.0				54.6
Queue Delay	0.0		0.0				0.0	0.0				0.0
Total Delay	170.3		86.1				118.6	49.0				54.6
LOS	F		F				F	D				D
Approach Delay	170.3		86.1					78.2				
Approach LOS	F		F					E				
Queue Length 50th (ft)	60		15				141	206				23
Queue Length 95th (ft)	#174		44				#313	335				59
Internal Link Dist (ft)	412		517					1256				
Turn Bay Length (ft)							200					150
Base Capacity (vph)	65		60				185	492				198
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				1.03	0.54				0.15

Intersection Summary

Lanes, Volumes, Timings

7: Sproul Rd/Spring Mill Rd & Aldwyn Ln/Kenilworth Rd & Lancaster Ave

9/17/2014



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	0.99	
Control Delay	109.0	
Queue Delay	0.0	
Total Delay	109.0	
LOS	F	
Approach Delay	104.3	
Approach LOS	F	
Queue Length 50th (ft)	290	
Queue Length 95th (ft)	#541	
Internal Link Dist (ft)	3088	
Turn Bay Length (ft)		
Base Capacity (vph)	306	
Starvation Cap Reductn	0	
Spillback Cap Reductn	0	
Storage Cap Reductn	0	
Reduced v/c Ratio	0.99	
Intersection Summary		

Lanes, Volumes, Timings
11: Chapel Dr & Lancaster Ave

9/17/2014

	→	↘	↙	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑	↘	↙	↖	↗
Volume (vph)	1004	33	30	995	14	4
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width (ft)	11	11	11	11	12	12
Storage Length (ft)		125	100		0	0
Storage Lanes		1	1		1	1
Taper Length (ft)			25		25	
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	1.00
Frt		0.850				0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	3241	1450	1621	3241	1676	1500
Flt Permitted			0.261		0.950	
Satd. Flow (perm)	3241	1450	445	3241	1676	1500
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		36				4
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)	1091	36	33	1082	15	4
Shared Lane Traffic (%)						
Lane Group Flow (vph)	1091	36	33	1082	15	4
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	11			11	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	1	1
Detector Template	Thru	Right	Left	Thru	Left	Right
Leading Detector (ft)	37	20	20	37	37	20
Trailing Detector (ft)	-3	0	0	-3	-3	0
Detector 1 Position(ft)	-3	0	0	-3	-3	0
Detector 1 Size(ft)	40	20	20	40	40	20
Detector 1 Type	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+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	NA	Perm	Perm	NA	Prot	Perm
Protected Phases	2			6	8	
Permitted Phases		2	6			8
Detector Phase	2	2	6	6	8	8
Switch Phase						
Minimum Initial (s)	10.0	10.0	10.0	10.0	4.0	4.0
Minimum Split (s)	21.0	21.0	21.0	21.0	28.0	28.0
Total Split (s)	32.0	32.0	32.0	32.0	28.0	28.0

Projected 23 am 9/15/2014 Baseline

Synchro 8 Report
Page 1

Lanes, Volumes, Timings
11: Chapel Dr & Lancaster Ave

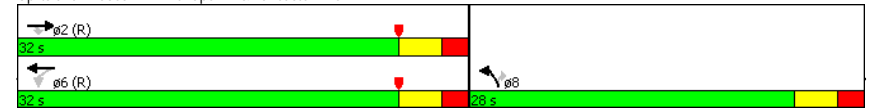
9/17/2014

	→	↘	↙	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Total Split (%)	53.3%	53.3%	53.3%	53.3%	46.7%	46.7%
Maximum Green (s)	27.0	27.0	27.0	27.0	23.0	23.0
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	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
Total Lost Time (s)	5.5	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	3.0
Recall Mode	C-Max	C-Max	C-Max	C-Max	None	None
Walk Time (s)	10.0	10.0	10.0	10.0	7.0	7.0
Flash Dont Walk (s)	0.0	0.0	0.0	0.0	16.0	16.0
Pedestrian Calls (#/hr)	0	0	0	0	0	0
Act Effect Green (s)	56.4	56.4	56.4	56.4	5.8	5.8
Actuated g/C Ratio	0.94	0.94	0.94	0.94	0.10	0.10
v/c Ratio	0.36	0.03	0.08	0.35	0.09	0.03
Control Delay	1.6	0.8	2.8	2.9	25.6	17.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	1.6	0.8	2.8	2.9	25.6	17.0
LOS	A	A	A	A	C	B
Approach Delay	1.5			2.9	23.8	
Approach LOS	A			A	C	
Queue Length 50th (ft)	0	0	0	0	5	0
Queue Length 95th (ft)	102	6	m11	318	20	7
Internal Link Dist (ft)	626			1205	239	
Turn Bay Length (ft)		125	100			
Base Capacity (vph)	3048	1366	418	3048	628	565
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	0.36	0.03	0.08	0.35	0.02	0.01

Intersection Summary

Area Type: Other
 Cycle Length: 60
 Actuated Cycle Length: 60
 Offset: 55 (92%), Referenced to phase 2:EBT and 6:WBL. Start of Yellow
 Natural Cycle: 60
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.36
 Intersection Signal Delay: 2.4 Intersection LOS: A
 Intersection Capacity Utilization 41.8% 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



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Lanes, Volumes, Timings
11: Chapel Dr & Lancaster Ave

9/17/2014

	→	↘	↙	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑	↘	↙	↖	↗
Volume (vph)	1004	33	30	995	14	4
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width (ft)	11	11	11	11	12	12
Storage Length (ft)		125	100		0	0
Storage Lanes		1	1		1	1
Taper Length (ft)			25		25	
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	1.00
Frt		0.850				0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	3241	1450	1621	3241	1676	1500
Flt Permitted			0.261		0.950	
Satd. Flow (perm)	3241	1450	445	3241	1676	1500
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		36				4
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)	1091	36	33	1082	15	4
Shared Lane Traffic (%)						
Lane Group Flow (vph)	1091	36	33	1082	15	4
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	11			11	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	1	1
Detector Template	Thru	Right	Left	Thru	Left	Right
Leading Detector (ft)	37	20	20	37	37	20
Trailing Detector (ft)	-3	0	0	-3	-3	0
Detector 1 Position(ft)	-3	0	0	-3	-3	0
Detector 1 Size(ft)	40	20	20	40	40	20
Detector 1 Type	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+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	NA	Perm	Perm	NA	Prot	Perm
Protected Phases	2			6	8	
Permitted Phases		2	6			8
Detector Phase	2	2	6	6	8	8
Switch Phase						
Minimum Initial (s)	10.0	10.0	10.0	10.0	4.0	4.0
Minimum Split (s)	21.0	21.0	21.0	21.0	28.0	28.0
Total Split (s)	32.0	32.0	32.0	32.0	28.0	28.0

Projected 23 am 9/15/2014 Baseline

Synchro 8 Report
Page 1

Lanes, Volumes, Timings
11: Chapel Dr & Lancaster Ave

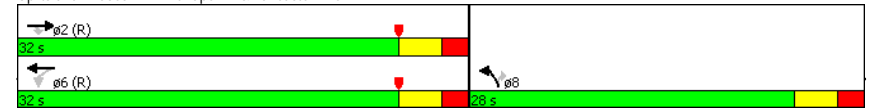
9/17/2014

	→	↘	↙	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Total Split (%)	53.3%	53.3%	53.3%	53.3%	46.7%	46.7%
Maximum Green (s)	27.0	27.0	27.0	27.0	23.0	23.0
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	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
Total Lost Time (s)	5.5	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	3.0
Recall Mode	C-Max	C-Max	C-Max	C-Max	None	None
Walk Time (s)	10.0	10.0	10.0	10.0	7.0	7.0
Flash Dont Walk (s)	0.0	0.0	0.0	0.0	16.0	16.0
Pedestrian Calls (#/hr)	0	0	0	0	0	0
Act Effect Green (s)	56.4	56.4	56.4	56.4	5.8	5.8
Actuated g/C Ratio	0.94	0.94	0.94	0.94	0.10	0.10
v/c Ratio	0.36	0.03	0.08	0.35	0.09	0.03
Control Delay	1.6	0.8	2.8	2.9	25.6	17.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	1.6	0.8	2.8	2.9	25.6	17.0
LOS	A	A	A	A	C	B
Approach Delay	1.5			2.9	23.8	
Approach LOS	A			A	C	
Queue Length 50th (ft)	0	0	0	0	5	0
Queue Length 95th (ft)	102	6	m11	318	20	7
Internal Link Dist (ft)	626			1205	239	
Turn Bay Length (ft)		125	100			
Base Capacity (vph)	3048	1366	418	3048	628	565
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	0.36	0.03	0.08	0.35	0.02	0.01

Intersection Summary

Area Type: Other
 Cycle Length: 60
 Actuated Cycle Length: 60
 Offset: 55 (92%), Referenced to phase 2:EBT and 6:WBT. Start of Yellow
 Natural Cycle: 60
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.36
 Intersection Signal Delay: 2.4 Intersection LOS: A
 Intersection Capacity Utilization 41.8% 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



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Lanes, Volumes, Timings

27: S Ithan Ave/N Ithan Ave & Lancaster Ave

9/17/2014



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↕	↔	↔	↕	↔	↔	↕	↔	↔	↕	↔
Volume (vph)	97	836	75	117	879	47	95	192	75	26	121	50
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	0.988				0.992		0.958				0.956	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1520	3004	0	1497	2970	0	1512	1525	0	1520	1530	0
Flt Permitted	0.160			0.165			0.526			0.302		
Satd. Flow (perm)	256	3004	0	260	2970	0	837	1525	0	483	1530	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)	103	889	80	124	935	50	101	204	80	28	129	53
Shared Lane Traffic (%)												
Lane Group Flow (vph)	103	969	0	124	985	0	101	284	0	28	182	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		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

Projected 23 am 9/15/2014 Baseline

Synchro 8 Report
Page 1

Lanes, Volumes, Timings

27: S Ithan Ave/N Ithan Ave & Lancaster Ave

9/17/2014

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

Projected 23 am 9/15/2014 Baseline

Synchro 8 Report
Page 2

Lanes, Volumes, Timings

27: S Ithan Ave/N Ithan Ave & Lancaster Ave

9/17/2014



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)	55.8	49.4		55.9	49.4		23.8	23.8		23.8	23.8	
Actuated g/C Ratio	0.46	0.41		0.47	0.41		0.20	0.20		0.20	0.20	
v/c Ratio	0.55	0.78		0.66	0.81		0.61	0.94		0.29	0.60	
Control Delay	31.0	37.2		29.2	31.2		60.6	85.9		49.8	52.7	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	31.0	37.2		29.2	31.2		60.6	85.9		49.8	52.7	
LOS	C	D		C	C		E	F		D	D	
Approach Delay		36.6			30.9			79.3			52.3	
Approach LOS		D			C			E			D	
Queue Length 50th (ft)	44	368		54	338		71	217		19	128	
Queue Length 95th (ft)	#90	#492		m82	#502		#138	#381		49	208	
Internal Link Dist (ft)		1205			231			264			893	
Turn Bay Length (ft)	200			250			200			65		
Base Capacity (vph)	187	1235		188	1223		170	311		98	312	
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	0.55	0.78		0.66	0.81		0.59	0.91		0.29	0.58	

Intersection Summary

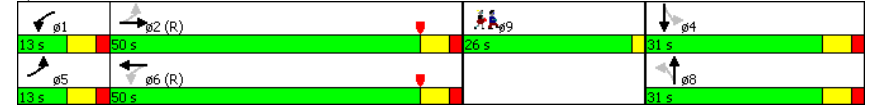
Area Type:	Other
Cycle Length:	120
Actuated Cycle Length:	120
Offset:	0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow, Master Intersection
Natural Cycle:	105
Control Type:	Actuated-Coordinated
Maximum v/c Ratio:	0.94
Intersection Signal Delay:	41.4
Intersection Capacity Utilization:	75.7%
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.

Lanes, Volumes, Timings

27: S Ithan Ave/N Ithan Ave & Lancaster Ave

9/17/2014

Splits and Phases: 27: S Ithan Ave/N Ithan Ave & Lancaster Ave



Lanes, Volumes, Timings

27: S Ithan Ave/N Ithan Ave & Lancaster Ave

9/17/2014

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 TWSC
2: County Line Rd & N Ithan Ave

9/17/2014

Intersection						
Int Delay, s/veh	0					
Movement	EBL	EBR	SBL	SBR	NWL	NWR
Vol, veh/h	209	15	142	267	30	257
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	0	-	0	-
Veh in Median Storage, #	0	-	0	-	0	-
Grade, %	0	-	0	-	0	-
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	222	16	151	284	32	273
Major/Minor	Minor2		Major2		Minor1	
Conflicting Flow All	137	0	0	-	8	0
Stage 1	0	-	-	-	0	-
Stage 2	137	-	-	-	8	-
Critical Hdwy	-	-	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	-
Pot Cap-1 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Approach	EB		SB		NW	
HCM Control Delay, s	-		0		-	
HCM LOS	-		-		-	
Minor Lane/Major Mvmt	NWLn1	EBLn1	SBL	SBR		
Capacity (veh/h)	-	-	-	-		
HCM Lane V/C Ratio	-	-	-	-		
HCM Control Delay (s)	-	-	-	-		
HCM Lane LOS	-	-	-	-		
HCM 95th %tile Q(veh)	-	-	-	-		

HCM 2010 TWSC
15: Conestoga Rd & Spring Mill Rd

9/17/2014

Intersection						
Int Delay, s/veh	0.2					
Movement	EBL	EBT	WBT	WBR	SWL	SWR
Vol, veh/h	2	633	697	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	736	810	3	5	9
Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	814	0	-	0	1553	812
Stage 1	-	-	-	-	812	-
Stage 2	-	-	-	-	741	-
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	804	-	-	-	123	376
Stage 1	-	-	-	-	433	-
Stage 2	-	-	-	-	468	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	804	-	-	-	123	376
Mov Cap-2 Maneuver	-	-	-	-	123	-
Stage 1	-	-	-	-	433	-
Stage 2	-	-	-	-	466	-
Approach	EB		WB		SW	
HCM Control Delay, s	0		0		22.2	
HCM LOS	-		-		C	
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SWLn1	
Capacity (veh/h)	804	-	-	-	223	
HCM Lane V/C Ratio	0.003	-	-	-	0.063	
HCM Control Delay (s)	9.5	0	-	-	22.2	
HCM Lane LOS	A	A	-	-	C	
HCM 95th %tile Q(veh)	0	-	-	-	0.2	

Intersection									
Int Delay, s/veh	3.7								
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR
Vol, veh/h	47	427	14	9	452	5	13	14	12
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-
Peak Hour Factor	80	80	80	80	80	80	80	80	80
Heavy Vehicles, %	3	3	3	3	3	3	3	3	3
Mvmt Flow	59	534	18	11	565	6	16	18	15
Major/Minor	Major1			Major2			Minor1		
Conflicting Flow All	571	0	0	551	0	0	1312	1254	543
Stage 1	-	-	-	-	-	-	660	660	-
Stage 2	-	-	-	-	-	-	652	594	-
Critical Hdwy	4.13	-	-	4.13	-	-	7.13	6.53	6.23
Critical Hdwy Stg 1	-	-	-	-	-	-	6.13	5.53	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.13	5.53	-
Follow-up Hdwy	2.227	-	-	2.227	-	-	3.527	4.027	3.327
Pot Cap-1 Maneuver	997	-	-	1014	-	-	135	171	538
Stage 1	-	-	-	-	-	-	450	459	-
Stage 2	-	-	-	-	-	-	455	491	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	997	-	-	1014	-	-	91	154	538
Mov Cap-2 Maneuver	-	-	-	-	-	-	91	154	-
Stage 1	-	-	-	-	-	-	411	420	-
Stage 2	-	-	-	-	-	-	345	483	-
Approach	EB			WB			NB		
HCM Control Delay, s	0.9			0.2			39.5		
HCM LOS	E			E			E		
Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	
Capacity (veh/h)	152	997	-	-	1014	-	-	364	
HCM Lane V/C Ratio	0.321	0.059	-	-	0.011	-	-	0.343	
HCM Control Delay (s)	39.5	8.8	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	

Intersection			
Int Delay, s/veh			
Movement	SBL	SBT	SBR
Vol, veh/h	2	15	83
Conflicting Peds, #/hr	0	0	0
Sign Control	Stop	Stop	Stop
RT Channelized	-	-	None
Storage Length	-	-	-
Veh in Median Storage, #	-	0	-
Grade, %	-	0	-
Peak Hour Factor	80	80	80
Heavy Vehicles, %	3	3	3
Mvmt Flow	2	19	104
Major/Minor	Minor2		
Conflicting Flow All	1267	1260	568
Stage 1	591	591	-
Stage 2	676	669	-
Critical Hdwy	7.13	6.53	6.23
Critical Hdwy Stg 1	6.13	5.53	-
Critical Hdwy Stg 2	6.13	5.53	-
Follow-up Hdwy	3.527	4.027	3.327
Pot Cap-1 Maneuver	145	170	520
Stage 1	492	493	-
Stage 2	441	454	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	119	153	520
Mov Cap-2 Maneuver	119	153	-
Stage 1	450	485	-
Stage 2	376	415	-
Approach	SB		
HCM Control Delay, s	20		
HCM LOS	C		
Minor Lane/Major Mvmt			

HCM 2010 TWSC
38: County Line Rd & N Ithan Ave

9/17/2014

Intersection						
Int Delay, s/veh	19.9					
Movement	NBT	NBR	SBL	SBT	SWL	SWR
Vol, veh/h	351	111	169	251	136	102
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Stop	Stop	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	91	91	91	91	91	91
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	386	122	186	276	149	112
Major/Minor	Major1	Minor2	Minor1			
Conflicting Flow All	0	0	503	508	585	447
Stage 1	-	-	0	0	447	-
Stage 2	-	-	503	508	138	-
Critical Hdwy	-	-	6.42	6.52	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	5.42	5.52	-	-
Follow-up Hdwy	-	-	3.518	4.018	3.518	3.318
Pot Cap-1 Maneuver	-	-	528	468	473	612
Stage 1	-	-	-	-	644	-
Stage 2	-	-	607	539	-	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	528	0	473	612
Mov Cap-2 Maneuver	-	-	528	0	473	-
Stage 1	-	-	-	0	644	-
Stage 2	-	-	607	0	-	-
Approach	NB	SB	SW			
HCM Control Delay, s	0	42.5	18.5			
HCM LOS		E	C			
Minor Lane/Major Mvmt	NBT	NBR	SBLn1	SWLn1		
Capacity (veh/h)	-	-	528	524		
HCM Lane V/C Ratio	-	-	0.874	0.499		
HCM Control Delay (s)	-	-	42.5	18.5		
HCM Lane LOS	-	-	E	C		
HCM 95th %tile Q(veh)	-	-	9.6	2.8		

HCM 2010 TWSC
43: County Line Rd & Roberts Rd

9/17/2014

Intersection										
Int Delay, s/veh	29.3									
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	
Vol, veh/h	68	101	8	2	24	6	14	624	26	
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	
RT Channelized	-	-	None	-	-	None	-	-	None	
Storage Length	-	-	-	-	-	-	-	-	-	
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	
Grade, %	-	0	-	-	0	-	-	0	-	
Peak Hour Factor	88	88	88	88	88	88	88	88	88	
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	
Mvmt Flow	77	115	9	2	27	7	16	709	30	
Major/Minor	Minor2	Minor1	Major1							
Conflicting Flow All	982	1352	293	1103	1359	369	585	0	0	
Stage 1	582	582	-	756	756	-	-	-	-	
Stage 2	400	770	-	347	603	-	-	-	-	
Critical Hdwy	7.54	6.54	6.94	7.54	6.54	6.94	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	-	-	
Pot Cap-1 Maneuver	203	149	703	166	147	628	986	-	-	
Stage 1	466	497	-	366	414	-	-	-	-	
Stage 2	597	408	-	642	487	-	-	-	-	
Platoon blocked, %	-	-	-	-	-	-	-	-	-	
Mov Cap-1 Maneuver	165	143	703	53	141	628	986	-	-	
Mov Cap-2 Maneuver	165	143	-	53	141	-	-	-	-	
Stage 1	453	489	-	356	402	-	-	-	-	
Stage 2	535	397	-	477	479	-	-	-	-	
Approach	EB	WB	NB							
HCM Control Delay, s	222.4	37.4	0.3							
HCM LOS	F	E								
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR		
Capacity (veh/h)	986	-	-	157	147	863	-	-		
HCM Lane V/C Ratio	0.016	-	-	1.281	0.247	0.011	-	-		
HCM Control Delay (s)	8.7	0.1	-	222.4	37.4	9.2	0.1	-		
HCM Lane LOS	A	A	-	F	E	A	A	-		
HCM 95th %tile Q(veh)	0	-	-	11.9	0.9	0	-	-		

HCM 2010 TWSC
43: County Line Rd & Roberts Rd

9/17/2014

Intersection			
Int Delay, s/veh			
Movement	SBL	SBT	SBR
Vol, veh/h	8	477	38
Conflicting Peds, #/hr	0	0	0
Sign Control	Free	Free	Free
RT Channelized	-	-	None
Storage Length	-	-	-
Veh in Median Storage, #	-	0	-
Grade, %	-	0	-
Peak Hour Factor	88	88	88
Heavy Vehicles, %	2	2	2
Mvmt Flow	9	542	43
Major/Minor	Major2		
Conflicting Flow All	739	0	0
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	4.14	-	-
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	2.22	-	-
Pot Cap-1 Maneuver	863	-	-
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	863	-	-
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-
Approach	SB		
HCM Control Delay, s	0.2		
HCM LOS			
Minor Lane/Major Mvmt			

HCM 2010 TWSC
52: Airdale Rd & County Line Rd

9/17/2014

Intersection						
Int Delay, s/veh	3.9					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	197	222	290	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	224	252	330	24	17	112
Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	353	0	-	0	1041	341
Stage 1	-	-	-	-	341	-
Stage 2	-	-	-	-	700	-
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	1211	-	-	-	256	704
Stage 1	-	-	-	-	722	-
Stage 2	-	-	-	-	494	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	1211	-	-	-	201	704
Mov Cap-2 Maneuver	-	-	-	-	201	-
Stage 1	-	-	-	-	722	-
Stage 2	-	-	-	-	388	-
Approach	EB		WB		SB	
HCM Control Delay, s	4.1		0		14	
HCM LOS					B	
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	
Capacity (veh/h)	1211	-	-	-	530	
HCM Lane V/C Ratio	0.185	-	-	-	0.244	
HCM Control Delay (s)	8.6	0	-	-	14	
HCM Lane LOS	A	A	-	-	B	
HCM 95th %tile Q(veh)	0.7	-	-	-	1	

HCM 2010 TWSC
53: County Line Rd & Lowrys Ln

9/17/2014

Intersection						
Int Delay, s/veh	3.8					

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	62	81	58	231	151	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	93	67	266	174	36

Major/Minor	Minor2	Major1	Major2
Conflicting Flow All	590	191	209
Stage 1	191	-	-
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	474	856	1374
Stage 1	846	-	-
Stage 2	682	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	447	856	1374
Mov Cap-2 Maneuver	447	-	-
Stage 1	846	-	-
Stage 2	643	-	-

Approach	EB	NB	SB
HCM Control Delay, s	13	1.6	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1374	-	613	-	-
HCM Lane V/C Ratio	0.049	-	0.268	-	-
HCM Control Delay (s)	7.8	0	13	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0.2	-	1.1	-	-

HCM 2010 TWSC
61: Dwy/Aldwyn Ln & S Ithan Ave

9/17/2014

Intersection										
Int Delay, s/veh	2.1									

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR
Vol, veh/h	9	342	9	16	199	13	7	1	12
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-
Peak Hour Factor	81	81	81	81	81	81	81	81	81
Heavy Vehicles, %	4	4	4	4	4	4	4	4	4
Mvmt Flow	11	422	11	20	246	16	9	1	15

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	262	0	0
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	4.14	-	4.14
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	2.236	-	2.236
Pot Cap-1 Maneuver	1291	-	-
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	1291	-	-
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0.2	0.6	14.2
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	417	1291	-	-	1116	-	-	592
HCM Lane V/C Ratio	0.059	0.009	-	-	0.018	-	-	0.161
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	-	-	0.6

HCM 2010 TWSC
61: Dwy/Aldwyn Ln & S Ithan Ave

9/17/2014

Intersection

Int Delay, s/veh

Movement	SBL	SBT	SBR
Vol, veh/h	16	0	61
Conflicting Peds, #/hr	0	0	0
Sign Control	Stop	Stop	Stop
RT Channelized	-	-	None
Storage Length	-	-	-
Veh in Median Storage, #	-	0	-
Grade, %	-	0	-
Peak Hour Factor	81	81	81
Heavy Vehicles, %	4	4	4
Mvmt Flow	20	0	75

Major/Minor

	Minor2		
Conflicting Flow All	751	749	254
Stage 1	293	293	-
Stage 2	458	456	-
Critical Hdwy	7.14	6.54	6.24
Critical Hdwy Stg 1	6.14	5.54	-
Critical Hdwy Stg 2	6.14	5.54	-
Follow-up Hdwy	3.536	4.036	3.336
Pot Cap-1 Maneuver	325	338	780
Stage 1	711	667	-
Stage 2	579	565	-
Platoon blocked, %			
Mov Cap-1 Maneuver	309	327	780
Mov Cap-2 Maneuver	309	327	-
Stage 1	703	653	-
Stage 2	558	559	-

Approach

	SB
HCM Control Delay, s	12.2
HCM LOS	B

Minor Lane/Major Mvmt

Capacity (veh/h)	186	1314	-
HCM Lane V/C Ratio	0.041	0.004	-
HCM Control Delay (s)	25.2	7.8	-
HCM Lane LOS	D	A	-
HCM 95th %tile Q(veh)	0.1	0	-

HCM 2010 TWSC
76: S Ithan Ave & Dwy

9/17/2014

Intersection

Int Delay, s/veh 3.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	SBL	SBR
Vol, veh/h	5	336	29	150	222	9	23	2
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	None
Storage Length	50	-	-	100	-	-	0	-
Veh in Median Storage, #	-	0	-	-	0	-	0	-
Grade, %	-	1	-	-	-1	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2
Mvmt Flow	5	365	32	163	241	10	25	2

Major/Minor

	Major1	Major2	Minor2	
Conflicting Flow All	251	0	0	971
Stage 1	-	-	-	572
Stage 2	-	-	-	399
Critical Hdwy	4.12	-	-	7.12
Critical Hdwy Stg 1	-	-	-	6.12
Critical Hdwy Stg 2	-	-	-	6.12
Follow-up Hdwy	2.218	-	-	3.518
Pot Cap-1 Maneuver	1314	-	-	232
Stage 1	-	-	-	505
Stage 2	-	-	-	627
Platoon blocked, %				
Mov Cap-1 Maneuver	1314	-	-	196
Mov Cap-2 Maneuver	-	-	-	196
Stage 1	-	-	-	503
Stage 2	-	-	-	610

Approach

	EB	WB	SB
HCM Control Delay, s	0.1	3.4	23
HCM LOS			C

Minor Lane/Major Mvmt

	NWLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	186	1314	-	-	1162	-	-	227
HCM Lane V/C Ratio	0.041	0.004	-	-	0.14	-	-	0.12
HCM Control Delay (s)	25.2	7.8	-	-	8.6	-	-	23
HCM Lane LOS	D	A	-	-	A	-	-	C
HCM 95th %tile Q(veh)	0.1	0	-	-	0.5	-	-	0.4

HCM 2010 TWSC
76: S Ithan Ave & Dwy

9/17/2014

Intersection
Int Delay, s/veh

Movement	NWU	NWL	NWR
Vol, veh/h	4	7	13
Conflicting Peds, #/hr	0	0	0
Sign Control	Stop	Stop	Stop
RT Channelized	-	-	-
Storage Length	-	0	-
Veh in Median Storage, #	-	0	-
Grade, %	-	0	-
Peak Hour Factor	92	92	92
Heavy Vehicles, %	2	2	2
Mvmt Flow	4	8	14

Major/Minor	Minor1		
Conflicting Flow All	0	978	381
Stage 1	0	392	-
Stage 2	0	586	-
Critical Hdwy	-	7.12	6.22
Critical Hdwy Stg 1	-	6.12	-
Critical Hdwy Stg 2	-	6.12	-
Follow-up Hdwy	-	3.518	3.318
Pot Cap-1 Maneuver	0	230	666
Stage 1	0	633	-
Stage 2	0	496	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	0	186	666
Mov Cap-2 Maneuver	0	186	-
Stage 1	0	631	-
Stage 2	0	401	-

Approach	NW
HCM Control Delay, s	25.2
HCM LOS	D

Minor Lane/Major Mvmt

HCM 2010 TWSC
79: Garrett Rd & Lancaster Ave

9/17/2014

Intersection
Int Delay, s/veh

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	1099	25	20	1194	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	1640	37	30	1782	0	39

Major/Minor	Major1	Major2	Minor1	
Conflicting Flow All	0	0	1678	0
Stage 1	-	-	-	2610
Stage 2	-	-	-	839
Critical Hdwy	-	-	4.1	-
Critical Hdwy Stg 1	-	-	-	1659
Critical Hdwy Stg 2	-	-	-	951
Follow-up Hdwy	-	-	2.2	-
Pot Cap-1 Maneuver	-	-	387	-
Stage 1	-	-	-	6.8
Stage 2	-	-	-	5.8
Platoon blocked, %	-	-	-	5.8
Mov Cap-1 Maneuver	-	-	387	-
Mov Cap-2 Maneuver	-	-	-	3.5
Stage 1	-	-	-	3.3
Stage 2	-	-	-	20
Platoon blocked, %	-	-	-	143
Mov Cap-1 Maneuver	-	-	387	-
Mov Cap-2 Maneuver	-	-	-	341
Stage 1	-	-	-	-
Stage 2	-	-	-	20
Platoon blocked, %	-	-	-	143
Mov Cap-1 Maneuver	-	-	387	-
Mov Cap-2 Maneuver	-	-	-	341
Stage 1	-	-	-	-
Stage 2	-	-	-	20

Approach	EB	WB	NB
HCM Control Delay, s	0	7.4	18.1
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	313	-	-	387	-
HCM Lane V/C Ratio	0.124	-	-	0.077	-
HCM Control Delay (s)	18.1	-	-	15.1	7.3
HCM Lane LOS	C	-	-	C	A
HCM 95th %tile Q(veh)	0.4	-	-	0.2	-

Lanes, Volumes, Timings
 2: County Line Rd & N Ithan Ave

9/17/2014



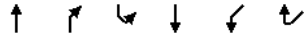
Lane Group	EBL	EBR	SBL	SBR	NWL	NWR
Lane Configurations	W		W		W	
Volume (vph)	209	15	142	267	30	257
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.991		0.912		0.879	
Flt Protected	0.955		0.983		0.995	
Satd. Flow (prot)	1763	0	1670	0	1629	0
Flt Permitted	0.955		0.983		0.995	
Satd. Flow (perm)	1763	0	1670	0	1629	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)	222	16	151	284	32	273
Shared Lane Traffic (%)						
Lane Group Flow (vph)	238	0	435	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	64.3%
ICU Level of Service	C
Analysis Period (min)	15

Lanes, Volumes, Timings

38: County Line Rd & N Ithaca Ave

9/17/2014



Lane Group	NBT	NBR	SBL	SBT	SWL	SWR
Lane Configurations	↑			↑	↑	
Volume (vph)	351	111	169	251	136	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	0.968				0.942	
Flt Protected				0.980	0.972	
Satd. Flow (prot)	1803	0	0	1825	1706	0
Flt Permitted				0.980	0.972	
Satd. Flow (perm)	1803	0	0	1825	1706	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	122	186	276	149	112
Shared Lane Traffic (%)						
Lane Group Flow (vph)	508	0	0	462	261	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	71.6%
ICU Level of Service	C
Analysis Period (min)	15

HCM 2010 AWSC
76: S Ithan Ave & Dwy

9/17/2014

Intersection											
Intersection Delay, s/veh	11.7										
Intersection LOS	B										
Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	SBU	SBL	SBR
Vol, veh/h	0	5	336	29	0	150	222	9	0	23	2
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
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	5	365	32	0	163	241	10	0	25	2
Number of Lanes	0	1	1	0	0	1	1	0	0	1	0

Approach	EB	WB	SB
Opposing Approach	WB	EB	
Opposing Lanes	2	2	0
Conflicting Approach Left	SB	NW	WB
Conflicting Lanes Left	1	1	2
Conflicting Approach Right	NW	SB	EB
Conflicting Lanes Right	1	1	2
HCM Control Delay	13.6	10.2	9.3
HCM LOS	B	B	A

Lane	NWLn1	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1
Vol Left, %	35%	100%	0%	100%	0%	92%
Vol Thru, %	0%	0%	92%	0%	96%	0%
Vol Right, %	65%	0%	8%	0%	4%	8%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	24	5	365	150	231	25
LT Vol	0	0	336	0	222	0
Through Vol	16	0	29	0	9	2
RT Vol	8	5	0	150	0	23
Lane Flow Rate	26	5	397	163	251	27
Geometry Grp	2	7	7	7	7	2
Degree of Util (X)	0.04	0.008	0.551	0.249	0.347	0.045
Departure Headway (Hd)	5.476	5.562	5.004	5.498	4.968	5.93
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	650	643	722	652	723	601
Service Time	3.543	3.3	2.741	3.235	2.705	3.997
HCM Lane V/C Ratio	0.04	0.008	0.55	0.25	0.347	0.045
HCM Control Delay	8.8	8.3	13.7	10.1	10.3	9.3
HCM Lane LOS	A	A	B	B	B	A
HCM 95th-tile Q	0.1	0	3.4	1	1.6	0.1

HCM 2010 AWSC
76: S Ithan Ave & Dwy

9/17/2014

Intersection			
Intersection Delay, s/veh	11.7		
Intersection LOS	B		
Movement	NWU	NWL	NWR
Vol, veh/h	4	7	13
Peak Hour Factor	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2
Mvmt Flow	4	8	14
Number of Lanes	0	1	0

Approach	NW
Opposing Approach	
Opposing Lanes	0
Conflicting Approach Left	EB
Conflicting Lanes Left	2
Conflicting Approach Right	WB
Conflicting Lanes Right	2
HCM Control Delay	8.8
HCM LOS	A

Lane

Lanes, Volumes, Timings

27: S Ithan Ave/N Ithan Ave & Lancaster Ave

9/17/2014



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↗	↘	↔	↗	↘	↔	↗	↘	↔	↗	↘
Volume (vph)	97	836	75	117	879	47	95	192	75	26	121	50
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%		0%		0%	
Storage Length (ft)	200		0	250		0	200		0	65		0
Storage Lanes	1		1	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850		0.992			0.958			0.956	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1520	3040	1360	1497	2970	0	1512	1525	0	1520	1530	0
Flt Permitted	0.159			0.200			0.526			0.302		
Satd. Flow (perm)	254	3040	1360	315	2970	0	837	1525	0	483	1530	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)	103	889	80	124	935	50	101	204	80	28	129	53
Shared Lane Traffic (%)												
Lane Group Flow (vph)	103	889	80	124	985	0	101	284	0	28	182	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	1	0		1	1		1	1	
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	
Leading Detector (ft)	37	0	20	37	0		37	37		37	37	
Trailing Detector (ft)	-3	0	0	-3	0		-3	-3		-3	-3	
Detector 1 Position(ft)	-3	0	0	-3	0		-3	-3		-3	-3	
Detector 1 Size(ft)	40	6	20	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	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	NA	Perm	pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2		2	6			8			4		
Detector Phase	5	2	2	1	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	3.0	34.0	34.0	3.0	34.0		3.0	3.0		3.0	3.0	

B 23 am w/EB RT at Ithan 9/15/2014 Baseline

Synchro 8 Report
Page 1

Lanes, Volumes, Timings

27: S Ithan Ave/N Ithan Ave & Lancaster Ave

9/17/2014

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

B 23 am w/EB RT at Ithan 9/15/2014 Baseline

Synchro 8 Report
Page 2

Lanes, Volumes, Timings

27: S Ithan Ave/N Ithan Ave & Lancaster Ave

9/17/2014



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Minimum Split (s)	13.0	40.0	40.0	13.0	40.0	40.0	13.0	13.0	13.0	13.0	13.0	13.0
Total Split (s)	13.0	47.0	47.0	13.0	47.0	47.0	31.0	31.0	31.0	31.0	31.0	31.0
Total Split (%)	10.8%	39.2%	39.2%	10.8%	39.2%	39.2%	25.8%	25.8%	25.8%	25.8%	25.8%	25.8%
Maximum Green (s)	7.0	41.0	41.0	7.0	41.0	41.0	25.0	25.0	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	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	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	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	6.5	6.5	6.5	6.5
Lead/Lag	Lead	Lag	Lag	Lead	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	3.0	3.0
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	None	None	None	None	None
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effect Green (s)	55.9	49.4	49.4	55.9	49.4	49.4	23.8	23.8	23.8	23.8	23.8	23.8
Actuated g/C Ratio	0.47	0.41	0.41	0.47	0.41	0.41	0.20	0.20	0.20	0.20	0.20	0.20
v/c Ratio	0.55	0.71	0.14	0.59	0.81	0.81	0.61	0.94	0.29	0.60	0.60	0.60
Control Delay	31.1	34.1	25.4	23.1	31.2	31.2	60.6	85.9	49.8	52.7	52.7	52.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	31.1	34.1	25.4	23.1	31.2	31.2	60.6	85.9	49.8	52.7	52.7	52.7
LOS	C	C	C	C	C	C	E	F	D	D	D	D
Approach Delay		33.2			30.3			79.3				52.3
Approach LOS		C			C			E				D
Queue Length 50th (ft)	44	324	42	54	338		71	217	19	128		128
Queue Length 95th (ft)	#91	310	80	m78	#502		#138	#381	49	208		208
Internal Link Dist (ft)		1205			231			264		893		893
Turn Bay Length (ft)	200			250			200			65		65
Base Capacity (vph)	186	1250	559	210	1221		170	311	98	312		312
Starvation Cap Reductn	0	0	0	0	0		0	0	0	0		0
Spillback Cap Reductn	0	0	0	0	0		0	0	0	0		0
Storage Cap Reductn	0	0	0	0	0		0	0	0	0		0
Reduced v/c Ratio	0.55	0.71	0.14	0.59	0.81		0.59	0.91	0.29	0.58		0.58

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: 39.9
 Intersection Capacity Utilization 75.7%
 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.

Lanes, Volumes, Timings

27: S Ithan Ave/N Ithan Ave & Lancaster Ave

9/17/2014

Splits and Phases: 27: S Ithan Ave/N Ithan Ave & Lancaster Ave



Lanes, Volumes, Timings

27: S Ithan Ave/N Ithan Ave & Lancaster Ave

9/17/2014

Lane Group	ø9
Minimum Split (s)	26.0
Total Split (s)	29.0
Total Split (%)	24%
Maximum Green (s)	27.0
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
3: County Line Rd & Spring Mill Rd

9/17/2014

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 (Ob), 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	180.0	178.9	180.0	180.0	176.6	180.0	180.0	180.0	180.0	180.0	177.3	180.0
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	135	301	90	135	307	80	168	402	78	150	526	72
Arrive On Green	0.32	0.32	0.32	0.32	0.32	0.32	0.41	0.41	0.41	0.41	0.41	0.41
Sat Flow, veh/h	150	936	278	146	952	250	187	986	192	157	1291	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	1364	0	0	1348	0	0	1365	0	0	1626	0	0
Q Serve(g_s), s	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.2	0.0	0.0
Cycle Q Clear(g_c), s	15.5	0.0	0.0	15.4	0.0	0.0	10.7	0.0	0.0	15.9	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	527	0	0	522	0	0	648	0	0	748	0	0
V/C Ratio(X)	1.00	0.00	0.00	0.83	0.00	0.00	0.62	0.00	0.00	0.78	0.00	0.00
Avail Cap(c_a), veh/h	527	0	0	522	0	0	1006	0	0	1142	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	17.1	0.0	0.0	15.6	0.0	0.0	11.1	0.0	0.0	13.0	0.0	0.0
Incr Delay (d2), s/veh	12.8	0.0	0.0	14.0	0.0	0.0	0.4	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(50%),veh/ln	8.8	0.0	0.0	7.7	0.0	0.0	4.3	0.0	0.0	7.2	0.0	0.0
LnGrp Delay(d),s/veh	30.0	0.0	0.0	29.6	0.0	0.0	11.5	0.0	0.0	13.9	0.0	0.0
LnGrp LOS	F			C			B			B		
Approach Vol, veh/h		529			432			399			586	
Approach Delay, s/veh		30.0			29.6			11.5			13.9	
Approach LOS		C			C			B			B	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		33.9		26.1		33.9		26.1				
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		17.5		17.9		17.4		12.7				
Green Ext Time (p_c), s		0.0		2.2		0.0		2.3				
Intersection Summary												
HCM 2010 Ctrl Delay				21.3								
HCM 2010 LOS				C								

HCM 2010 Signalized Intersection Summary
7: Sproul Rd/Spring Mill Rd & Aldwyn Ln/Kenilworth Rd & Lancaster Ave

9/17/2014

HCM 2010 methodology does not support more than 4 approaches.

HCM 2010 Signalized Intersection Summary
11: Chapel Dr & Lancaster Ave

9/17/2014

HCM 2010 Computation does not support turning movement with Shared and Exclusive lanes.

HCM 2010 Signalized Intersection Summary
16: Sproul Rd & Conestoga Rd

9/17/2014

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 (Ob), 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	178.2	178.2	180.0	182.7	182.7	184.5	177.3	177.3	179.1	180.9	179.1	180.9
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	226	811	0	266	605	0	190	601	88	88	317	84
Arrive On Green	0.05	0.46	0.00	0.33	0.33	0.00	0.06	0.40	0.40	0.26	0.26	0.26
Sat Flow, veh/h	1697	1782	0	869	1827	0	1689	1514	221	137	1204	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	19.9	0.0	2.1	21.9	0.0	3.5	0.0	6.8	14.3	0.0	0.0
Cycle Q Clear(g_c), s	3.1	19.9	0.0	12.3	21.9	0.0	3.5	0.0	6.8	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	226	811	0	266	605	0	190	0	689	489	0	0
V/C Ratio(X)	0.48	0.70	0.00	0.11	0.89	0.00	0.57	0.00	0.32	0.90	0.00	0.00
Avail Cap(c_a), veh/h	277	811	0	266	605	0	233	0	734	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	18.7	17.0	0.0	25.8	24.8	0.0	21.1	0.0	16.2	28.7	0.0	0.0
Incr Delay (d2), s/veh	1.6	5.0	0.0	0.8	18.2	0.0	2.7	0.0	0.3	19.6	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(50%),veh/ln	1.5	10.8	0.0	0.6	14.0	0.0	1.7	0.0	3.3	12.1	0.0	0.0
LnGrp Delay(d),s/veh	20.2	22.0	0.0	26.6	43.0	0.0	23.7	0.0	16.5	48.2	0.0	0.0
LnGrp LOS	C	C		C	D		C		B	D		
Approach Vol, veh/h		677			569			328			440	
Approach Delay, s/veh		21.7			42.2			18.9			48.2	
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	10.5	26.5		43.0		37.0	9.7	33.3				
Change Period (Y+Rc), s	5.5	5.5		5.0		5.5	5.0	5.0				
Max Green Setting (Gmax), s	7.0	21.0		36.0		33.5	7.0	24.0				
Max Q Clear Time (g_c+I1), s	5.5	22.5		21.9		8.8	5.1	23.9				
Green Ext Time (p_c), s	0.0	0.0		6.0		2.4	0.0	0.0				
Intersection Summary												
HCM 2010 Ctrl Delay				32.8								
HCM 2010 LOS				C								

HCM 2010 Signalized Intersection Summary
25: S Ithan Ave & Conestoga Rd

9/17/2014

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 (Ob), 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	185.4	183.6	185.4	176.4	174.7	176.4	176.3	174.5	176.3	184.4	182.6	184.4
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	0	1
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	738	10	90	736	61	144	259	75	147	144	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	113	1576	21	11	1571	130	182	1115	324	206	620	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	1709	0	0	1712	0	0	1621	0	0	1627	0	0
Q Serve(g_s), s	2.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.5	0.0	0.0
Cycle Q Clear(g_c), s	14.2	0.0	0.0	11.7	0.0	0.0	0.7	0.0	0.0	7.8	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	892	0	0	887	0	0	478	0	0	476	0	0
V/C Ratio(X)	0.74	0.00	0.00	0.66	0.00	0.00	0.07	0.00	0.00	0.65	0.00	0.00
Avail Cap(c_a), veh/h	1237	0	0	1241	0	0	803	0	0	823	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	13.1	0.0	0.0	15.7	0.0	0.0
Incr Delay (d2), s/veh	1.5	0.0	0.0	0.8	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(50%),veh/ln	7.0	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	11.3	0.0	0.0	10.1	0.0	0.0	13.1	0.0	0.0	17.2	0.0	0.0
LnGrp LOS	B			B			B			B		
Approach Vol, veh/h		662			581			35			309	
Approach Delay, s/veh		11.3			10.1			13.1			17.2	
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		26.8		16.6		26.8		16.6				
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		16.2		9.8				
Green Ext Time (p_c), s		5.0		1.2		4.7		1.0				
Intersection Summary												
HCM 2010 Ctrl Delay				12.0								
HCM 2010 LOS				B								

HCM 2010 Signalized Intersection Summary
27: S Ithan Ave/N Ithan Ave & Lancaster Ave

9/17/2014

HCM 2010 methodology does not support exclusive ped or hold phases.

HCM 2010 Signalized Intersection Summary
 33: Williams Rd/Garrett Ave & Conestoga Rd

9/17/2014

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 (Ob), 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	187.2	187.2	187.2	187.2	187.2	187.2	180.0	180.0	180.0	172.8	172.8	172.8
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	153	27	54	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	656	316	648	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	1620	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	234	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	601	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(50%),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
 51: Lowrys Ln & Lancaster Ave

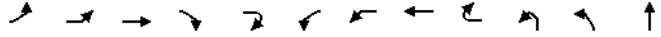
9/17/2014

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 (Ob), 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	180.0	178.2	180.0	177.3	175.5	177.3	190.0	188.1	190.0	188.1	186.3	188.1
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	76	1834	36	86	1805	7	149	217	73	214	117	96
Arrive On Green	0.73	0.73	0.73	0.55	0.55	0.55	0.20	0.20	0.20	0.20	0.20	0.20
Sat Flow, veh/h	1	3326	64	16	3273	13	268	1094	369	545	587	481
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	1708	0	1595	1732	0	0	1613	0	0
Q Serve(g_s), s	0.0	0.0	9.5	0.0	0.0	9.1	0.0	0.0	0.0	5.5	0.0	0.0
Cycle Q Clear(g_c), s	9.4	0.0	9.5	8.8	0.0	9.1	1.7	0.0	0.0	7.2	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	1057	0	888	1019	0	880	440	0	0	426	0	0
V/C Ratio(X)	0.63	0.00	0.68	0.50	0.00	0.54	0.17	0.00	0.00	0.60	0.00	0.00
Avail Cap(c_a), veh/h	1057	0	888	1019	0	880	444	0	0	819	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	0.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	4.1	0.0	4.1	6.8	0.0	6.9	16.1	0.0	0.0	18.2	0.0	0.0
Incr Delay (d2), s/veh	1.0	0.0	1.4	1.8	0.0	2.4	0.2	0.0	0.0	1.3	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(50%),veh/ln	4.7	0.0	4.4	4.7	0.0	4.5	0.9	0.0	0.0	3.3	0.0	0.0
LnGrp Delay(d),s/veh	5.1	0.0	5.6	8.6	0.0	9.2	16.3	0.0	0.0	19.6	0.0	0.0
LnGrp LOS	A		A	A		A	B			B		
Approach Vol, veh/h	1263		984				75		255			
Approach Delay, s/veh	5.3		8.9				16.3		19.6			
Approach LOS	A		A				B		B			
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	2		4				6		8			
Phs Duration (G+Y+Rc), s	44.9		15.1				44.9		15.1			
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	11.5		9.2				11.1		3.7			
Green Ext Time (p_c), s	8.6		1.0				8.7		1.2			
Intersection Summary												
HCM 2010 Ctrl Delay	8.4											
HCM 2010 LOS	A											

Lanes, Volumes, Timings

7: Sproul Rd/Spring Mill Rd & Aldwyn Ln/Kenilworth Rd & Lancaster Ave

9/17/2014



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
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	1.18	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

EX pm Baseline

Lanes, Volumes, Timings

7: Sproul Rd/Spring Mill Rd & Aldwyn Ln/Kenilworth Rd & Lancaster Ave

9/17/2014



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	10	12	12	11	11
Grade (%)					-3%					3%		
Storage Length (ft)				0		0			200			0
Storage Lanes				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
Flt Protected					0.995				0.950			0.976
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				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	15	15	15	9	9	15	15	15
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		

EX pm Baseline

Lanes, Volumes, Timings

7: Sproul Rd/Spring Mill Rd & Aldwyn Ln/Kenilworth Rd & Lancaster Ave

9/17/2014



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		

Lanes, Volumes, Timings

7: Sproul Rd/Spring Mill Rd & Aldwyn Ln/Kenilworth Rd & Lancaster Ave

9/17/2014



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	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%	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	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	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	3.0	3.0
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	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	3.0
Recall Mode	None	None	Max	Max	None	None	None		None	None	None	None
Walk Time (s)			7.0	7.0	7.0	7.0	7.0		7.0	7.0	7.0	7.0
Flash Dont Walk (s)			20.0	20.0	20.0	20.0	20.0		20.0	20.0	20.0	20.0
Pedestrian Calls (#/hr)			0	0	0	0	0		0	0	0	0
Act Effect Green (s)		44.3	44.3	44.3		30.0	30.0		30.0	30.0		11.6
Actuated g/C Ratio		0.41	0.41	0.41		0.28	0.28		0.28	0.28		0.11
v/c Ratio		1.51	0.79	0.37		0.26	0.83		0.26	0.83		0.57
Control Delay		283.2	35.5	10.4		44.7	37.7		44.7	37.7		65.8
Queue Delay		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		44.7	37.7		65.8
LOS		F	D		B		D		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

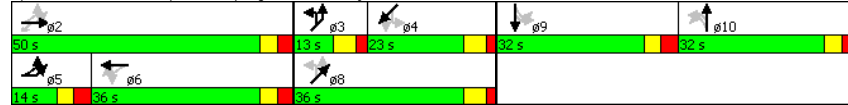
Area Type:	Other
Cycle Length:	150
Actuated Cycle Length:	107.7
Natural Cycle:	150
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	1.68
Intersection Signal Delay:	99.2
Intersection LOS:	F
Intersection Capacity Utilization:	114.6%
ICU Level of Service:	H
Analysis Period (min):	15
-	Volume exceeds 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

9/17/2014

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

9/17/2014



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

Lanes, Volumes, Timings

7: Sproul Rd/Spring Mill Rd & Aldwyn Ln/Kenilworth Rd & Lancaster Ave

9/17/2014



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 Effect 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					

Lanes, Volumes, Timings
11: Chapel Dr & Lancaster Ave

9/17/2014

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	CI+Ex		CI+Ex	CI+Ex	CI+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	

EX pm Baseline

Synchro 8 Report
Page 1

Lanes, Volumes, Timings
11: Chapel Dr & Lancaster Ave

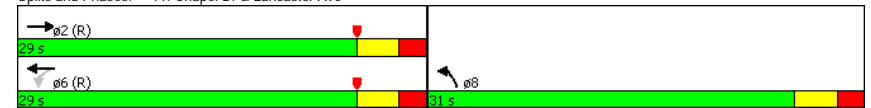
9/17/2014

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 Capacity Utilization 53.8%
 Analysis Period (min) 15
 m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 11: Chapel Dr & Lancaster Ave



EX pm Baseline

Synchro 8 Report
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Lanes, Volumes, Timings

27: S Ithan Ave/N Ithan Ave & Lancaster Ave

9/17/2014



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	8		4	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	

EX pm Baseline

Synchro 8 Report
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Lanes, Volumes, Timings

27: S Ithan Ave/N Ithan Ave & Lancaster Ave

9/17/2014

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

EX pm Baseline

Synchro 8 Report
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Lanes, Volumes, Timings

27: S Ithan Ave/N Ithan Ave & Lancaster Ave

9/17/2014



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	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%	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	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	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	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	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	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 Effect 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.

Lanes, Volumes, Timings

27: S Ithan Ave/N Ithan Ave & Lancaster Ave

9/17/2014

Splits and Phases: 27: S Ithan Ave/N Ithan Ave & Lancaster Ave



Lanes, Volumes, Timings

27: S Ithan Ave/N Ithan Ave & Lancaster Ave

9/17/2014

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 TWSC
2: County Line Rd & N Ithan Ave

9/17/2014

Intersection						
Int Delay, s/veh	0					
Movement	EBL	EBR	SBL	SBR	NWL	NWR
Vol, veh/h	218	36	296	302	23	159
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	0	-	0	-
Veh in Median Storage, #	0	-	0	-	0	-
Grade, %	0	-	0	-	0	-
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	1	1	1	1	1	1
Mvmt Flow	232	38	315	321	24	169
Major/Minor	Minor2	Major2		Minor1		
Conflicting Flow All	85	0	0	-	19	0
Stage 1	0	-	-	-	0	-
Stage 2	85	-	-	-	19	-
Critical Hdwy	-	-	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	-
Pot Cap-1 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Approach	EB	SB		NW		
HCM Control Delay, s	-	0		-		
HCM LOS	-	-		-		
Minor Lane/Major Mvmt	NWLn1	EBLn1	SBL	SBR		
Capacity (veh/h)	-	-	-	-		
HCM Lane V/C Ratio	-	-	-	-		
HCM Control Delay (s)	-	-	-	-		
HCM Lane LOS	-	-	-	-		
HCM 95th %tile Q(veh)	-	-	-	-		

HCM 2010 TWSC
15: Conestoga Rd & Spring Mill Rd

9/17/2014

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	

HCM 2010 TWSC
29: Strathmore Dr/Lowrys Ln & Conestoga Rd

9/17/2014

Intersection									
Int Delay, s/veh	2.6								

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR
Vol, veh/h	36	494	17	17	456	16	15	8	17
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-
Peak Hour Factor	96	96	96	96	96	96	96	96	96
Heavy Vehicles, %	1	1	1	1	1	1	1	1	1
Mvmt Flow	38	515	18	18	475	17	16	8	18

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	492	0	0
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	4.11	-	-
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	2.209	-	-
Pot Cap-1 Maneuver	1077	-	-
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	1077	-	-
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0.6	0.3	24.9
HCM LOS	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

HCM 2010 TWSC
29: Strathmore Dr/Lowrys Ln & Conestoga Rd

9/17/2014

Intersection			
Int Delay, s/veh			

Movement	SBL	SBT	SBR
Vol, veh/h	9	17	52
Conflicting Peds, #/hr	0	0	0
Sign Control	Stop	Stop	Stop
RT Channelized	-	-	None
Storage Length	-	-	-
Veh in Median Storage, #	-	0	-
Grade, %	-	0	-
Peak Hour Factor	96	96	96
Heavy Vehicles, %	1	1	1
Mvmt Flow	9	18	54

Major/Minor	Minor2
Conflicting Flow All	1130
Stage 1	519
Stage 2	611
Critical Hdwy	7.11
Critical Hdwy Stg 1	6.11
Critical Hdwy Stg 2	6.11
Follow-up Hdwy	3.509
Pot Cap-1 Maneuver	182
Stage 1	542
Stage 2	483
Platoon blocked, %	-
Mov Cap-1 Maneuver	161
Mov Cap-2 Maneuver	161
Stage 1	515
Stage 2	436

Approach	SB
HCM Control Delay, s	19.2
HCM LOS	C

Minor Lane/Major Mvmt

HCM 2010 TWSC
38: County Line Rd & N Ithan Ave

9/17/2014

Intersection						
Int Delay, s/veh	55.5					
Movement	NBT	NBR	SBL	SBT	SWL	SWR
Vol, veh/h	264	115	179	483	112	61
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Stop	Stop	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	1	1	1	1	1	1
Mvmt Flow	281	122	190	514	119	65
Major/Minor	Major1		Minor2		Minor1	
Conflicting Flow All	0	0	374	403	599	342
Stage 1	-	-	0	0	342	-
Stage 2	-	-	374	403	257	-
Critical Hdwy	-	-	6.41	6.51	6.41	6.21
Critical Hdwy Stg 1	-	-	-	-	5.41	-
Critical Hdwy Stg 2	-	-	5.41	5.51	-	-
Follow-up Hdwy	-	-	3.509	4.009	3.509	3.309
Pot Cap-1 Maneuver	-	-	629	538	466	703
Stage 1	-	-	-	-	722	-
Stage 2	-	-	698	601	-	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	629	0	466	703
Mov Cap-2 Maneuver	-	-	629	0	466	-
Stage 1	-	-	-	0	722	-
Stage 2	-	-	698	0	-	-
Approach	NB		SB		SW	
HCM Control Delay, s	0		97.7		15.4	
HCM LOS			F		C	
Minor Lane/Major Mvmt	NBT	NBR	SBLn1	SWLn1		
Capacity (veh/h)	-	-	629	529		
HCM Lane V/C Ratio	-	-	1.12	0.348		
HCM Control Delay (s)	-	-	97.7	15.4		
HCM Lane LOS	-	-	F	C		
HCM 95th %tile Q(veh)	-	-	21.6	1.5		

HCM 2010 TWSC
43: County Line Rd & Roberts Rd

9/17/2014

Intersection										
Int Delay, s/veh	3									
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	
Vol, veh/h	36	25	1	9	25	11	4	501	28	
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	
RT Channelized	-	-	None	-	-	None	-	-	None	
Storage Length	-	-	-	-	-	-	-	-	-	
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	
Grade, %	-	0	-	-	0	-	-	0	-	
Peak Hour Factor	95	95	95	95	95	95	95	95	95	
Heavy Vehicles, %	1	1	1	1	1	1	1	1	1	
Mvmt Flow	38	26	1	9	26	12	4	527	29	
Major/Minor	Minor2			Minor1			Major1			
Conflicting Flow All	1014	1294	368	925	1311	278	737	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	-	-	
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	-	-	
Pot Cap-1 Maneuver	194	163	632	225	159	722	871	-	-	
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	-	-	
Mov Cap-2 Maneuver	163	159	-	192	155	-	-	-	-	
Stage 1	380	420	-	486	512	-	-	-	-	
Stage 2	650	505	-	570	407	-	-	-	-	
Approach	EB			WB			NB			
HCM Control Delay, s	41.1			28.3			0.1			
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
43: County Line Rd & Roberts Rd

9/17/2014

Intersection			
Int Delay, s/veh			
Movement	SBL	SBT	SBR
Vol, veh/h	11	641	59
Conflicting Peds, #/hr	0	0	0
Sign Control	Free	Free	Free
RT Channelized	-	-	None
Storage Length	-	-	-
Veh in Median Storage, #	-	0	-
Grade, %	-	0	-
Peak Hour Factor	95	95	95
Heavy Vehicles, %	1	1	1
Mvmt Flow	12	675	62
Major/Minor	Major2		
Conflicting Flow All	557	0	0
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	4.12	-	-
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	2.21	-	-
Pot Cap-1 Maneuver	1017	-	-
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	1017	-	-
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-
Approach	SB		
HCM Control Delay, s	0.2		
HCM LOS			
Minor Lane/Major Mvmt			

HCM 2010 TWSC
52: Airdale Rd & County Line Rd

9/17/2014

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
53: County Line Rd & Lowrys Ln

9/17/2014

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
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	-	-

HCM 2010 TWSC
61: Dwy/Aldwyn Ln & S Ithan Ave

9/17/2014

Intersection										
Int Delay, s/veh	2.4									

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR
Vol, veh/h	34	130	5	51	267	21	8	3	37
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-
Peak Hour Factor	91	91	91	91	91	91	91	91	91
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2
Mvmt Flow	37	143	5	56	293	23	9	3	41

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	316	0	0
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	4.12	-	4.12
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	2.218	-	2.218
Pot Cap-1 Maneuver	1244	-	1434
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	1244	-	1434
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	1.6	1.1	10.9
HCM LOS			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

Intersection

Int Delay, s/veh

Movement	SBL	SBT	SBR
Vol, veh/h	4	0	13
Conflicting Peds, #/hr	0	0	0
Sign Control	Stop	Stop	Stop
RT Channelized	-	-	None
Storage Length	-	-	-
Veh in Median Storage, #	-	0	-
Grade, %	-	0	-
Peak Hour Factor	91	91	91
Heavy Vehicles, %	2	2	2
Mvmt Flow	4	0	14

Major/Minor

	Minor2		
Conflicting Flow All	659	640	305
Stage 1	417	417	-
Stage 2	242	223	-
Critical Hdwy	7.12	6.52	6.22
Critical Hdwy Stg 1	6.12	5.52	-
Critical Hdwy Stg 2	6.12	5.52	-
Follow-up Hdwy	3.518	4.018	3.318
Pot Cap-1 Maneuver	377	393	735
Stage 1	613	591	-
Stage 2	762	719	-
Platoon blocked, %			
Mov Cap-1 Maneuver	336	362	735
Mov Cap-2 Maneuver	336	362	-
Stage 1	593	563	-
Stage 2	701	696	-

Approach

	SB
HCM Control Delay, s	11.5
HCM LOS	B

Minor Lane/Major Mvmt

HCM research expects at least one 'Stop' controlled approach at the intersection.

HCM 2010 TWSC
76: S Ithan Ave & Dwy

9/17/2014

Intersection						
Int Delay, s/veh	3.7					

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	0	149	258	0	109	53
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, %	-	1	-1	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	162	280	0	118	58

Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	280	0	442
Stage 1	-	-	280
Stage 2	-	-	162
Critical Hdwy	4.12	-	6.42
Critical Hdwy Stg 1	-	-	5.42
Critical Hdwy Stg 2	-	-	5.42
Follow-up Hdwy	2.218	-	3.518
Pot Cap-1 Maneuver	1283	-	573
Stage 1	-	-	767
Stage 2	-	-	867
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	1283	-	573
Mov Cap-2 Maneuver	-	-	573
Stage 1	-	-	767
Stage 2	-	-	867

Approach	EB	WB	SB
HCM Control Delay, s	0	0	13
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1283	-	-	-	623
HCM Lane V/C Ratio	-	-	-	-	0.283
HCM Control Delay (s)	0	-	-	-	13
HCM Lane LOS	A	-	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	1.2

HCM 2010 TWSC
78: Dwy & S Ithan Ave

9/17/2014

Intersection						
Int Delay, s/veh	1.2					

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	208	0	0	418	20	54
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, %	1	-	-	-1	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	226	0	0	454	22	59

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	680
Stage 1	-	-	226
Stage 2	-	-	454
Critical Hdwy	-	4.12	6.42
Critical Hdwy Stg 1	-	-	5.42
Critical Hdwy Stg 2	-	-	5.42
Follow-up Hdwy	-	2.218	3.518
Pot Cap-1 Maneuver	-	1342	417
Stage 1	-	-	812
Stage 2	-	-	640
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	1342	417
Mov Cap-2 Maneuver	-	-	417
Stage 1	-	-	812
Stage 2	-	-	640

Approach	EB	WB	NB
HCM Control Delay, s	0	0	11.4
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	647	-	-	1342	-
HCM Lane V/C Ratio	0.124	-	-	-	-
HCM Control Delay (s)	11.4	-	-	0	-
HCM Lane LOS	B	-	-	A	-
HCM 95th %tile Q(veh)	0.4	-	-	0	-

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	1523	2158
Stage 1	-	-	1495
Stage 2	-	-	663
Critical Hdwy	-	4.1	6.8
Critical Hdwy Stg 1	-	-	5.8
Critical Hdwy Stg 2	-	-	5.8
Follow-up Hdwy	-	2.2	3.5
Pot Cap-1 Maneuver	-	444	42
Stage 1	-	-	175
Stage 2	-	-	480
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	444	28
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	-

HCM 2010 TWSC
2: County Line Rd & N Ithan Ave

9/17/2014

Intersection	
Int Delay, s/veh	0

Movement	EBL	EBR	SBL	SBR	NWL	NWR
Vol, veh/h	218	36	296	302	23	159
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	0	-	0	-
Veh in Median Storage, #	0	-	0	-	0	-
Grade, %	0	-	0	-	0	-
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	1	1	1	1	1	1
Mvmt Flow	232	38	315	321	24	169

Major/Minor	Minor2	Major2	Minor1
Conflicting Flow All	85	0	19
Stage 1	0	-	0
Stage 2	85	-	19
Critical Hdwy	-	-	-
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	-	-	-
Pot Cap-1 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	-	-
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	EB	SB	NW
HCM Control Delay, s	-	0	-
HCM LOS	-	-	-

Minor Lane/Major Mvmt	NWLn1	EBLn1	SBL	SBR
Capacity (veh/h)	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-
HCM Control Delay (s)	-	-	-	-
HCM Lane LOS	-	-	-	-
HCM 95th %tile Q(veh)	-	-	-	-

HCM 2010 TWSC
 38: County Line Rd & N Ithan Ave

9/17/2014

Intersection	
Int Delay, s/veh	55.5

Movement	NBT	NBR	SBL	SBT	SWL	SWR
Vol, veh/h	264	115	179	483	112	61
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Stop	Stop	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	1	1	1	1	1	1
Mvmt Flow	281	122	190	514	119	65

Major/Minor	Major1	Minor2	Minor1
Conflicting Flow All	0	0	374
Stage 1	-	-	0
Stage 2	-	-	374
Critical Hdwy	-	-	6.41
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	5.41
Follow-up Hdwy	-	-	3.509
Pot Cap-1 Maneuver	-	-	629
Stage 1	-	-	-
Stage 2	-	-	698
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	-	629
Mov Cap-2 Maneuver	-	-	629
Stage 1	-	-	-
Stage 2	-	-	698

Approach	NB	SB	SW
HCM Control Delay, s	0	97.7	15.4
HCM LOS		F	C

Minor Lane/Major Mvmt	NBT	NBR	SBLn1	SWLn1
Capacity (veh/h)	-	-	629	529
HCM Lane V/C Ratio	-	-	1.12	0.348
HCM Control Delay (s)	-	-	97.7	15.4
HCM Lane LOS	-	-	F	C
HCM 95th %tile Q(veh)	-	-	21.6	1.5

HCM 2010 Signalized Intersection Summary
3: County Line Rd & Spring Mill Rd

9/17/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Volume (veh/h)	64	305	94	56	244	52	72	202	38	65	396	45
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Ob), 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	180.0	178.9	180.0	180.0	176.6	180.0	180.0	180.0	180.0	180.0	177.3	180.0
Adj Flow Rate, veh/h	89	339	109	78	280	81	89	259	58	86	445	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	127	348	103	122	332	87	139	350	69	131	489	67
Arrive On Green	0.38	0.38	0.38	0.38	0.38	0.38	0.41	0.41	0.41	0.41	0.41	0.41
Sat Flow, veh/h	153	929	276	137	885	231	161	856	170	152	1198	165
Grp Volume(v), veh/h	537	0	0	439	0	0	406	0	0	596	0	0
Grp Sat Flow(s),veh/h/ln	1358	0	0	1252	0	0	1187	0	0	1515	0	0
Q Serve(g_s), s	2.9	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	22.5	0.0	0.0	19.6	0.0	0.0	17.1	0.0	0.0	23.1	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	579	0	0	540	0	0	558	0	0	687	0	0
V/C Ratio(X)	0.93	0.00	0.00	0.81	0.00	0.00	0.73	0.00	0.00	0.87	0.00	0.00
Avail Cap(c_a), veh/h	579	0	0	540	0	0	558	0	0	687	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)	0.47	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	18.8	0.0	0.0	16.8	0.0	0.0	14.4	0.0	0.0	17.1	0.0	0.0
Incr Delay (d2), s/veh	13.2	0.0	0.0	12.6	0.0	0.0	4.2	0.0	0.0	10.9	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(50%),veh/ln	10.9	0.0	0.0	8.7	0.0	0.0	6.4	0.0	0.0	11.7	0.0	0.0
LnGrp Delay(d),s/veh	32.0	0.0	0.0	29.4	0.0	0.0	18.6	0.0	0.0	28.0	0.0	0.0
LnGrp LOS	C			C			B			C		
Approach Vol, veh/h		537			439			406			596	
Approach Delay, s/veh		32.0			29.4			18.6			28.0	
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		29.0		31.0		29.0		31.0				
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		24.5		25.1		21.6		19.1				
Green Ext Time (p_c), s		0.0		0.0		0.7		1.5				
Intersection Summary												
HCM 2010 Ctrl Delay				27.5								
HCM 2010 LOS				C								

HCM 2010 Signalized Intersection Summary
7: Sproul Rd/Spring Mill Rd & Aldwyn Ln/Kenilworth Rd & Lancaster Ave

9/17/2014

HCM 2010 methodology does not support more than 4 approaches.

HCM 2010 Signalized Intersection Summary
11: Chapel Dr & Lancaster Ave

9/17/2014

	→	↘	↙	←	↖	↗		
Movement	EBT	EBR	WBL	WBT	NBL	NBR		
Lane Configurations	↑↓			↑↓	↑↓			
Volume (veh/h)	1105	122	20	812	85	19		
Number	2	12	1	6	3	18		
Initial Q (Ob), veh	0	0	0	0	0	0		
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00		
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00		
Adj Sat Flow, veh/h/ln	176.5	180.0	180.0	176.5	176.5	180.0		
Adj Flow Rate, veh/h	1201	133	22	883	92	21		
Adj No. of Lanes	2	0	0	2	0	0		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92		
Percent Heavy Veh, %	2	2	2	2	0	0		
Cap, veh/h	1995	220	109	2087	97	22		
Arrive On Green	0.65	0.65	1.00	1.00	0.07	0.07		
Sat Flow, veh/h	3134	336	24	3267	1327	303		
Grp Volume(v), veh/h	660	674	476	429	114	0		
Grp Sat Flow(s),veh/h/ln	1676	1705	1685	1526	1645	0		
Q Serve(g_s), s	9.1	9.1	0.0	0.0	2.8	0.0		
Cycle Q Clear(g_c), s	9.1	9.1	0.0	0.0	2.8	0.0		
Prop In Lane		0.20	0.05		0.81	0.18		
Lane Grp Cap(c), veh/h	1098	1117	1197	999	120	0		
V/C Ratio(X)	0.60	0.60	0.40	0.43	0.95	0.00		
Avail Cap(c_a), veh/h	1098	1117	1197	999	915	0		
HCM Platoon Ratio	1.00	1.00	2.00	2.00	1.00	1.00		
Upstream Filter(l)	0.41	0.41	0.75	0.75	1.00	0.00		
Uniform Delay (d), s/veh	4.0	4.0	0.0	0.0	18.7	0.0		
Incr Delay (d2), s/veh	1.0	1.0	0.7	1.0	27.0	0.0		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	4.3	4.4	0.2	0.3	2.1	0.0		
LnGrp Delay(d),s/veh	5.0	5.0	0.7	1.0	45.7	0.0		
LnGrp LOS	A	A	A	A	D			
Approach Vol, veh/h	1334			905	114			
Approach Delay, s/veh	5.0			0.9	45.7			
Approach LOS	A			A	D			
Timer	1	2	3	4	5	6	7	8
Assigned Phs		2				6		8
Phs Duration (G+Y+Rc), s		51.5				51.5		8.5
Change Period (Y+Rc), s		5.0				5.0		5.0
Max Green Setting (Gmax), s		27.0				27.0		23.0
Max Q Clear Time (g_c+I1), s		11.1				2.0		4.8
Green Ext Time (p_c), s		8.8				11.1		0.0
Intersection Summary								
HCM 2010 Ctrl Delay				5.4				
HCM 2010 LOS				A				

Notes
User approved volume balancing among the lanes for turning movement.

HCM 2010 Signalized Intersection Summary
16: Sproul Rd & Conestoga Rd

9/17/2014

	↘	→	↙	↖	←	↗	↘	↙	↖	↗	↘	↙	↖
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR	
Lane Configurations	↘	↘		↘	↘		↘	↘	↘		↘	↘	
Volume (veh/h)	105	549	217	27	522	47	105	185	27	51	291	82	
Number	7	4	14	3	8	18	1	6	16	5	2	12	
Initial Q (Ob), 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	178.2	178.2	180.0	182.7	182.7	184.5	177.3	177.3	179.1	180.9	179.1	180.9	
Adj Flow Rate, veh/h	111	578	0	28	549	0	111	195	28	54	306	86	
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	213	799	0	250	589	0	192	614	88	89	324	86	
Arrive On Green	0.06	0.45	0.00	0.32	0.32	0.00	0.06	0.40	0.40	0.27	0.27	0.27	
Sat Flow, veh/h	1697	1782	0	861	1827	0	1689	1517	218	138	1203	320	
Grp Volume(v), veh/h	111	578	0	28	549	0	111	0	223	446	0	0	
Grp Sat Flow(s),veh/h/ln	1697	1782	0	861	1827	0	1689	0	1735	1661	0	0	
Q Serve(g_s), s	3.3	20.7	0.0	2.1	22.7	0.0	3.6	0.0	6.9	14.6	0.0	0.0	
Cycle Q Clear(g_c), s	3.3	20.7	0.0	13.0	22.7	0.0	3.6	0.0	6.9	20.9	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	213	799	0	250	589	0	192	0	702	498	0	0	
V/C Ratio(X)	0.52	0.72	0.00	0.11	0.93	0.00	0.58	0.00	0.32	0.89	0.00	0.00	
Avail Cap(c_a), veh/h	260	799	0	250	589	0	233	0	744	498	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(l)	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	17.6	0.0	26.9	25.6	0.0	20.9	0.0	15.9	28.4	0.0	0.0	
Incr Delay (d2), s/veh	2.0	5.6	0.0	0.9	23.7	0.0	2.7	0.0	0.3	18.4	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(50%),veh/ln	1.6	11.4	0.0	0.6	15.3	0.0	1.7	0.0	3.3	12.1	0.0	0.0	
LnGrp Delay(d),s/veh	21.3	23.2	0.0	27.8	49.3	0.0	23.6	0.0	16.1	46.8	0.0	0.0	
LnGrp LOS	C	C		C	D		C		B	D			
Approach Vol, veh/h		689			577			334				446	
Approach Delay, s/veh		22.9			48.3			18.6				46.8	
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	27.0		42.4		37.6	9.8	32.6					
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	5.6	22.9		22.7		8.9	5.3	24.7					
Green Ext Time (p_c), s	0.0	0.0		5.8		2.4	0.0	0.0					
Intersection Summary													
HCM 2010 Ctrl Delay				34.6									
HCM 2010 LOS				C									

HCM 2010 Signalized Intersection Summary
25: S Ithan Ave & Conestoga Rd

9/17/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		+			+			+			+	
Volume (veh/h)	64	520	7	11	469	40	7	18	6	53	87	136
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Ob), 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	185.4	183.6	185.4	176.4	174.7	176.4	176.3	174.5	176.3	184.4	182.6	184.4
Adj Flow Rate, veh/h	73	591	8	12	533	45	8	20	7	60	99	155
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	144	753	10	87	753	63	141	254	74	144	141	184
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	113	1572	20	10	1570	131	181	1106	322	208	615	802
Grp Volume(v), veh/h	672	0	0	590	0	0	35	0	0	314	0	0
Grp Sat Flow(s),veh/h/ln	1705	0	0	1711	0	0	1608	0	0	1626	0	0
Q Serve(g_s), s	2.6	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	14.7	0.0	0.0	12.1	0.0	0.0	0.7	0.0	0.0	8.2	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	907	0	0	902	0	0	468	0	0	469	0	0
V/C Ratio(X)	0.74	0.00	0.00	0.65	0.00	0.00	0.07	0.00	0.00	0.67	0.00	0.00
Avail Cap(c_a), veh/h	1349	0	0	1359	0	0	644	0	0	657	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	9.2	0.0	0.0	13.5	0.0	0.0	16.4	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	1.7	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(50%),veh/ln	7.2	0.0	0.0	5.8	0.0	0.0	0.3	0.0	0.0	3.9	0.0	0.0
LnGrp Delay(d),s/veh	10.9	0.0	0.0	10.0	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		672			590			35			314	
Approach Delay, s/veh		10.9			10.0			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		16.8		27.9		16.8				
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		16.7		10.2				
Green Ext Time (p_c), s		5.5		1.1		5.2		0.7				
Intersection Summary												
HCM 2010 Ctrl Delay				12.0								
HCM 2010 LOS				B								

HCM 2010 Signalized Intersection Summary
27: S Ithan Ave/N Ithan Ave & Lancaster Ave

9/17/2014

HCM 2010 methodology does not support exclusive ped or hold phases.

HCM 2010 Signalized Intersection Summary
33: Williams Rd/Garrett Ave & Conestoga Rd

9/17/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↕			↕			↕			↕	
Volume (veh/h)	26	495	9	12	493	28	16	1	11	27	12	52
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Ob), 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	187.2	187.2	187.2	187.2	187.2	187.2	180.0	180.0	180.0	172.8	172.8	172.8
Adj Flow Rate, veh/h	28	538	10	13	536	30	17	1	12	29	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	1249	23	67	1235	68	141	25	52	100	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	40	1751	32	13	1732	95	634	296	620	324	308	858
Grp Volume(v), veh/h	576	0	0	579	0	0	30	0	0	99	0	0
Grp Sat Flow(s),veh/h/ln	1823	0	0	1841	0	0	1550	0	0	1491	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	8.2	0.0	0.0	8.3	0.0	0.0	1.1	0.0	0.0	4.1	0.0	0.0
Prop In Lane	0.05		0.02	0.02		0.05	0.57		0.40	0.29		0.58
Lane Grp Cap(c), veh/h	1359	0	0	1370	0	0	217	0	0	197	0	0
V/C Ratio(X)	0.42	0.00	0.00	0.42	0.00	0.00	0.14	0.00	0.00	0.50	0.00	0.00
Avail Cap(c_a), veh/h	1359	0	0	1370	0	0	401	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(l)	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	3.8	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(50%),veh/ln	4.5	0.0	0.0	4.5	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	27.7	0.0	0.0	31.5	0.0	0.0
LnGrp LOS	A			A			C			C		
Approach Vol, veh/h		576			579			30			99	
Approach Delay, s/veh		4.8			4.8			27.7			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		11.8		52.0		11.8				
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		10.2		6.1		10.3		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
51: Lowrys Ln & Lancaster Ave

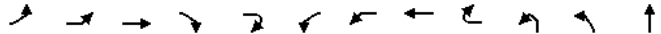
9/17/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Volume (veh/h)	2	1155	22	15	900	4	19	36	15	97	70	71
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Ob), 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	180.0	178.2	180.0	177.3	175.5	177.3	190.0	188.1	190.0	188.1	186.3	188.1
Adj Flow Rate, veh/h	2	1255	24	16	978	4	21	39	16	105	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	65	1989	38	76	1956	8	131	201	67	196	108	91
Arrive On Green	1.00	1.00	1.00	0.60	0.60	0.60	0.19	0.19	0.19	0.19	0.19	0.19
Sat Flow, veh/h	1	3327	64	16	3271	13	263	1071	356	562	574	483
Grp Volume(v), veh/h	673	0	608	516	0	482	76	0	0	258	0	0
Grp Sat Flow(s),veh/h/ln	1781	0	1611	1705	0	1595	1689	0	0	1619	0	0
Q Serve(g_s), s	0.0	0.0	0.0	0.0	0.0	9.8	0.0	0.0	0.0	6.6	0.0	0.0
Cycle Q Clear(g_c), s	0.0	0.0	0.0	9.4	0.0	9.8	2.0	0.0	0.0	8.6	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	1129	0	963	1086	0	954	399	0	0	395	0	0
V/C Ratio(X)	0.60	0.00	0.63	0.48	0.00	0.51	0.19	0.00	0.00	0.65	0.00	0.00
Avail Cap(c_a), veh/h	1129	0	963	1086	0	954	515	0	0	507	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(l)	0.41	0.00	0.41	1.00	0.00	1.00	0.00	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	6.5	19.3	0.0	0.0	21.9	0.0	0.0
Incr Delay (d2), s/veh	1.0	0.0	1.3	1.5	0.0	1.9	0.2	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(50%),veh/ln	0.3	0.0	0.3	4.9	0.0	4.7	1.0	0.0	0.0	4.0	0.0	0.0
LnGrp Delay(d),s/veh	1.0	0.0	1.3	7.9	0.0	8.4	19.5	0.0	0.0	23.8	0.0	0.0
LnGrp LOS	A		A	A		A	B			C		
Approach Vol, veh/h		1281			998			76			258	
Approach Delay, s/veh		1.1			8.1			19.5			23.8	
Approach LOS		A			A			B			C	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		44.0		16.0		44.0		16.0				
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		10.6		11.8		4.0				
Green Ext Time (p_c), s		12.2		0.5		10.6		1.0				
Intersection Summary												
HCM 2010 Ctrl Delay			6.6									
HCM 2010 LOS			A									
Notes												
User approved pedestrian interval to be less than phase max green.												

Lanes, Volumes, Timings

7: Sproul Rd/Spring Mill Rd & Aldwyn Ln/Kenilworth Rd & Lancaster Ave

9/17/2014



Lane Group	EBL2	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR2	NBL2	NBL	NBT
Lane Configurations		↔	↕	↔	↕		↔	↕	↔		↔	↕
Volume (vph)	4	248	980	30	280	2	22	848	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
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					0.191					0.753
Satd. Flow (perm)	0	170	3180	0	1576	0	340	3366	0	0	0	1203
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	256	1010	31	289	2	23	874	34	7	54	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	260	1041	0	289	0	25	908	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	Right	Left	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	1.18	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

Lanes, Volumes, Timings

7: Sproul Rd/Spring Mill Rd & Aldwyn Ln/Kenilworth Rd & Lancaster Ave

9/17/2014



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	190	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				200			0
Storage Lanes					0				1			0
Taper Length (ft)					25				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
Flt Protected					0.995				0.950			0.976
Satd. Flow (prot)	0	0	0	0	1462	0	0	0	1651	1640	0	0
Flt Permitted					0.982				0.125			0.753
Satd. Flow (perm)	0	0	0	0	1443	0	0	0	217	1640	0	0
Right Turn on Red		No				No		No				No
Satd. Flow (RTOR)												
Link Speed (mph)					25				40			40
Link Distance (ft)					597				1336			492
Travel Time (s)					16.3				22.8			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	10	1	1	0	3	14	196	0	115	21	1
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	19	0	0	0	196	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			0
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	1.15	1.15	1.09	1.09	1.14	1.14	1.14
Turning Speed (mph)	9	9	15	15	15	15	15	9	9	15	15	15
Number of Detectors	1	1	1		1			1	1	1		1
Detector Template	Left	Left	Thru		Left	Left	Thru		Left	Left	Thru	Thru
Leading Detector (ft)			20	20	37				20	37		37
Trailing Detector (ft)	0	0	-3		-3				0	-3		-3
Detector 1 Position(ft)	0	0	-3		-3				0	-3		-3
Detector 1 Size(ft)	20	20	40		40				20	40		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
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									3	3		8
Permitted Phases		9	9						8	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

Lanes, Volumes, Timings

7: Sproul Rd/Spring Mill Rd & Aldwyn Ln/Kenilworth Rd & Lancaster Ave

9/17/2014

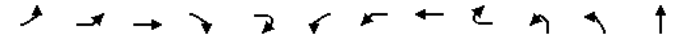


Lane Group	SWL2	SWL	SWT	SWR	SWR2
Lane Configurations					
Volume (vph)	39	9	165	233	1
Ideal Flow (vphpl)	1800	1800	1800	1800	1800
Lane Width (ft)	10	10	10	10	10
Grade (%)			-7%		
Storage Length (ft)		150		0	
Storage Lanes		1		0	
Taper Length (ft)		25			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00
Frt			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	170	240	1
Shared Lane Traffic (%)					
Lane Group Flow (vph)	0	49	411	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		

Lanes, Volumes, Timings

7: Sproul Rd/Spring Mill Rd & Aldwyn Ln/Kenilworth Rd & Lancaster Ave

9/17/2014



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 Effect 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	0.85		0.39		0.34	1.02				1.07
Control Delay		136.2	49.6		10.1		64.8	79.6				188.7
Queue Delay		0.0	0.0		0.0		0.0	0.0				0.0
Total Delay		136.2	49.6		10.1		64.8	79.6				188.7
LOS		F	D		B		E	E				F
Approach Delay			56.6					79.2				188.7
Approach LOS			E					E				F
Queue Length 50th (ft)		-258	500		44		21	-425				-83
Queue Length 95th (ft)		#445	599		120		56	#563				#197
Internal Link Dist (ft)			497					1529				412
Turn Bay Length (ft)		300					75					
Base Capacity (vph)		230	1221		741		74	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	0.85		0.39		0.34	1.02				1.07

Intersection Summary

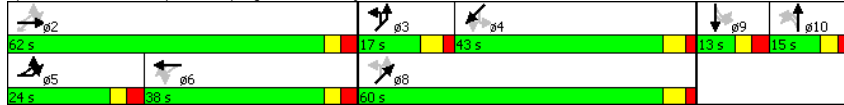
Area Type:	Other
Cycle Length:	150
Actuated Cycle Length:	144.8
Natural Cycle:	150
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	1.13
Intersection Signal Delay:	74.9
Intersection LOS:	E
Intersection Capacity Utilization:	115.6%
ICU Level of Service:	H
Analysis Period (min):	15
-	Volume exceeds 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

9/17/2014

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

9/17/2014



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			1.07	0.23			
Control Delay					83.2			120.9	33.7			
Queue Delay					0.0			0.0	0.0			
Total Delay					83.2			120.9	33.7			
LOS					F			F	C			
Approach Delay					83.2				85.1			
Approach LOS					F				F			
Queue Length 50th (ft)					18			-153	94			
Queue Length 95th (ft)					48			#322	150			
Internal Link Dist (ft)					517				1256			
Turn Bay Length (ft)								200				
Base Capacity (vph)					64			184	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			1.07	0.23			

Intersection Summary

Lanes, Volumes, Timings

7: Sproul Rd/Spring Mill Rd & Aldwyn Ln/Kenilworth Rd & Lancaster Ave

9/17/2014



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	1.05		
Control Delay		46.1	109.9		
Queue Delay		0.0	0.0		
Total Delay		46.1	109.9		
LOS		D	F		
Approach Delay			103.1		
Approach LOS			F		
Queue Length 50th (ft)		38	-450		
Queue Length 95th (ft)		77	#665		
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	1.05		
Intersection Summary					

Lanes, Volumes, Timings
11: Chapel Dr & Lancaster Ave

9/17/2014

	→	↖	↙	←	↘	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↓			↑↑	↔	
Volume (vph)	1105	122	20	812	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)	1201	133	22	883	92	21
Shared Lane Traffic (%)						
Lane Group Flow (vph)	1334	0	0	905	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	CI+Ex		CI+Ex	CI+Ex	CI+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	

NB 18 pm 9/16/2014 Baseline

Synchro 8 Report
Page 1

Lanes, Volumes, Timings
11: Chapel Dr & Lancaster Ave

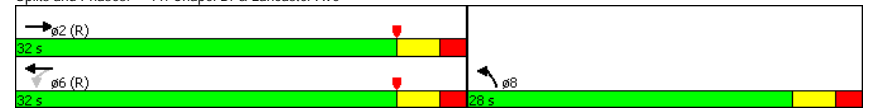
9/17/2014

	→	↖	↙	←	↘	↗
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	6.6			3.3	24.8	
Queue Delay	0.0			0.0	0.0	
Total Delay	6.6			3.3	24.8	
LOS	A			A	C	
Approach Delay	6.6			3.3	24.8	
Approach LOS	A			A	C	
Queue Length 50th (ft)	108			1	31	
Queue Length 95th (ft)	202			m123	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: 6.2 Intersection LOS: A
 Intersection Capacity Utilization 54.2% 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



NB 18 pm 9/16/2014 Baseline

Synchro 8 Report
Page 2

Lanes, Volumes, Timings

27: S Ithan Ave/N Ithan Ave & Lancaster Ave

9/17/2014



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↕	↔	↔	↕	↔	↔	↕	↔	↔	↕	↔
Volume (vph)	81	951	92	96	694	31	64	125	77	66	236	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			0.994			0.943			0.964	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1565	3089	0	1541	3064	0	1557	1545	0	1565	1588	0
Flt Permitted	0.262			0.111			0.227			0.464		
Satd. Flow (perm)	432	3089	0	180	3064	0	372	1545	0	764	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)	85	1001	97	101	731	33	67	132	81	69	248	78
Shared Lane Traffic (%)												
Lane Group Flow (vph)	85	1098	0	101	764	0	67	213	0	69	326	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	8		4	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	

Lanes, Volumes, Timings

27: S Ithan Ave/N Ithan Ave & Lancaster Ave

9/17/2014

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

Lanes, Volumes, Timings

27: S Ithan Ave/N Ithan Ave & Lancaster Ave

9/17/2014



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 Effect 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		0.64	0.59		0.89	0.68		0.45	1.01	
Control Delay	21.0	44.3		37.7	25.3		126.0	56.0		52.3	99.5	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	21.0	44.3		37.7	25.3		126.0	56.0		52.3	99.5	
LOS	C	D		D	C		F	E		D	F	
Approach Delay		42.7			26.8			72.8			91.3	
Approach LOS		D			C			E			F	
Queue Length 50th (ft)	35	478		44	200		51	154		47	-257	
Queue Length 95th (ft)	m63	#609		m#100	238		#144	241		97	#448	
Internal Link Dist (ft)		1211			1954			103			893	
Turn Bay Length (ft)	140			70			105			65		
Base Capacity (vph)	273	1253		157	1289		75	315		155	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	0.31	0.88		0.64	0.59		0.89	0.68		0.45	1.01	

Intersection Summary

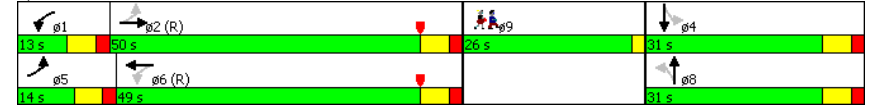
Area Type: Other
 Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow, Master Intersection
 Natural Cycle: 115
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.01
 Intersection Signal Delay: 47.8 Intersection LOS: D
 Intersection Capacity Utilization 79.7% 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.

Lanes, Volumes, Timings

27: S Ithan Ave/N Ithan Ave & Lancaster Ave

9/17/2014

Splits and Phases: 27: S Ithan Ave/N Ithan Ave & Lancaster Ave



Lanes, Volumes, Timings

27: S Ithan Ave/N Ithan Ave & Lancaster Ave

9/17/2014

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 TWSC
2: County Line Rd & N Ithan Ave

9/17/2014

Intersection						
Int Delay, s/veh	0					
Movement	EBL	EBR	SBL	SBR	NWL	NWR
Vol, veh/h	221	37	300	307	23	161
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	0	-	0	-
Veh in Median Storage, #	0	-	0	-	0	-
Grade, %	0	-	0	-	0	-
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	1	1	1	1	1	1
Mvmt Flow	235	39	319	327	24	171

Major/Minor	Minor2	Major2	Minor1
Conflicting Flow All	86	0	20
Stage 1	0	-	0
Stage 2	86	-	20
Critical Hdwy	-	-	-
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	-	-	-
Pot Cap-1 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	-	-
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	EB	SB	NW
HCM Control Delay, s	0		
HCM LOS	-		

Minor Lane/Major Mvmt	NWLn1	EBLn1	SBL	SBR
Capacity (veh/h)	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-
HCM Control Delay (s)	-	-	-	-
HCM Lane LOS	-	-	-	-
HCM 95th %tile Q(veh)	-	-	-	-

HCM 2010 TWSC
15: Conestoga Rd & Spring Mill Rd

9/17/2014

Intersection						
Int Delay, s/veh	0.5					
Movement	EBL	EBT	WBT	WBR	SWL	SWR
Vol, veh/h	10	656	616	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	683	642	3	18	9

Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	645	0	1347
Stage 1	-	-	643
Stage 2	-	-	704
Critical Hdwy	4.11	-	6.41
Critical Hdwy Stg 1	-	-	5.41
Critical Hdwy Stg 2	-	-	5.41
Follow-up Hdwy	2.209	-	3.509
Pot Cap-1 Maneuver	945	-	167
Stage 1	-	-	525
Stage 2	-	-	492
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	945	-	164
Mov Cap-2 Maneuver	-	-	164
Stage 1	-	-	525
Stage 2	-	-	484

Approach	EB	WB	SW
HCM Control Delay, s	0.1	0	24.5
HCM LOS	-	-	C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SWLn1
Capacity (veh/h)	945	-	-	-	212
HCM Lane V/C Ratio	0.011	-	-	-	0.128
HCM Control Delay (s)	8.9	0	-	-	24.5
HCM Lane LOS	A	A	-	-	C
HCM 95th %tile Q(veh)	0	-	-	-	0.4

HCM 2010 TWSC
29: Strathmore Dr/Lowrys Ln & Conestoga Rd

9/17/2014

Intersection									
Int Delay, s/veh	2.6								
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR
Vol, veh/h	36	501	17	17	463	16	15	8	17
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-
Peak Hour Factor	96	96	96	96	96	96	96	96	96
Heavy Vehicles, %	1	1	1	1	1	1	1	1	1
Mvmt Flow	38	522	18	18	482	17	16	8	18
Major/Minor	Major1			Major2			Minor1		
Conflicting Flow All	499	0	0	540	0	0	1169	1140	531
Stage 1	-	-	-	-	-	-	606	606	-
Stage 2	-	-	-	-	-	-	563	534	-
Critical Hdwy	4.11	-	-	4.11	-	-	7.11	6.51	6.21
Critical Hdwy Stg 1	-	-	-	-	-	-	6.11	5.51	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.11	5.51	-
Follow-up Hdwy	2.209	-	-	2.209	-	-	3.509	4.009	3.309
Pot Cap-1 Maneuver	1070	-	-	1034	-	-	171	202	550
Stage 1	-	-	-	-	-	-	486	488	-
Stage 2	-	-	-	-	-	-	513	526	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	1070	-	-	1034	-	-	135	187	550
Mov Cap-2 Maneuver	-	-	-	-	-	-	135	187	-
Stage 1	-	-	-	-	-	-	461	463	-
Stage 2	-	-	-	-	-	-	438	513	-
Approach	EB			WB			NB		
HCM Control Delay, s	0.6			0.3			25.6		
HCM LOS	D			D			D		
Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	
Capacity (veh/h)	216	1070	-	-	1034	-	-	329	
HCM Lane V/C Ratio	0.193	0.035	-	-	0.017	-	-	0.25	
HCM Control Delay (s)	25.6	8.5	0	-	8.5	0	-	19.6	
HCM Lane LOS	D	A	A	-	A	A	-	C	
HCM 95th %tile Q(veh)	0.7	0.1	-	-	0.1	-	-	1	

HCM 2010 TWSC
29: Strathmore Dr/Lowrys Ln & Conestoga Rd

9/17/2014

Intersection			
Int Delay, s/veh			
Movement	SBL	SBT	SBR
Vol, veh/h	9	17	53
Conflicting Peds, #/hr	0	0	0
Sign Control	Stop	Stop	Stop
RT Channelized	-	-	None
Storage Length	-	-	-
Veh in Median Storage, #	-	0	-
Grade, %	-	0	-
Peak Hour Factor	96	96	96
Heavy Vehicles, %	1	1	1
Mvmt Flow	9	18	55
Major/Minor	Minor2		
Conflicting Flow All	1145	1141	491
Stage 1	526	526	-
Stage 2	619	615	-
Critical Hdwy	7.11	6.51	6.21
Critical Hdwy Stg 1	6.11	5.51	-
Critical Hdwy Stg 2	6.11	5.51	-
Follow-up Hdwy	3.509	4.009	3.309
Pot Cap-1 Maneuver	177	201	580
Stage 1	537	530	-
Stage 2	478	484	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	156	186	580
Mov Cap-2 Maneuver	156	186	-
Stage 1	510	517	-
Stage 2	431	459	-
Approach	SB		
HCM Control Delay, s	19.6		
HCM LOS	C		
Minor Lane/Major Mvmt			

HCM 2010 TWSC
38: County Line Rd & N Ithan Ave

9/17/2014

Intersection						
Int Delay, s/veh	60.7					

Movement	NBT	NBR	SBL	SBT	SWL	SWR
Vol, veh/h	268	117	182	490	114	62
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Stop	Stop	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	1	1	1	1	1	1
Mvmt Flow	285	124	194	521	121	66

Major/Minor	Major1	Minor2	Minor1		
Conflicting Flow All	0	0	380	410	608
Stage 1	-	-	0	0	347
Stage 2	-	-	380	410	261
Critical Hdwy	-	-	6.41	6.51	6.41
Critical Hdwy Stg 1	-	-	-	-	5.41
Critical Hdwy Stg 2	-	-	5.41	5.51	-
Follow-up Hdwy	-	-	3.509	4.009	3.509
Pot Cap-1 Maneuver	-	-	624	533	461
Stage 1	-	-	-	-	718
Stage 2	-	-	694	597	-
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	624	0	461
Mov Cap-2 Maneuver	-	-	624	0	461
Stage 1	-	-	-	0	718
Stage 2	-	-	694	0	-

Approach	NB	SB	SW
HCM Control Delay, s	0	107.2	15.6
HCM LOS		F	C

Minor Lane/Major Mvmt	NBT	NBR	SBLn1	SWLn1
Capacity (veh/h)	-	-	624	524
HCM Lane V/C Ratio	-	-	1.146	0.357
HCM Control Delay (s)	-	-	107.2	15.6
HCM Lane LOS	-	-	F	C
HCM 95th %tile Q(veh)	-	-	23	1.6

HCM 2010 TWSC
43: County Line Rd & Roberts Rd

9/17/2014

Intersection										
Int Delay, s/veh	3.1									

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR
Vol, veh/h	37	25	1	9	26	11	4	509	28
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	1	1	1	1	1	1	1	1	1
Mvmt Flow	39	26	1	9	27	12	4	536	29

Major/Minor	Minor2	Minor1	Major1		
Conflicting Flow All	1029	1313	374	938	1330
Stage 1	739	739	-	559	559
Stage 2	290	574	-	379	771
Critical Hdwy	7.52	6.52	6.92	7.52	6.52
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
Pot Cap-1 Maneuver	189	158	626	221	155
Stage 1	377	424	-	483	512
Stage 2	696	504	-	618	410
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	157	154	626	188	151
Mov Cap-2 Maneuver	157	154	-	188	151
Stage 1	374	415	-	480	508
Stage 2	643	500	-	566	401

Approach	EB	WB	NB
HCM Control Delay, s	43.3	29.5	0.1
HCM LOS	E	D	

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	864	-	-	158	195	1010	-	-
HCM Lane V/C Ratio	0.005	-	-	0.42	0.248	0.011	-	-
HCM Control Delay (s)	9.2	0	-	43.3	29.5	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
43: County Line Rd & Roberts Rd

9/17/2014

Intersection			
Int Delay, s/veh			
Movement	SBL	SBT	SBR
Vol, veh/h	11	651	59
Conflicting Peds, #/hr	0	0	0
Sign Control	Free	Free	Free
RT Channelized	-	-	None
Storage Length	-	-	-
Veh in Median Storage, #	-	0	-
Grade, %	-	0	-
Peak Hour Factor	95	95	95
Heavy Vehicles, %	1	1	1
Mvmt Flow	12	685	62
Major/Minor	Major2		
Conflicting Flow All	565	0	0
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	4.12	-	-
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	2.21	-	-
Pot Cap-1 Maneuver	1010	-	-
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	1010	-	-
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-
Approach	SB		
HCM Control Delay, s	0.2		
HCM LOS			
Minor Lane/Major Mvmt			

HCM 2010 TWSC
52: Airdale Rd & County Line Rd

9/17/2014

Intersection						
Int Delay, s/veh	3.6					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	169	214	343	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	218	350	16	12	120
Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	366	0	-	0	921	358
Stage 1	-	-	-	-	358	-
Stage 2	-	-	-	-	563	-
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	1198	-	-	-	302	689
Stage 1	-	-	-	-	710	-
Stage 2	-	-	-	-	572	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	1198	-	-	-	253	689
Mov Cap-2 Maneuver	-	-	-	-	253	-
Stage 1	-	-	-	-	710	-
Stage 2	-	-	-	-	479	-
Approach	EB		WB		SB	
HCM Control Delay, s	3.8		0		12.8	
HCM LOS					B	
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	
Capacity (veh/h)	1198	-	-	-	594	
HCM Lane V/C Ratio	0.144	-	-	-	0.223	
HCM Control Delay (s)	8.5	0	-	-	12.8	
HCM Lane LOS	A	A	-	-	B	
HCM 95th %tile Q(veh)	0.5	-	-	-	0.8	

HCM 2010 TWSC
53: County Line Rd & Lowrys Ln

9/17/2014

Intersection						
Int Delay, s/veh	1.5					

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	16	18	52	182	155	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	190	161	129

Major/Minor	Minor2	Major1	Major2	Minor1
Conflicting Flow All	524	226	291	0
Stage 1	226	-	-	-
Stage 2	298	-	-	-
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	517	818	1282	-
Stage 1	816	-	-	-
Stage 2	758	-	-	-
Platoon blocked, %	-	-	-	-
Mov Cap-1 Maneuver	493	818	1282	-
Mov Cap-2 Maneuver	493	-	-	-
Stage 1	816	-	-	-
Stage 2	722	-	-	-

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)	1282	-	624	-	-
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	-	-

HCM 2010 TWSC
61: Dwy/Aldwyn Ln & S Ithan Ave

9/17/2014

Intersection										
Int Delay, s/veh	2.4									

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR
Vol, veh/h	35	132	5	52	271	21	8	3	38
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-
Peak Hour Factor	91	91	91	91	91	91	91	91	91
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2
Mvmt Flow	38	145	5	57	298	23	9	3	42

Major/Minor	Major1	Major2	Minor1	Minor2
Conflicting Flow All	321	0	0	656
Stage 1	-	-	-	225
Stage 2	-	-	-	431
Critical Hdwy	4.12	-	4.12	7.12
Critical Hdwy Stg 1	-	-	-	6.12
Critical Hdwy Stg 2	-	-	-	5.52
Follow-up Hdwy	2.218	-	2.218	3.518
Pot Cap-1 Maneuver	1239	-	1430	379
Stage 1	-	-	-	778
Stage 2	-	-	-	603
Platoon blocked, %	-	-	-	-
Mov Cap-1 Maneuver	1239	-	1430	349
Mov Cap-2 Maneuver	-	-	-	349
Stage 1	-	-	-	752
Stage 2	-	-	-	562

Approach	EB	WB	NB
HCM Control Delay, s	1.6	1.2	10.9
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	665	1239	-	-	1430	-	-	568
HCM Lane V/C Ratio	0.081	0.031	-	-	0.04	-	-	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

Intersection

Int Delay, s/veh

Movement	SBL	SBT	SBR
Vol, veh/h	4	0	13
Conflicting Peds, #/hr	0	0	0
Sign Control	Stop	Stop	Stop
RT Channelized	-	-	None
Storage Length	-	-	-
Veh in Median Storage, #	-	0	-
Grade, %	-	0	-
Peak Hour Factor	91	91	91
Heavy Vehicles, %	2	2	2
Mvmt Flow	4	0	14

Major/Minor

	Minor2		
Conflicting Flow All	671	651	309
Stage 1	424	424	-
Stage 2	247	227	-
Critical Hdwy	7.12	6.52	6.22
Critical Hdwy Stg 1	6.12	5.52	-
Critical Hdwy Stg 2	6.12	5.52	-
Follow-up Hdwy	3.518	4.018	3.318
Pot Cap-1 Maneuver	370	388	731
Stage 1	608	587	-
Stage 2	757	716	-
Platoon blocked, %			
Mov Cap-1 Maneuver	329	357	731
Mov Cap-2 Maneuver	329	357	-
Stage 1	588	558	-
Stage 2	695	692	-

Approach

	SB
HCM Control Delay, s	11.6
HCM LOS	B

Minor Lane/Major Mvmt

HCM research expects at least one 'Stop' controlled approach at the intersection.

HCM 2010 TWSC
76: S Ithan Ave & Dwy

9/17/2014

Intersection						
Int Delay, s/veh	3.7					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	0	151	262	0	109	53
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, %	-	1	-1	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	164	285	0	118	58
Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	285	0	-	0	449	285
Stage 1	-	-	-	-	285	-
Stage 2	-	-	-	-	164	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1277	-	-	-	568	754
Stage 1	-	-	-	-	763	-
Stage 2	-	-	-	-	865	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	1277	-	-	-	568	754
Mov Cap-2 Maneuver	-	-	-	-	568	-
Stage 1	-	-	-	-	763	-
Stage 2	-	-	-	-	865	-
Approach	EB		WB		SB	
HCM Control Delay, s	0		0		13.1	
HCM LOS					B	
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	
Capacity (veh/h)	1277	-	-	-	618	
HCM Lane V/C Ratio	-	-	-	-	0.285	
HCM Control Delay (s)	0	-	-	-	13.1	
HCM Lane LOS	A	-	-	-	B	
HCM 95th %tile Q(veh)	0	-	-	-	1.2	

HCM 2010 TWSC
78: Dwy & S Ithan Ave

9/17/2014

Intersection						
Int Delay, s/veh	1.2					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	211	0	0	424	20	54
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, %	1	-	-	-1	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	229	0	0	461	22	59
Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	229	0	690	229
Stage 1	-	-	-	-	229	-
Stage 2	-	-	-	-	461	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1339	-	411	810
Stage 1	-	-	-	-	809	-
Stage 2	-	-	-	-	635	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	1339	-	411	810
Mov Cap-2 Maneuver	-	-	-	-	411	-
Stage 1	-	-	-	-	809	-
Stage 2	-	-	-	-	635	-
Approach	EB		WB		NB	
HCM Control Delay, s	0		0		11.4	
HCM LOS					B	
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	
Capacity (veh/h)	642	-	-	1339	-	
HCM Lane V/C Ratio	0.125	-	-	-	-	
HCM Control Delay (s)	11.4	-	-	0	-	
HCM Lane LOS	B	-	-	A	-	
HCM 95th %tile Q(veh)	0.4	-	-	0	-	

Intersection	
Int Delay, s/veh	1.5

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	1221	47	48	914	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	1489	57	59	1115	0	46

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	1546	2192
Stage 1	-	-	1518
Stage 2	-	-	674
Critical Hdwy	-	4.1	6.8
Critical Hdwy Stg 1	-	-	5.8
Critical Hdwy Stg 2	-	-	5.8
Follow-up Hdwy	-	2.2	3.5
Pot Cap-1 Maneuver	-	435	40
Stage 1	-	-	171
Stage 2	-	-	473
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	435	26
Mov Cap-2 Maneuver	-	-	26
Stage 1	-	-	171
Stage 2	-	-	305

Approach	EB	WB	NB
HCM Control Delay, s	0	2.9	17
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	346	-	-	435	-
HCM Lane V/C Ratio	0.134	-	-	0.135	-
HCM Control Delay (s)	17	-	-	14.6	2.3
HCM Lane LOS	C	-	-	B	A
HCM 95th %tile Q(veh)	0.5	-	-	0.5	-

Lanes, Volumes, Timings

2: County Line Rd & N Ithan Ave

9/17/2014



Lane Group	EBL	EBR	SBL	SBR	NWL	NWR
Lane Configurations	WT		WT		WT	
Volume (vph)	221	37	300	307	23	161
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)	235	39	319	327	24	171
Shared Lane Traffic (%)						
Lane Group Flow (vph)	274	0	646	0	195	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	71.2%
ICU Level of Service	C
Analysis Period (min)	15

Lanes, Volumes, Timings

38: County Line Rd & N Ithaca Ave

9/17/2014



Lane Group	NBT	NBR	SBL	SBT	SWL	SWR
Lane Configurations	↑			↑	↑	
Volume (vph)	268	117	182	490	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)	285	124	194	521	121	66
Shared Lane Traffic (%)						
Lane Group Flow (vph)	409	0	0	715	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	77.2%
ICU Level of Service	D
Analysis Period (min)	15

HCM 2010 Signalized Intersection Summary
3: County Line Rd & Spring Mill Rd

9/17/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Volume (veh/h)	64	305	94	46	244	52	72	182	38	65	376	45
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Ob), 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	180.0	178.9	180.0	180.0	176.5	180.0	180.0	180.0	180.0	180.0	177.3	180.0
Adj Flow Rate, veh/h	89	339	109	64	280	81	89	233	58	86	422	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	137	385	115	118	383	101	146	335	73	135	477	69
Arrive On Green	0.38	0.38	0.38	0.38	0.38	0.38	0.39	0.39	0.39	0.39	0.39	0.39
Sat Flow, veh/h	171	1004	299	123	999	264	178	849	185	163	1208	175
Grp Volume(v), veh/h	537	0	0	425	0	0	380	0	0	573	0	0
Grp Sat Flow(s),veh/h/ln	1475	0	0	1385	0	0	1212	0	0	1546	0	0
Q Serve(g_s), s	5.8	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	20.8	0.0	0.0	15.0	0.0	0.0	15.0	0.0	0.0	21.0	0.0	0.0
Prop In Lane	0.17		0.20	0.15		0.19	0.23		0.15	0.15		0.11
Lane Grp Cap(c), veh/h	637	0	0	602	0	0	554	0	0	681	0	0
V/C Ratio(X)	0.84	0.00	0.00	0.71	0.00	0.00	0.69	0.00	0.00	0.84	0.00	0.00
Avail Cap(c_a), veh/h	637	0	0	602	0	0	587	0	0	717	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	17.3	0.0	0.0	15.2	0.0	0.0	14.3	0.0	0.0	16.9	0.0	0.0
Incr Delay (d2), s/veh	6.4	0.0	0.0	6.8	0.0	0.0	2.4	0.0	0.0	8.0	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(50%),veh/ln	9.5	0.0	0.0	7.0	0.0	0.0	5.5	0.0	0.0	10.3	0.0	0.0
LnGrp Delay(d),s/veh	23.7	0.0	0.0	22.0	0.0	0.0	16.8	0.0	0.0	24.9	0.0	0.0
LnGrp LOS	C			C			B			C		
Approach Vol, veh/h		537			425			380			573	
Approach Delay, s/veh		23.7			22.0			16.8			24.9	
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		30.3		29.7		30.3		29.7				
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		22.8		23.0		17.0		17.0				
Green Ext Time (p_c), s		0.1		0.6		2.3		1.7				
Intersection Summary												
HCM 2010 Ctrl Delay				22.3								
HCM 2010 LOS				C								

HCM 2010 Signalized Intersection Summary
7: Sproul Rd/Spring Mill Rd & Aldwyn Ln/Kenilworth Rd & Lancaster Ave

9/17/2014

HCM 2010 methodology does not support more than 4 approaches.

HCM 2010 Signalized Intersection Summary
11: Chapel Dr & Lancaster Ave

9/17/2014

	→	↘	↙	←	↖	↗		
Movement	EBT	EBR	WBL	WBT	NBL	NBR		
Lane Configurations	↑↑			↑↑	↑	↑		
Volume (veh/h)	1167	37	26	849	103	30		
Number	2	12	1	6	3	18		
Initial Q (Ob), veh	0	0	0	0	0	0		
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00		
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00		
Adj Sat Flow, veh/h/ln	176.5	180.0	180.0	176.5	176.5	176.5		
Adj Flow Rate, veh/h	1268	40	28	923	112	33		
Adj No. of Lanes	2	0	0	2	1	1		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92		
Percent Heavy Veh, %	2	2	2	2	2	2		
Cap, veh/h	2139	67	113	2033	148	132		
Arrive On Green	0.64	0.64	0.64	0.64	0.09	0.09		
Sat Flow, veh/h	3406	105	32	3234	1681	1500		
Grp Volume(v), veh/h	640	668	497	454	112	33		
Grp Sat Flow(s),veh/h/ln	1676	1746	1660	1526	1681	1500		
Q Serve(g_s), s	9.0	9.0	0.0	6.2	2.7	0.8		
Cycle Q Clear(g_c), s	9.0	9.0	5.7	6.2	2.7	0.8		
Prop In Lane		0.06	0.06		1.00	1.00		
Lane Grp Cap(c), veh/h	1081	1125	1163	983	148	132		
V/C Ratio(X)	0.59	0.59	0.43	0.46	0.76	0.25		
Avail Cap(c_a), veh/h	1081	1125	1163	983	920	821		
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00		
Upstream Filter(l)	1.00	1.00	0.73	0.73	1.00	1.00		
Uniform Delay (d), s/veh	4.2	4.2	3.6	3.7	18.3	17.5		
Incr Delay (d2), s/veh	2.4	2.3	0.8	1.1	7.7	1.0		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	4.8	5.0	3.0	2.8	1.6	0.4		
LnGrp Delay(d),s/veh	6.6	6.5	4.5	4.8	26.0	18.5		
LnGrp LOS	A	A	A	A	C	B		
Approach Vol, veh/h	1308			951	145			
Approach Delay, s/veh	6.6			4.6	24.3			
Approach LOS	A			A	C			
Timer	1	2	3	4	5	6	7	8
Assigned Phs		2				6		8
Phs Duration (G+Y+Rc), s		50.9				50.9		9.1
Change Period (Y+Rc), s		5.0				5.0		5.0
Max Green Setting (Gmax), s		27.0				27.0		23.0
Max Q Clear Time (g_c+I1), s		11.0				8.2		4.7
Green Ext Time (p_c), s		8.9				9.8		0.4
Intersection Summary								
HCM 2010 Ctrl Delay				6.9				
HCM 2010 LOS				A				

HCM 2010 Signalized Intersection Summary
16: Sproul Rd & Conestoga Rd

9/17/2014

	↘	→	↙	↖	←	↗	↘	↙	↖	↗	↘	↙	↖
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR	
Lane Configurations	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	
Volume (veh/h)	106	546	220	27	512	47	106	187	28	51	295	83	
Number	7	4	14	3	8	18	1	6	16	5	2	12	
Initial Q (Ob), 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	178.2	178.2	180.0	182.7	182.7	184.5	177.3	177.3	179.1	180.9	179.1	180.9	
Adj Flow Rate, veh/h	112	575	0	28	539	0	112	197	29	54	311	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	220	798	0	252	588	0	192	612	90	88	324	86	
Arrive On Green	0.06	0.45	0.00	0.32	0.32	0.00	0.06	0.40	0.40	0.27	0.27	0.27	
Sat Flow, veh/h	1697	1782	0	864	1827	0	1689	1511	223	136	1206	320	
Grp Volume(v), veh/h	112	575	0	28	539	0	112	0	226	452	0	0	
Grp Sat Flow(s),veh/h/ln	1697	1782	0	864	1827	0	1689	0	1734	1662	0	0	
Q Serve(g_s), s	3.3	20.5	0.0	2.1	22.2	0.0	3.6	0.0	7.0	14.7	0.0	0.0	
Cycle Q Clear(g_c), s	3.3	20.5	0.0	12.8	22.2	0.0	3.6	0.0	7.0	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	798	0	252	588	0	192	0	702	498	0	0	
V/C Ratio(X)	0.51	0.72	0.00	0.11	0.92	0.00	0.58	0.00	0.32	0.91	0.00	0.00	
Avail Cap(c_a), veh/h	266	798	0	252	588	0	233	0	744	498	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(l)	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	17.6	0.0	26.8	25.5	0.0	20.9	0.0	15.9	28.6	0.0	0.0	
Incr Delay (d2), s/veh	1.8	5.6	0.0	0.9	21.5	0.0	2.8	0.0	0.3	20.3	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(50%),veh/ln	1.6	11.3	0.0	0.6	14.6	0.0	1.8	0.0	3.4	12.5	0.0	0.0	
LnGrp Delay(d),s/veh	21.0	23.1	0.0	27.7	47.0	0.0	23.7	0.0	16.2	48.9	0.0	0.0	
LnGrp LOS	C	C		C	D		C		B	D			
Approach Vol, veh/h		687			567			338				452	
Approach Delay, s/veh		22.8			46.1			18.7				48.9	
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	27.0		42.4		37.6	9.9	32.5					
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		35.5		34.0	7.0	23.5					
Max Q Clear Time (g_c+I1), s	5.6	23.0		22.5		9.0	5.3	24.2					
Green Ext Time (p_c), s	0.0	0.0		5.7		2.5	0.0	0.0					
Intersection Summary													
HCM 2010 Ctrl Delay				34.3									
HCM 2010 LOS				C									

HCM 2010 Signalized Intersection Summary
25: S Ithan Ave & Conestoga Rd

9/17/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		+			+			+			+	
Volume (veh/h)	61	520	7	11	469	37	7	15	6	43	77	126
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Ob), 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	185.4	183.6	185.4	176.4	174.7	176.4	176.3	174.5	176.3	184.4	182.6	184.4
Adj Flow Rate, veh/h	69	591	8	12	533	42	8	17	7	49	88	143
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	767	10	93	757	59	150	225	75	139	129	174
Arrive On Green	0.48	0.48	0.48	0.48	0.48	0.48	0.21	0.21	0.21	0.21	0.21	0.21
Sat Flow, veh/h	105	1600	21	10	1580	123	201	1071	356	182	614	832
Grp Volume(v), veh/h	668	0	0	587	0	0	32	0	0	280	0	0
Grp Sat Flow(s),veh/h/ln	1727	0	0	1713	0	0	1628	0	0	1628	0	0
Q Serve(g_s), s	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.8	0.0	0.0
Cycle Q Clear(g_c), s	13.2	0.0	0.0	11.2	0.0	0.0	0.6	0.0	0.0	6.8	0.0	0.0
Prop In Lane	0.10		0.01	0.02		0.07	0.25		0.22	0.17		0.51
Lane Grp Cap(c), veh/h	922	0	0	909	0	0	449	0	0	443	0	0
V/C Ratio(X)	0.72	0.00	0.00	0.65	0.00	0.00	0.07	0.00	0.00	0.63	0.00	0.00
Avail Cap(c_a), veh/h	1452	0	0	1452	0	0	689	0	0	701	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	9.0	0.0	0.0	8.6	0.0	0.0	13.3	0.0	0.0	15.7	0.0	0.0
Incr Delay (d2), s/veh	1.1	0.0	0.0	0.8	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(50%),veh/ln	6.6	0.0	0.0	5.4	0.0	0.0	0.3	0.0	0.0	3.2	0.0	0.0
LnGrp Delay(d),s/veh	10.1	0.0	0.0	9.4	0.0	0.0	13.4	0.0	0.0	17.2	0.0	0.0
LnGrp LOS	B			A			B			B		
Approach Vol, veh/h	668			587			32			280		
Approach Delay, s/veh	10.1			9.4			13.4			17.2		
Approach LOS	B			A			B			B		
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	2		4		6		8					
Phs Duration (G+Y+Rc), s	26.5		15.3		26.5		15.3					
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	13.2		2.6		15.2		8.8					
Green Ext Time (p_c), s	5.5		1.0		5.3		0.7					
Intersection Summary												
HCM 2010 Ctrl Delay				11.2								
HCM 2010 LOS				B								

HCM 2010 Signalized Intersection Summary
27: S Ithan Ave/N Ithan Ave & Lancaster Ave

9/17/2014

HCM 2010 methodology does not support exclusive ped or hold phases.

HCM 2010 Signalized Intersection Summary
33: Williams Rd/Garrett Ave & Conestoga Rd

9/17/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↕			↕			↕			↕	
Volume (veh/h)	26	485	9	12	490	28	16	1	11	27	12	52
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Ob), 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	187.2	187.2	187.2	187.2	187.2	187.2	180.0	180.0	180.0	172.8	172.8	172.8
Adj Flow Rate, veh/h	28	527	10	13	533	30	17	1	12	29	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	1247	23	67	1235	68	141	25	52	100	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	32	13	1732	96	634	296	620	324	308	858
Grp Volume(v), veh/h	565	0	0	576	0	0	30	0	0	99	0	0
Grp Sat Flow(s),veh/h/ln	1822	0	0	1841	0	0	1550	0	0	1491	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	8.0	0.0	0.0	8.2	0.0	0.0	1.1	0.0	0.0	4.1	0.0	0.0
Prop In Lane	0.05		0.02	0.02		0.05	0.57		0.40	0.29		0.58
Lane Grp Cap(c), veh/h	1358	0	0	1370	0	0	217	0	0	197	0	0
V/C Ratio(X)	0.42	0.00	0.00	0.42	0.00	0.00	0.14	0.00	0.00	0.50	0.00	0.00
Avail Cap(c_a), veh/h	1358	0	0	1370	0	0	401	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(l)	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	3.8	0.0	0.0	27.3	0.0	0.0	28.7	0.0	0.0
Incr Delay (d2), s/veh	0.9	0.0	0.0	0.9	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(50%),veh/ln	4.3	0.0	0.0	4.5	0.0	0.0	0.5	0.0	0.0	1.9	0.0	0.0
LnGrp Delay(d),s/veh	4.7	0.0	0.0	4.8	0.0	0.0	27.7	0.0	0.0	31.5	0.0	0.0
LnGrp LOS	A			A			C			C		
Approach Vol, veh/h	565			576			30			99		
Approach Delay, s/veh	4.7			4.8			27.7			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		11.8		52.0		11.8					
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	10.0		6.1		10.2		3.1					
Green Ext Time (p_c), s	5.5		0.3		5.5		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
51: Lowrys Ln & Lancaster Ave

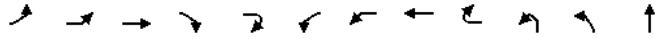
9/17/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Volume (veh/h)	2	1214	22	15	996	4	19	36	15	97	70	71
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Ob), 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	180.0	178.2	180.0	177.3	175.5	177.3	190.0	188.1	190.0	188.1	186.3	188.1
Adj Flow Rate, veh/h	2	1320	24	16	1083	4	21	39	16	105	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	65	1992	36	75	1958	7	131	201	67	196	108	91
Arrive On Green	0.60	0.60	0.60	0.60	0.60	0.60	0.19	0.19	0.19	0.19	0.19	0.19
Sat Flow, veh/h	1	3331	60	15	3275	12	263	1071	356	562	574	483
Grp Volume(v), veh/h	706	0	640	571	0	532	76	0	0	258	0	0
Grp Sat Flow(s),veh/h/ln	1781	0	1611	1706	0	1595	1689	0	0	1619	0	0
Q Serve(g_s), s	0.0	0.0	14.8	0.0	0.0	11.3	0.0	0.0	0.0	6.6	0.0	0.0
Cycle Q Clear(g_c), s	14.8	0.0	14.8	10.9	0.0	11.3	2.0	0.0	0.0	8.6	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	1129	0	963	1086	0	954	399	0	0	395	0	0
V/C Ratio(X)	0.63	0.00	0.66	0.53	0.00	0.56	0.19	0.00	0.00	0.65	0.00	0.00
Avail Cap(c_a), veh/h	1129	0	963	1086	0	954	515	0	0	507	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(l)	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	6.7	0.0	6.8	19.3	0.0	0.0	21.9	0.0	0.0
Incr Delay (d2), s/veh	2.6	0.0	3.6	1.8	0.0	2.4	0.2	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(50%),veh/ln	7.9	0.0	7.4	5.8	0.0	5.5	1.0	0.0	0.0	4.0	0.0	0.0
LnGrp Delay(d),s/veh	10.1	0.0	11.1	8.5	0.0	9.2	19.5	0.0	0.0	23.8	0.0	0.0
LnGrp LOS	B		B	A		A	B			C		
Approach Vol, veh/h	1346			1103			76			258		
Approach Delay, s/veh	10.6			8.8			19.5			23.8		
Approach LOS	B			A			B			C		
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	2		4		6		8					
Phs Duration (G+Y+Rc), s	44.0		16.0		44.0		16.0					
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	16.8		10.6		13.3		4.0					
Green Ext Time (p_c), s	10.1		0.5		11.2		1.0					
Intersection Summary												
HCM 2010 Ctrl Delay	11.4											
HCM 2010 LOS	B											
Notes												
User approved pedestrian interval to be less than phase max green.												

Lanes, Volumes, Timings

7: Sproul Rd/Spring Mill Rd & Aldwyn Ln/Kenilworth Rd & Lancaster Ave

9/17/2014



Lane Group	EBL2	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR2	NBL2	NBL	NBT
Lane Configurations												
Volume (vph)	4	248	977	30	280	2	22	901	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
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					0.221					0.753
Satd. Flow (perm)	0	151	3180	0	1576	0	394	3370	0	0	0	1203
Right Turn on Red					Yes			Yes				
Satd. Flow (RTOR)					234			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	256	1007	31	289	2	23	929	34	7	54	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	260	1038	0	289	0	25	963	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	1.18	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

Lanes, Volumes, Timings

7: Sproul Rd/Spring Mill Rd & Aldwyn Ln/Kenilworth Rd & Lancaster Ave

9/17/2014



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	190	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				200			0
Storage Lanes					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
Flt Protected					0.995				0.950			0.976
Satd. Flow (prot)	0	0	0	0	1462	0	0	0	1651	1640	0	0
Flt Permitted					0.982				0.098			0.976
Satd. Flow (perm)	0	0	0	0	1443	0	0	0	170	1640	0	0
Right Turn on Red		No				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	196	0	115	21	1
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	19	0	0	0	196	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			0
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	1.15	1.15	1.09	1.09	1.14	1.14	1.14
Turning Speed (mph)	9	9	15	15	15	15	15	9	9	15	15	15
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	9	9			3	3	8		
Permitted Phases			9	9	9			8	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		

Lanes, Volumes, Timings

7: Sproul Rd/Spring Mill Rd & Aldwyn Ln/Kenilworth Rd & Lancaster Ave

9/17/2014



Lane Group	SWL2	SWL	SWT	SWR	SWR2
Lane Configurations					
Volume (vph)	39	9	165	233	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	170	240	1
Shared Lane Traffic (%)					
Lane Group Flow (vph)	0	49	411	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		

Lanes, Volumes, Timings

7: Sproul Rd/Spring Mill Rd & Aldwyn Ln/Kenilworth Rd & Lancaster Ave

9/17/2014



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 Effect 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		1.13	0.78	0.36		0.25	0.97					1.21
Control Delay		134.5	42.1	7.9		53.5	63.8					236.1
Queue Delay		0.0	0.0	0.0		0.0	0.0					0.0
Total Delay		134.5	42.1	7.9		53.5	63.8					236.1
LOS		F	D	A		D	E					F
Approach Delay			51.0				63.6					236.1
Approach LOS			D				E					F
Queue Length 50th (ft)		-257	470	33		20	415					-91
Queue Length 95th (ft)		#444	563	101		52	#569					#205
Internal Link Dist (ft)			497				784					412
Turn Bay Length (ft)			300				75					
Base Capacity (vph)		231	1331	795		99	997					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	0.78	0.36		0.25	0.97					1.21

Intersection Summary

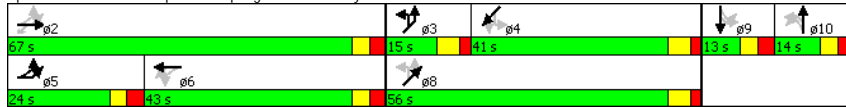
Area Type:	Other
Cycle Length:	150
Actuated Cycle Length:	144.8
Natural Cycle:	150
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	1.35
Intersection Signal Delay:	77.5
Intersection LOS:	E
Intersection Capacity Utilization:	115.7%
ICU Level of Service:	H
Analysis Period (min):	15
-	Volume exceeds 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.

Lanes, Volumes, Timings

7: Sproul Rd/Spring Mill Rd & Aldwyn Ln/Kenilworth Rd & Lancaster Ave

9/17/2014

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

9/17/2014

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		
Total Lost Time (s)					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					1.35		0.24
Control Delay					83.2					227.6		36.8
Queue Delay					0.0					0.0		0.0
Total Delay					83.2					227.6		36.8
LOS					F					F		D
Approach Delay					83.2					149.1		
Approach LOS					F					F		
Queue Length 50th (ft)					18					-209		98
Queue Length 95th (ft)					48					#377		156
Internal Link Dist (ft)					517					1256		
Turn Bay Length (ft)										200		
Base Capacity (vph)					64					145		561
Starvation Cap Reductn					0					0		0
Spillback Cap Reductn					0					0		0
Storage Cap Reductn					0					0		0
Reduced v/c Ratio					0.30					1.35		0.24

Intersection Summary

Lanes, Volumes, Timings

7: Sproul Rd/Spring Mill Rd & Aldwyn Ln/Kenilworth Rd & Lancaster Ave

9/17/2014



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	1.11		
Control Delay		47.9	129.3		
Queue Delay		0.0	0.0		
Total Delay		47.9	129.3		
LOS		D	F		
Approach Delay			120.6		
Approach LOS			F		
Queue Length 50th (ft)		39	-471		
Queue Length 95th (ft)		79	#686		
Internal Link Dist (ft)			3088		
Turn Bay Length (ft)		150			
Base Capacity (vph)		272	371		
Starvation Cap Reductn		0	0		
Spillback Cap Reductn		0	0		
Storage Cap Reductn		0	0		
Reduced v/c Ratio		0.18	1.11		
Intersection Summary					

Lanes, Volumes, Timings
11: Chapel Dr & Lancaster Ave

9/17/2014

	→	↖	↙	←	↗	↘
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑	↖	↘
Volume (vph)	1167	37	26	849	103	30
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width (ft)	11	11	11	11	12	12
Storage Length (ft)		125	100		0	0
Storage Lanes		0	0		1	1
Taper Length (ft)			25		25	
Lane Util. Factor	0.95	0.95	0.95	0.95	1.00	1.00
Frt	0.995					0.850
Flt Protected				0.999	0.950	
Satd. Flow (prot)	3225	0	0	3238	1676	1500
Flt Permitted				0.892	0.950	
Satd. Flow (perm)	3225	0	0	2891	1676	1500
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	7					22
Link Speed (mph)	35			35	25	
Link Distance (ft)	745			1291	319	
Travel Time (s)	14.5			25.1	8.7	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1268	40	28	923	112	33
Shared Lane Traffic (%)						
Lane Group Flow (vph)	1308	0	0	951	112	33
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	10			10	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	1
Detector Template	Thru		Left	Thru	Left	Right
Leading Detector (ft)	37		20	37	37	20
Trailing Detector (ft)	-3		0	-3	-3	0
Detector 1 Position(ft)	-3		0	-3	-3	0
Detector 1 Size(ft)	40		20	40	40	20
Detector 1 Type	CI+Ex		CI+Ex	CI+Ex	CI+Ex	CI+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	NA	Prot	Perm
Protected Phases	2			6	8	
Permitted Phases			6			8
Detector Phase	2		6	6	8	8
Switch Phase						
Minimum Initial (s)	10.0		10.0	10.0	4.0	4.0
Minimum Split (s)	21.0		21.0	21.0	28.0	28.0
Total Split (s)	32.0		32.0	32.0	28.0	28.0

Lanes, Volumes, Timings
11: Chapel Dr & Lancaster Ave

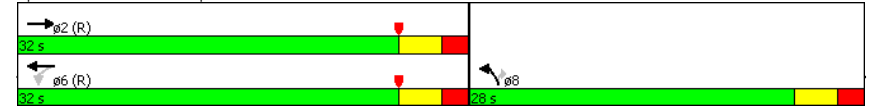
9/17/2014

	→	↖	↙	←	↗	↘
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Total Split (%)	53.3%		53.3%	53.3%	46.7%	46.7%
Maximum Green (s)	27.0		27.0	27.0	23.0	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	None	None
Walk Time (s)	10.0		10.0	10.0	7.0	7.0
Flash Dont Walk (s)	0.0		0.0	0.0	16.0	16.0
Pedestrian Calls (#/hr)	0		0	0	0	0
Act Effect Green (s)	43.3		43.3	43.3	8.9	8.9
Actuated g/C Ratio	0.72		0.72	0.72	0.15	0.15
v/c Ratio	0.56		0.46	0.46	0.45	0.14
Control Delay	6.8		3.8	3.8	28.2	13.2
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	6.8		3.8	3.8	28.2	13.2
LOS	A		A	A	C	B
Approach Delay	6.8		3.8	3.8	24.8	
Approach LOS	A		A	A	C	
Queue Length 50th (ft)	111		1	38	3	
Queue Length 95th (ft)	202		m225	73	22	
Internal Link Dist (ft)	665		1211	239		
Turn Bay Length (ft)						
Base Capacity (vph)	2330		2087	628	576	
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	0.56		0.46	0.18	0.06	

Intersection Summary

Area Type: Other
 Cycle Length: 60
 Actuated Cycle Length: 60
 Offset: 26 (43%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow
 Natural Cycle: 60
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.56
 Intersection Signal Delay: 6.7
 Intersection LOS: A
 Intersection Capacity Utilization 59.8%
 ICU Level of Service B
 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

9/17/2014



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↕	↕	↔	↕	↕	↔	↕	↕	↔	↕	↕
Volume (vph)	79	1001	116	114	701	34	89	91	29	67	183	85
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%		0%		0%	
Storage Length (ft)	250		0	200		0	200		0	65		0
Storage Lanes	1		1	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850		0.993			0.963			0.953	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1565	3129	1400	1541	3061	0	1557	1578	0	1565	1570	0
Flt Permitted	0.261			0.132			0.301			0.652		
Satd. Flow (perm)	430	3129	1400	214	3061	0	493	1578	0	1074	1570	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		35			35			25			25	
Link Distance (ft)		1291			265			344			973	
Travel Time (s)		25.1			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)	83	1054	122	120	738	36	94	96	31	71	193	89
Shared Lane Traffic (%)												
Lane Group Flow (vph)	83	1054	122	120	774	0	94	127	0	71	282	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			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	1	
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	
Leading Detector (ft)	37	37	20	37	37		37	37		37	37	
Trailing Detector (ft)	-3	-3	0	-3	-3		-3	-3		-3	-3	
Detector 1 Position(ft)	-3	-3	0	-3	-3		-3	-3		-3	-3	
Detector 1 Size(ft)	40	40	20	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	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	NA	Perm	pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2		2	6			8			4		
Detector Phase	5	2	2	1	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	3.0	34.0	34.0	3.0	34.0		3.0	3.0		3.0	3.0	
Minimum Split (s)	13.0	40.0	40.0	13.0	40.0		13.0	13.0		13.0	13.0	

Lanes, Volumes, Timings

27: S Ithan Ave/N Ithan Ave & Lancaster Ave

9/17/2014

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

Lanes, Volumes, Timings

27: S Ithan Ave/N Ithan Ave & Lancaster Ave

9/17/2014



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Split (s)	14.0	50.0	50.0	13.0	49.0	49.0	31.0	31.0	31.0	31.0	31.0	31.0
Total Split (%)	11.7%	41.7%	41.7%	10.8%	40.8%	40.8%	25.8%	25.8%	25.8%	25.8%	25.8%	25.8%
Maximum Green (s)	8.0	44.0	44.0	7.0	43.0	43.0	25.0	25.0	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	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	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	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	6.5	6.5	6.5	6.5
Lead/Lag	Lead	Lag	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	3.0	
Recall Mode	None	C-Max	C-Max	None	C-Max		None	None		None	None	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effect Green (s)	56.8	49.7	49.7	56.7	51.5		23.5	23.5		23.5	23.5	
Actuated g/C Ratio	0.47	0.41	0.41	0.47	0.43		0.20	0.20		0.20	0.20	
v/c Ratio	0.31	0.81	0.21	0.69	0.59		0.98	0.41		0.34	0.92	
Control Delay	20.7	40.3	26.5	38.1	24.5		135.3	46.3		46.1	81.7	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	20.7	40.3	26.5	38.1	24.5		135.3	46.3		46.1	81.7	
LOS	C	D	C	D	C		F	D		D	F	
Approach Delay		37.6			26.3			84.2			74.5	
Approach LOS		D			C			F			E	
Queue Length 50th (ft)	35	458	64	53	201		72	86		47	214	
Queue Length 95th (ft)	m62	#562	100	m#105	240		#182	147		94	#370	
Internal Link Dist (ft)		1211			185			264			893	
Turn Bay Length (ft)	250			200			200			65		
Base Capacity (vph)	275	1295	579	173	1313		100	322		219	320	
Starvation Cap Reductn	0	0	0	0	0		0	0		0	0	
Spillback Cap Reductn	0	0	0	0	0		0	0		0	0	
Storage Cap Reductn	0	0	0	0	0		0	0		0	0	
Reduced v/c Ratio	0.30	0.81	0.21	0.69	0.59		0.94	0.39		0.32	0.88	

Intersection Summary

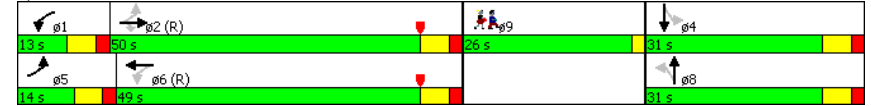
Area Type: Other
 Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow, Master Intersection
 Natural Cycle: 105
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.98
 Intersection Signal Delay: 42.5 Intersection LOS: D
 Intersection Capacity Utilization 78.4% 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.

Lanes, Volumes, Timings

27: S Ithan Ave/N Ithan Ave & Lancaster Ave

9/17/2014

Splits and Phases: 27: S Ithan Ave/N Ithan Ave & Lancaster Ave



Lanes, Volumes, Timings

27: S Ithan Ave/N Ithan Ave & Lancaster Ave

9/17/2014

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 TWSC
2: County Line Rd & N Ithan Ave

9/17/2014

Intersection						
Int Delay, s/veh	0					
Movement	EBL	EBR	SBL	SBR	NWL	NWR
Vol, veh/h	191	37	300	264	23	161
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	0	-	0	-
Veh in Median Storage, #	0	-	0	-	0	-
Grade, %	0	-	0	-	0	-
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	1	1	1	1	1	1
Mvmt Flow	203	39	319	281	24	171

Major/Minor	Minor2	Major2	Minor1
Conflicting Flow All	86	0	20
Stage 1	0	-	0
Stage 2	86	-	20
Critical Hdwy	-	-	-
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	-	-	-
Pot Cap-1 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	-	-
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	EB	SB	NW
HCM Control Delay, s	0		
HCM LOS	-		

Minor Lane/Major Mvmt	NWLn1	EBLn1	SBL	SBR
Capacity (veh/h)	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-
HCM Control Delay (s)	-	-	-	-
HCM Lane LOS	-	-	-	-
HCM 95th %tile Q(veh)	-	-	-	-

HCM 2010 TWSC
15: Conestoga Rd & Spring Mill Rd

9/17/2014

Intersection						
Int Delay, s/veh	0.5					
Movement	EBL	EBT	WBT	WBR	SWL	SWR
Vol, veh/h	10	653	606	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	680	631	3	18	9

Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	634	0	1334
Stage 1	-	-	633
Stage 2	-	-	701
Critical Hdwy	4.11	-	6.41
Critical Hdwy Stg 1	-	-	5.41
Critical Hdwy Stg 2	-	-	5.41
Follow-up Hdwy	2.209	-	3.509
Pot Cap-1 Maneuver	954	-	171
Stage 1	-	-	531
Stage 2	-	-	494
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	954	-	168
Mov Cap-2 Maneuver	-	-	168
Stage 1	-	-	531
Stage 2	-	-	486

Approach	EB	WB	SW
HCM Control Delay, s	0.1	0	23.9
HCM LOS	-	-	C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SWLn1
Capacity (veh/h)	954	-	-	-	217
HCM Lane V/C Ratio	0.011	-	-	-	0.125
HCM Control Delay (s)	8.8	0	-	-	23.9
HCM Lane LOS	A	A	-	-	C
HCM 95th %tile Q(veh)	0	-	-	-	0.4

HCM 2010 TWSC
29: Strathmore Dr/Lowrys Ln & Conestoga Rd

9/17/2014

Intersection									
Int Delay, s/veh	2.6								
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR
Vol, veh/h	37	491	17	17	460	16	15	8	17
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-
Peak Hour Factor	96	96	96	96	96	96	96	96	96
Heavy Vehicles, %	1	1	1	1	1	1	1	1	1
Mvmt Flow	39	511	18	18	479	17	16	8	18
Major/Minor	Major1			Major2			Minor1		
Conflicting Flow All	496	0	0	529	0	0	1156	1128	520
Stage 1	-	-	-	-	-	-	597	597	-
Stage 2	-	-	-	-	-	-	559	531	-
Critical Hdwy	4.11	-	-	4.11	-	-	7.11	6.51	6.21
Critical Hdwy Stg 1	-	-	-	-	-	-	6.11	5.51	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.11	5.51	-
Follow-up Hdwy	2.209	-	-	2.209	-	-	3.509	4.009	3.309
Pot Cap-1 Maneuver	1073	-	-	1043	-	-	174	205	558
Stage 1	-	-	-	-	-	-	491	493	-
Stage 2	-	-	-	-	-	-	515	528	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	1073	-	-	1043	-	-	138	190	558
Mov Cap-2 Maneuver	-	-	-	-	-	-	138	190	-
Stage 1	-	-	-	-	-	-	465	467	-
Stage 2	-	-	-	-	-	-	439	515	-
Approach	EB			WB			NB		
HCM Control Delay, s	0.6			0.3			25		
HCM LOS	D			D			D		
Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	
Capacity (veh/h)	221	1073	-	-	1043	-	-	334	
HCM Lane V/C Ratio	0.189	0.036	-	-	0.017	-	-	0.246	
HCM Control Delay (s)	25	8.5	0	-	8.5	0	-	19.3	
HCM Lane LOS	D	A	A	-	A	A	-	C	
HCM 95th %tile Q(veh)	0.7	0.1	-	-	0.1	-	-	1	

HCM 2010 TWSC
29: Strathmore Dr/Lowrys Ln & Conestoga Rd

9/17/2014

Intersection			
Int Delay, s/veh			
Movement	SBL	SBT	SBR
Vol, veh/h	9	17	53
Conflicting Peds, #/hr	0	0	0
Sign Control	Stop	Stop	Stop
RT Channelized	-	-	None
Storage Length	-	-	-
Veh in Median Storage, #	-	0	-
Grade, %	-	0	-
Peak Hour Factor	96	96	96
Heavy Vehicles, %	1	1	1
Mvmt Flow	9	18	55
Major/Minor	Minor2		
Conflicting Flow All	1133	1129	488
Stage 1	523	523	-
Stage 2	610	606	-
Critical Hdwy	7.11	6.51	6.21
Critical Hdwy Stg 1	6.11	5.51	-
Critical Hdwy Stg 2	6.11	5.51	-
Follow-up Hdwy	3.509	4.009	3.309
Pot Cap-1 Maneuver	181	205	582
Stage 1	539	532	-
Stage 2	483	488	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	160	190	582
Mov Cap-2 Maneuver	160	190	-
Stage 1	511	519	-
Stage 2	435	463	-
Approach	SB		
HCM Control Delay, s	19.3		
HCM LOS	C		
Minor Lane/Major Mvmt			

HCM 2010 TWSC
38: County Line Rd & N Ithan Ave

9/17/2014

Intersection						
Int Delay, s/veh	44.4					
Movement	NBT	NBR	SBL	SBT	SWL	SWR
Vol, veh/h	248	107	182	460	101	62
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Stop	Stop	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	1	1	1	1	1	1
Mvmt Flow	264	114	194	489	107	66
Major/Minor	Major1	Minor2	Minor1			
Conflicting Flow All	0	0	354	378	566	321
Stage 1	-	-	0	0	321	-
Stage 2	-	-	354	378	245	-
Critical Hdwy	-	-	6.41	6.51	6.41	6.21
Critical Hdwy Stg 1	-	-	-	-	5.41	-
Critical Hdwy Stg 2	-	-	5.41	5.51	-	-
Follow-up Hdwy	-	-	3.509	4.009	3.509	3.309
Pot Cap-1 Maneuver	-	-	646	555	487	722
Stage 1	-	-	-	-	738	-
Stage 2	-	-	713	617	-	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	646	0	487	722
Mov Cap-2 Maneuver	-	-	646	0	487	-
Stage 1	-	-	-	0	738	-
Stage 2	-	-	713	0	-	-
Approach	NB	SB	SW			
HCM Control Delay, s	0	76.5	14.4			
HCM LOS		F	B			
Minor Lane/Major Mvmt	NBT	NBR	SBLn1	SWLn1		
Capacity (veh/h)	-	-	646	556		
HCM Lane V/C Ratio	-	-	1.057	0.312		
HCM Control Delay (s)	-	-	76.5	14.4		
HCM Lane LOS	-	-	F	B		
HCM 95th %tile Q(veh)	-	-	18.5	1.3		

HCM 2010 TWSC
43: County Line Rd & Roberts Rd

9/17/2014

Intersection										
Int Delay, s/veh	3.1									
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	
Vol, veh/h	37	25	1	9	26	11	4	509	28	
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	
RT Channelized	-	-	None	-	-	None	-	-	None	
Storage Length	-	-	-	-	-	-	-	-	-	
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	
Grade, %	-	0	-	-	0	-	-	0	-	
Peak Hour Factor	95	95	95	95	95	95	95	95	95	
Heavy Vehicles, %	1	1	1	1	1	1	1	1	1	
Mvmt Flow	39	26	1	9	27	12	4	536	29	
Major/Minor	Minor2	Minor1	Major1							
Conflicting Flow All	1029	1313	374	938	1330	283	747	0	0	
Stage 1	739	739	-	559	559	-	-	-	-	
Stage 2	290	574	-	379	771	-	-	-	-	
Critical Hdwy	7.52	6.52	6.92	7.52	6.52	6.92	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	-	-	
Pot Cap-1 Maneuver	189	158	626	221	155	717	864	-	-	
Stage 1	377	424	-	483	512	-	-	-	-	
Stage 2	696	504	-	618	410	-	-	-	-	
Platoon blocked, %	-	-	-	-	-	-	-	-	-	
Mov Cap-1 Maneuver	157	154	626	188	151	717	864	-	-	
Mov Cap-2 Maneuver	157	154	-	188	151	-	-	-	-	
Stage 1	374	415	-	480	508	-	-	-	-	
Stage 2	643	500	-	566	401	-	-	-	-	
Approach	EB	WB	NB							
HCM Control Delay, s	43.3	29.5	0.1							
HCM LOS	E	D								
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR		
Capacity (veh/h)	864	-	-	158	195	1010	-	-		
HCM Lane V/C Ratio	0.005	-	-	0.42	0.248	0.011	-	-		
HCM Control Delay (s)	9.2	0	-	43.3	29.5	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
43: County Line Rd & Roberts Rd

9/17/2014

Intersection			
Int Delay, s/veh			
Movement	SBL	SBT	SBR
Vol, veh/h	11	651	59
Conflicting Peds, #/hr	0	0	0
Sign Control	Free	Free	Free
RT Channelized	-	-	None
Storage Length	-	-	-
Veh in Median Storage, #	-	0	-
Grade, %	-	0	-
Peak Hour Factor	95	95	95
Heavy Vehicles, %	1	1	1
Mvmt Flow	12	685	62
Major/Minor	Major2		
Conflicting Flow All	565	0	0
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	4.12	-	-
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	2.21	-	-
Pot Cap-1 Maneuver	1010	-	-
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	1010	-	-
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-
Approach	SB		
HCM Control Delay, s	0.2		
HCM LOS			
Minor Lane/Major Mvmt			

HCM 2010 TWSC
52: Airdale Rd & County Line Rd

9/17/2014

Intersection						
Int Delay, s/veh	3.6					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	169	214	343	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	218	350	16	12	120
Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	366	0	-	0	921	358
Stage 1	-	-	-	-	358	-
Stage 2	-	-	-	-	563	-
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	1198	-	-	-	302	689
Stage 1	-	-	-	-	710	-
Stage 2	-	-	-	-	572	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	1198	-	-	-	253	689
Mov Cap-2 Maneuver	-	-	-	-	253	-
Stage 1	-	-	-	-	710	-
Stage 2	-	-	-	-	479	-
Approach	EB		WB		SB	
HCM Control Delay, s	3.8		0		12.8	
HCM LOS					B	
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	
Capacity (veh/h)	1198	-	-	-	594	
HCM Lane V/C Ratio	0.144	-	-	-	0.223	
HCM Control Delay (s)	8.5	0	-	-	12.8	
HCM Lane LOS	A	A	-	-	B	
HCM 95th %tile Q(veh)	0.5	-	-	-	0.8	

HCM 2010 TWSC
53: County Line Rd & Lowrys Ln

9/17/2014

Intersection						
Int Delay, s/veh	1.5					

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	16	18	52	182	155	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	190	161	129

Major/Minor	Minor2	Major1	Major2
Conflicting Flow All	524	226	291
Stage 1	226	-	-
Stage 2	298	-	-
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	517	818	1282
Stage 1	816	-	-
Stage 2	758	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	493	818	1282
Mov Cap-2 Maneuver	493	-	-
Stage 1	816	-	-
Stage 2	722	-	-

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)	1282	-	624	-	-
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	-	-

HCM 2010 TWSC
61: Dwy/Aldwyn Ln & S Ithan Ave

9/17/2014

Intersection										
Int Delay, s/veh	2.6									

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR
Vol, veh/h	35	123	5	52	241	22	8	3	38
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-
Peak Hour Factor	91	91	91	91	91	91	91	91	91
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2
Mvmt Flow	38	135	5	57	265	24	9	3	42

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	289	0	0
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	4.12	-	-
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	2.218	-	-
Pot Cap-1 Maneuver	1273	-	-
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	1273	-	-
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	1.7	1.3	10.7
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	688	1273	-	-	1442	-	-	598
HCM Lane V/C Ratio	0.078	0.03	-	-	0.04	-	-	0.031
HCM Control Delay (s)	10.7	7.9	0	-	7.6	0	-	11.2
HCM Lane LOS	B	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	0.3	0.1	-	-	0.1	-	-	0.1

HCM 2010 TWSC
61: Dwy/Aldwyn Ln & S Ithan Ave

9/17/2014

Intersection			
Int Delay, s/veh			
Movement	SBL	SBT	SBR
Vol, veh/h	4	0	13
Conflicting Peds, #/hr	0	0	0
Sign Control	Stop	Stop	Stop
RT Channelized	-	-	None
Storage Length	-	-	-
Veh in Median Storage, #	-	0	-
Grade, %	-	0	-
Peak Hour Factor	91	91	91
Heavy Vehicles, %	2	2	2
Mvmt Flow	4	0	14
Major/Minor	Minor2		
Conflicting Flow All	628	609	277
Stage 1	391	391	-
Stage 2	237	218	-
Critical Hdwy	7.12	6.52	6.22
Critical Hdwy Stg 1	6.12	5.52	-
Critical Hdwy Stg 2	6.12	5.52	-
Follow-up Hdwy	3.518	4.018	3.318
Pot Cap-1 Maneuver	395	410	762
Stage 1	633	607	-
Stage 2	766	723	-
Platoon blocked, %			
Mov Cap-1 Maneuver	352	378	762
Mov Cap-2 Maneuver	352	378	-
Stage 1	613	578	-
Stage 2	704	700	-
Approach	SB		
HCM Control Delay, s	11.2		
HCM LOS	B		
Minor Lane/Major Mvmt			

HCM 2010 TWSC
76: S Ithan Ave & Dwy

9/17/2014

Intersection								
Int Delay, s/veh	7.1							
Movement	EBL	EBT	EBR	WBL	WBT	WBR	SBL	SBR
Vol, veh/h	4	136	25	136	280	5	20	6
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	None
Storage Length	50	-	-	100	-	-	0	-
Veh in Median Storage, #	-	0	-	-	0	-	0	-
Grade, %	-	1	-	-	-1	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2
Mvmt Flow	4	148	27	148	304	5	22	7
Major/Minor	Major1		Major2			Minor2		
Conflicting Flow All	310	0	0	175	0	0	825	307
Stage 1	-	-	-	-	-	-	603	-
Stage 2	-	-	-	-	-	-	222	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	3.318
Pot Cap-1 Maneuver	1250	-	-	1401	-	-	292	733
Stage 1	-	-	-	-	-	-	486	-
Stage 2	-	-	-	-	-	-	780	-
Platoon blocked, %								
Mov Cap-1 Maneuver	1250	-	-	1401	-	-	196	733
Mov Cap-2 Maneuver	-	-	-	-	-	-	196	-
Stage 1	-	-	-	-	-	-	484	-
Stage 2	-	-	-	-	-	-	671	-
Approach	EB		WB			SB		
HCM Control Delay, s	0.2		2.5			17.4		
HCM LOS						C		
Minor Lane/Major Mvmt	NWLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	265	1250	-	-	1401	-	-	320
HCM Lane V/C Ratio	0.234	0.003	-	-	0.106	-	-	0.095
HCM Control Delay (s)	22.7	7.9	-	-	7.9	-	-	17.4
HCM Lane LOS	C	A	-	-	A	-	-	C
HCM 95th %tile Q(veh)	0.9	0	-	-	0.4	-	-	0.3

HCM 2010 TWSC
76: S Ithan Ave & Dwy

9/17/2014

Intersection

Int Delay, s/veh

Movement	NWU	NWL	NWR
Vol, veh/h	28	57	95
Conflicting Peds, #/hr	0	0	0
Sign Control	Stop	Stop	Stop
RT Channelized	-	-	-
Storage Length	-	0	-
Veh in Median Storage, #	-	0	-
Grade, %	-	0	-
Peak Hour Factor	92	92	92
Heavy Vehicles, %	2	2	2
Mvmt Flow	30	62	103

Major/Minor

	Minor1		
Conflicting Flow All	0	787	161
Stage 1	0	170	-
Stage 2	0	617	-
Critical Hdwy	-	7.12	6.22
Critical Hdwy Stg 1	-	6.12	-
Critical Hdwy Stg 2	-	6.12	-
Follow-up Hdwy	-	3.518	3.318
Pot Cap-1 Maneuver	0	309	884
Stage 1	0	832	-
Stage 2	0	477	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	0	265	884
Mov Cap-2 Maneuver	0	265	-
Stage 1	0	829	-
Stage 2	0	402	-

Approach

	NW
HCM Control Delay, s	22.7
HCM LOS	C

Minor Lane/Major Mvmt

	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	328	-	-	408	-
HCM Lane V/C Ratio	0.141	-	-	0.143	-
HCM Control Delay (s)	17.8	-	-	15.3	3.2
HCM Lane LOS	C	-	-	C	A
HCM 95th %tile Q(veh)	0.5	-	-	0.5	-

HCM 2010 TWSC
79: Garrett Rd & Lancaster Ave

9/17/2014

Intersection

Int Delay, s/veh 1.9

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	1280	47	48	1010	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	1561	57	59	1232	0	46

Major/Minor

	Major1	Major2	Minor1	
Conflicting Flow All	0	0	1618	0
Stage 1	-	-	-	1590
Stage 2	-	-	-	733
Critical Hdwy	-	-	4.1	-
Critical Hdwy Stg 1	-	-	-	5.8
Critical Hdwy Stg 2	-	-	-	5.8
Follow-up Hdwy	-	-	2.2	-
Pot Cap-1 Maneuver	-	-	408	-
Stage 1	-	-	-	156
Stage 2	-	-	-	442
Platoon blocked, %	-	-	-	-
Mov Cap-1 Maneuver	-	-	408	-
Mov Cap-2 Maneuver	-	-	-	17
Stage 1	-	-	-	156
Stage 2	-	-	-	240

Approach

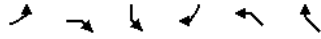
	EB	WB	NB
HCM Control Delay, s	0	3.7	17.8
HCM LOS			C

Minor Lane/Major Mvmt

	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	328	-	-	408	-
HCM Lane V/C Ratio	0.141	-	-	0.143	-
HCM Control Delay (s)	17.8	-	-	15.3	3.2
HCM Lane LOS	C	-	-	C	A
HCM 95th %tile Q(veh)	0.5	-	-	0.5	-

Lanes, Volumes, Timings
 2: County Line Rd & N Ithan Ave

9/17/2014



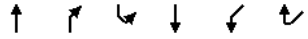
Lane Group	EBL	EBR	SBL	SBR	NWL	NWR
Lane Configurations	WT		WT		WT	
Volume (vph)	191	37	300	264	23	161
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.978		0.937		0.882	
Flt Protected	0.960		0.974		0.994	
Satd. Flow (prot)	1759	0	1717	0	1649	0
Flt Permitted	0.960		0.974		0.994	
Satd. Flow (perm)	1759	0	1717	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)	203	39	319	281	24	171
Shared Lane Traffic (%)						
Lane Group Flow (vph)	242	0	600	0	195	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	66.9%
ICU Level of Service	C
Analysis Period (min)	15

Lanes, Volumes, Timings
 38: County Line Rd & N Ithaca Ave

9/17/2014



Lane Group	NBT	NBR	SBL	SBT	SWL	SWR
Lane Configurations	↑			↑	↓	↓
Volume (vph)	248	107	182	460	101	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				0.948	
Flt Protected				0.986	0.970	
Satd. Flow (prot)	1804	0	0	1855	1730	0
Flt Permitted				0.986	0.970	
Satd. Flow (perm)	1804	0	0	1855	1730	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)	264	114	194	489	107	66
Shared Lane Traffic (%)						
Lane Group Flow (vph)	378	0	0	683	173	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	73.2%
ICU Level of Service	D
Analysis Period (min)	15

HCM 2010 Signalized Intersection Summary
3: County Line Rd & Spring Mill Rd

9/17/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Volume (veh/h)	65	308	96	57	247	52	73	205	38	66	401	45
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Ob), 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	180.0	178.9	180.0	180.0	176.6	180.0	180.0	180.0	180.0	180.0	177.3	180.0
Adj Flow Rate, veh/h	90	342	112	79	284	81	90	263	58	87	451	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	127	343	103	122	331	85	137	342	67	130	484	66
Arrive On Green	0.38	0.38	0.38	0.38	0.38	0.38	0.41	0.41	0.41	0.41	0.41	0.41
Sat Flow, veh/h	151	914	276	137	884	228	155	838	163	150	1185	161
Grp Volume(v), veh/h	544	0	0	444	0	0	411	0	0	603	0	0
Grp Sat Flow(s),veh/h/ln	1341	0	0	1249	0	0	1156	0	0	1496	0	0
Q Serve(g_s), s	2.3	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	22.5	0.0	0.0	20.2	0.0	0.0	18.0	0.0	0.0	24.0	0.0	0.0
Prop In Lane	0.17		0.21	0.18		0.18	0.22		0.14	0.14		0.11
Lane Grp Cap(c), veh/h	573	0	0	539	0	0	545	0	0	679	0	0
V/C Ratio(X)	0.95	0.00	0.00	0.82	0.00	0.00	0.75	0.00	0.00	0.89	0.00	0.00
Avail Cap(c_a), veh/h	573	0	0	539	0	0	545	0	0	679	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	19.1	0.0	0.0	17.0	0.0	0.0	14.6	0.0	0.0	17.4	0.0	0.0
Incr Delay (d2), s/veh	15.8	0.0	0.0	13.3	0.0	0.0	5.3	0.0	0.0	13.2	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(50%),veh/ln	11.4	0.0	0.0	8.9	0.0	0.0	6.7	0.0	0.0	12.2	0.0	0.0
LnGrp Delay(d),s/veh	34.9	0.0	0.0	30.3	0.0	0.0	19.9	0.0	0.0	30.5	0.0	0.0
LnGrp LOS	C			C			B			C		
Approach Vol, veh/h		544			444			411			603	
Approach Delay, s/veh		34.9			30.3			19.9			30.5	
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		29.0		31.0		29.0		31.0				
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		24.5		26.0		22.2		20.0				
Green Ext Time (p_c), s		0.0		0.0		0.4		1.4				
Intersection Summary												
HCM 2010 Ctrl Delay				29.5								
HCM 2010 LOS				C								

HCM 2010 Signalized Intersection Summary
7: Sproul Rd/Spring Mill Rd & Aldwyn Ln/Kenilworth Rd & Lancaster Ave

9/17/2014

HCM 2010 methodology does not support more than 4 approaches.

HCM 2010 Signalized Intersection Summary
11: Chapel Dr & Lancaster Ave

9/17/2014

Movement	EBT	EBR	WBL	WBT	NBL	NBR		
Lane Configurations	↑↑			↑↑	↑	↑		
Volume (veh/h)	1119	124	20	822	85	19		
Number	2	12	1	6	3	18		
Initial Q (Ob), veh	0	0	0	0	0	0		
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00		
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00		
Adj Sat Flow, veh/h/ln	176.5	180.0	180.0	176.5	176.5	180.0		
Adj Flow Rate, veh/h	1216	135	22	893	92	21		
Adj No. of Lanes	2	0	0	2	0	0		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92		
Percent Heavy Veh, %	2	2	2	2	0	0		
Cap, veh/h	1994	221	109	2087	97	22		
Arrive On Green	0.65	0.65	1.00	1.00	0.07	0.07		
Sat Flow, veh/h	3133	337	24	3267	1327	303		
Grp Volume(v), veh/h	668	683	481	434	114	0		
Grp Sat Flow(s),veh/h/ln	1676	1705	1685	1526	1645	0		
Q Serve(g_s), s	9.2	9.3	0.0	0.0	2.8	0.0		
Cycle Q Clear(g_c), s	9.2	9.3	0.0	0.0	2.8	0.0		
Prop In Lane		0.20	0.05		0.81	0.18		
Lane Grp Cap(c), veh/h	1098	1117	1196	999	120	0		
V/C Ratio(X)	0.61	0.61	0.40	0.43	0.95	0.00		
Avail Cap(c_a), veh/h	1098	1117	1196	999	915	0		
HCM Platoon Ratio	1.00	1.00	2.00	2.00	1.00	1.00		
Upstream Filter(l)	0.38	0.38	0.74	0.74	1.00	0.00		
Uniform Delay (d), s/veh	4.0	4.0	0.0	0.0	18.7	0.0		
Incr Delay (d2), s/veh	1.0	1.0	0.7	1.0	27.0	0.0		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	4.4	4.5	0.2	0.3	2.1	0.0		
LnGrp Delay(d),s/veh	5.0	5.0	0.7	1.0	45.7	0.0		
LnGrp LOS	A	A	A	A	D			
Approach Vol, veh/h	1351			915	114			
Approach Delay, s/veh	5.0			0.9	45.7			
Approach LOS	A			A	D			
Timer	1	2	3	4	5	6	7	8
Assigned Phs		2				6		8
Phs Duration (G+Y+Rc), s		51.5				51.5		8.5
Change Period (Y+Rc), s		5.0				5.0		5.0
Max Green Setting (Gmax), s		27.0				27.0		23.0
Max Q Clear Time (g_c+I1), s		11.3				2.0		4.8
Green Ext Time (p_c), s		8.9				11.4		0.0
Intersection Summary								
HCM 2010 Ctrl Delay				5.4				
HCM 2010 LOS				A				

Notes
User approved volume balancing among the lanes for turning movement.

HCM 2010 Signalized Intersection Summary
16: Sproul Rd & Conestoga Rd

9/17/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑
Volume (veh/h)	106	556	220	28	528	47	106	187	28	51	295	83
Number	7	4	14	3	8	18	1	6	16	5	2	12
Initial Q (Ob), 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	178.2	178.2	180.0	182.7	182.7	184.5	177.3	177.3	179.1	180.9	179.1	180.9
Adj Flow Rate, veh/h	112	585	0	29	556	0	112	197	29	54	311	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	208	798	0	245	588	0	192	612	90	88	324	86
Arrive On Green	0.06	0.45	0.00	0.32	0.32	0.00	0.06	0.40	0.40	0.27	0.27	0.27
Sat Flow, veh/h	1697	1782	0	856	1827	0	1689	1511	223	136	1206	320
Grp Volume(v), veh/h	112	585	0	29	556	0	112	0	226	452	0	0
Grp Sat Flow(s),veh/h/ln	1697	1782	0	856	1827	0	1689	0	1734	1662	0	0
Q Serve(g_s), s	3.3	21.1	0.0	2.3	23.2	0.0	3.6	0.0	7.0	14.7	0.0	0.0
Cycle Q Clear(g_c), s	3.3	21.1	0.0	13.5	23.2	0.0	3.6	0.0	7.0	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	208	798	0	245	588	0	192	0	702	498	0	0
V/C Ratio(X)	0.54	0.73	0.00	0.12	0.95	0.00	0.58	0.00	0.32	0.91	0.00	0.00
Avail Cap(c_a), veh/h	255	798	0	245	588	0	233	0	744	498	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(l)	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	19.4	17.7	0.0	27.3	25.8	0.0	20.9	0.0	15.9	28.6	0.0	0.0
Incr Delay (d2), s/veh	2.1	5.9	0.0	1.0	26.0	0.0	2.8	0.0	0.3	20.3	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(50%),veh/ln	1.6	11.5	0.0	0.6	15.8	0.0	1.8	0.0	3.4	12.5	0.0	0.0
LnGrp Delay(d),s/veh	21.6	23.6	0.0	28.3	51.8	0.0	23.7	0.0	16.2	48.9	0.0	0.0
LnGrp LOS	C	C		C	D		C		B	D		
Approach Vol, veh/h		697			585			338				452
Approach Delay, s/veh		23.3			50.7			18.7				48.9
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	27.0		42.4		37.6	9.9	32.5				
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		35.5		34.0	7.0	23.5				
Max Q Clear Time (g_c+I1), s	5.6	23.0		23.1		9.0	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				35.8								
HCM 2010 LOS				D								

HCM 2010 Signalized Intersection Summary
25: S Ithan Ave & Conestoga Rd

9/17/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Volume (veh/h)	65	526	7	11	475	40	7	19	6	53	88	138
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Ob), 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	185.4	183.6	185.4	176.4	174.7	176.4	176.3	174.5	176.3	184.4	182.6	184.4
Adj Flow Rate, veh/h	74	598	8	12	540	45	8	22	7	60	100	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	143	757	10	86	760	62	135	264	71	142	142	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	114	1565	20	10	1572	129	168	1144	306	206	614	805
Grp Volume(v), veh/h	680	0	0	597	0	0	37	0	0	317	0	0
Grp Sat Flow(s),veh/h/ln	1699	0	0	1712	0	0	1617	0	0	1625	0	0
Q Serve(g_s), s	2.8	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	15.2	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		0.50
Lane Grp Cap(c), veh/h	909	0	0	908	0	0	470	0	0	469	0	0
V/C Ratio(X)	0.75	0.00	0.00	0.66	0.00	0.00	0.08	0.00	0.00	0.68	0.00	0.00
Avail Cap(c_a), veh/h	1321	0	0	1334	0	0	635	0	0	645	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	9.3	0.0	0.0	13.8	0.0	0.0	16.7	0.0	0.0
Incr Delay (d2), s/veh	1.4	0.0	0.0	0.8	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(50%),veh/ln	7.5	0.0	0.0	6.0	0.0	0.0	0.4	0.0	0.0	4.0	0.0	0.0
LnGrp Delay(d),s/veh	11.2	0.0	0.0	10.1	0.0	0.0	13.8	0.0	0.0	18.4	0.0	0.0
LnGrp LOS	B			B			B			B		
Approach Vol, veh/h	680			597			37			317		
Approach Delay, s/veh	11.2			10.1			13.8			18.4		
Approach LOS	B			B			B			B		
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	2		4		6		8					
Phs Duration (G+Y+Rc), s	28.5		17.0		28.5		17.0					
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	14.5		2.8		17.2		10.4					
Green Ext Time (p_c), s	5.6		1.1		5.3		0.7					
Intersection Summary												
HCM 2010 Ctrl Delay	12.3											
HCM 2010 LOS	B											

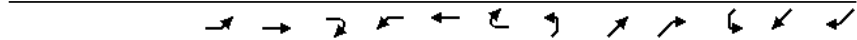
HCM 2010 Signalized Intersection Summary
27: S Ithan Ave/N Ithan Ave & Lancaster Ave

9/17/2014

HCM 2010 methodology does not support exclusive ped or hold phases.

HCM 2010 Signalized Intersection Summary
33: Williams Rd/Garrett Ave & Conestoga Rd

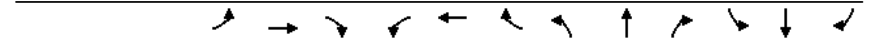
9/17/2014



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↕			↕			↕			↕	
Volume (veh/h)	27	502	9	12	500	29	16	1	11	28	12	52
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Ob), 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	187.2	187.2	187.2	187.2	187.2	187.2	180.0	180.0	180.0	172.8	172.8	172.8
Adj Flow Rate, veh/h	29	546	10	13	543	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	71	141	25	52	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	1748	31	13	1727	100	632	294	618	334	307	849
Grp Volume(v), veh/h	585	0	0	588	0	0	30	0	0	100	0	0
Grp Sat Flow(s), veh/h/ln	1821	0	0	1840	0	0	1544	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	8.4	0.0	0.0	8.5	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	218	0	0	199	0	0
V/C Ratio(X)	0.43	0.00	0.00	0.43	0.00	0.00	0.14	0.00	0.00	0.50	0.00	0.00
Avail Cap(c_a), veh/h	1356	0	0	1369	0	0	400	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(l)	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(50%),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	27.7	0.0	0.0	31.5	0.0	0.0
LnGrp LOS	A			A			C			C		
Approach Vol, veh/h	585			588			30			100		
Approach Delay, s/veh	4.9			4.9			27.7			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	10.4		6.2		10.5		3.1					
Green Ext Time (p_c), s	5.7		0.3		5.7		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
51: Lowrys Ln & Lancaster Ave

9/17/2014



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Volume (veh/h)	2	1170	23	15	912	4	20	36	15	99	71	72
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Ob), 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	180.0	178.2	180.0	177.3	175.5	177.3	190.0	188.1	190.0	188.1	186.3	188.1
Adj Flow Rate, veh/h	2	1272	25	16	991	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	65	1981	39	76	1948	8	135	200	66	199	109	92
Arrive On Green	1.00	1.00	1.00	0.60	0.60	0.60	0.19	0.19	0.19	0.19	0.19	0.19
Sat Flow, veh/h	1	3325	65	16	3271	13	276	1048	347	570	569	480
Grp Volume(v), veh/h	682	0	617	523	0	488	77	0	0	263	0	0
Grp Sat Flow(s), veh/h/ln	1781	0	1610	1705	0	1595	1671	0	0	1619	0	0
Q Serve(g_s), s	0.0	0.0	0.0	0.0	0.0	10.0	0.0	0.0	0.0	6.8	0.0	0.0
Cycle Q Clear(g_c), s	0.0	0.0	0.0	9.6	0.0	10.0	2.0	0.0	0.0	8.8	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	1125	0	959	1082	0	950	401	0	0	399	0	0
V/C Ratio(X)	0.61	0.00	0.64	0.48	0.00	0.51	0.19	0.00	0.00	0.66	0.00	0.00
Avail Cap(c_a), veh/h	1125	0	959	1082	0	950	510	0	0	505	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(l)	0.39	0.00	0.39	1.00	0.00	1.00	0.00	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	6.6	19.2	0.0	0.0	21.9	0.0	0.0
Incr Delay (d2), s/veh	0.9	0.0	1.3	1.5	0.0	2.0	0.2	0.0	0.0	2.1	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	0.0	0.3	5.1	0.0	4.9	1.0	0.0	0.0	4.2	0.0	0.0
LnGrp Delay(d),s/veh	0.9	0.0	1.3	8.1	0.0	8.6	19.5	0.0	0.0	24.0	0.0	0.0
LnGrp LOS	A		A	A		A	B			C		
Approach Vol, veh/h	1299			1011			77			263		
Approach Delay, s/veh	1.1			8.3			19.5			24.0		
Approach LOS	A			A			B			C		
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	2		4		6		8					
Phs Duration (G+Y+Rc), s	43.8		16.2		43.8		16.2					
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		10.8		12.0		4.0					
Green Ext Time (p_c), s	12.5		0.5		10.7		1.0					
Intersection Summary												
HCM 2010 Ctrl Delay	6.7											
HCM 2010 LOS	A											
Notes												
User approved pedestrian interval to be less than phase max green.												

Lanes, Volumes, Timings

7: Sproul Rd/Spring Mill Rd & Aldwyn Ln/Kenilworth Rd & Lancaster Ave

9/17/2014



Lane Group	EBL2	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR2	NBL2	NBL	NBT
Lane Configurations		↑	↑↑		↑		↑	↑↑				↑
Volume (vph)	4	251	992	31	284	2	23	858	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
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					0.182					0.753
Satd. Flow (perm)	0	170	3177	0	1576	0	324	3366	0	0	0	1203
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	259	1023	32	293	2	24	885	34	7	54	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	263	1055	0	293	0	26	919	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	1.18	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

Lanes, Volumes, Timings

7: Sproul Rd/Spring Mill Rd & Aldwyn Ln/Kenilworth Rd & Lancaster Ave

9/17/2014



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	192	0	113	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	10	12	12	11	11
Grade (%)					-3%						3%	
Storage Length (ft)					0				200			0
Storage Lanes					0				1			0
Taper Length (ft)					25				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
Flt Protected					0.995				0.950			0.976
Satd. Flow (prot)	0	0	0	0	1462	0	0	0	1651	1640	0	0
Flt Permitted					0.982				0.117			0.753
Satd. Flow (perm)	0	0	0	0	1443	0	0	0	203	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	198	0	116	21	1
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	19	0	0	0	198	138	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			0
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	1.15	1.15	1.09	1.09	1.14	1.14	1.14
Turning Speed (mph)	9	9	15	15	15	15	15	9	9	15	15	15
Number of Detectors	1	1	1	1	1	1	1	1	1	1	1	1
Detector Template	Left	Left	Thru		Left	Left	Thru		Left	Left	Thru	
Leading Detector (ft)	20	20	37		20	20	37		20	37	37	
Trailing Detector (ft)	0	0	-3		0	0	-3		0	-3	-3	
Detector 1 Position(ft)	0	0	-3		0	0	-3		0	-3	-3	
Detector 1 Size(ft)	20	20	40		20	20	40		20	40	40	
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	NA		pm+pt	pm+pt	NA	
Protected Phases	5	5	2						3	3	8	
Permitted Phases	9	9			9	9			8	8		
Detector Phase	9	9	2		9	9	2		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	

Lanes, Volumes, Timings

7: Sproul Rd/Spring Mill Rd & Aldwyn Ln/Kenilworth Rd & Lancaster Ave

9/17/2014



Lane Group	SWL2	SWL	SWT	SWR	SWR2
Lane Configurations					
Volume (vph)	39	9	168	236	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	173	243	1
Shared Lane Traffic (%)					
Lane Group Flow (vph)	0	49	417	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		

Lanes, Volumes, Timings

7: Sproul Rd/Spring Mill Rd & Aldwyn Ln/Kenilworth Rd & Lancaster Ave

9/17/2014



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					
Total Lost Time (s)		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 Effect 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		1.14	0.86	0.40		0.37	1.04					1.07
Control Delay		140.4	50.5	10.4		67.7	82.9					188.7
Queue Delay		0.0	0.0	0.0		0.0	0.0					0.0
Total Delay		140.4	50.5	10.4		67.7	82.9					188.7
LOS		F	D		B	E	F					F
Approach Delay			57.9				82.5					188.7
Approach LOS			E				F					F
Queue Length 50th (ft)		-264	510		46		22		-437			-83
Queue Length 95th (ft)		#453	#620		124		58		#575			#197
Internal Link Dist (ft)			497				1529					412
Turn Bay Length (ft)			300				75					
Base Capacity (vph)		230	1220		741		70		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		1.14	0.86		0.40		0.37		1.04			1.07

Intersection Summary

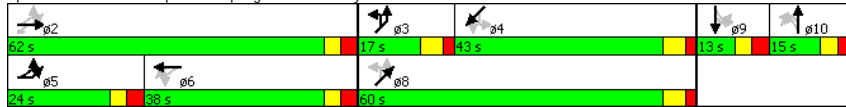
Area Type:	Other
Cycle Length:	150
Actuated Cycle Length:	144.8
Natural Cycle:	140
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	1.14
Intersection Signal Delay:	77.5
Intersection Capacity Utilization:	116.5%
ICU Level of Service:	H
Analysis Period (min):	15
- Volume exceeds capacity, queue 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

9/17/2014

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

9/17/2014



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		
Total Lost Time (s)					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				1.10	0.23		
Control Delay					83.2				131.7	33.8		
Queue Delay					0.0				0.0	0.0		
Total Delay					83.2				131.7	33.8		
LOS					F				F	C		
Approach Delay					83.2					91.5		
Approach LOS					F					F		
Queue Length 50th (ft)					18				-165	95		
Queue Length 95th (ft)					48				#334	151		
Internal Link Dist (ft)					517					1256		
Turn Bay Length (ft)									200			
Base Capacity (vph)					64				180	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				1.10	0.23		

Intersection Summary

Lanes, Volumes, Timings

7: Sproul Rd/Spring Mill Rd & Aldwyn Ln/Kenilworth Rd & Lancaster Ave

9/17/2014



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	113.9		
Queue Delay		0.0	0.0		
Total Delay		46.1	113.9		
LOS		D	F		
Approach Delay			106.8		
Approach LOS			F		
Queue Length 50th (ft)		38	-462		
Queue Length 95th (ft)		77	#679		
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					

Lanes, Volumes, Timings
11: Chapel Dr & Lancaster Ave

9/17/2014

	→	↖	↙	←	↘	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑	↘	↗
Volume (vph)	1119	124	20	822	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)	1216	135	22	893	92	21
Shared Lane Traffic (%)						
Lane Group Flow (vph)	1351	0	0	915	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	CI+Ex		CI+Ex	CI+Ex	CI+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	

NB 23 pm 9/16/2014 Baseline

Synchro 8 Report
Page 1

Lanes, Volumes, Timings
11: Chapel Dr & Lancaster Ave

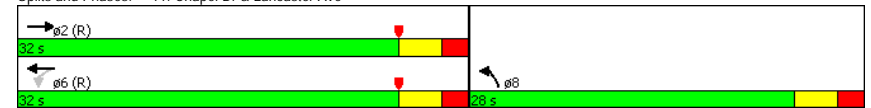
9/17/2014

	→	↖	↙	←	↘	↗
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			3.3	24.8	
Queue Delay	0.0			0.0	0.0	
Total Delay	6.7			3.3	24.8	
LOS	A			A	C	
Approach Delay	6.7			3.3	24.8	
Approach LOS	A			A	C	
Queue Length 50th (ft)	111			1	31	
Queue Length 95th (ft)	206			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

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 54.5% 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



NB 23 pm 9/16/2014 Baseline

Synchro 8 Report
Page 2

Lanes, Volumes, Timings

27: S Ithan Ave/N Ithan Ave & Lancaster Ave

9/17/2014



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↕	↔	↔	↕	↔	↔	↕	↔	↔	↕	↔
Volume (vph)	82	963	94	98	703	32	65	126	78	67	238	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	0.257			0.106			0.219			0.459		
Satd. Flow (perm)	423	3089	0	172	3061	0	359	1545	0	756	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	1014	99	103	740	34	68	133	82	71	251	79
Shared Lane Traffic (%)												
Lane Group Flow (vph)	86	1113	0	103	774	0	68	215	0	71	330	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	

Lanes, Volumes, Timings

27: S Ithan Ave/N Ithan Ave & Lancaster Ave

9/17/2014

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

Lanes, Volumes, Timings

27: S Ithan Ave/N Ithan Ave & Lancaster Ave

9/17/2014



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 Effect 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	0.33	0.89		0.67	0.60		0.93	0.68		0.46	1.02	
Control Delay	21.1	45.2		40.9	25.4		136.7	56.4		53.1	102.3	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	21.1	45.2		40.9	25.4		136.7	56.4		53.1	102.3	
LOS	C	D		D	C		F	E		D	F	
Approach Delay		43.5			27.2			75.7			93.6	
Approach LOS		D			C			E			F	
Queue Length 50th (ft)	36	484		47	202		52	155		49	-265	
Queue Length 95th (ft)	m#3	#623		m#107	241		#147	243		99	#456	
Internal Link Dist (ft)		1211			1954			103			893	
Turn Bay Length (ft)	140			70			105			65		
Base Capacity (vph)	269	1253		154	1288		73	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	0.89		0.67	0.60		0.93	0.68		0.46	1.02	

Intersection Summary

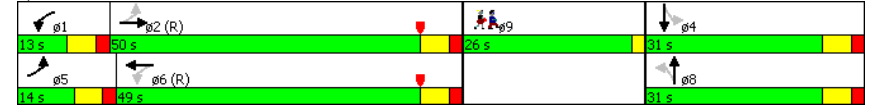
Area Type: Other
 Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow, Master Intersection
 Natural Cycle: 115
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.02
 Intersection Signal Delay: 48.9 Intersection LOS: D
 Intersection Capacity Utilization 80.5% 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.

Lanes, Volumes, Timings

27: S Ithan Ave/N Ithan Ave & Lancaster Ave

9/17/2014

Splits and Phases: 27: S Ithan Ave/N Ithan Ave & Lancaster Ave



Lanes, Volumes, Timings

27: S Ithan Ave/N Ithan Ave & Lancaster Ave

9/17/2014

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 TWSC
2: County Line Rd & N Ithan Ave

9/17/2014

Intersection						
Int Delay, s/veh	0					
Movement	EBL	EBR	SBL	SBR	NWL	NWR
Vol, veh/h	224	37	304	310	24	163
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	0	-	0	-
Veh in Median Storage, #	0	-	0	-	0	-
Grade, %	0	-	0	-	0	-
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	1	1	1	1	1	1
Mvmt Flow	238	39	323	330	26	173
Major/Minor	Minor2	Major2		Minor1		
Conflicting Flow All	87	0	0	-	20	0
Stage 1	0	-	-	-	0	-
Stage 2	87	-	-	-	20	-
Critical Hdwy	-	-	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	-
Pot Cap-1 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Approach	EB	SB		NW		
HCM Control Delay, s	-	0		-		
HCM LOS	-			-		
Minor Lane/Major Mvmt	NWLn1	EBLn1	SBL	SBR		
Capacity (veh/h)	-	-	-	-		
HCM Lane V/C Ratio	-	-	-	-		
HCM Control Delay (s)	-	-	-	-		
HCM Lane LOS	-	-	-	-		
HCM 95th %tile Q(veh)	-	-	-	-		

HCM 2010 TWSC
15: Conestoga Rd & Spring Mill Rd

9/17/2014

Intersection						
Int Delay, s/veh	0.5					
Movement	EBL	EBT	WBT	WBR	SWL	SWR
Vol, veh/h	10	664	624	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	692	650	3	18	9
Major/Minor	Major1	Major2		Minor2		
Conflicting Flow All	653	0	-	0	1365	652
Stage 1	-	-	-	-	652	-
Stage 2	-	-	-	-	713	-
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	-	-	-	163	470
Stage 1	-	-	-	-	520	-
Stage 2	-	-	-	-	488	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	939	-	-	-	160	470
Mov Cap-2 Maneuver	-	-	-	-	160	-
Stage 1	-	-	-	-	520	-
Stage 2	-	-	-	-	480	-
Approach	EB	WB		SW		
HCM Control Delay, s	0.1	0		25		
HCM LOS	-			D		
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SWLn1	
Capacity (veh/h)	939	-	-	-	207	
HCM Lane V/C Ratio	0.011	-	-	-	0.131	
HCM Control Delay (s)	8.9	0	-	-	25	
HCM Lane LOS	A	A	-	-	D	
HCM 95th %tile Q(veh)	0	-	-	-	0.4	

HCM 2010 TWSC
29: Strathmore Dr/Lowrys Ln & Conestoga Rd

9/17/2014

Intersection									
Int Delay, s/veh	2.6								
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR
Vol, veh/h	37	508	17	17	469	16	15	8	17
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-
Peak Hour Factor	96	96	96	96	96	96	96	96	96
Heavy Vehicles, %	1	1	1	1	1	1	1	1	1
Mvmt Flow	39	529	18	18	489	17	16	8	18
Major/Minor	Major1			Major2			Minor1		
Conflicting Flow All	505	0	0	547	0	0	1184	1156	538
Stage 1	-	-	-	-	-	-	615	615	-
Stage 2	-	-	-	-	-	-	569	541	-
Critical Hdwy	4.11	-	-	4.11	-	-	7.11	6.51	6.21
Critical Hdwy Stg 1	-	-	-	-	-	-	6.11	5.51	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.11	5.51	-
Follow-up Hdwy	2.209	-	-	2.209	-	-	3.509	4.009	3.309
Pot Cap-1 Maneuver	1065	-	-	1027	-	-	167	197	545
Stage 1	-	-	-	-	-	-	480	484	-
Stage 2	-	-	-	-	-	-	509	522	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	1065	-	-	1027	-	-	132	182	545
Mov Cap-2 Maneuver	-	-	-	-	-	-	132	182	-
Stage 1	-	-	-	-	-	-	455	458	-
Stage 2	-	-	-	-	-	-	434	509	-
Approach	EB			WB			NB		
HCM Control Delay, s	0.6			0.3			26.1		
HCM LOS	D			D			D		
Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	
Capacity (veh/h)	212	1065	-	-	1027	-	-	323	
HCM Lane V/C Ratio	0.197	0.036	-	-	0.017	-	-	0.255	
HCM Control Delay (s)	26.1	8.5	0	-	8.6	0	-	19.9	
HCM Lane LOS	D	A	A	-	A	A	-	C	
HCM 95th %tile Q(veh)	0.7	0.1	-	-	0.1	-	-	1	

HCM 2010 TWSC
29: Strathmore Dr/Lowrys Ln & Conestoga Rd

9/17/2014

Intersection			
Int Delay, s/veh			
Movement	SBL	SBT	SBR
Vol, veh/h	9	17	53
Conflicting Peds, #/hr	0	0	0
Sign Control	Stop	Stop	Stop
RT Channelized	-	-	None
Storage Length	-	-	-
Veh in Median Storage, #	-	0	-
Grade, %	-	0	-
Peak Hour Factor	96	96	96
Heavy Vehicles, %	1	1	1
Mvmt Flow	9	18	55
Major/Minor	Minor2		
Conflicting Flow All	1160	1156	497
Stage 1	532	532	-
Stage 2	628	624	-
Critical Hdwy	7.11	6.51	6.21
Critical Hdwy Stg 1	6.11	5.51	-
Critical Hdwy Stg 2	6.11	5.51	-
Follow-up Hdwy	3.509	4.009	3.309
Pot Cap-1 Maneuver	173	197	575
Stage 1	533	527	-
Stage 2	472	479	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	152	182	575
Mov Cap-2 Maneuver	152	182	-
Stage 1	505	514	-
Stage 2	425	454	-
Approach	SB		
HCM Control Delay, s	19.9		
HCM LOS	C		
Minor Lane/Major Mvmt			

HCM 2010 TWSC
38: County Line Rd & N Ithan Ave

9/17/2014

Intersection						
Int Delay, s/veh	65					

Movement	NBT	NBR	SBL	SBT	SWL	SWR
Vol, veh/h	271	118	184	496	115	63
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Stop	Stop	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	1	1	1	1	1	1
Mvmt Flow	288	126	196	528	122	67

Major/Minor	Major1	Minor2	Minor1	Minor1	Minor1
Conflicting Flow All	0	0	385	414	615
Stage 1	-	-	0	0	351
Stage 2	-	-	385	414	264
Critical Hdwy	-	-	6.41	6.51	6.41
Critical Hdwy Stg 1	-	-	-	-	5.41
Critical Hdwy Stg 2	-	-	5.41	5.51	-
Follow-up Hdwy	-	-	3.509	4.009	3.509
Pot Cap-1 Maneuver	-	-	620	530	456
Stage 1	-	-	-	-	715
Stage 2	-	-	690	595	-
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	620	0	456
Mov Cap-2 Maneuver	-	-	620	0	456
Stage 1	-	-	-	0	715
Stage 2	-	-	690	0	-

Approach	NB	SB	SW
HCM Control Delay, s	0	115.1	15.9
HCM LOS		F	C

Minor Lane/Major Mvmt	NBT	NBR	SBLn1	SWLn1
Capacity (veh/h)	-	-	620	519
HCM Lane V/C Ratio	-	-	1.167	0.365
HCM Control Delay (s)	-	-	115.1	15.9
HCM Lane LOS	-	-	F	C
HCM 95th %tile Q(veh)	-	-	24.2	1.7

HCM 2010 TWSC
43: County Line Rd & Roberts Rd

9/17/2014

Intersection										
Int Delay, s/veh	3.2									

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR
Vol, veh/h	37	26	1	9	26	11	4	515	29
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	1	1	1	1	1	1	1	1	1
Mvmt Flow	39	27	1	9	27	12	4	542	31

Major/Minor	Minor2	Minor1	Minor1	Major1	Major1
Conflicting Flow All	1042	1330	379	950	1347
Stage 1	749	749	-	566	566
Stage 2	293	581	-	384	781
Critical Hdwy	7.52	6.52	6.92	7.52	6.52
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
Pot Cap-1 Maneuver	185	155	622	216	151
Stage 1	372	420	-	479	508
Stage 2	694	500	-	613	406
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	153	151	622	182	147
Mov Cap-2 Maneuver	153	151	-	182	147
Stage 1	369	411	-	476	504
Stage 2	641	497	-	559	397

Approach	EB	WB	NB
HCM Control Delay, s	45.4	30.3	0.1
HCM LOS	E	D	

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	856	-	-	154	190	1003	-	-
HCM Lane V/C Ratio	0.005	-	-	0.437	0.255	0.012	-	-
HCM Control Delay (s)	9.2	0	-	45.4	30.3	8.6	0.1	-
HCM Lane LOS	A	A	-	E	D	A	A	-
HCM 95th %tile Q(veh)	0	-	-	2	1	0	-	-

HCM 2010 TWSC
43: County Line Rd & Roberts Rd

9/17/2014

Intersection			
Int Delay, s/veh			
Movement	SBL	SBT	SBR
Vol, veh/h	11	659	61
Conflicting Peds, #/hr	0	0	0
Sign Control	Free	Free	Free
RT Channelized	-	-	None
Storage Length	-	-	-
Veh in Median Storage, #	-	0	-
Grade, %	-	0	-
Peak Hour Factor	95	95	95
Heavy Vehicles, %	1	1	1
Mvmt Flow	12	694	64
Major/Minor	Major2		
Conflicting Flow All	573	0	0
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	4.12	-	-
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	2.21	-	-
Pot Cap-1 Maneuver	1003	-	-
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	1003	-	-
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-
Approach	SB		
HCM Control Delay, s	0.2		
HCM LOS			
Minor Lane/Major Mvmt			

HCM 2010 TWSC
52: Airdale Rd & County Line Rd

9/17/2014

Intersection						
Int Delay, s/veh	3.6					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	171	217	347	16	12	119
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	221	354	16	12	121
Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	370	0	-	0	932	362
Stage 1	-	-	-	-	362	-
Stage 2	-	-	-	-	570	-
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	1194	-	-	-	297	685
Stage 1	-	-	-	-	707	-
Stage 2	-	-	-	-	568	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	1194	-	-	-	248	685
Mov Cap-2 Maneuver	-	-	-	-	248	-
Stage 1	-	-	-	-	707	-
Stage 2	-	-	-	-	474	-
Approach	EB		WB		SB	
HCM Control Delay, s	3.8		0		12.9	
HCM LOS					B	
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	
Capacity (veh/h)	1194	-	-	-	590	
HCM Lane V/C Ratio	0.146	-	-	-	0.227	
HCM Control Delay (s)	8.5	0	-	-	12.9	
HCM Lane LOS	A	A	-	-	B	
HCM 95th %tile Q(veh)	0.5	-	-	-	0.9	

HCM 2010 TWSC
53: County Line Rd & Lowrys Ln

9/17/2014

Intersection						
Int Delay, s/veh	1.4					

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	16	19	52	184	157	125
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	17	20	54	192	164	130

Major/Minor	Minor2	Major1	Major2
Conflicting Flow All	529	229	294
Stage 1	229	-	-
Stage 2	300	-	-
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	514	815	1279
Stage 1	814	-	-
Stage 2	756	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	490	815	1279
Mov Cap-2 Maneuver	490	-	-
Stage 1	814	-	-
Stage 2	720	-	-

Approach	EB	NB	SB
HCM Control Delay, s	11.1	1.7	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1279	-	625	-	-
HCM Lane V/C Ratio	0.042	-	0.058	-	-
HCM Control Delay (s)	7.9	0	11.1	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0.1	-	0.2	-	-

HCM 2010 TWSC
61: Dwy/Aldwyn Ln & S Ithan Ave

9/17/2014

Intersection										
Int Delay, s/veh	2.4									

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR
Vol, veh/h	35	134	5	52	274	22	8	3	38
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-
Peak Hour Factor	91	91	91	91	91	91	91	91	91
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2
Mvmt Flow	38	147	5	57	301	24	9	3	42

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	325	0	0
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	4.12	-	-
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	2.218	-	-
Pot Cap-1 Maneuver	1235	-	-
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	1235	-	-
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	1.6	1.1	10.9
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	660	1235	-	-	1428	-	-	564
HCM Lane V/C Ratio	0.082	0.031	-	-	0.04	-	-	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

Intersection

Int Delay, s/veh

Movement	SBL	SBT	SBR
Vol, veh/h	4	0	13
Conflicting Peds, #/hr	0	0	0
Sign Control	Stop	Stop	Stop
RT Channelized	-	-	None
Storage Length	-	-	-
Veh in Median Storage, #	-	0	-
Grade, %	-	0	-
Peak Hour Factor	91	91	91
Heavy Vehicles, %	2	2	2
Mvmt Flow	4	0	14

Major/Minor

	Minor2		
Conflicting Flow All	676	657	313
Stage 1	427	427	-
Stage 2	249	230	-
Critical Hdwy	7.12	6.52	6.22
Critical Hdwy Stg 1	6.12	5.52	-
Critical Hdwy Stg 2	6.12	5.52	-
Follow-up Hdwy	3.518	4.018	3.318
Pot Cap-1 Maneuver	367	385	727
Stage 1	606	585	-
Stage 2	755	714	-
Platoon blocked, %			
Mov Cap-1 Maneuver	326	354	727
Mov Cap-2 Maneuver	326	354	-
Stage 1	585	556	-
Stage 2	692	690	-

Approach

	SB
HCM Control Delay, s	11.6
HCM LOS	B

Minor Lane/Major Mvmt

HCM research expects at least one 'Stop' controlled approach at the intersection.

HCM 2010 TWSC
76: S Ithan Ave & Dwy

9/17/2014

Intersection						
Int Delay, s/veh	3.7					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	0	153	265	0	109	53
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, %	-	1	-1	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	166	288	0	118	58
Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	288	0	-	0	454	288
Stage 1	-	-	-	-	288	-
Stage 2	-	-	-	-	166	-
Critical Hdwy	4.12	-	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	2.218	-	-	-	3.518	3.318
Pot Cap-1 Maneuver	1274	-	-	-	564	751
Stage 1	-	-	-	-	761	-
Stage 2	-	-	-	-	863	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	1274	-	-	-	564	751
Mov Cap-2 Maneuver	-	-	-	-	564	-
Stage 1	-	-	-	-	761	-
Stage 2	-	-	-	-	863	-
Approach	EB		WB		SB	
HCM Control Delay, s	0		0		13.2	
HCM LOS					B	
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	
Capacity (veh/h)	1274	-	-	-	614	
HCM Lane V/C Ratio	-	-	-	-	0.287	
HCM Control Delay (s)	0	-	-	-	13.2	
HCM Lane LOS	A	-	-	-	B	
HCM 95th %tile Q(veh)	0	-	-	-	1.2	

HCM 2010 TWSC
78: Dwy & S Ithan Ave

9/17/2014

Intersection						
Int Delay, s/veh	1.2					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	214	0	0	430	20	54
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, %	1	-	-	-1	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	233	0	0	467	22	59
Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	233	0	700	233
Stage 1	-	-	-	-	233	-
Stage 2	-	-	-	-	467	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1335	-	405	806
Stage 1	-	-	-	-	806	-
Stage 2	-	-	-	-	631	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	1335	-	405	806
Mov Cap-2 Maneuver	-	-	-	-	405	-
Stage 1	-	-	-	-	806	-
Stage 2	-	-	-	-	631	-
Approach	EB		WB		NB	
HCM Control Delay, s	0		0		11.5	
HCM LOS					B	
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	
Capacity (veh/h)	636	-	-	1335	-	
HCM Lane V/C Ratio	0.126	-	-	-	-	
HCM Control Delay (s)	11.5	-	-	0	-	
HCM Lane LOS	B	-	-	A	-	
HCM 95th %tile Q(veh)	0.4	-	-	0	-	

HCM 2010 TWSC
79: Garrett Rd & Lancaster Ave

9/17/2014

Intersection	
Int Delay, s/veh	1.6

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	1236	47	48	925	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	1507	57	59	1128	0	46

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	1565	2217
Stage 1	-	-	1536
Stage 2	-	-	681
Critical Hdwy	-	4.1	6.8
Critical Hdwy Stg 1	-	-	5.8
Critical Hdwy Stg 2	-	-	5.8
Follow-up Hdwy	-	2.2	3.5
Pot Cap-1 Maneuver	-	428	38
Stage 1	-	-	167
Stage 2	-	-	469
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	428	24
Mov Cap-2 Maneuver	-	-	24
Stage 1	-	-	167
Stage 2	-	-	296

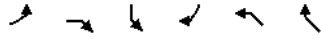
Approach	EB	WB	NB
HCM Control Delay, s	0	3.1	17.2
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	341	-	-	428	-
HCM Lane V/C Ratio	0.136	-	-	0.137	-
HCM Control Delay (s)	17.2	-	-	14.7	2.5
HCM Lane LOS	C	-	-	B	A
HCM 95th %tile Q(veh)	0.5	-	-	0.5	-

Lanes, Volumes, Timings

2: County Line Rd & N Ithan Ave

9/17/2014



Lane Group	EBL	EBR	SBL	SBR	NWL	NWR
Lane Configurations	W		W		W	
Volume (vph)	224	37	304	310	24	163
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)	238	39	323	330	26	173
Shared Lane Traffic (%)						
Lane Group Flow (vph)	277	0	653	0	199	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	

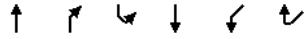
Intersection Summary

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	71.9%
ICU Level of Service	C
Analysis Period (min)	15

Lanes, Volumes, Timings

38: County Line Rd & N Ithaca Ave

9/17/2014



Lane Group	NBT	NBR	SBL	SBT	SWL	SWR
Lane Configurations	↑			↑	↑	
Volume (vph)	271	118	184	496	115	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)	288	126	196	528	122	67
Shared Lane Traffic (%)						
Lane Group Flow (vph)	414	0	0	724	189	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	78.0%
ICU Level of Service	D
Analysis Period (min)	15

HCM 2010 Signalized Intersection Summary
3: County Line Rd & Spring Mill Rd

9/17/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Volume (veh/h)	65	308	96	47	247	52	73	185	38	66	381	45
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Ob), 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	180.0	178.9	180.0	180.0	176.5	180.0	180.0	180.0	180.0	180.0	177.3	180.0
Adj Flow Rate, veh/h	90	342	112	65	284	81	90	237	58	87	428	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	134	373	113	115	370	96	145	337	72	135	480	69
Arrive On Green	0.38	0.38	0.38	0.38	0.38	0.38	0.40	0.40	0.40	0.40	0.40	0.40
Sat Flow, veh/h	167	979	297	118	973	253	176	843	181	162	1203	172
Grp Volume(v), veh/h	544	0	0	430	0	0	385	0	0	580	0	0
Grp Sat Flow(s),veh/h/ln	1442	0	0	1344	0	0	1199	0	0	1537	0	0
Q Serve(g_s), s	6.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.1	0.0	0.0
Cycle Q Clear(g_c), s	22.2	0.0	0.0	16.0	0.0	0.0	15.5	0.0	0.0	21.6	0.0	0.0
Prop In Lane	0.17		0.21	0.15		0.19	0.23		0.15	0.15		0.11
Lane Grp Cap(c), veh/h	620	0	0	582	0	0	554	0	0	684	0	0
V/C Ratio(X)	0.88	0.00	0.00	0.74	0.00	0.00	0.69	0.00	0.00	0.85	0.00	0.00
Avail Cap(c_a), veh/h	620	0	0	582	0	0	576	0	0	708	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	18.0	0.0	0.0	15.6	0.0	0.0	14.3	0.0	0.0	16.9	0.0	0.0
Incr Delay (d2), s/veh	8.1	0.0	0.0	8.2	0.0	0.0	2.8	0.0	0.0	8.7	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(50%),veh/ln	10.2	0.0	0.0	7.5	0.0	0.0	5.8	0.0	0.0	10.7	0.0	0.0
LnGrp Delay(d),s/veh	26.0	0.0	0.0	23.8	0.0	0.0	17.2	0.0	0.0	25.6	0.0	0.0
LnGrp LOS	C			C			B			C		
Approach Vol, veh/h	544			430			385			580		
Approach Delay, s/veh	26.0			23.8			17.2			25.6		
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	29.9		30.1		29.9		30.1					
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	24.2		23.6		18.0		17.5					
Green Ext Time (p_c), s	0.0		0.5		2.1		1.7					
Intersection Summary												
HCM 2010 Ctrl Delay	23.7											
HCM 2010 LOS	C											

HCM 2010 Signalized Intersection Summary
7: Sproul Rd/Spring Mill Rd & Aldwyn Ln/Kenilworth Rd & Lancaster Ave

9/17/2014

HCM 2010 methodology does not support more than 4 approaches.

HCM 2010 Signalized Intersection Summary
11: Chapel Dr & Lancaster Ave

9/17/2014

	→	↘	↙	←	↖	↗		
Movement	EBT	EBR	WBL	WBT	NBL	NBR		
Lane Configurations	↑↑			↑↑	↑	↑		
Volume (veh/h)	1181	37	26	859	103	30		
Number	2	12	1	6	3	18		
Initial Q (Ob), veh	0	0	0	0	0	0		
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00		
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00		
Adj Sat Flow, veh/h/ln	176.5	180.0	180.0	176.5	176.5	176.5		
Adj Flow Rate, veh/h	1284	40	28	934	112	33		
Adj No. of Lanes	2	0	0	2	1	1		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92		
Percent Heavy Veh, %	2	2	2	2	2	2		
Cap, veh/h	2140	67	113	2032	148	132		
Arrive On Green	0.64	0.64	0.64	0.64	0.09	0.09		
Sat Flow, veh/h	3408	103	32	3234	1681	1500		
Grp Volume(v), veh/h	648	676	502	460	112	33		
Grp Sat Flow(s),veh/h/ln	1676	1746	1660	1526	1681	1500		
Q Serve(g_s), s	9.2	9.2	0.0	6.3	2.7	0.8		
Cycle Q Clear(g_c), s	9.2	9.2	5.8	6.3	2.7	0.8		
Prop In Lane		0.06	0.06		1.00	1.00		
Lane Grp Cap(c), veh/h	1081	1126	1162	983	148	132		
V/C Ratio(X)	0.60	0.60	0.43	0.47	0.76	0.25		
Avail Cap(c_a), veh/h	1081	1126	1162	983	920	821		
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00		
Upstream Filter(l)	1.00	1.00	0.72	0.72	1.00	1.00		
Uniform Delay (d), s/veh	4.2	4.2	3.6	3.7	18.3	17.5		
Incr Delay (d2), s/veh	2.5	2.4	0.8	1.2	7.7	1.0		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	4.9	5.1	3.1	2.9	1.6	0.4		
LnGrp Delay(d),s/veh	6.7	6.6	4.5	4.9	26.0	18.5		
LnGrp LOS	A	A	A	A	C	B		
Approach Vol, veh/h	1324			962	145			
Approach Delay, s/veh	6.7			4.7	24.3			
Approach LOS	A			A	C			
Timer	1	2	3	4	5	6	7	8
Assigned Phs		2				6		8
Phs Duration (G+Y+Rc), s		50.9				50.9		9.1
Change Period (Y+Rc), s		5.0				5.0		5.0
Max Green Setting (Gmax), s		27.0				27.0		23.0
Max Q Clear Time (g_c+I1), s		11.2				8.3		4.7
Green Ext Time (p_c), s		9.0				9.9		0.4
Intersection Summary								
HCM 2010 Ctrl Delay				6.9				
HCM 2010 LOS				A				

HCM 2010 Signalized Intersection Summary
16: Sproul Rd & Conestoga Rd

9/17/2014

	↘	→	↙	↖	←	↗	↘	↙	↖	↗	↘	↙	↖
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR	
Lane Configurations	↑	↑		↑	↑		↑	↑		↑	↑	↑	
Volume (veh/h)	106	553	220	27	518	47	106	187	28	51	295	83	
Number	7	4	14	3	8	18	1	6	16	5	2	12	
Initial Q (Ob), 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	178.2	178.2	180.0	182.7	182.7	184.5	177.3	177.3	179.1	180.9	179.1	180.9	
Adj Flow Rate, veh/h	112	582	0	28	545	0	112	197	29	54	311	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	216	798	0	247	588	0	192	612	90	88	324	86	
Arrive On Green	0.06	0.45	0.00	0.32	0.32	0.00	0.06	0.40	0.40	0.27	0.27	0.27	
Sat Flow, veh/h	1697	1782	0	858	1827	0	1689	1511	223	136	1206	320	
Grp Volume(v), veh/h	112	582	0	28	545	0	112	0	226	452	0	0	
Grp Sat Flow(s),veh/h/ln	1697	1782	0	858	1827	0	1689	0	1734	1662	0	0	
Q Serve(g_s), s	3.3	20.9	0.0	2.2	22.5	0.0	3.6	0.0	7.0	14.7	0.0	0.0	
Cycle Q Clear(g_c), s	3.3	20.9	0.0	13.2	22.5	0.0	3.6	0.0	7.0	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	216	798	0	247	588	0	192	0	702	498	0	0	
V/C Ratio(X)	0.52	0.73	0.00	0.11	0.93	0.00	0.58	0.00	0.32	0.91	0.00	0.00	
Avail Cap(c_a), veh/h	262	798	0	247	588	0	233	0	744	498	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(l)	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	17.7	0.0	27.1	25.6	0.0	20.9	0.0	15.9	28.6	0.0	0.0	
Incr Delay (d2), s/veh	1.9	5.8	0.0	0.9	23.0	0.0	2.8	0.0	0.3	20.3	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(50%),veh/ln	1.6	11.5	0.0	0.6	15.1	0.0	1.8	0.0	3.4	12.5	0.0	0.0	
LnGrp Delay(d),s/veh	21.2	23.5	0.0	28.1	48.6	0.0	23.7	0.0	16.2	48.9	0.0	0.0	
LnGrp LOS	C	C		C	D		C		B	D			
Approach Vol, veh/h		694			573			338				452	
Approach Delay, s/veh		23.1			47.6			18.7				48.9	
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	27.0		42.4		37.6	9.9	32.5					
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		35.5		34.0	7.0	23.5					
Max Q Clear Time (g_c+I1), s	5.6	23.0		22.9		9.0	5.3	24.5					
Green Ext Time (p_c), s	0.0	0.0		5.7		2.5	0.0	0.0					
Intersection Summary													
HCM 2010 Ctrl Delay				34.9									
HCM 2010 LOS				C									

HCM 2010 Signalized Intersection Summary
25: S Ithan Ave & Conestoga Rd

9/17/2014

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Volume (veh/h)	62	526	7	11	475	37	7	16	6	43	78	128
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Ob), 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	185.4	183.6	185.4	176.4	174.7	176.4	176.3	174.5	176.3	184.4	182.6	184.4
Adj Flow Rate, veh/h	70	598	8	12	540	42	8	18	7	49	89	145
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	771	10	91	764	59	146	231	73	137	130	176
Arrive On Green	0.48	0.48	0.48	0.48	0.48	0.48	0.21	0.21	0.21	0.21	0.21	0.21
Sat Flow, veh/h	106	1595	20	10	1582	121	193	1091	346	180	614	834
Grp Volume(v), veh/h	676	0	0	594	0	0	33	0	0	283	0	0
Grp Sat Flow(s),veh/h/ln	1722	0	0	1713	0	0	1630	0	0	1628	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	3.9	0.0	0.0
Cycle Q Clear(g_c), s	13.7	0.0	0.0	11.5	0.0	0.0	0.7	0.0	0.0	7.0	0.0	0.0
Prop In Lane	0.10		0.01	0.02		0.07	0.24		0.21	0.17		0.51
Lane Grp Cap(c), veh/h	925	0	0	914	0	0	449	0	0	443	0	0
V/C Ratio(X)	0.73	0.00	0.00	0.65	0.00	0.00	0.07	0.00	0.00	0.64	0.00	0.00
Avail Cap(c_a), veh/h	1424	0	0	1427	0	0	678	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)	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	9.1	0.0	0.0	8.7	0.0	0.0	13.5	0.0	0.0	16.0	0.0	0.0
Incr Delay (d2), s/veh	1.1	0.0	0.0	0.8	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(50%),veh/ln	6.7	0.0	0.0	5.6	0.0	0.0	0.3	0.0	0.0	3.3	0.0	0.0
LnGrp Delay(d),s/veh	10.2	0.0	0.0	9.5	0.0	0.0	13.6	0.0	0.0	17.5	0.0	0.0
LnGrp LOS	B			A			B			B		
Approach Vol, veh/h		676			594			33			283	
Approach Delay, s/veh		10.2			9.5			13.6			17.5	
Approach LOS		B			A			B			B	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		27.1		15.5		27.1		15.5				
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		13.5		2.7		15.7		9.0				
Green Ext Time (p_c), s		5.6		1.0		5.4		0.7				
Intersection Summary												
HCM 2010 Ctrl Delay				11.3								
HCM 2010 LOS				B								

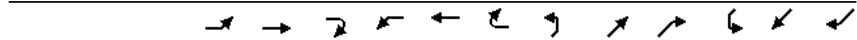
HCM 2010 Signalized Intersection Summary
27: S Ithan Ave/N Ithan Ave & Lancaster Ave

9/17/2014

HCM 2010 methodology does not support exclusive ped or hold phases.

HCM 2010 Signalized Intersection Summary
33: Williams Rd/Garrett Ave & Conestoga Rd

9/17/2014



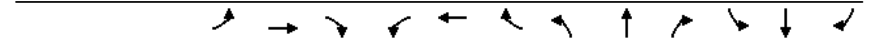
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↕			↕			↕				↕
Volume (veh/h)	27	492	9	12	497	29	16	1	11	28	12	52
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Ob), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	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	187.2	187.2	187.2	187.2	187.2	187.2	180.0	180.0	180.0	172.8	172.8	172.8
Adj Flow Rate, veh/h	29	535	10	13	540	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	1244	23	67	1230	72	141	25	52	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	1746	32	13	1727	101	632	294	618	334	307	849
Grp Volume(v), veh/h	574	0	0	585	0	0	30	0	0	100	0	0
Grp Sat Flow(s), veh/h/ln	1820	0	0	1840	0	0	1544	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	8.2	0.0	0.0	8.5	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	218	0	0	199	0	0
V/C Ratio(X)	0.42	0.00	0.00	0.43	0.00	0.00	0.14	0.00	0.00	0.50	0.00	0.00
Avail Cap(c_a), veh/h	1356	0	0	1369	0	0	400	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(l)	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(50%), veh/ln	4.5	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	27.7	0.0	0.0	31.5	0.0	0.0
LnGrp LOS	A			A			C			C		
Approach Vol, veh/h	574			585			30			100		
Approach Delay, s/veh	4.8			4.8			27.7			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	10.2		6.2		10.5		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
51: Lowrys Ln & Lancaster Ave

9/17/2014



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Volume (veh/h)	2	1229	23	15	1008	4	20	36	15	99	71	72
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Ob), 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	180.0	178.2	180.0	177.3	175.5	177.3	190.0	188.1	190.0	188.1	186.3	188.1
Adj Flow Rate, veh/h	2	1336	25	16	1096	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	65	1983	37	74	1951	7	135	200	66	199	109	92
Arrive On Green	0.60	0.60	0.60	0.60	0.60	0.60	0.19	0.19	0.19	0.19	0.19	0.19
Sat Flow, veh/h	1	3329	62	15	3275	12	276	1048	347	570	569	480
Grp Volume(v), veh/h	715	0	648	577	0	539	77	0	0	263	0	0
Grp Sat Flow(s), veh/h/ln	1781	0	1611	1706	0	1595	1671	0	0	1619	0	0
Q Serve(g_s), s	0.0	0.0	15.3	0.0	0.0	11.6	0.0	0.0	0.0	6.8	0.0	0.0
Cycle Q Clear(g_c), s	15.2	0.0	15.3	11.1	0.0	11.6	2.0	0.0	0.0	8.8	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	1125	0	960	1082	0	950	401	0	0	399	0	0
V/C Ratio(X)	0.64	0.00	0.67	0.53	0.00	0.57	0.19	0.00	0.00	0.66	0.00	0.00
Avail Cap(c_a), veh/h	1125	0	960	1082	0	950	510	0	0	505	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(l)	1.00	0.00	1.00	1.00	0.00	1.00	0.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	7.7	0.0	7.7	6.8	0.0	6.9	19.2	0.0	0.0	21.9	0.0	0.0
Incr Delay (d2), s/veh	2.7	0.0	3.8	1.9	0.0	2.4	0.2	0.0	0.0	2.1	0.0	0.0
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%), veh/ln	8.2	0.0	7.7	5.9	0.0	5.6	1.0	0.0	0.0	4.2	0.0	0.0
LnGrp Delay(d), s/veh	10.4	0.0	11.5	8.7	0.0	9.4	19.5	0.0	0.0	24.0	0.0	0.0
LnGrp LOS	B		B	A		A	B			C		
Approach Vol, veh/h	1363			1116			77			263		
Approach Delay, s/veh	10.9			9.0			19.5			24.0		
Approach LOS	B			A			B			C		
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	2		4		6		8					
Phs Duration (G+Y+Rc), s	43.8		16.2		43.8		16.2					
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	17.3		10.8		13.6		4.0					
Green Ext Time (p_c), s	10.0		0.5		11.3		1.0					

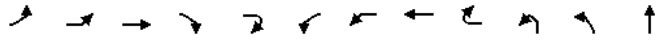
Intersection Summary	
HCM 2010 Ctrl Delay	11.6
HCM 2010 LOS	B

Notes
User approved pedestrian interval to be less than phase max green.

Lanes, Volumes, Timings

7: Sproul Rd/Spring Mill Rd & Aldwyn Ln/Kenilworth Rd & Lancaster Ave

9/17/2014



Lane Group	EBL2	EBL	EBT	EBR	EBR2	WBL2	WBL	WBT	WBR2	NBL2	NBL	NBT
Lane Configurations		↑	↑↑		↑		↑	↑↑				↑
Volume (vph)	4	251	989	31	284	2	23	911	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
Flt Protected		0.950					0.950					0.961
Satd. Flow (prot)	0	1541	3177	0	1576	0	1693	3370	0	0	0	1536
Flt Permitted		0.093					0.213					0.753
Satd. Flow (perm)	0	151	3177	0	1576	0	380	3370	0	0	0	1203
Right Turn on Red					Yes			Yes				
Satd. Flow (RTOR)					234			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	259	1020	32	293	2	24	939	34	7	54	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	263	1052	0	293	0	26	973	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	1.18	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

Lanes, Volumes, Timings

7: Sproul Rd/Spring Mill Rd & Aldwyn Ln/Kenilworth Rd & Lancaster Ave

9/17/2014



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	192	0	113	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	10	12	12	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
Flt Protected					0.995				0.950			0.976
Satd. Flow (prot)	0	0	0	0	1462	0	0	0	1651	1640	0	0
Flt Permitted					0.982				0.097			0.976
Satd. Flow (perm)	0	0	0	0	1443	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	198	0	116	21	1
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	19	0	0	0	198	138	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			0
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	1.15	1.15	1.09	1.09	1.14	1.14	1.14
Turning Speed (mph)	9	9	15	15	15	15	15	9	9	15	15	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	

Lanes, Volumes, Timings

7: Sproul Rd/Spring Mill Rd & Aldwyn Ln/Kenilworth Rd & Lancaster Ave

9/17/2014

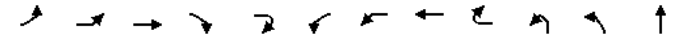


Lane Group	SWL2	SWL	SWT	SWR	SWR2
Lane Configurations					
Volume (vph)	39	9	168	236	1
Ideal Flow (vphpl)	1800	1800	1800	1800	1800
Lane Width (ft)	10	10	10	10	10
Grade (%)			-7%		
Storage Length (ft)		150		0	
Storage Lanes		1		0	
Taper Length (ft)		25			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00
Frt			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	173	243	1
Shared Lane Traffic (%)					
Lane Group Flow (vph)	0	49	417	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		

Lanes, Volumes, Timings

7: Sproul Rd/Spring Mill Rd & Aldwyn Ln/Kenilworth Rd & Lancaster Ave

9/17/2014



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 Effect 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	0.79	0.37		0.27	0.98					1.21
Control Delay		138.7	42.7	8.2		54.7	65.9					236.1
Queue Delay		0.0	0.0	0.0		0.0	0.0					0.0
Total Delay		138.7	42.7	8.2		54.7	65.9					236.1
LOS		F	D	A		D	E					F
Approach Delay			52.1				65.6					236.1
Approach LOS			D				E					F
Queue Length 50th (ft)			-263	480	36	21	-427					-91
Queue Length 95th (ft)			#452	574	106	53	#580					#205
Internal Link Dist (ft)			497			784						412
Turn Bay Length (ft)			300			75						
Base Capacity (vph)		231	1329	795		96	997					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		1.14	0.79	0.37		0.27	0.98					1.21

Intersection Summary

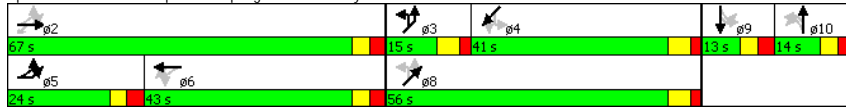
Area Type:	Other
Cycle Length:	150
Actuated Cycle Length:	144.8
Natural Cycle:	150
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	1.37
Intersection Signal Delay:	79.5
Intersection LOS:	E
Intersection Capacity Utilization:	116.6%
ICU Level of Service:	H
Analysis Period (min):	15
-	Volume exceeds 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

9/17/2014

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

9/17/2014

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		
Total Lost Time (s)					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					235.1		36.8
Queue Delay					0.0					0.0		0.0
Total Delay					83.2					235.1		36.8
LOS					F					F		D
Approach Delay					83.2					153.7		
Approach LOS					F					F		
Queue Length 50th (ft)					18					-213		99
Queue Length 95th (ft)					48					#382		158
Internal Link Dist (ft)					517					1256		
Turn Bay Length (ft)										200		
Base Capacity (vph)					64					145		561
Starvation Cap Reductn					0					0		0
Spillback Cap Reductn					0					0		0
Storage Cap Reductn					0					0		0
Reduced v/c Ratio					0.30					1.37		0.25

Lanes, Volumes, Timings

7: Sproul Rd/Spring Mill Rd & Aldwyn Ln/Kenilworth Rd & Lancaster Ave

9/17/2014



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	1.12		
Control Delay		47.9	134.3		
Queue Delay		0.0	0.0		
Total Delay		47.9	134.3		
LOS		D	F		
Approach Delay			125.2		
Approach LOS			F		
Queue Length 50th (ft)		39	-483		
Queue Length 95th (ft)		79	#700		
Internal Link Dist (ft)			3088		
Turn Bay Length (ft)		150			
Base Capacity (vph)		272	371		
Starvation Cap Reductn		0	0		
Spillback Cap Reductn		0	0		
Storage Cap Reductn		0	0		
Reduced v/c Ratio		0.18	1.12		
Intersection Summary					

Lanes, Volumes, Timings
11: Chapel Dr & Lancaster Ave

9/17/2014

	→	↖	↗	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↔↔			↔↔	↔	↔
Volume (vph)	1181	37	26	859	103	30
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Width (ft)	11	11	11	11	12	12
Storage Length (ft)		125	100		0	0
Storage Lanes		0	0		1	1
Taper Length (ft)			25		25	
Lane Util. Factor	0.95	0.95	0.95	0.95	1.00	1.00
Frt	0.995					0.850
Flt Protected				0.999	0.950	
Satd. Flow (prot)	3225	0	0	3238	1676	1500
Flt Permitted				0.891	0.950	
Satd. Flow (perm)	3225	0	0	2888	1676	1500
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)	7					21
Link Speed (mph)	35			35	25	
Link Distance (ft)	745			1291	319	
Travel Time (s)	14.5			25.1	8.7	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1284	40	28	934	112	33
Shared Lane Traffic (%)						
Lane Group Flow (vph)	1324	0	0	962	112	33
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	10			10	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	1
Detector Template	Thru		Left	Thru	Left	Right
Leading Detector (ft)	37		20	37	37	20
Trailing Detector (ft)	-3		0	-3	-3	0
Detector 1 Position(ft)	-3		0	-3	-3	0
Detector 1 Size(ft)	40		20	40	40	20
Detector 1 Type	CI+Ex		CI+Ex	CI+Ex	CI+Ex	CI+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	NA	Prot	Perm
Protected Phases	2			6	8	
Permitted Phases			6			8
Detector Phase	2		6	6	8	8
Switch Phase						
Minimum Initial (s)	10.0		10.0	10.0	4.0	4.0
Minimum Split (s)	21.0		21.0	21.0	28.0	28.0
Total Split (s)	32.0		32.0	32.0	28.0	28.0

Lanes, Volumes, Timings
11: Chapel Dr & Lancaster Ave

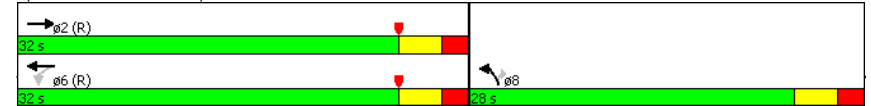
9/17/2014

	→	↖	↗	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Total Split (%)	53.3%		53.3%	53.3%	46.7%	46.7%
Maximum Green (s)	27.0		27.0	27.0	23.0	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	None	None
Walk Time (s)	10.0		10.0	10.0	7.0	7.0
Flash Dont Walk (s)	0.0		0.0	0.0	16.0	16.0
Pedestrian Calls (#/hr)	0		0	0	0	0
Act Effect Green (s)	43.3		43.3	43.3	8.9	8.9
Actuated g/C Ratio	0.72		0.72	0.72	0.15	0.15
v/c Ratio	0.57		0.46	0.46	0.45	0.14
Control Delay	6.9		3.9	3.9	28.2	13.6
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	6.9		3.9	3.9	28.2	13.6
LOS	A		A	A	C	B
Approach Delay	6.9		3.9	3.9	24.9	
Approach LOS	A		A	A	C	
Queue Length 50th (ft)	113		1	38	4	
Queue Length 95th (ft)	206		m210	73	22	
Internal Link Dist (ft)	665		1211	239		
Turn Bay Length (ft)						
Base Capacity (vph)	2330		2085	628	575	
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	0.57		0.46	0.18	0.06	

Intersection Summary

Area Type: Other
 Cycle Length: 60
 Actuated Cycle Length: 60
 Offset: 26 (43%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow
 Natural Cycle: 60
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.57
 Intersection Signal Delay: 6.8
 Intersection LOS: A
 Intersection Capacity Utilization 60.1%
 ICU Level of Service B
 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

9/17/2014



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↕	↔	↔	↕	↔	↔	↕	↔	↔	↕	↔
Volume (vph)	80	1003	118	116	710	35	90	92	30	68	185	86
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	200		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		0.984			0.993			0.963			0.952	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1565	3079	0	1541	3061	0	1557	1578	0	1565	1568	0
Flt Permitted	0.256			0.088			0.294			0.647		
Satd. Flow (perm)	422	3079	0	143	3061	0	482	1578	0	1066	1568	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		35			35			25			25	
Link Distance (ft)		1291			265			344			973	
Travel Time (s)		25.1			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)	84	1056	124	122	747	37	95	97	32	72	195	91
Shared Lane Traffic (%)												
Lane Group Flow (vph)	84	1180	0	122	784	0	95	129	0	72	286	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			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	8		4	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	

Lanes, Volumes, Timings

27: S Ithan Ave/N Ithan Ave & Lancaster Ave

9/17/2014

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

Lanes, Volumes, Timings

27: S Ithan Ave/N Ithan Ave & Lancaster Ave

9/17/2014



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 Effect Green (s)	56.7	49.6		56.6	51.4		23.6	23.6		23.6	23.6	
Actuated g/C Ratio	0.47	0.41		0.47	0.43		0.20	0.20		0.20	0.20	
v/c Ratio	0.32	0.93		0.85	0.60		1.01	0.42		0.34	0.93	
Control Delay	20.8	48.8		65.4	24.6		143.3	46.4		46.3	83.3	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	20.8	48.8		65.4	24.6		143.3	46.4		46.3	83.3	
LOS	C	D		E	C		F	D		D	F	
Approach Delay		46.9			30.1			87.5			75.9	
Approach LOS		D			C			F			E	
Queue Length 50th (ft)	35	-543		69	204		74	87		48	218	
Queue Length 95th (ft)	m62	#682		m#147	243		#187	149		95	#377	
Internal Link Dist (ft)		1211			185			264			893	
Turn Bay Length (ft)	250			200			200			65		
Base Capacity (vph)	271	1272		143	1310		98	322		217	320	
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	0.31	0.93		0.85	0.60		0.97	0.40		0.33	0.89	

Intersection Summary

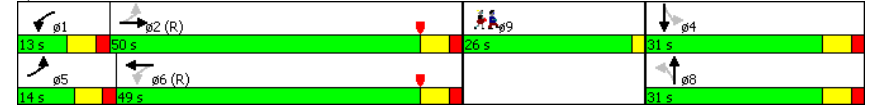
Area Type: Other
 Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow, Master Intersection
 Natural Cycle: 115
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.01
 Intersection Signal Delay: 48.5 Intersection LOS: D
 Intersection Capacity Utilization 82.8% ICU Level of Service E
 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.

Lanes, Volumes, Timings

27: S Ithan Ave/N Ithan Ave & Lancaster Ave

9/17/2014

Splits and Phases: 27: S Ithan Ave/N Ithan Ave & Lancaster Ave



Lanes, Volumes, Timings

27: S Ithan Ave/N Ithan Ave & Lancaster Ave

9/17/2014

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 TWSC
2: County Line Rd & N Ithan Ave

9/17/2014

Intersection						
Int Delay, s/veh	0					
Movement	EBL	EBR	SBL	SBR	NWL	NWR
Vol, veh/h	194	37	304	267	24	163
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	0	-	0	-
Veh in Median Storage, #	0	-	0	-	0	-
Grade, %	0	-	0	-	0	-
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	1	1	1	1	1	1
Mvmt Flow	206	39	323	284	26	173

Major/Minor	Minor2	Major2	Minor1
Conflicting Flow All	87	0	20
Stage 1	0	-	0
Stage 2	87	-	20
Critical Hdwy	-	-	-
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	-	-	-
Pot Cap-1 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	-	-
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	EB	SB	NW
HCM Control Delay, s	0		
HCM LOS	-		

Minor Lane/Major Mvmt	NWLn1	EBLn1	SBL	SBR
Capacity (veh/h)	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-
HCM Control Delay (s)	-	-	-	-
HCM Lane LOS	-	-	-	-
HCM 95th %tile Q(veh)	-	-	-	-

HCM 2010 TWSC
15: Conestoga Rd & Spring Mill Rd

9/17/2014

Intersection						
Int Delay, s/veh	0.5					
Movement	EBL	EBT	WBT	WBR	SWL	SWR
Vol, veh/h	10	661	614	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	689	640	3	18	9

Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	643	0	1350
Stage 1	-	-	641
Stage 2	-	-	709
Critical Hdwy	4.11	-	6.41
Critical Hdwy Stg 1	-	-	5.41
Critical Hdwy Stg 2	-	-	5.41
Follow-up Hdwy	2.209	-	3.509
Pot Cap-1 Maneuver	947	-	167
Stage 1	-	-	527
Stage 2	-	-	490
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	947	-	164
Mov Cap-2 Maneuver	-	-	164
Stage 1	-	-	527
Stage 2	-	-	482

Approach	EB	WB	SW
HCM Control Delay, s	0.1	0	24.5
HCM LOS	-	-	C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SWLn1
Capacity (veh/h)	947	-	-	-	212
HCM Lane V/C Ratio	0.011	-	-	-	0.128
HCM Control Delay (s)	8.8	0	-	-	24.5
HCM Lane LOS	A	A	-	-	C
HCM 95th %tile Q(veh)	0	-	-	-	0.4

HCM 2010 TWSC
29: Strathmore Dr/Lowrys Ln & Conestoga Rd

9/17/2014

Intersection									
Int Delay, s/veh	2.6								
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR
Vol, veh/h	37	498	17	17	466	16	15	8	17
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-
Peak Hour Factor	96	96	96	96	96	96	96	96	96
Heavy Vehicles, %	1	1	1	1	1	1	1	1	1
Mvmt Flow	39	519	18	18	485	17	16	8	18
Major/Minor	Major1			Major2			Minor1		
Conflicting Flow All	502	0	0	536	0	0	1171	1143	528
Stage 1	-	-	-	-	-	-	605	605	-
Stage 2	-	-	-	-	-	-	566	538	-
Critical Hdwy	4.11	-	-	4.11	-	-	7.11	6.51	6.21
Critical Hdwy Stg 1	-	-	-	-	-	-	6.11	5.51	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.11	5.51	-
Follow-up Hdwy	2.209	-	-	2.209	-	-	3.509	4.009	3.309
Pot Cap-1 Maneuver	1068	-	-	1037	-	-	170	201	552
Stage 1	-	-	-	-	-	-	486	489	-
Stage 2	-	-	-	-	-	-	511	524	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	1068	-	-	1037	-	-	135	186	552
Mov Cap-2 Maneuver	-	-	-	-	-	-	135	186	-
Stage 1	-	-	-	-	-	-	461	464	-
Stage 2	-	-	-	-	-	-	436	511	-
Approach	EB			WB			NB		
HCM Control Delay, s	0.6			0.3			25.6		
HCM LOS	D			D			D		
Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	
Capacity (veh/h)	216	1068	-	-	1037	-	-	328	
HCM Lane V/C Ratio	0.193	0.036	-	-	0.017	-	-	0.251	
HCM Control Delay (s)	25.6	8.5	0	-	8.5	0	-	19.6	
HCM Lane LOS	D	A	A	-	A	A	-	C	
HCM 95th %tile Q(veh)	0.7	0.1	-	-	0.1	-	-	1	

HCM 2010 TWSC
29: Strathmore Dr/Lowrys Ln & Conestoga Rd

9/17/2014

Intersection			
Int Delay, s/veh			
Movement	SBL	SBT	SBR
Vol, veh/h	9	17	53
Conflicting Peds, #/hr	0	0	0
Sign Control	Stop	Stop	Stop
RT Channelized	-	-	None
Storage Length	-	-	-
Veh in Median Storage, #	-	0	-
Grade, %	-	0	-
Peak Hour Factor	96	96	96
Heavy Vehicles, %	1	1	1
Mvmt Flow	9	18	55
Major/Minor	Minor2		
Conflicting Flow All	1147	1143	494
Stage 1	529	529	-
Stage 2	618	614	-
Critical Hdwy	7.11	6.51	6.21
Critical Hdwy Stg 1	6.11	5.51	-
Critical Hdwy Stg 2	6.11	5.51	-
Follow-up Hdwy	3.509	4.009	3.309
Pot Cap-1 Maneuver	177	201	577
Stage 1	535	529	-
Stage 2	478	484	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	156	186	577
Mov Cap-2 Maneuver	156	186	-
Stage 1	507	516	-
Stage 2	431	459	-
Approach	SB		
HCM Control Delay, s	19.6		
HCM LOS	C		
Minor Lane/Major Mvmt			

HCM 2010 TWSC
38: County Line Rd & N Ithan Ave

9/17/2014

Intersection						
Int Delay, s/veh	47.9					
Movement	NBT	NBR	SBL	SBT	SWL	SWR
Vol, veh/h	251	108	184	466	102	63
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Stop	Stop	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	1	1	1	1	1	1
Mvmt Flow	267	115	196	496	109	67
Major/Minor	Major1	Minor2	Minor1			
Conflicting Flow All	0	0	358	382	572	324
Stage 1	-	-	0	0	324	-
Stage 2	-	-	358	382	248	-
Critical Hdwy	-	-	6.41	6.51	6.41	6.21
Critical Hdwy Stg 1	-	-	-	-	5.41	-
Critical Hdwy Stg 2	-	-	5.41	5.51	-	-
Follow-up Hdwy	-	-	3.509	4.009	3.509	3.309
Pot Cap-1 Maneuver	-	-	642	553	483	719
Stage 1	-	-	-	-	735	-
Stage 2	-	-	710	614	-	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	642	0	483	719
Mov Cap-2 Maneuver	-	-	642	0	483	-
Stage 1	-	-	-	0	735	-
Stage 2	-	-	710	0	-	-
Approach	NB	SB	SW			
HCM Control Delay, s	0	82.9	14.5			
HCM LOS		F	B			
Minor Lane/Major Mvmt	NBT	NBR	SBLn1	SWLn1		
Capacity (veh/h)	-	-	642	552		
HCM Lane V/C Ratio	-	-	1.077	0.318		
HCM Control Delay (s)	-	-	82.9	14.5		
HCM Lane LOS	-	-	F	B		
HCM 95th %tile Q(veh)	-	-	19.5	1.4		

HCM 2010 TWSC
43: County Line Rd & Roberts Rd

9/17/2014

Intersection										
Int Delay, s/veh	3.2									
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	
Vol, veh/h	37	26	1	9	26	11	4	515	29	
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	
RT Channelized	-	-	None	-	-	None	-	-	None	
Storage Length	-	-	-	-	-	-	-	-	-	
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	
Grade, %	-	0	-	-	0	-	-	0	-	
Peak Hour Factor	95	95	95	95	95	95	95	95	95	
Heavy Vehicles, %	1	1	1	1	1	1	1	1	1	
Mvmt Flow	39	27	1	9	27	12	4	542	31	
Major/Minor	Minor2	Minor1	Major1							
Conflicting Flow All	1042	1330	379	950	1347	286	758	0	0	
Stage 1	749	749	-	566	566	-	-	-	-	
Stage 2	293	581	-	384	781	-	-	-	-	
Critical Hdwy	7.52	6.52	6.92	7.52	6.52	6.92	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	-	-	
Pot Cap-1 Maneuver	185	155	622	216	151	714	856	-	-	
Stage 1	372	420	-	479	508	-	-	-	-	
Stage 2	694	500	-	613	406	-	-	-	-	
Platoon blocked, %	-	-	-	-	-	-	-	-	-	
Mov Cap-1 Maneuver	153	151	622	182	147	714	856	-	-	
Mov Cap-2 Maneuver	153	151	-	182	147	-	-	-	-	
Stage 1	369	411	-	476	504	-	-	-	-	
Stage 2	641	497	-	559	397	-	-	-	-	
Approach	EB	WB	NB							
HCM Control Delay, s	45.4	30.3	0.1							
HCM LOS	E	D								
Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR		
Capacity (veh/h)	856	-	-	154	190	1003	-	-		
HCM Lane V/C Ratio	0.005	-	-	0.437	0.255	0.012	-	-		
HCM Control Delay (s)	9.2	0	-	45.4	30.3	8.6	0.1	-		
HCM Lane LOS	A	A	-	E	D	A	A	-		
HCM 95th %tile Q(veh)	0	-	-	2	1	0	-	-		

HCM 2010 TWSC
43: County Line Rd & Roberts Rd

9/17/2014

Intersection			
Int Delay, s/veh			
Movement	SBL	SBT	SBR
Vol, veh/h	11	659	61
Conflicting Peds, #/hr	0	0	0
Sign Control	Free	Free	Free
RT Channelized	-	-	None
Storage Length	-	-	-
Veh in Median Storage, #	-	0	-
Grade, %	-	0	-
Peak Hour Factor	95	95	95
Heavy Vehicles, %	1	1	1
Mvmt Flow	12	694	64
Major/Minor	Major2		
Conflicting Flow All	573	0	0
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	4.12	-	-
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	2.21	-	-
Pot Cap-1 Maneuver	1003	-	-
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	1003	-	-
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-
Approach	SB		
HCM Control Delay, s	0.2		
HCM LOS			
Minor Lane/Major Mvmt			

HCM 2010 TWSC
52: Airdale Rd & County Line Rd

9/17/2014

Intersection						
Int Delay, s/veh	3.6					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	171	217	347	16	12	119
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	221	354	16	12	121
Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	370	0	-	0	932	362
Stage 1	-	-	-	-	362	-
Stage 2	-	-	-	-	570	-
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	1194	-	-	-	297	685
Stage 1	-	-	-	-	707	-
Stage 2	-	-	-	-	568	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	1194	-	-	-	248	685
Mov Cap-2 Maneuver	-	-	-	-	248	-
Stage 1	-	-	-	-	707	-
Stage 2	-	-	-	-	474	-
Approach	EB		WB		SB	
HCM Control Delay, s	3.8		0		12.9	
HCM LOS					B	
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	
Capacity (veh/h)	1194	-	-	-	590	
HCM Lane V/C Ratio	0.146	-	-	-	0.227	
HCM Control Delay (s)	8.5	0	-	-	12.9	
HCM Lane LOS	A	A	-	-	B	
HCM 95th %tile Q(veh)	0.5	-	-	-	0.9	

HCM 2010 TWSC
53: County Line Rd & Lowrys Ln

9/17/2014

Intersection						
Int Delay, s/veh	1.4					

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	16	19	52	184	157	125
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	17	20	54	192	164	130

Major/Minor	Minor2	Major1	Major2
Conflicting Flow All	529	229	294
Stage 1	229	-	-
Stage 2	300	-	-
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	514	815	1279
Stage 1	814	-	-
Stage 2	756	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	490	815	1279
Mov Cap-2 Maneuver	490	-	-
Stage 1	814	-	-
Stage 2	720	-	-

Approach	EB	NB	SB
HCM Control Delay, s	11.1	1.7	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1279	-	625	-	-
HCM Lane V/C Ratio	0.042	-	0.058	-	-
HCM Control Delay (s)	7.9	0	11.1	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0.1	-	0.2	-	-

HCM 2010 TWSC
61: Dwy/Aldwyn Ln & S Ithan Ave

9/17/2014

Intersection										
Int Delay, s/veh	2.5									

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR
Vol, veh/h	35	125	5	52	244	22	8	3	38
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-
Peak Hour Factor	91	91	91	91	91	91	91	91	91
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2
Mvmt Flow	38	137	5	57	268	24	9	3	42

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	292	0	0
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	4.12	-	-
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	2.218	-	-
Pot Cap-1 Maneuver	1270	-	-
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	1270	-	-
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	1.7	1.2	10.7
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	685	1270	-	-	1440	-	-	594
HCM Lane V/C Ratio	0.079	0.03	-	-	0.04	-	-	0.031
HCM Control Delay (s)	10.7	7.9	0	-	7.6	0	-	11.3
HCM Lane LOS	B	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	0.3	0.1	-	-	0.1	-	-	0.1

HCM 2010 TWSC
61: Dwy/Aldwyn Ln & S Ithan Ave

9/17/2014

Intersection			
Int Delay, s/veh			
Movement	SBL	SBT	SBR
Vol, veh/h	4	0	13
Conflicting Peds, #/hr	0	0	0
Sign Control	Stop	Stop	Stop
RT Channelized	-	-	None
Storage Length	-	-	-
Veh in Median Storage, #	-	0	-
Grade, %	-	0	-
Peak Hour Factor	91	91	91
Heavy Vehicles, %	2	2	2
Mvmt Flow	4	0	14
Major/Minor	Minor2		
Conflicting Flow All	635	615	280
Stage 1	395	395	-
Stage 2	240	220	-
Critical Hdwy	7.12	6.52	6.22
Critical Hdwy Stg 1	6.12	5.52	-
Critical Hdwy Stg 2	6.12	5.52	-
Follow-up Hdwy	3.518	4.018	3.318
Pot Cap-1 Maneuver	391	407	759
Stage 1	630	605	-
Stage 2	763	721	-
Platoon blocked, %			
Mov Cap-1 Maneuver	348	375	759
Mov Cap-2 Maneuver	348	375	-
Stage 1	609	577	-
Stage 2	701	697	-
Approach	SB		
HCM Control Delay, s	11.3		
HCM LOS	B		
Minor Lane/Major Mvmt			

HCM 2010 TWSC
76: S Ithan Ave & Dwy

9/17/2014

Intersection								
Int Delay, s/veh	7.1							
Movement	EBL	EBT	EBR	WBL	WBT	WBR	SBL	SBR
Vol, veh/h	4	138	25	136	284	5	20	6
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	None
Storage Length	50	-	-	100	-	-	0	-
Veh in Median Storage, #	-	0	-	-	0	-	0	-
Grade, %	-	1	-	-	-1	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2
Mvmt Flow	4	150	27	148	309	5	22	7
Major/Minor	Major1		Major2			Minor2		
Conflicting Flow All	314	0	0	177	0	0	831	311
Stage 1	-	-	-	-	-	-	607	-
Stage 2	-	-	-	-	-	-	224	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	3.318
Pot Cap-1 Maneuver	1246	-	-	1399	-	-	289	729
Stage 1	-	-	-	-	-	-	483	-
Stage 2	-	-	-	-	-	-	779	-
Platoon blocked, %								
Mov Cap-1 Maneuver	1246	-	-	1399	-	-	193	729
Mov Cap-2 Maneuver	-	-	-	-	-	-	193	-
Stage 1	-	-	-	-	-	-	481	-
Stage 2	-	-	-	-	-	-	670	-
Approach	EB			WB			SB	
HCM Control Delay, s	0.2			2.5			17.6	
HCM LOS							C	
Minor Lane/Major Mvmt	NWLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	262	1246	-	-	1399	-	-	316
HCM Lane V/C Ratio	0.236	0.003	-	-	0.106	-	-	0.096
HCM Control Delay (s)	22.9	7.9	-	-	7.9	-	-	17.6
HCM Lane LOS	C	A	-	-	A	-	-	C
HCM 95th %tile Q(veh)	0.9	0	-	-	0.4	-	-	0.3

HCM 2010 TWSC
76: S Ithan Ave & Dwy

9/17/2014

Intersection

Int Delay, s/veh

Movement	NWU	NWL	NWR
Vol, veh/h	28	57	95
Conflicting Peds, #/hr	0	0	0
Sign Control	Stop	Stop	Stop
RT Channelized	-	-	-
Storage Length	-	0	-
Veh in Median Storage, #	-	0	-
Grade, %	-	0	-
Peak Hour Factor	92	92	92
Heavy Vehicles, %	2	2	2
Mvmt Flow	30	62	103

Major/Minor

	Minor1		
Conflicting Flow All	0	793	164
Stage 1	0	172	-
Stage 2	0	621	-
Critical Hdwy	-	7.12	6.22
Critical Hdwy Stg 1	-	6.12	-
Critical Hdwy Stg 2	-	6.12	-
Follow-up Hdwy	-	3.518	3.318
Pot Cap-1 Maneuver	0	306	881
Stage 1	0	830	-
Stage 2	0	475	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	0	262	881
Mov Cap-2 Maneuver	0	262	-
Stage 1	0	827	-
Stage 2	0	400	-

Approach

	NW
HCM Control Delay, s	22.9
HCM LOS	C

Minor Lane/Major Mvmt

HCM 2010 TWSC
79: Garrett Rd & Lancaster Ave

9/17/2014

Intersection

Int Delay, s/veh 2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	1295	47	48	1021	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	1579	57	59	1245	0	46

Major/Minor

	Major1	Major2	Minor1	
Conflicting Flow All	0	0	1637	0
Stage 1	-	-	-	1608
Stage 2	-	-	-	740
Critical Hdwy	-	-	4.1	-
Critical Hdwy Stg 1	-	-	-	5.8
Critical Hdwy Stg 2	-	-	-	5.8
Follow-up Hdwy	-	-	2.2	-
Pot Cap-1 Maneuver	-	-	401	-
Stage 1	-	-	-	152
Stage 2	-	-	-	438
Platoon blocked, %	-	-	-	-
Mov Cap-1 Maneuver	-	-	401	-
Mov Cap-2 Maneuver	-	-	-	16
Stage 1	-	-	-	152
Stage 2	-	-	-	229

Approach

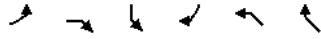
	EB	WB	NB
HCM Control Delay, s	0	3.9	18
HCM LOS			C

Minor Lane/Major Mvmt

	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	323	-	-	401	-
HCM Lane V/C Ratio	0.143	-	-	0.146	-
HCM Control Delay (s)	18	-	-	15.5	3.4
HCM Lane LOS	C	-	-	C	A
HCM 95th %tile Q(veh)	0.5	-	-	0.5	-

Lanes, Volumes, Timings
 2: County Line Rd & N Ithan Ave

9/17/2014



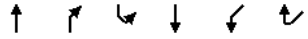
Lane Group	EBL	EBR	SBL	SBR	NWL	NWR
Lane Configurations	W		W		W	
Volume (vph)	194	37	304	267	24	163
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.979		0.937		0.883	
Flt Protected	0.960		0.974		0.994	
Satd. Flow (prot)	1761	0	1717	0	1651	0
Flt Permitted	0.960		0.974		0.994	
Satd. Flow (perm)	1761	0	1717	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)	206	39	323	284	26	173
Shared Lane Traffic (%)						
Lane Group Flow (vph)	245	0	607	0	199	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	67.6%
ICU Level of Service	C
Analysis Period (min)	15

Lanes, Volumes, Timings
 38: County Line Rd & N Ithaca Ave

9/17/2014



Lane Group	NBT	NBR	SBL	SBT	SWL	SWR
Lane Configurations	↑			↑	↑	
Volume (vph)	251	108	184	466	102	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				0.949	
Flt Protected				0.986	0.970	
Satd. Flow (prot)	1804	0	0	1855	1732	0
Flt Permitted				0.986	0.970	
Satd. Flow (perm)	1804	0	0	1855	1732	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)	267	115	196	496	109	67
Shared Lane Traffic (%)						
Lane Group Flow (vph)	382	0	0	692	176	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	74.0%
ICU Level of Service	D
Analysis Period (min)	15

HCM 2010 AWSC
76: S Ithan Ave & Dwy

9/17/2014

Intersection											
Intersection Delay, s/veh	11.2										
Intersection LOS	B										
Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	SBU	SBL	SBR
Vol, veh/h	0	4	138	25	0	136	284	5	0	20	6
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
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	4	150	27	0	148	309	5	0	22	7
Number of Lanes	0	1	1	0	0	1	1	0	0	1	0

Approach		EB	WB
Opposing Approach	WB	EB	
Opposing Lanes	2	2	
Conflicting Approach Left	SB	NW	
Conflicting Lanes Left	1	1	
Conflicting Approach Right	NW	SB	
Conflicting Lanes Right	1	1	
HCM Control Delay	10.5	11.9	
HCM LOS	B	B	

Lane	NWLn1	EBLn1	EBLn2	WBLn1	WBLn2	SBLn1
Vol Left, %	38%	100%	0%	100%	0%	79%
Vol Thru, %	0%	0%	85%	0%	98%	0%
Vol Right, %	62%	0%	15%	0%	2%	21%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	180	4	163	136	289	28
LT Vol	0	0	138	0	284	0
Through Vol	112	0	25	0	5	6
RT Vol	68	4	0	136	0	22
Lane Flow Rate	196	4	177	148	314	30
Geometry Grp	2	7	7	7	7	2
Degree of Util (X)	0.281	0.008	0.277	0.239	0.462	0.05
Departure Headway (Hd)	5.175	6.241	5.626	5.811	5.294	5.912
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	687	577	641	612	672	608
Service Time	3.268	3.943	3.329	3.608	3.091	3.923
HCM Lane V/C Ratio	0.285	0.007	0.276	0.242	0.467	0.049
HCM Control Delay	10.3	9	10.5	10.5	12.6	9.2
HCM Lane LOS	B	A	B	B	B	A
HCM 95th-tile Q	1.2	0	1.1	0.9	2.4	0.2

HCM 2010 AWSC
76: S Ithan Ave & Dwy

9/17/2014

Intersection			
Intersection Delay, s/veh	11.2		
Intersection LOS	B		
Movement	NWU	NWL	NWR
Vol, veh/h	28	57	95
Peak Hour Factor	0.92	0.92	0.92
Heavy Vehicles, %	2	2	2
Mvmt Flow	30	62	103
Number of Lanes	0	1	0

Approach		NW
Opposing Approach	WB	EB
Opposing Lanes	2	2
Conflicting Approach Left	SB	NW
Conflicting Lanes Left	1	1
Conflicting Approach Right	NW	SB
Conflicting Lanes Right	1	1
HCM Control Delay	10.3	11.9
HCM LOS	B	B

Lane

Lanes, Volumes, Timings

27: S Ithan Ave/N Ithan Ave & Lancaster Ave

9/17/2014



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↕	↗	↔	↕	↗	↔	↕	↗	↔	↕	↗
Volume (vph)	80	1003	118	116	710	35	90	92	30	68	185	86
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	200		0	200		0	65		0
Storage Lanes	1		1	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850		0.993			0.963			0.952	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1565	3129	1400	1541	3061	0	1557	1578	0	1565	1568	0
Flt Permitted	0.256			0.131			0.294			0.647		
Satd. Flow (perm)	422	3129	1400	213	3061	0	482	1578	0	1066	1568	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		35			35			25			25	
Link Distance (ft)		1291			265			344			973	
Travel Time (s)		25.1			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)	84	1056	124	122	747	37	95	97	32	72	195	91
Shared Lane Traffic (%)												
Lane Group Flow (vph)	84	1056	124	122	784	0	95	129	0	72	286	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			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	1	
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	
Leading Detector (ft)	37	37	20	37	37		37	37		37	37	
Trailing Detector (ft)	-3	-3	0	-3	-3		-3	-3		-3	-3	
Detector 1 Position(ft)	-3	-3	0	-3	-3		-3	-3		-3	-3	
Detector 1 Size(ft)	40	40	20	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	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	NA	Perm	pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2		2	6			8			4		
Detector Phase	5	2	2	1	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	3.0	34.0	34.0	3.0	34.0		3.0	3.0		3.0	3.0	
Minimum Split (s)	13.0	40.0	40.0	13.0	40.0		13.0	13.0		13.0	13.0	

B 23 pm w/EB RT at Ithan 9/16/2014 Baseline

Synchro 8 Report
Page 1

Lanes, Volumes, Timings

27: S Ithan Ave/N Ithan Ave & Lancaster Ave

9/17/2014

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

B 23 pm w/EB RT at Ithan 9/16/2014 Baseline

Synchro 8 Report
Page 2

Lanes, Volumes, Timings

27: S Ithan Ave/N Ithan Ave & Lancaster Ave

9/17/2014



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Split (s)	14.0	47.0	47.0	13.0	46.0		31.0	31.0		31.0	31.0	
Total Split (%)	11.7%	39.2%	39.2%	10.8%	38.3%		25.8%	25.8%		25.8%	25.8%	
Maximum Green (s)	8.0	41.0	41.0	7.0	40.0		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	4.0	
All-Red Time (s)	2.0	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	0.5	
Total Lost Time (s)	6.5	6.5	6.5	6.5	6.5		6.5	6.5		6.5	6.5	
Lead/Lag	Lead	Lag	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	3.0	
Recall Mode	None	C-Max	C-Max	None	C-Max		None	None		None	None	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
Act Effect Green (s)	56.7	49.6	49.6	56.6	51.4		23.6	23.6		23.6	23.6	
Actuated g/C Ratio	0.47	0.41	0.41	0.47	0.43		0.20	0.20		0.20	0.20	
v/c Ratio	0.32	0.82	0.21	0.71	0.60		1.01	0.42		0.34	0.93	
Control Delay	20.8	40.3	26.5	39.5	24.6		143.3	46.4		46.3	83.3	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	20.8	40.3	26.5	39.5	24.6		143.3	46.4		46.3	83.3	
LOS	C	D	C	D	C		F	D		D	F	
Approach Delay		37.7			26.6			87.5			75.9	
Approach LOS		D			C			F			E	
Queue Length 50th (ft)	35	458	65	55	204		74	87		48	218	
Queue Length 95th (ft)	m62	#563	100	m#105	243		#187	149		95	#377	
Internal Link Dist (ft)		1211			185			264			893	
Turn Bay Length (ft)	250			200			200			65		
Base Capacity (vph)	271	1292	578	172	1310		98	322		217	320	
Starvation Cap Reductn	0	0	0	0	0		0	0		0	0	
Spillback Cap Reductn	0	0	0	0	0		0	0		0	0	
Storage Cap Reductn	0	0	0	0	0		0	0		0	0	
Reduced v/c Ratio	0.31	0.82	0.21	0.71	0.60		0.97	0.40		0.33	0.89	

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: 1.01

Intersection Signal Delay: 43.1

Intersection LOS: D

Intersection Capacity Utilization 78.8%

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.

Lanes, Volumes, Timings

27: S Ithan Ave/N Ithan Ave & Lancaster Ave

9/17/2014

Splits and Phases: 27: S Ithan Ave/N Ithan Ave & Lancaster Ave



Lanes, Volumes, Timings

27: S Ithan Ave/N Ithan Ave & Lancaster Ave

9/17/2014

Lane Group	ø9
Total Split (s)	29.0
Total Split (%)	24%
Maximum Green (s)	27.0
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	

CAPACITY ANALYSES

The TIS includes an unusually large number of intersections in the study area, as requested by the Township. Additionally, some intersections are not eligible for HCM 2010 analysis. Some intersections were examined using more than one lane configuration or traffic control treatment. All of these factors combine to create a printed capacity analysis output which is large and difficult to navigate.

Synchro files for the AM and PM peak hours of the five scenarios examined (Existing, 2018 Base, 2018 Projected, 2023 Base, and 2023 Projected) are available upon request and provide an more navigable alternative to inspect the LOS results. When examining level of service results and comparing with Table I, the following must be considered:

For signalized intersections:

- *Synchro* node numbers 7, 11, and 27 are ineligible for HCM 2010 analysis and the results utilized were based upon Percentile Delay (i.e., *Synchro*) results.
- When examining the impact of adding a EB right-turn lane at the intersection of Lancaster Avenue and Ithan Avenue (node 27), 3 additional seconds must be added to Phase 9 to account for the added crosswalk length (12 feet). The cycle length is held constant and Phase 2+6 is reduced accordingly.

For unsignalized intersections:

- *Synchro* node numbers 2 and 38 are ineligible for HCM 2010 analysis and the results utilized were based upon Percentile Delay (i.e., *Synchro*) results 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.

APPENDIX J

Signal Plans

Radnor

File # 0009

TIME PERIOD	1	2	3	4	5	6	7	8	9	10	11	12	TOTALS
7:00AM TO 8:00AM													
8:00AM TO 9:00AM													
9:00AM TO 10:00AM													
10:00AM TO 11:00AM													
11:00AM TO 12:00PM													
12:00PM TO 1:00PM													
1:00PM TO 2:00PM													
2:00PM TO 3:00PM													
3:00PM TO 4:00PM													
4:00PM TO 5:00PM													
5:00PM TO 6:00PM													
6:00PM TO 7:00PM													

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.

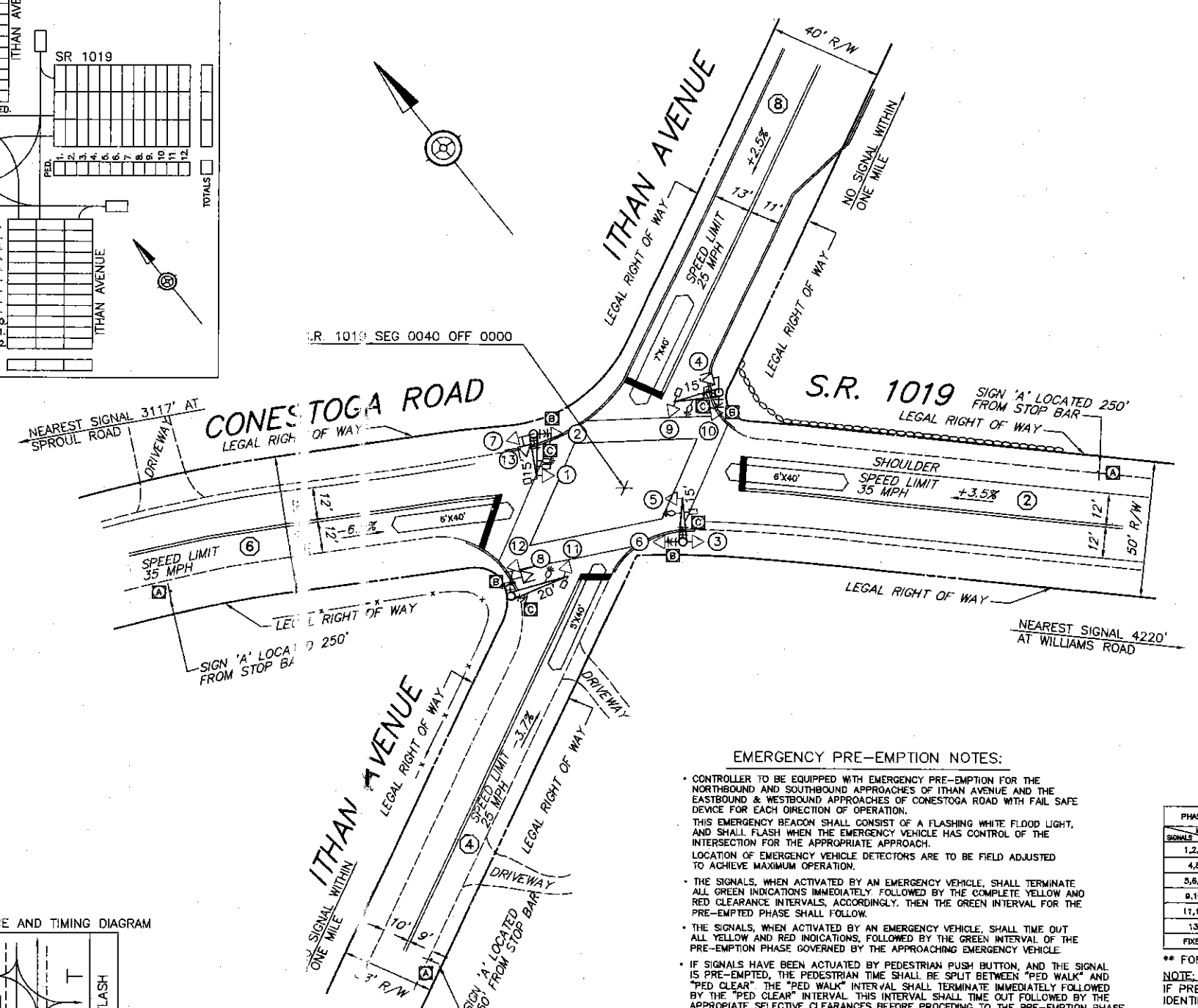
PRIOR TO INSTALLATION THE CONTRACTOR SHALL CONSULT WITH THE LOCAL OFFICIALS AND UTILITY COMPANIES TO RESOLVE ANY PROBLEMS WHICH MAY BE CREATED DUE TO THE LOCATION OF UTILITIES.

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 STANDARDS TC-7800 SERIES.



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 AND 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 ACTIVATED 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 PROCEEDING 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 2,4,6 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.

EMERGENCY PRE-EMPTION PHASING MOVEMENT, SEQUENCE AND TIMING DIAGRAM

PHASE	2	4	6	8
7	G	Y	R	R
8	Y	R	G	G
9	R	G	Y	Y
10	R	R	R	R
11	R	R	R	R
12	R	R	R	R
13	R	R	R	R
14	R	R	R	R
15	R	R	R	R
16	R	R	R	R
17	R	R	R	R
18	R	R	R	R
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.

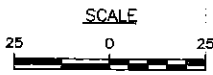
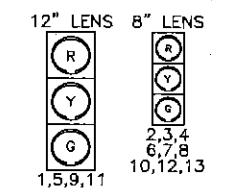
⊙ G WHEN RETURNING TO NORMAL OPERATION

MOVEMENT, SEQUENCE AND TIMING DIAGRAM

PHASE	2+6	4+8
1,2,3	G Y R	R R R
4,8	G Y R	R R R
5,6,7	G Y R	R R R
9,10	R R R	G Y R
11,12	R R R	G Y R
13	R R R	G Y R

FIXED	3	4	2	3	4	2
MINIMUM	3			3		
PASSAGE	3			3		
MAX. 1	30			20		
PEDESTRIAN*	11			11		
MEMORY	NL			NL		

SIGNAL INDICATIONS



LEGEND

②	MAST ARM/IDENTIFYING LENGTH	①2'x8'	LOOP SENSOR/SIZE
⊙	VEHICULAR SIGNAL HEAD/BACKPLATE/VISORS/DIRECTIONAL ARROW/IDENTIFYING NUMBER	⊙	MICROWAVE PRESENCE DETECTOR
⊙	PEDESTRIAN SIGNAL HEAD/IDENTIFYING NUMBER	⊙	EMERGENCY PRE-EMPTION FLASHING BEACON
⊙	PEDESTRIAN PUSHBUTTON/SIGN	⊙	EMERGENCY PRE-EMPTION DEVICE
⊙	SIGN/IDENTIFYING LETTER	⊙	CURB RAMP
⊙		⊙	UTILITY POLE
⊙		⊙	PHASE NUMBER
⊙		⊙	INLET

SIGNALS TO BE EQUIPPED WITH TUNNEL VISORS & LOUVERS 4,8,13

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: *Frank Seiboth*

FRANK SEIBOTH 11/15/71
DISTRICT TRAFFIC ENGINEER DATE

NO.	REVISION	DES. REV.	DATE	REV.	DATE	RECOM.	DATE
1	NEW PLAN, ADDED PRE-EMPTION						
2							
3							
4							
5							
6							
7							
8							

* UPON PEDESTRIAN ACTUATION ONLY.

MOVEMENT, SEQUENCE AND TIMING DIAGRAM

	1				2				3				4				5				6				7				8				9				10				FLASH			
PHASE	2+5				2+6				3+8				4+8				9				10																							
INTERVAL	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22																						
SIGNALS	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R																						
1	R	R	R	R	R	R	R	R	G	G	Y	R	G	G	Y	R	R	R	R	R	R	R																						
2	R	R	R	R	R	R	R	R	R	R	R	R	G	G	Y	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																						
5,6	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R																						
7	G	G	Y	R	G	G	Y	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R																						
8	G	G	Y	R	G	G	Y	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R																						
9,10	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R																						
11,12	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R																						
13,14*	H	H	H	H	M	FH	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H																						
15,16*	H	H	H	H	M	FH	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H																						
17,18*	M	FH	H	H	M	FH	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H																						
19,20*	H	H	H	H	H	H	H	H	M	FH	H	H	M	FH	H	H	H	H	H	H	H	H																						

FIXED			3	3			3	3			4	2			4	2			3	3			3	3
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			7	25														
MEMORY	NL				MN				NL				NL				NL				NL			

*MAN SYMBOL UPON PEDESTRIAN ACTUATION ONLY, OTHERWISE HAND SYMBOL AT ALL TIMES.

- OPERATION NOTES:
- G/Y IF FOLLOWED BY 4+8
 - G IF FOLLOWED BY 4+8
 - G/Y IF FOLLOWED BY 2+6
 - G IF FOLLOWED BY 2+6
 - MAN SYMBOL IF FOLLOWED BY 2+6
 - TIMING FOR THIS PHASE SHALL BE AS SHOWN IN PHASE 2+6 AND SHALL TIME OUT IN THIS PHASE OR PHASE 2+6.
 - MAN SYMBOL IF FOLLOWED BY 4+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
G	R1-2	36X36	YIELD
H	R5-1	30X30	DO NOT ENTER
I	R10-12	30X36	LEFT TURN YIELD ON GREEN
J	R3-7R	30X30	RIGHT LANE MUST TURN RIGHT
K	R9-3A	18X18	NO PEDESTRIAN CROSSING

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.

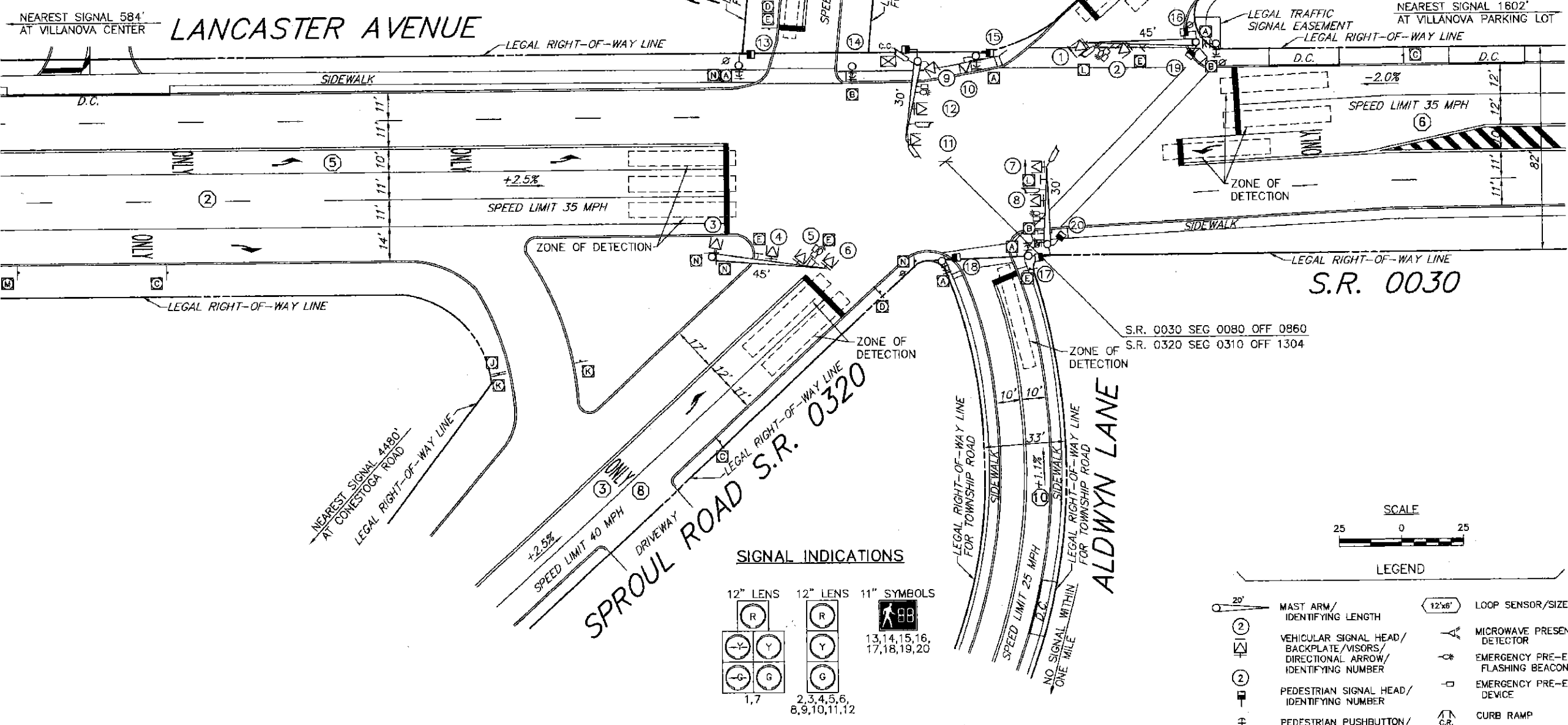
PRIOR TO INSTALLATION THE CONTRACTOR SHALL CONSULT WITH THE LOCAL OFFICIALS AND UTILITY COMPANIES TO RESOLVE ANY PROBLEMS WHICH MAY BE CREATED DUE TO THE LOCATION OF UTILITIES.

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.

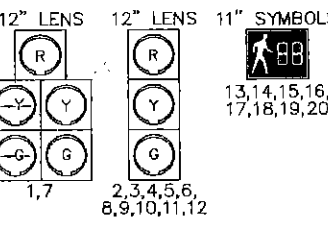
WHEN LIQUID FUELS MONEY IS USED, SIGNAL INSTALLATION MUST CONFORM TO FORM 408 AND A COPY OF THE PROPOSED SPECIFICATIONS MUST BE SUBMITTED TO THE DISTRICT TRAFFIC UNIT, FOR REVIEW, PRIOR TO BIDDING.

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.

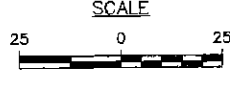


SIGNAL INDICATIONS



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



LEGEND

②	MAST ARM/IDENTIFYING LENGTH	①2'x6'	LOOP SENSOR/SIZE
②	VEHICULAR SIGNAL HEAD/BACKPLATE/VISORS/DIRECTIONAL ARROW/IDENTIFYING NUMBER	⊙	MICROWAVE PRESENCE DETECTOR
②	PEDESTRIAN SIGNAL HEAD/IDENTIFYING NUMBER	⊕	EMERGENCY PRE-EMPTION FLASHING BEACON
⊕	PEDESTRIAN PUSHBUTTON/SIGN	⊖	EMERGENCY PRE-EMPTION DEVICE
⊕	SIGN/IDENTIFYING LETTER	⊕	CURB RAMP
⊕	LUMINAIRE	⊕	UTILITY POLE
		②	PHASE NUMBER
		⊕	INLET

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

NO.	REVISION	DES./REV.	DATE	REV.	DATE	RECOM.	DATE
1	AS-BUILT DRAWING	McM	3/5/12	WLF	9/14/12	JRB	3/8/12
2							
3							
4							
5							
6							
7							
8							

1. 7:00AM TO 8:00AM	21	3	52	122
2. 8:00AM TO 9:00AM				
3. 9:00AM TO 10:00AM	5	0	17	15
4. 10:00AM TO 11:00AM	2	0	14	30
5. 11:00AM TO 12:00PM	1	1	11	31
6. 12:00PM TO 1:00PM				
7. 1:00PM TO 2:00PM	0	1	1	15
8. 2:00PM TO 3:00PM	2	0	2	9
9. 3:00PM TO 4:00PM	4	1	2	5
10. 4:00PM TO 5:00PM				
11. 5:00PM TO 6:00PM	2	0	1	8
12. 6:00PM TO 7:00PM	3	0	3	6
TOTALS	1622	1257	198	34

1. 7:00AM TO 8:00AM	70	5	172	204
2. 8:00AM TO 9:00AM	45	5	166	268
3. 9:00AM TO 10:00AM	34	13	142	260
4. 10:00AM TO 11:00AM				
5. 11:00AM TO 12:00PM	48	9	114	260
6. 12:00PM TO 1:00PM	40	5	86	250
7. 1:00PM TO 2:00PM	45	6	105	218
8. 2:00PM TO 3:00PM				
9. 3:00PM TO 4:00PM	78	4	96	184
10. 4:00PM TO 5:00PM	54	10	137	202
11. 5:00PM TO 6:00PM	32	2	97	157
12. 6:00PM TO 7:00PM				
TOTALS	32	179	7073	198

1. 7:00AM TO 8:00AM	240	222	24	4
2. 8:00AM TO 9:00AM	203	228	35	7
3. 9:00AM TO 10:00AM	171	190	20	4
4. 10:00AM TO 11:00AM				
5. 11:00AM TO 12:00PM	116	97	20	5
6. 12:00PM TO 1:00PM	165	114	22	4
7. 1:00PM TO 2:00PM	145	84	23	3
8. 2:00PM TO 3:00PM				
9. 3:00PM TO 4:00PM	184	139	13	2
10. 4:00PM TO 5:00PM	216	95	19	3
11. 5:00PM TO 6:00PM	182	88	22	2
12. 6:00PM TO 7:00PM				
TOTALS	39	358	99	36

**EMERGENCY PRE-EMPTION PHASING
MOVEMENT, SEQUENCE AND TIMING DIAGRAM**

PHASE	2			4			6			8		
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

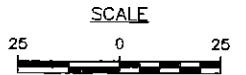
** FOR DURATION OF PRE-EMPTION

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.

(a) G/Y WHEN RETURNING TO NORMAL OPERATION
(b) 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.



LEGEND

20'	MAST ARM/ IDENTIFYING LENGTH	12x6"	LOOP SENSDR/SIZE
(2)	VEHICULAR SIGNAL HEAD/ BACKPLATE/VISORS/ DIRECTIONAL ARROW/ IDENTIFYING NUMBER	△	MICROWAVE PRESENCE DETECTOR
(2)	PEDESTRIAN SIGNAL HEAD/ IDENTIFYING NUMBER	⊠	EMERGENCY PRE-EMPTION FLASHING BEACON
⊠	PEDESTRIAN PUSHBUTTON/ SIGN	⊠	EMERGENCY PRE-EMPTION DEVICE
(A)	SIGN/IDENTIFYING LETTER	↑	CURB RAMP
		⊙	UTILITY POLE
		(2)	PHASE NUMBER
		⊠	INLET

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 40B.

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 40B 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) & 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

NO.	REVISION	DES/ REVM	DATE	REVM	DATE	RECOM	DATE
1	AS-BUILT DRAWING	MCM	3/5/12	WLB	8/12/12	PLB	3/14/12
2							
3							
4							
5							
6							
7							
8							

RADNOR

#780

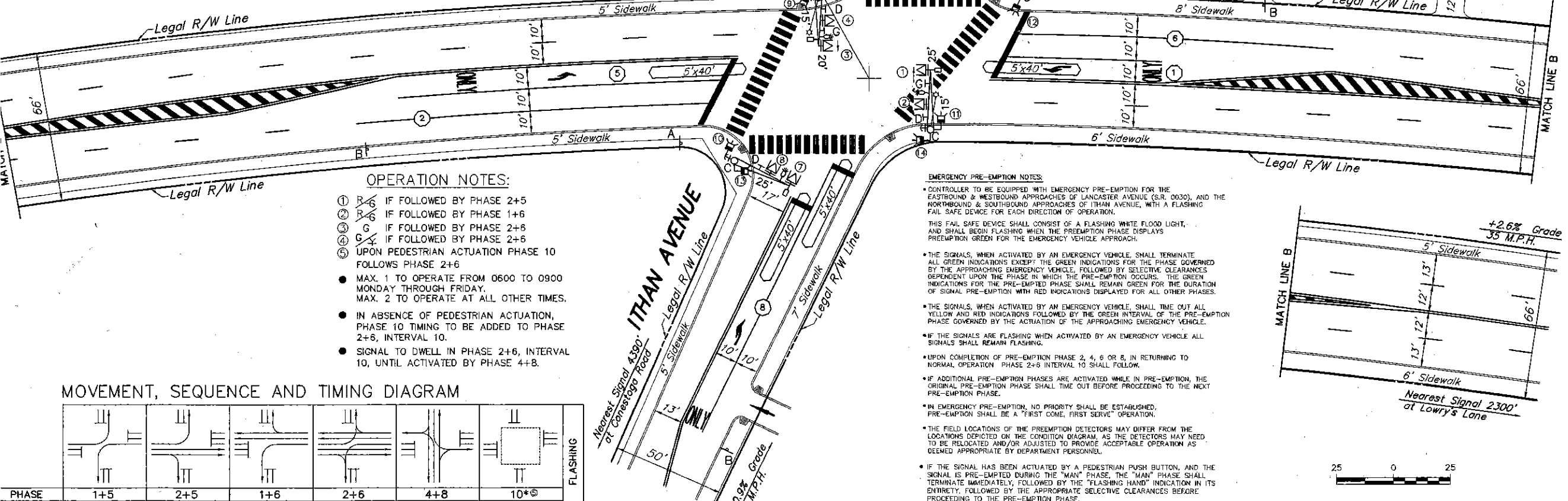
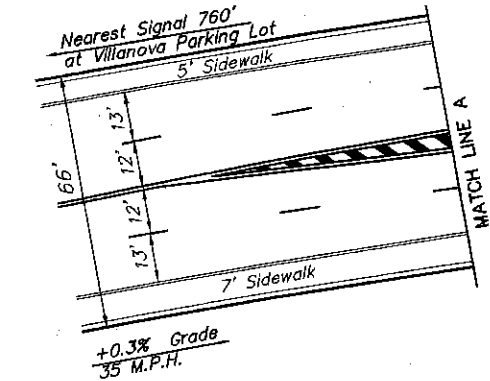
SIGN TABULATION			
PLAN NO.	SERIES NUMBER	SIZE	REMARKS
A	R10-11	24"x30"	NO TURN ON RED
B	R3-7L	30"x30"	LEFT LANE MUST TURN LEFT
C	R10-3B	9"x12"	EDUCATIONAL PUSH BUTTON FOR WALKING PERSON
D	R10-11	30"x36"	NO TURN ON RED
E	R10-12	30"x36"	LEFT TURN YIELD ON GREEN

EMERGENCY PRE-EMPTION PHASING MOVEMENT, SEQUENCE AND TIMING DIAGRAM

PHASE	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	R	R	R	R	R	R	R	R	R	R	R	R
3	R	R	R	R	R	R	R	R	R	R	R	R
4	R	R	R	R	R	R	R	R	R	R	R	R
5,6	R	R	R	R	R	R	R	R	R	R	R	R
7,8	R	R	R	R	R	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 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.
 (C) SIGNAL TO INDICATE C WHEN RETURNING TO NORMAL OPERATION.
 (G) SIGNAL TO INDICATE G/Y WHEN RETURNING TO NORMAL OPERATION.

TIME	964119391309	TOTALS
1. 7:00 AM to 8:00 AM	33	172
2. 8:00 AM to 9:00 AM	79	153
3. 9:00 AM to 10:00 AM	74	175
4. 10:00 AM to 11:00 AM	65	159
5. 11:00 AM to 12:00 PM	63	167
6. 12:00 PM to 1:00 PM	91	147
7. 1:00 PM to 2:00 PM	76	164
8. 2:00 PM to 3:00 PM	84	166
9. 3:00 PM to 4:00 PM	142	191
10. 4:00 PM to 5:00 PM	151	228
11. 5:00 PM to 6:00 PM	151	228
12. 6:00 PM to 7:00 PM	147	228
TOTALS	1512	2281



- 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 IF FOLLOWED BY PHASE 2+6
 - 5. UPON PEDESTRIAN ACTUATION PHASE 10 FOLLOWS PHASE 2+6
 - 6. MAX. 1 TO OPERATE FROM 0600 TO 0900 MONDAY THROUGH FRIDAY. MAX. 2 TO OPERATE AT ALL OTHER TIMES.
 - 7. IN ABSENCE OF PEDESTRIAN ACTUATION, PHASE 10 TIMING TO BE ADDED TO PHASE 2+6, INTERVAL 10.
 - 8. SIGNAL TO DWELL IN PHASE 2+6, INTERVAL 10, UNTIL ACTIVATED BY PHASE 4+8.

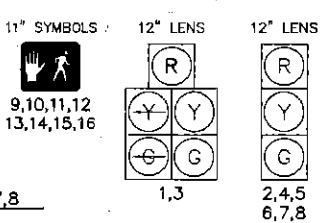
- EMERGENCY PRE-EMPTION NOTES:**
- 1. CONTROLLER TO BE EQUIPPED WITH EMERGENCY PRE-EMPTION FOR THE EASTBOUND & WESTBOUND APPROACHES OF LANCASTER AVENUE (S.R. 0030), AND THE NORTHBOUND & SOUTHBOUND APPROACHES OF ITHAN AVENUE, WITH A FLASHING FAIL SAFE DEVICE FOR EACH DIRECTION OF OPERATION. THIS FAIL 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.
 - 2. 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.
 - 3. 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.
 - 4. IF THE SIGNALS ARE FLASHING WHEN ACTIVATED BY AN EMERGENCY VEHICLE ALL SIGNALS SHALL REMAIN FLASHING.
 - 5. UPON COMPLETION OF PRE-EMPTION PHASE 2, 4, 6 OR 8, IN RETURNING TO NORMAL OPERATION PHASE 2+6 INTERVAL 10 SHALL FOLLOW.
 - 6. 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.
 - 7. IN EMERGENCY PRE-EMPTION, NO PRIORITY SHALL BE ESTABLISHED. PRE-EMPTION SHALL BE A "FIRST COME, FIRST SERVED" OPERATION.
 - 8. 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.
 - 9. IF THE SIGNAL HAS BEEN ACTIVATED BY A PEDESTRIAN PUSH BUTTON, AND THE SIGNAL IS PRE-EMPTED DURING THE "MAN" PHASE, THE "MAN" 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.

MOVEMENT, SEQUENCE AND TIMING DIAGRAM

PHASE	1+5	2+5	1+6	2+6	4+8	10*	FLASHING
1	R	R	R	R	R	R	Y
2	R	R	R	R	R	R	Y
3	R	R	R	R	R	R	Y
4	R	R	R	R	R	R	Y
5,6,7,8	R	R	R	R	R	R	R
9,10,11,12	H	H	H	H	H	H	M FH H
13,14,15,16	H	H	H	H	H	H	M FH H
FIXED	7	4 2	7	4 2	7	4 2	
MINIMUM	7	7	7	7	7	7	
PASSAGE	3	3	3	3	3	3	
MAXIMUM 1	7	7	7	7	7	7	
MAXIMUM 2	7	7	7	7	7	7	
PEDESTRIAN*							9 15 2
MEMORY	NL	NL	NL	MR	NL	NL	

SIGNALS TO BE EQUIPPED WITH TUNNEL VISORS 1,2,3,4,5,6,7,8
 SIGNALS TO BE EQUIPPED WITH TUNNEL VISORS & LOUVERS 1,3, 2,4,5, 6,7,8

SIGNAL INDICATIONS



- LEGEND**
- 20' MICROWAVE DETECTOR
 - VEHICULAR SIGNAL HEAD/BACKPLATE/VISORS/DIRECTIONAL ARROW/IDENTIFYING NUMBER
 - PEDESTRIAN SIGNAL HEAD/IDENTIFYING NUMBER
 - AUDIBLE PEDESTRIAN SIGNAL/IDENTIFYING NUMBER
 - PEDESTRIAN PUSHBUTTON/SIGNAL
 - SIGN/IDENTIFYING LETTER
 - 20' LUMINAIRE/IDENTIFYING LENGTH
 - EMERGENCY PREEMPTION BEACON
 - EMERGENCY PREEMPTION DETECTOR
 - CURB CUT RAMP
 - UTILITY POLE
 - PHASE NUMBER
 - INLET
 - LOOP SENSOR/SIZE

GENERAL NOTES

NO MODIFICATIONS TO THIS INSTALLATION ARE PERMITTED UNLESS PRIOR APPROVAL IS OBTAINED 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 40B.
 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 40B 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

NO.	REVISION	DES/REV.	DATE	REV.	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	5/15/01	WJE	5/19/01
4	Added Hand/Man Indications	PAI	7/16/02	MK	11/18/02	WJE	11/18/02

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: 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

NO.	REVISION	DES/REV.	DATE	REV.	DATE	RECOM.	DATE
1	AS-BUILT DRAWING	MCM	3/5/12	WLT	5/14/12	PLR	5/14/12
2							
3							
4							
5							
6							
7							
8							

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
E	R10-12	30X36	LEFT TURN YIELD ON GREEN
F	D3-4	90X16	OVERHEAD STREET NAME SIGN (SEE DETAIL)
G	D3-4	60X16	OVERHEAD STREET NAME SIGN (SEE DETAIL)
H	R10-7	24X30	DO NOT BLOCK DRIVEWAY

MOVEMENT, SEQUENCE AND TIMING DIAGRAM

PHASE	1+5		2+5		1+6		2+6		9*		4+8	
	SIGNALS	INTERVAL	SIGNALS	INTERVAL	SIGNALS	INTERVAL	SIGNALS	INTERVAL	SIGNALS	INTERVAL	SIGNALS	INTERVAL
1	R	10	R	10	R	10	R	10	R	10	R	10
2	R	10	R	10	R	10	R	10	R	10	R	10
3	R	10	R	10	R	10	R	10	R	10	R	10
4	R	10	R	10	R	10	R	10	R	10	R	10
5,6,7,8	R	10	R	10	R	10	R	10	R	10	R	10
9,10,11,12*	H	10	H	10	H	10	H	10	H	10	H	10
13,14,15,16*	H	10	H	10	H	10	H	10	H	10	H	10

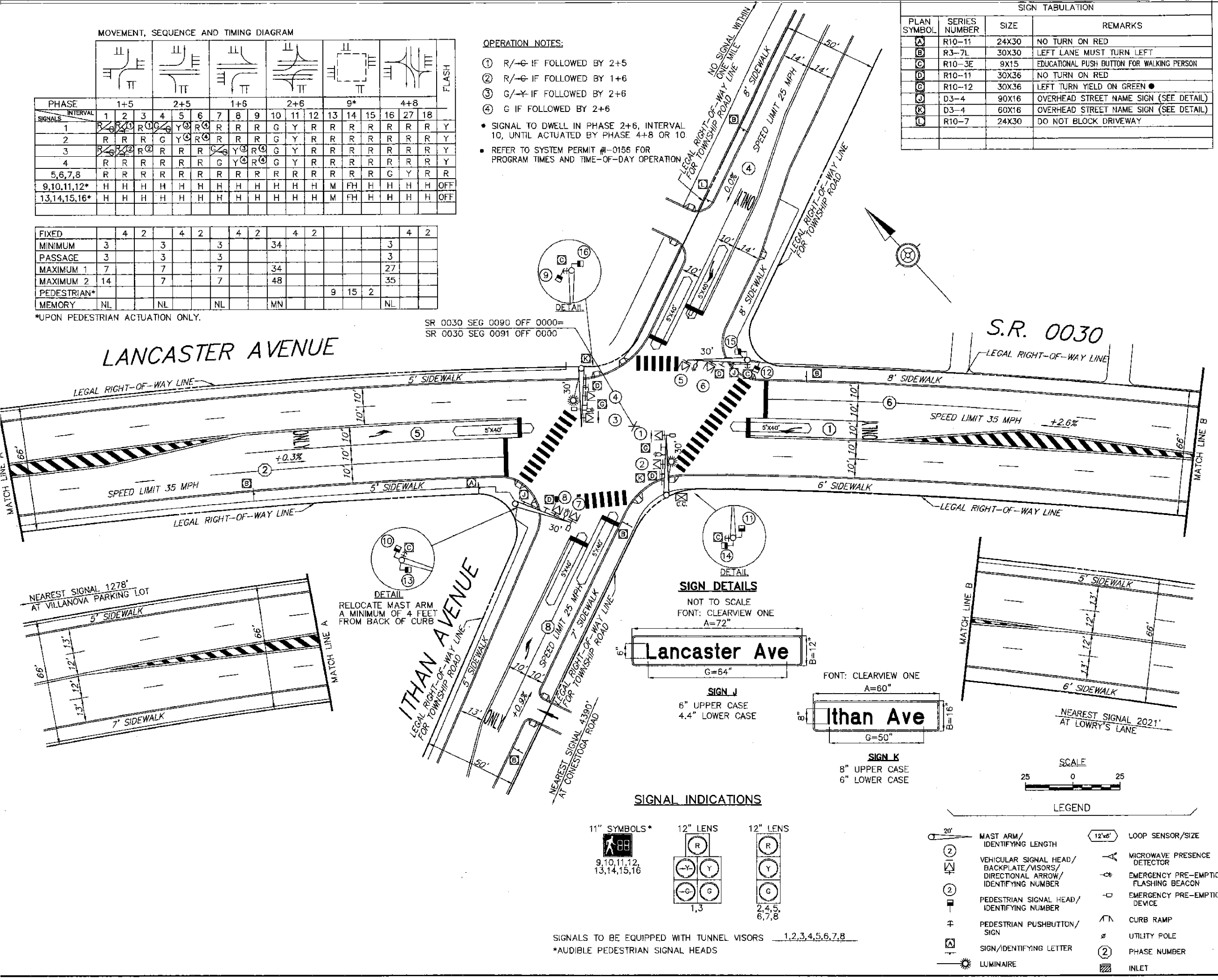
FIXED	4	2	4	2	4	2	4	2	4	2	
MINIMUM	3		3		3		34		3		
PASSAGE	3		3		3				3		
MAXIMUM 1	7		7		7		34		27		
MAXIMUM 2	14		7		7		48		35		
PEDESTRIAN*									9	15	2
MEMORY	NL		NL		NL		MN		NL		

*UPON PEDESTRIAN ACTUATION ONLY.

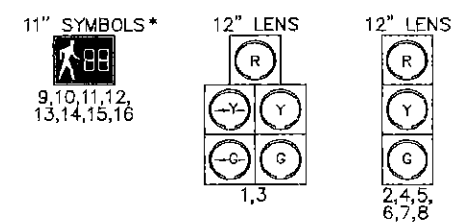
OPERATION NOTES:

- ① R/⊘ IF FOLLOWED BY 2+5
- ② R/⊘ IF FOLLOWED BY 1+6
- ③ G/⊘ 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

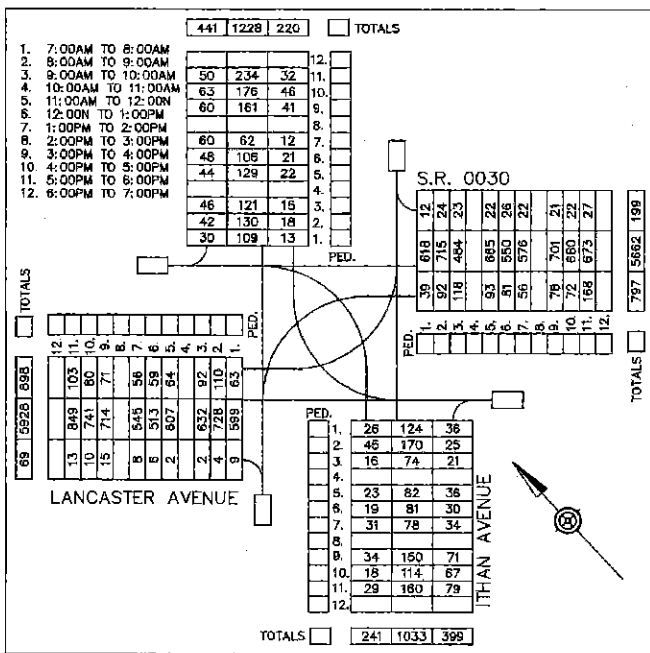


SIGNAL INDICATIONS



SIGNALS TO BE EQUIPPED WITH TUNNEL VISORS 1,2,3,4,5,6,7,8
*AUDIBLE PEDESTRIAN SIGNAL HEADS

20'	12"x6"
② MAST ARM/ IDENTIFYING LENGTH	△ LOOP SENSOR/ SIZE
② VEHICULAR SIGNAL HEAD/ BACKPLATE/ VISORS/ DIRECTIONAL ARROW/ IDENTIFYING NUMBER	⊘ MICROWAVE PRESENCE DETECTOR
② PEDESTRIAN SIGNAL HEAD/ IDENTIFYING NUMBER	⊘ EMERGENCY PRE-EMPTION FLASHING BEACON
+ PEDESTRIAN PUSHBUTTON/ SIGN	⊘ EMERGENCY PRE-EMPTION DEVICE
② SIGN/ IDENTIFYING LETTER	⊘ CURB RAMP
☀ LUMINAIRE	⊘ UTILITY POLE
	② PHASE NUMBER
	⊘ INLET



EMERGENCY PRE-EMPTION PHASING MOVEMENT, SEQUENCE AND TIMING DIAGRAM

PHASE	2				4			6			8		
	INTERVAL	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	R
2	G	Y	R	R	R	R	R	R	R	R	R	R	R
3	R	R	R	R	R	R	R	G	Y	R	R	R	R
4	R	R	R	R	R	R	R	G	Y	R	R	R	R
5,6	R	R	R	R	R	R	R	R	R	R	G	Y	R
7,8	R	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	H
13,14,15,16	H	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:

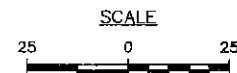
IF PRE-EMPTION EQUIPMENT HAS ENCODING CAPABILITIES FOR VEHICLE IDENTIFICATION, IT IS RECOMMENDED TO HAVE THE ZERO "00" FEATURE ON, TO GIVE UNCODED EMITTERS THE ABILITY TO ACTIVATE THE EMERGENCY PRE-EMPTION.

(a) G/Y WHEN RETURNING TO NORMAL OPERATION

(b) 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.



LEGEND

②	MAST ARM/ IDENTIFYING LENGTH	12x8'	LOOP SENSOR/SIZE
②	VEHICULAR SIGNAL HEAD/ BACKPLATE/VISORS/ DIRECTIONAL ARROW/ IDENTIFYING NUMBER	△	MICROWAVE PRESENCE DETECTOR
②	PEDESTRIAN SIGNAL HEAD/ IDENTIFYING NUMBER	⊙	EMERGENCY PRE-EMPTION FLASHING BEACON
⊕	PEDESTRIAN PUSHBUTTON/ SIGN	⊖	EMERGENCY PRE-EMPTION DEVICE
②	SIGN/IDENTIFYING LETTER	⊕	CURB RAMP
		⊕	UTILITY POLE
		②	PHASE NUMBER
		⊕	INLET

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 PERMITEE.

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 40B.

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 PERMITEE 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 40B AND A COPY OF THE PROPOSED SPECIFICATIONS MUST BE SUBMITTED TO THE DISTRICT TRAFFIC UNIT, FOR REVIEW, PRIOR TO BIDDING.

PERMITEE 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-8000 SERIES.

SYSTEM PERMIT #1-0156

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 _____

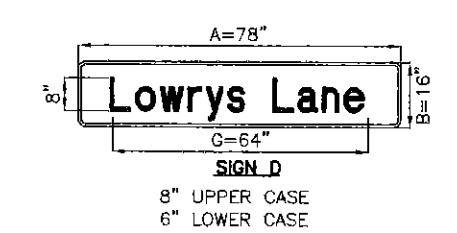
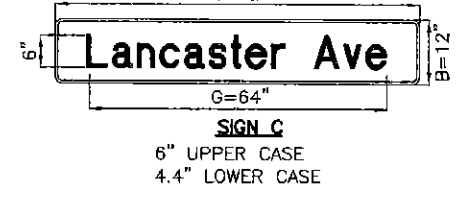
RECOMMENDED: PAUL M. LUTZ 11/24/08

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	lute	9/1/12	lute	3/1/12
2							
3							
4							
5							
6							
7							
8							

1.	2:00AM TO 8:00AM	12
2.	8:00AM TO 9:00AM	11
3.	9:00AM TO 10:00AM	10
4.	10:00AM TO 11:00AM	9
5.	11:00AM TO 12:00PM	8
6.	12:00PM TO 1:00PM	7
7.	1:00PM TO 2:00PM	6
8.	2:00PM TO 3:00PM	5
9.	3:00PM TO 4:00PM	4
10.	4:00PM TO 5:00PM	3
11.	5:00PM TO 6:00PM	2
12.	6:00PM TO 7:00PM	1
TOTALS		137 334 212

NOT TO SCALE
FONT: CLEARVIEW ONE
A=72"



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

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.

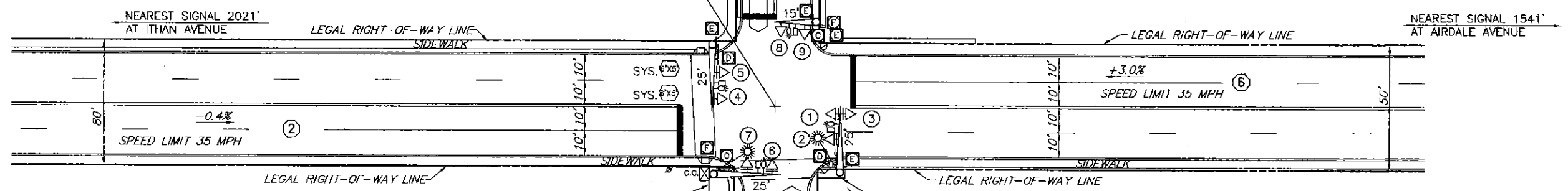
SYSTEM PERMIT #-0156

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./REV.	DATE	REV.	DATE	RECOM.	DATE
1	AS-BUILT DRAWING	MCM	3/5/12	WLB	3/12/12	11/24/08	5/14/12
2							
3							
4							
5							
6							
7							
8							



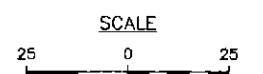
LANCASTER AVENUE

LOWRY'S LANE

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.



LEGEND

- 20' 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
- 12"x6" LOOP SENSOR/SIZE
- MICROWAVE PRESENCE DETECTOR
- EMERGENCY PRE-EMPTION FLASHING BEACON
- EMERGENCY PRE-EMPTION DEVICE
- CURB RAMP
- UTILITY POLE
- PHASE NUMBER
- INLET

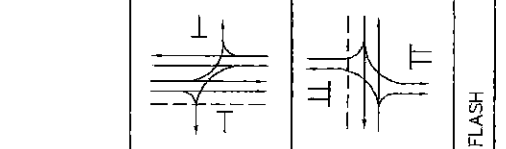
EMERGENCY PRE-EMPTION PHASING MOVEMENT, SEQUENCE AND TIMING DIAGRAM

PHASE	2	4	6	8
INTERVAL	9 10 11	12 13 14	15 16 17	18 19 20
1,2	G Y G R	R R R R	R R R R	R R R R
3,4,5	R R R R	R R R R	G Y G R	R R R R
6,7	R R R R	G Y R R	R R R R	R R R R
8,9	R R R R	R R R R	R R R R	G Y R R
10,11	H H H H	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	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.

- REFER TO SYSTEM PERMIT #-0156 FOR PROGRAM TIMES AND TIME-OF-DAY OPERATION
- PED RECYCLE FOR PHASE 2+6

MOVEMENT, SEQUENCE AND TIMING DIAGRAM

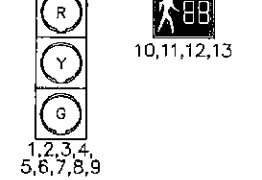


PHASE	2+6	4+8	FLASH
INTERVAL	1 2 3 4	5 6 7 8	
1,2	G G Y R R R R Y		
3,4,5	G G Y R R R R Y		
6,7	R R R R G G Y R R		
8,9	R R R R R G G Y R R		
10,11	H H H H M F H H OFF		
12,13	M F H H H H H H OFF		

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

SIGNAL INDICATIONS



TIME	12	11	10	9	8	7	6	5	4	3	2	1	Totals
AM TO 8:00 AM													
AM TO 9:00 AM													
AM TO 10:00 AM													
AM TO 11:00 AM													
AM TO 12:00 PM	109	285	58										
PM TO 1:00 PM	66	185	40										
PM TO 2:00 PM													
PM TO 3:00 PM													
PM TO 4:00 PM													
PM TO 5:00 PM													
PM TO 6:00 PM													
PM TO 7:00 PM													
Totals	239	486	183										

EMERGENCY PRE-EMPTION:

MOVEMENT, SEQUENCE, AND TIMING DIAGRAM	6	2	4	8								
INTERVAL	13	14	15	16	17	18	19	20	21	22	23	24
SIGNALS	1,5	G	Y	R	R	R	R	R	R	R	R	R
	6	G	Y	R	R	R	R	R	R	R	R	R
	3,8,10	R	R	R	R	R	R	R	R	R	R	R
	2	R	R	R	R	R	R	R	R	R	R	R
	4	R	R	R	R	R	R	R	R	R	R	R
	7,9,11	R	R	R	R	R	R	R	R	R	R	R
FIXED TIME	*	3.5	2	*	3.5	2	*	3	2	*	3	2

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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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.

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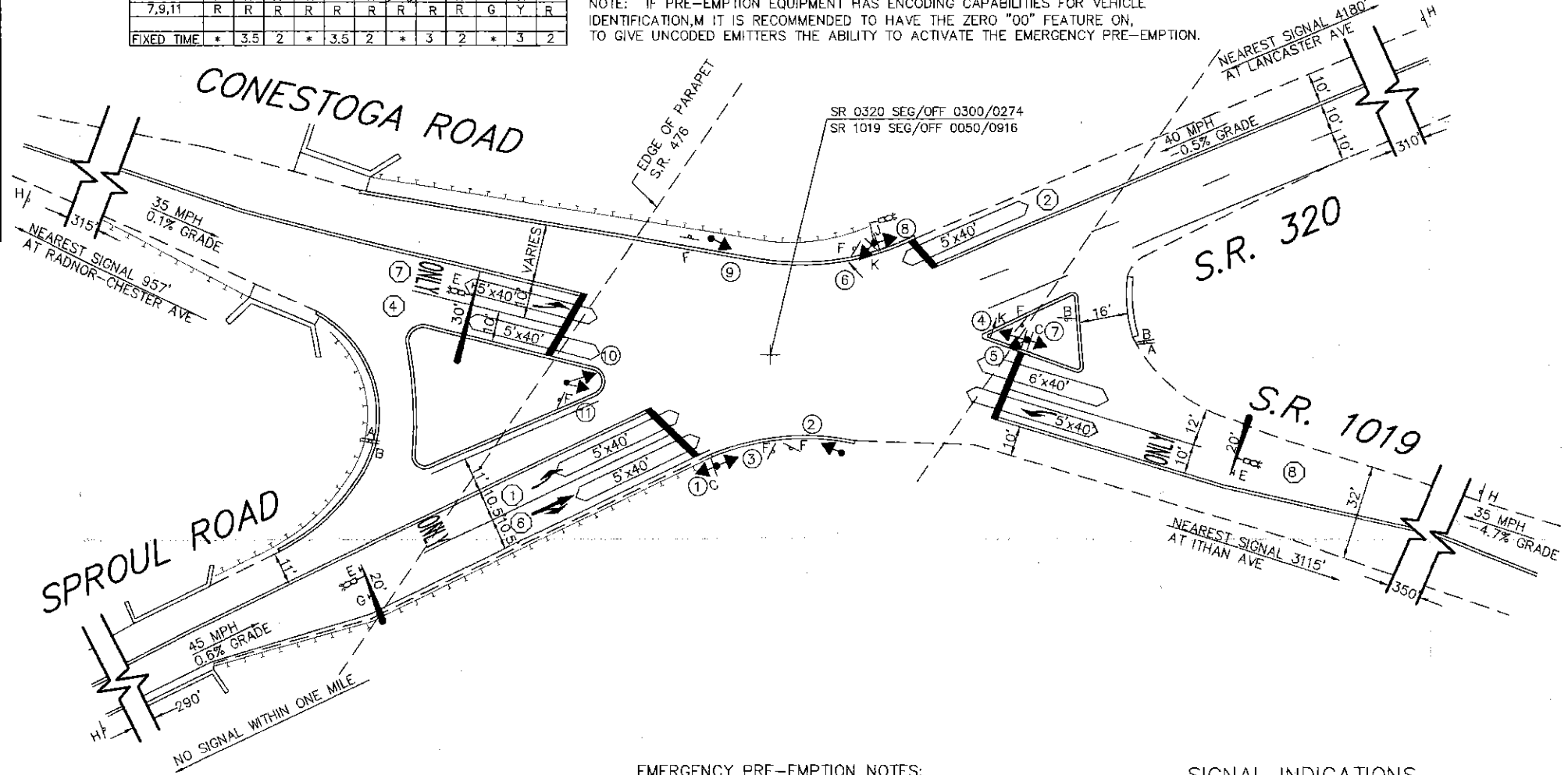
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COUNT DATE: MARCH 2009

WEEKLY PROGRAM CHART

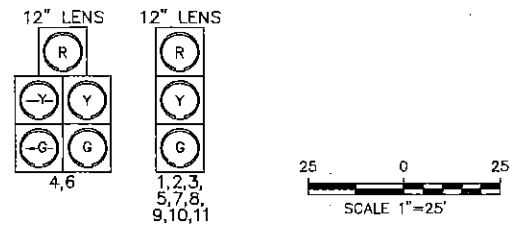
EVENT	DAY*	TIME	CYCLE	PROGRAM	REMARKS
1	1-5	0600	90	1	AM PEAK
2	1-5	1000	80	2	MID DAY
3	1-5	1600	80	3	PM PEAK
4	1-5	1900	-	MAX.	FREE
5	6,7	0800	80	2	WEEKEND
6	6,7	2000	-	MAX.	FREE

* DAY 1 = MONDAY

EMERGENCY PRE-EMPTION NOTES:

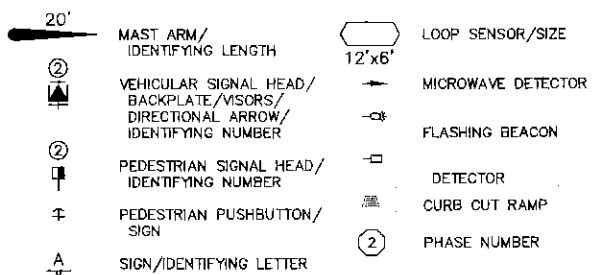
- CONTROLLER TO BE EQUIPPED WITH EMERGENCY PRE-EMPTION FOR THE NORTHBOUND & SOUTHBOUND APPROACHES OF SPROUL ROAD AND THE EASTBOUND & WESTBOUND APPROACHES OF CONESTOGA ROAD WITH A FAIL SAFE DEVICE FOR EACH DIRECTION OF OPERATION. THIS EMERGENCY BEACON SHALL CONSIST OF A FLASHING WHITE FLOOD LIGHT, AND 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



MOVEMENT, SEQUENCE AND TIMING DIAGRAM

PHASE	1+6	2+6	4+7	4+8	FLASHING
INTERVAL	1 2 3	4 5 6	7 8 9	10 11 12	
SIGNALS	1,5	G Y R	R R R	R R R	R
	6	G Y R	R R R	R R R	R
	3,8,10	R R R	R R R	R R R	R
	2	R R R	R R R	R R R	R
	4	R R R	R R R	R R R	R
	7,9,11	R R R	R R R	R R R	R
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	NL	NL	NL	MN	
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.

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: _____ DATE _____
 MUNICIPAL SIGNALS ENGINEER: WERNER J. EICHORN DATE 5/17/87
 DISTRICT TRAFFIC ENGINEER

NO.	REVISION	DATE	REV.	DATE	RECOM.	DATE
1	ADDED PRE-EMPTION	9/10/04	MLK	9/13/04	LRB	9/20/04
2	ADD EB LT PHASE, RETIMING	5/4/09	hwb	5/14/09	hwb	5/14/09
3						
4						
5						
6						
7						
8						

SIGN TABULATION			
PLAN SYMBOL	SERIES NUMBER	SIZE	REMARKS
A	R10-11	30X36	NO-TURN ON RED
B	R10-8	5X12	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 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.

THE MINIMUM HORIZONTAL DISTANCE BETWEEN SIGNALS MEASURED AT RIGHT ANGLES TO THE APPROACH SHALL BE 0 FEET.

EXACT LOCATION OF DETECTORS SHALL BE DETERMINED PRIOR TO INSTALLATION BY A REPRESENTATIVE OF PENNDOT.

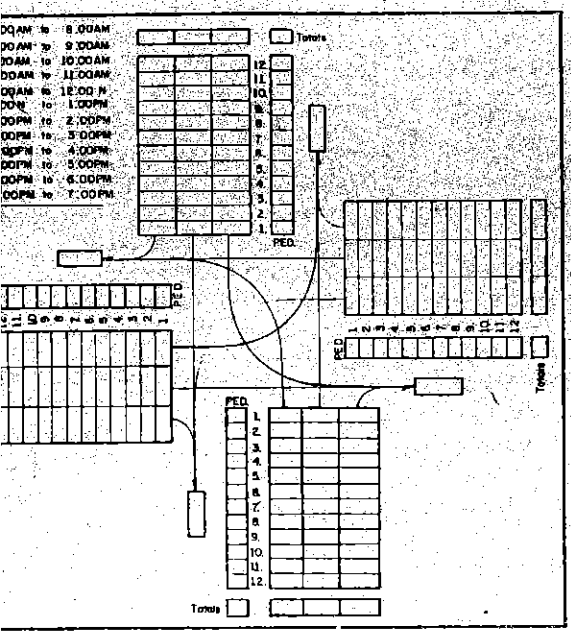
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IN ADDITION TO THIS SIGNAL PERMIT THE PERMITTEE SHALL OBTAIN A HIGHWAY OCCUPANCY PERMIT PRIOR TO ANY OPENINGS BEING MADE IN OR UNDER ANY PORTION OF A STATE HIGHWAY.

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.

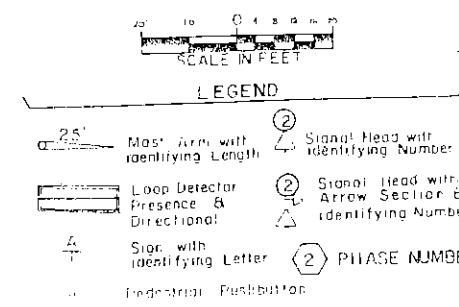
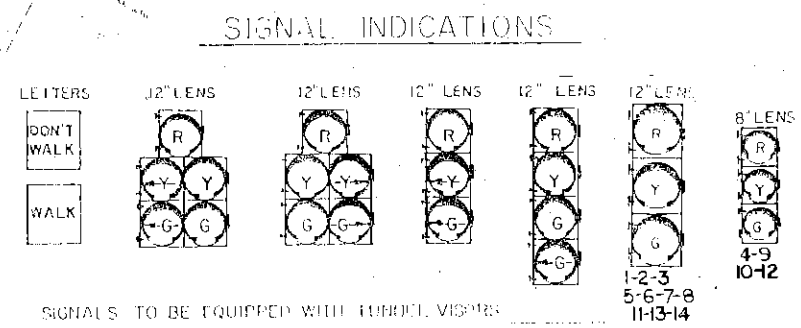
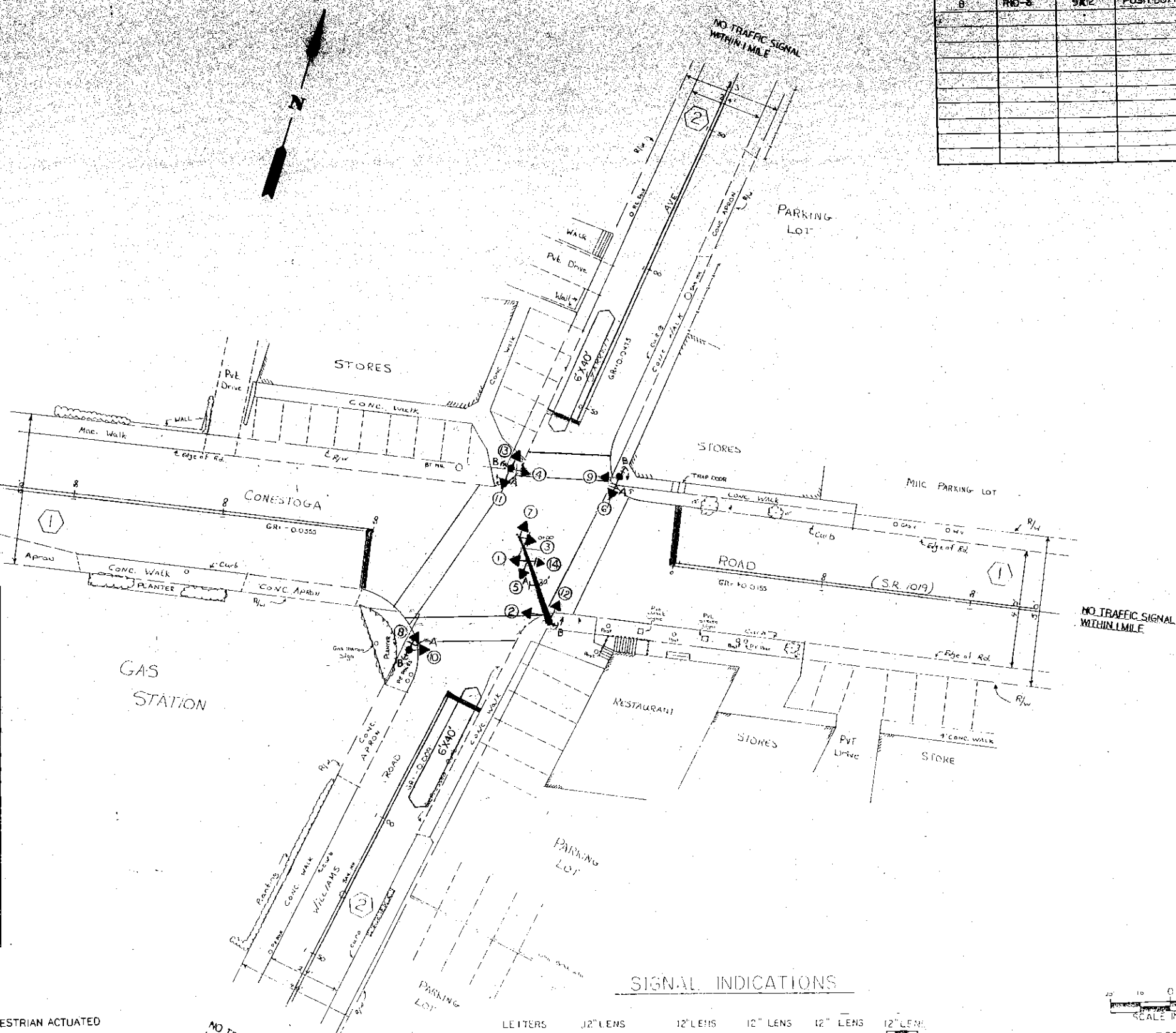


MOVEMENT, SEQUENCE, AND TIMING DIAGRAM

PHASE	MOVEMENT						SEQUENCE
	1	2	3	4	5	6	
INTERVAL	1	2	3	4	5	6	
3	G	Y	R	R	R		Y
7-8	R	R	R	G	Y	R	R
7-4	G	Y	R	R	R		OFF
	R	R	R	G	Y	R	R
	G	Y	R	R	R		Y
	R	R	R	G	Y	R	OFF

UM	4	2	4	2
AGE			5	4
			20	20
STRIAN				
RY	MR	NL		

PEDESTRIAN ACTUATED



PENNSYLVANIA DEPARTMENT OF TRANSPORTATION
 ENGINEERING DISTRICT 6-0

COUNTY: DELAWARE COUNTY
 MUNICIPALITY: RADNOR TOWNSHIP
 INTERSECTION: CONESTOGA ROAD (1019) AND GARRETT AVENUE

REVIEWED: _____ DATE _____

MUNICIPAL OFFICIAL: _____ DATE _____

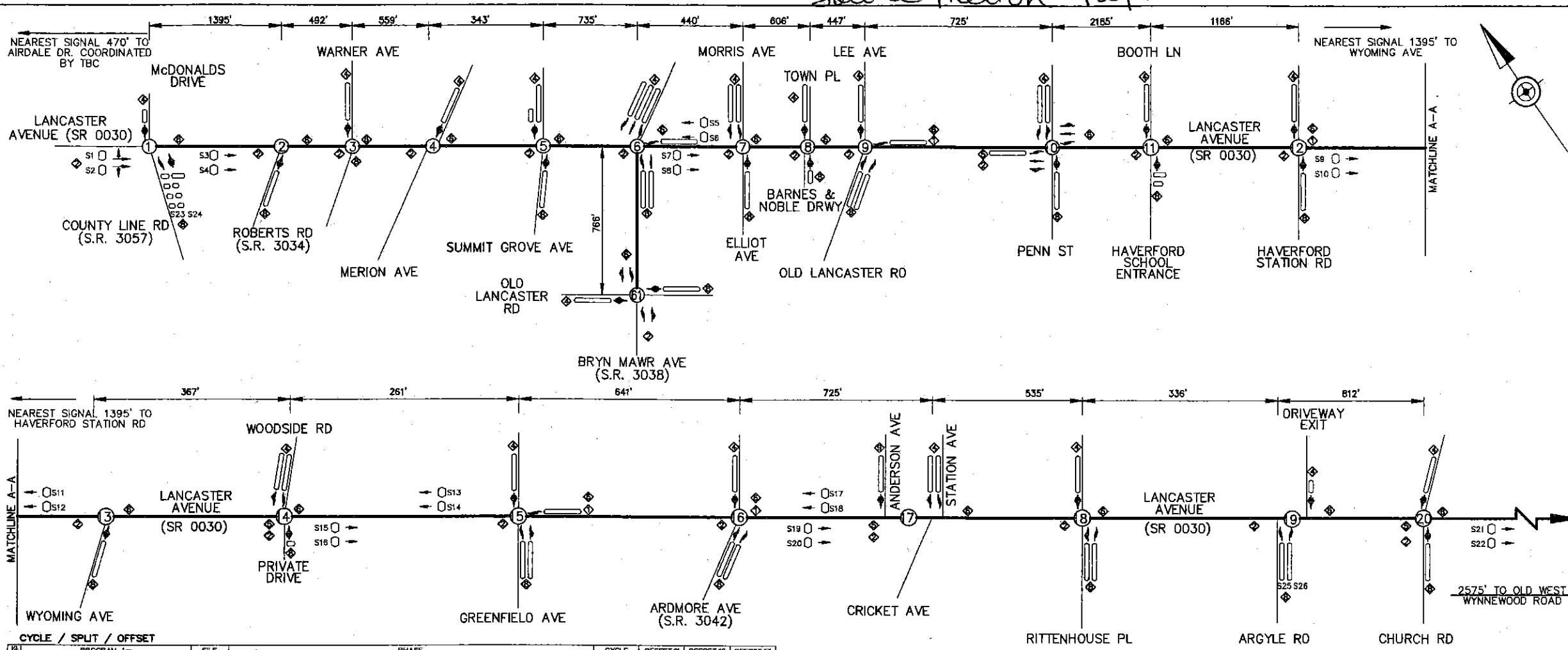
RECOMMENDED: *Mark S. Kay* 10-22-94

DISTRICT TRAFFIC ENGINEER: _____ DATE _____

Revised: *10/19/94* *mk* *10/19/94*
 and change from 12" to 8" *mk* *3/22/91*
 Revised: *mk* *3/22/91*
 Revised: *mk* *3/22/91*
 Revised: *mk* *3/22/91*
 Revised: *mk* *3/22/91*

Lower Merion Twp.

1-0065



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 281, 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.

CYCLE / SPLIT / OFFSET

INTERSECTIONS	FILE NUMBER	PHASE	CYCLE	OFFSET#1	OFFSET#2	OFFSET#3
PROGRAM 1 - INTERSECTIONS						
COORDINATION OF SIGNALS ALONG LANCASTER AVENUE BETWEEN OLD WEST WYNNWOOD ROAD & LANCASTER HOSPITAL DRIVE*						
10 OLD LANCASTER RD & BRYN MAWR AVE	0466	13 (LEAD)	44	0	0	0
11 LANCASTER AVE & CHURCH RD	0466	13 (LEAD)	44	0	0	0
12 LANCASTER AVE & ARGYLE RD/DRIVEWAY EXIT	0465	24 (SPLIT)	90	24	54	84
13 LANCASTER AVE & RITTENHOUSE PL	0484	24 (SPLIT)	90	24	54	84
14 LANCASTER AVE & STATION AVE / DRIVEWAY EXIT	0483	24 (SPLIT)	90	24	54	84
15 LANCASTER AVE & ARDMORE AVE	0482	21 (SPLIT)	90	21	51	81
16 LANCASTER AVE & GREENFIELD AVE	0481	15 (LEAD)	48	0	0	0
17 LANCASTER AVE & WOODSIDE RD	0480	15 (LEAD)	48	0	0	0
18 LANCASTER AVE & WOODSIDE RD	0480	15 (LEAD)	48	0	0	0
19 LANCASTER AVE & WOODSIDE RD	0480	15 (LEAD)	48	0	0	0
20 LANCASTER AVE & WOODSIDE RD	0480	15 (LEAD)	48	0	0	0
21 LANCASTER AVE & WOODSIDE RD	0480	15 (LEAD)	48	0	0	0
22 LANCASTER AVE & WOODSIDE RD	0480	15 (LEAD)	48	0	0	0
23 LANCASTER AVE & WOODSIDE RD	0480	15 (LEAD)	48	0	0	0
24 LANCASTER AVE & WOODSIDE RD	0480	15 (LEAD)	48	0	0	0
25 LANCASTER AVE & WOODSIDE RD	0480	15 (LEAD)	48	0	0	0
26 LANCASTER AVE & WOODSIDE RD	0480	15 (LEAD)	48	0	0	0
27 LANCASTER AVE & WOODSIDE RD	0480	15 (LEAD)	48	0	0	0
28 LANCASTER AVE & WOODSIDE RD	0480	15 (LEAD)	48	0	0	0
29 LANCASTER AVE & WOODSIDE RD	0480	15 (LEAD)	48	0	0	0
30 LANCASTER AVE & WOODSIDE RD	0480	15 (LEAD)	48	0	0	0
31 LANCASTER AVE & WOODSIDE RD	0480	15 (LEAD)	48	0	0	0
32 LANCASTER AVE & WOODSIDE RD	0480	15 (LEAD)	48	0	0	0
33 LANCASTER AVE & WOODSIDE RD	0480	15 (LEAD)	48	0	0	0
34 LANCASTER AVE & WOODSIDE RD	0480	15 (LEAD)	48	0	0	0
35 LANCASTER AVE & WOODSIDE RD	0480	15 (LEAD)	48	0	0	0
36 LANCASTER AVE & WOODSIDE RD	0480	15 (LEAD)	48	0	0	0
37 LANCASTER AVE & WOODSIDE RD	0480	15 (LEAD)	48	0	0	0
38 LANCASTER AVE & WOODSIDE RD	0480	15 (LEAD)	48	0	0	0
39 LANCASTER AVE & WOODSIDE RD	0480	15 (LEAD)	48	0	0	0
40 LANCASTER AVE & WOODSIDE RD	0480	15 (LEAD)	48	0	0	0
41 LANCASTER AVE & WOODSIDE RD	0480	15 (LEAD)	48	0	0	0
42 LANCASTER AVE & WOODSIDE RD	0480	15 (LEAD)	48	0	0	0
PROGRAM 2 - INTERSECTIONS						
COORDINATION OF SIGNALS ALONG LANCASTER AVENUE BETWEEN OLD WEST WYNNWOOD ROAD & LANCASTER HOSPITAL DRIVE*						
10 OLD LANCASTER RD & BRYN MAWR AVE	0466	13 (LEAD)	44	0	0	0
11 LANCASTER AVE & CHURCH RD	0466	13 (LEAD)	44	0	0	0
12 LANCASTER AVE & ARGYLE RD/DRIVEWAY EXIT	0465	24 (SPLIT)	90	24	54	84
13 LANCASTER AVE & RITTENHOUSE PL	0484	24 (SPLIT)	90	24	54	84
14 LANCASTER AVE & STATION AVE / DRIVEWAY EXIT	0483	24 (SPLIT)	90	24	54	84
15 LANCASTER AVE & ARDMORE AVE	0482	21 (SPLIT)	90	21	51	81
16 LANCASTER AVE & GREENFIELD AVE	0481	15 (LEAD)	48	0	0	0
17 LANCASTER AVE & WOODSIDE RD	0480	15 (LEAD)	48	0	0	0
18 LANCASTER AVE & WOODSIDE RD	0480	15 (LEAD)	48	0	0	0
19 LANCASTER AVE & WOODSIDE RD	0480	15 (LEAD)	48	0	0	0
20 LANCASTER AVE & WOODSIDE RD	0480	15 (LEAD)	48	0	0	0
21 LANCASTER AVE & WOODSIDE RD	0480	15 (LEAD)	48	0	0	0
22 LANCASTER AVE & WOODSIDE RD	0480	15 (LEAD)	48	0	0	0
23 LANCASTER AVE & WOODSIDE RD	0480	15 (LEAD)	48	0	0	0
24 LANCASTER AVE & WOODSIDE RD	0480	15 (LEAD)	48	0	0	0
25 LANCASTER AVE & WOODSIDE RD	0480	15 (LEAD)	48	0	0	0
26 LANCASTER AVE & WOODSIDE RD	0480	15 (LEAD)	48	0	0	0
27 LANCASTER AVE & WOODSIDE RD	0480	15 (LEAD)	48	0	0	0
28 LANCASTER AVE & WOODSIDE RD	0480	15 (LEAD)	48	0	0	0
29 LANCASTER AVE & WOODSIDE RD	0480	15 (LEAD)	48	0	0	0
30 LANCASTER AVE & WOODSIDE RD	0480	15 (LEAD)	48	0	0	0
31 LANCASTER AVE & WOODSIDE RD	0480	15 (LEAD)	48	0	0	0
32 LANCASTER AVE & WOODSIDE RD	0480	15 (LEAD)	48	0	0	0
33 LANCASTER AVE & WOODSIDE RD	0480	15 (LEAD)	48	0	0	0
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35 LANCASTER AVE & WOODSIDE RD	0480	15 (LEAD)	48	0	0	0
36 LANCASTER AVE & WOODSIDE RD	0480	15 (LEAD)	48	0	0	0
37 LANCASTER AVE & WOODSIDE RD	0480	15 (LEAD)	48	0	0	0
38 LANCASTER AVE & WOODSIDE RD	0480	15 (LEAD)	48	0	0	0
39 LANCASTER AVE & WOODSIDE RD	0480	15 (LEAD)	48	0	0	0
40 LANCASTER AVE & WOODSIDE RD	0480	15 (LEAD)	48	0	0	0
41 LANCASTER AVE & WOODSIDE RD	0480	15 (LEAD)	48	0	0	0
42 LANCASTER AVE & WOODSIDE RD	0480	15 (LEAD)	48	0	0	0
PROGRAM 3 - INTERSECTIONS						
COORDINATION OF SIGNALS ALONG LANCASTER AVENUE BETWEEN OLD WEST WYNNWOOD ROAD & LANCASTER HOSPITAL DRIVE*						
10 OLD LANCASTER RD & BRYN MAWR AVE	0466	13 (LEAD)	44	0	0	0
11 LANCASTER AVE & CHURCH RD	0466	13 (LEAD)	44	0	0	0
12 LANCASTER AVE & ARGYLE RD/DRIVEWAY EXIT	0465	24 (SPLIT)	90	24	54	84
13 LANCASTER AVE & RITTENHOUSE PL	0484	24 (SPLIT)	90	24	54	84
14 LANCASTER AVE & STATION AVE / DRIVEWAY EXIT	0483	24 (SPLIT)	90	24	54	84
15 LANCASTER AVE & ARDMORE AVE	0482	21 (SPLIT)	90	21	51	81
16 LANCASTER AVE & GREENFIELD AVE	0481	15 (LEAD)	48	0	0	0
17 LANCASTER AVE & WOODSIDE RD	0480	15 (LEAD)	48	0	0	0
18 LANCASTER AVE & WOODSIDE RD	0480	15 (LEAD)	48	0	0	0
19 LANCASTER AVE & WOODSIDE RD	0480	15 (LEAD)	48	0	0	0
20 LANCASTER AVE & WOODSIDE RD	0480	15 (LEAD)	48	0	0	0
21 LANCASTER AVE & WOODSIDE RD	0480	15 (LEAD)	48	0	0	0
22 LANCASTER AVE & WOODSIDE RD	0480	15 (LEAD)	48	0	0	0
23 LANCASTER AVE & WOODSIDE RD	0480	15 (LEAD)	48	0	0	0
24 LANCASTER AVE & WOODSIDE RD	0480	15 (LEAD)	48	0	0	0
25 LANCASTER AVE & WOODSIDE RD	0480	15 (LEAD)	48	0	0	0
26 LANCASTER AVE & WOODSIDE RD	0480	15 (LEAD)	48	0	0	0
27 LANCASTER AVE & WOODSIDE RD	0480	15 (LEAD)	48	0	0	0
28 LANCASTER AVE & WOODSIDE RD	0480	15 (LEAD)	48	0	0	0
29 LANCASTER AVE & WOODSIDE RD	0480	15 (LEAD)	48	0	0	0
30 LANCASTER AVE & WOODSIDE RD	0480	15 (LEAD)	48	0	0	0
31 LANCASTER AVE & WOODSIDE RD	0480	15 (LEAD)	48	0	0	0
32 LANCASTER AVE & WOODSIDE RD	0480	15 (LEAD)	48	0	0	0
33 LANCASTER AVE & WOODSIDE RD	0480	15 (LEAD)	48	0	0	0
34 LANCASTER AVE & WOODSIDE RD	0480	15 (LEAD)	48	0	0	0
35 LANCASTER AVE & WOODSIDE RD	0480	15 (LEAD)	48	0	0	0
36 LANCASTER AVE & WOODSIDE RD	0480	15 (LEAD)	48	0	0	0
37 LANCASTER AVE & WOODSIDE RD	0480	15 (LEAD)	48	0	0	0
38 LANCASTER AVE & WOODSIDE RD	0480	15 (LEAD)	48	0	0	0
39 LANCASTER AVE & WOODSIDE RD	0480	15 (LEAD)	48	0	0	0
40 LANCASTER AVE & WOODSIDE RD	0480	15 (LEAD)	48	0	0	0
41 LANCASTER AVE & WOODSIDE RD	0480	15 (LEAD)	48	0	0	0
42 LANCASTER AVE & WOODSIDE RD	0480	15 (LEAD)	48	0	0	0

- SYSTEM NOTES**
- PROGRAM TO BE SELECTED BY CLOSED LOOP SYSTEM (TIME OF DAY) OR TBC BACKUP.
 - OFFSETS ARE REFERENCED TO NEMA TS2 1ST GREEN, ON LANCASTER AVENUE.
 - 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.
 - PRIMARY COORDINATION: CLOSED LOOP SYSTEM - SPREAD SPECTRUM RADIO COMMUNICATION.
SECONDARY COORDINATION: TBC (DEFAULT TO BACKUP TBC).
 - SYSTEM IS DESIGNED FOR THE SYSTEM SOFTWARE: MARC NX.
 - 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 CYLCE/SPLIT/OFFSET MATRIX

- LEGEND**
- ④ INTERSECTION ADDRESS
 - ## LOOP / SYSTEM LOOP / IDENTIFYING NUMBER
 - LOOP SENSOR
 - ◇ PHASE NUMBER
- NOT TO SCALE

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: *Andrew Widop* DATE: 4/6/11
MUNICIPAL OFFICIAL DATE

RECOMMENDED: A B PATEL DATE: 03/05/04
L R BELMONTE DATE: 03/08/04
DISTRICT TRAFFIC ENGINEER DATE

NO	REVISION	DES/REVW	DATE	REVW	DATE	RECOM	DATE
1	ADD OLD LANCASTER RD TPO & OLD BRYN MAWR AVE			DLA	02/27/09	ABP	02/27/09
2	ADD RT LANE TO SB & ADD LT TPO LANE TO EB & WB AT INT #10		4/14/11	WRC	4/14/11	abp	4/14/11

SYSTEM PERMIT # I-0065

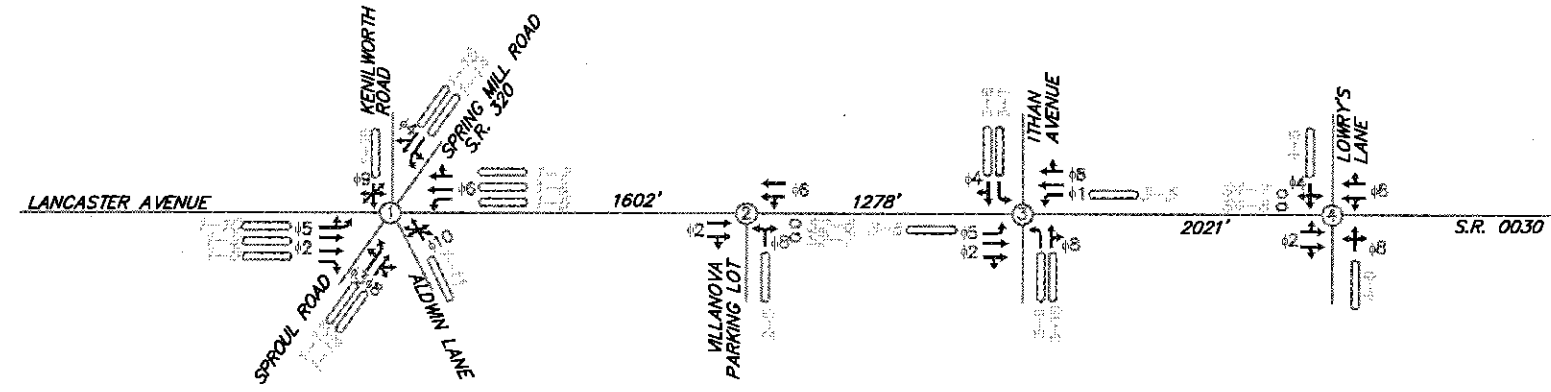
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 5/17/2011 5:31:38 PM eforley Traffic Planning and Design, Inc.

TRAFFIC SIGNAL SYSTEM PERMIT PLAN

EVENT	DAY	TIME	CYCLE	OFFSET	PROGRAM	REMARKS
1	1-7	20:00	-	-	MAX 1	FREE
2	1-5	06:00	VARIABLE	VARIABLE	1	AM PEAK
3	1-5	10:00	VARIABLE	VARIABLE	2	OFF PEAK
4	1-5	15:00	VARIABLE	VARIABLE	3	PM PEAK
5	6,7	08:00	VARIABLE	VARIABLE	2	OFF PEAK

MONDAY = DAY 1
 OFFSET REFERENCED TO START OF YELLOW ON LANCASTER AVE

NOTES: - ALL SPLIT PHASES INCLUDE YELLOW AND RED TIMES FOR A GIVEN PHASE.
 - REFER TO SIGNAL PERMIT PLAN FOR MAX 1, MAX 2, CLEARANCE AND RED TIMES



SYSTEM NOTES

- PROGRAM TO BE SELECTED BY CLOSED LOOP SYSTEM (TIME OF DAY) OR TSC BACKUP.
- OFFSETS ARE REFERENCED TO THE BEGINNING OF YELLOW ON LANCASTER AVENUE.
- SYSTEM LIMITS: LANCASTER AVENUE @ INTERSECTION FROM SPROUL RD TO LOWRY'S LANE. MASTER: RADNOR MAINTENANCE BUILDING.
- PRIMARY COORDINATION: FIBER OPTIC CABLE. SECONDARY COORDINATION: TSC (DEFAULT TO BACKUP TRC).

GENERAL NOTES

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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.

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MAINTAIN MASTER CONTROLLER COMMUNICATION SUCH AS PHONE DROPS.

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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 405 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-7600 SERIES.

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	0228			55	15 (LEAD)	26	16 (LEAD)	39		41	32 (SPLIT)	32 (SPLIT)	180	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	0228			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)	48		33	26 (PED)		120	0
4 LANCASTER AVE & LOWRY'S LANE	0781			33		27		33		27			60	25

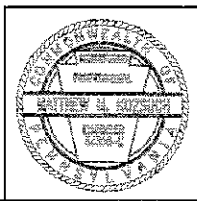
CYCLE/SPLIT/OFFSET

Program 3 =			Phase										Cycle	Offset
Intersections	File #	Master	1	2	3	4	5	6	7	8	9	10		
1 LANCASTER AVE & SPROUL ROAD	0228			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
- PHASE

SCALE: NOT TO SCALE



PENNSYLVANIA DEPARTMENT OF TRANSPORTATION
 ENGINEERING DISTRICT 6-0

COUNTY: DELAWARE
 MUNICIPALITY: RADNOR TOWNSHIP
 INTERSECTION: TRAFFIC SIGNAL SYSTEM

REVIEWED:

RECOMMENDED:

DESIGNED BY:

NO.	DATE	BY	REVISION

SIGN TABULATION			
PLAN SYMBOL	SERIES NUMBER	SIZE	REMARKS
A	R10-3	9 x 12	PUSH BUTTON FOR GREEN

GENERAL NOTES

NO MODIFICATIONS OF THIS INSTALLATION ARE PERMITTED UNLESS PRIOR APPROVAL IS GRANT IN WRITING BY A REPRESENTATIVE OF THE DEPART OF TRANSPORTATION.

ALL MAINTENANCE WORK INCLUDING TRIMMING TREES, NECESSARY FOR PROPER VISIBILITY OF 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 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 SIGNAL 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.

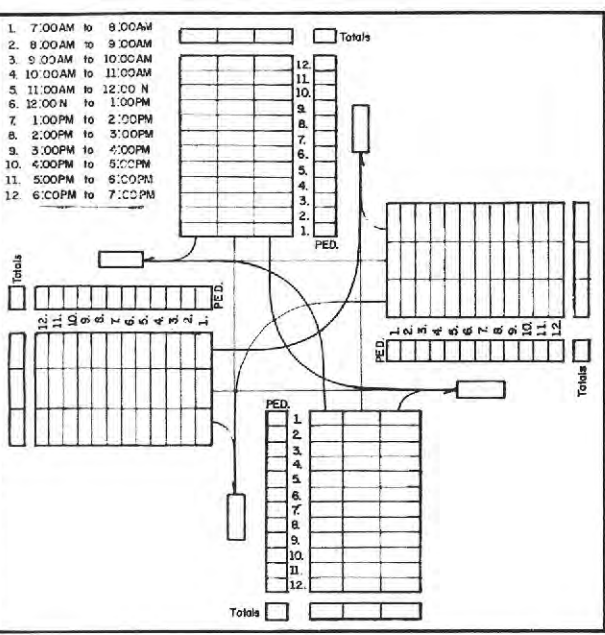
CURBING TO BE INSTALLED BY MUNICIPALITY WHERE NOTED, SHALL BE PLAIN CEMENT CONCRETE CURB OR GRANITE CURB, INSTALLED IN ACCORDANCE WITH DEPARTMENT SPECIFICATIONS FORM 400.

PRIOR TO INSTALLATION THE CONTRACTOR SHALL CONSULT WITH THE LOCAL OFFICIALS AND UTILITIES 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.

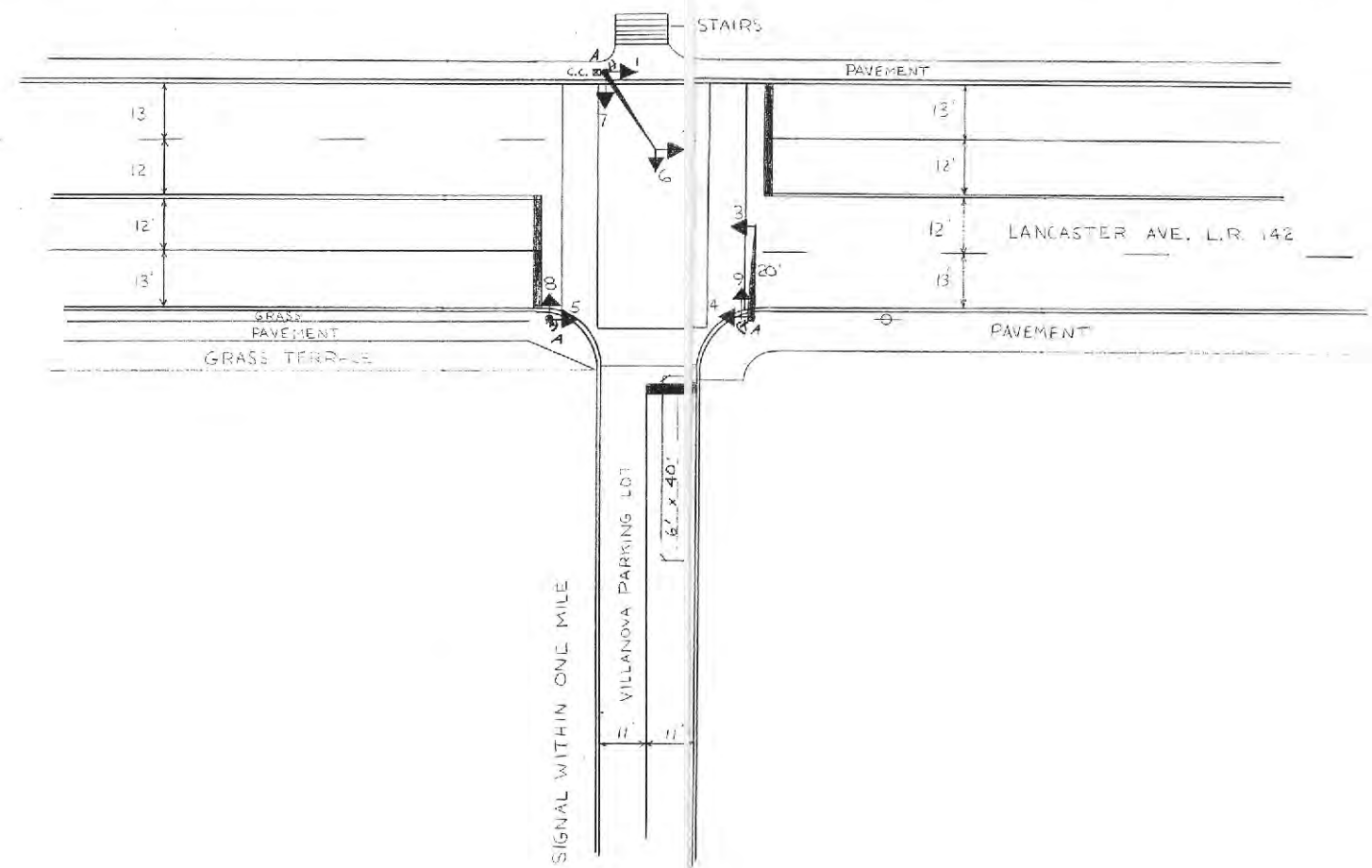
THIS DRAWING CANNOT BE USED AS A CONSTRUCTION DRAWING UNLESS THE PERMITTEE COMPLIES WITH THE PROVISIONS OF ACT 287, PREVENTION OF DAMAGE TO UNDERGROUND UTILITIES, EFFECTIVE DATE APRIL 10, 1975.

WHEN LIQUID FUELS MONEY IS USED, SIGN INSTALLATION MUST CONFORM TO FORM 40 AND A COPY OF THE PROPOSED SPECIFICATIONS MUST BE SUBMITTED TO THE DISTRICT TRAFFIC UNIT, FOR REVIEW, PRIOR TO BIDDING.



← NEAREST SIGNAL 680' TO SPRING MILL RD.

← NEAREST SIGNAL 760' TO ITHAN AVE.



MOVEMENT, SEQUENCE, AND TIMING DIAGRAM

PHASE	A			B			FLASHING
	1	2	3	4	5	6	
INTERVAL SIGNALS	1-2-3-4-5	G	Y	R	R	R	Y
	6-7-8-9	R	R	P	G	Y	R

FIXED TIME	20*	3	2									
INITIAL				4								
VEHICLE EXT.				4								
MAXIMUM				20								
PEDESTRIAN				20								

DIAL	DAY	OPERATION
1	MON - SUN	6:00AM - 6:00PM
2	MON - SUN	6:00PM - 12:00MID
3	MON - SUN	12:00MID - 6:00AM - FLASH

* UPON ACTUATION ONLY

RELEASE OFFSET **

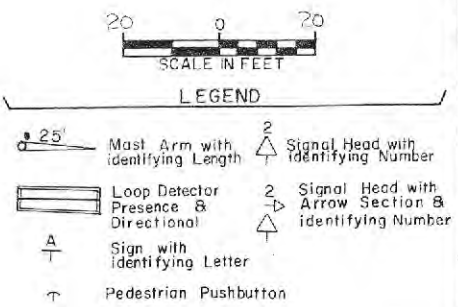
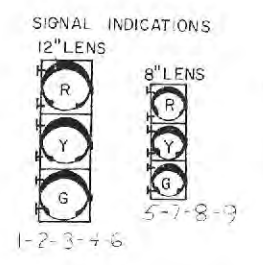
DIAL 1 80 SEC 9.5 SEC

DIAL 2 70 SEC 8.5 SEC

DIAL 3 FLASH

† MINIMUM GREEN TIME; ACTUAL GREEN TIME TO BE DETERMINED BY CYCLE LENGTH AND TRAFFIC VOLUMES.

** OFFSET REFERENCED TO START OF INTERVAL N° 2



TURN LANE WARRANT ANALYSIS

The project includes providing new auxiliary left- and right-turn lanes along Route 30 and Ithan Avenue. There are, however, certain locations where either left-or right-turn auxiliary lanes are *not* suggested. In one case this is because of a suggested prohibition:

- Route 30 WLL driveway, no WB left turn lane is suggested since the movement is prohibited.

In other cases it is because the lanes are not warranted:

- Route 30 PAC driveway, no EB right turn lane is suggested since it is not warranted.
- Ithan Ave LAH/Garage driveways, no NB/SB right turn lanes are suggested since they are not warranted.

Thus the turn lane warrant analysis focuses on the three instances mentioned directly above, to demonstrate the lack of need. Such evidence is provided on the following pages and is based on SOL 470-08-4 as well as PennDOT *Publication 46* Chapter 11 page 11-46 Turn Lane Warrants.

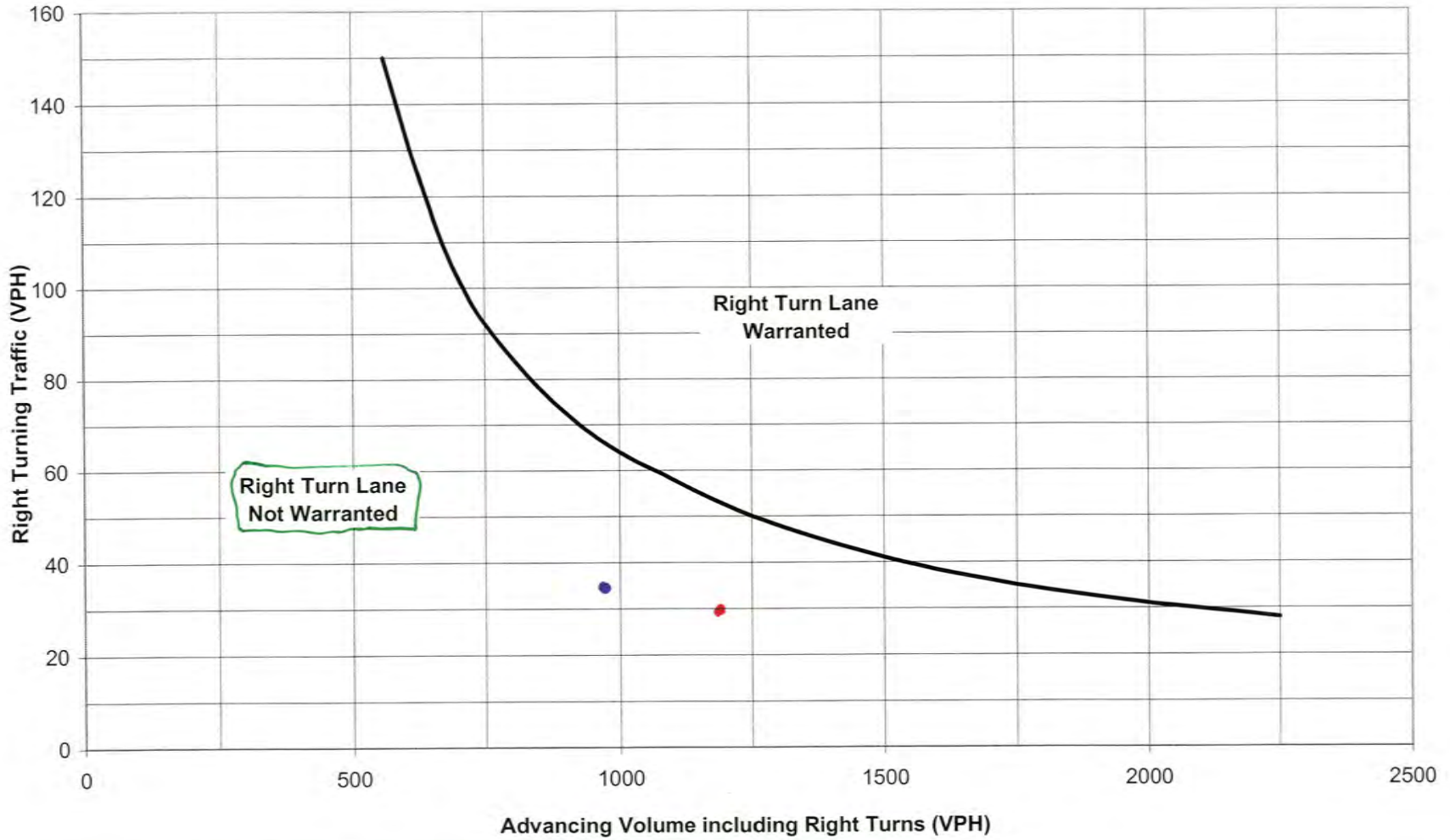
Note that the Queue Analysis (based on Synchro results) demonstrates adequate storage lengths for the site access auxiliary lanes and other key locations. Even so, an alternative to predicting necessary auxiliary lane storage length is provided in SOL 470-08-4, and this analysis is also provided. Note that using Chapter 11 guidelines, the site is Level terrain (truck adjustment factor) and is Traffic Control Condition “A” (using either posted speed limits of 25 mph or a design speed of 35 mph). To simplify calculations and add conservative measure, a Pt value of 10% was used which results in a T factor of 1.05 to be applied to subject volumes (2023 Projected Condition scenario volumes). The following table summarizes SOL 470-08-4 storage need predictions and compares with that which is provided.

DWY	DIR	CYC/HR	ADJ'D SUBJ VOL (AM/PM)	AVG VEH/CYC	SUG'D EXH 11-8 LENGTH (FT)	PROVIDED LENGTH (STOR+TAP)	OK?
WLL	EB R	60	34 / 29	1 / 1	75	125+75	OK
CW	EB R	60	35 / 39	1 / 1	75	125+75	OK
	WB L	60	32 / 27	1 / 1	75	100+75	OK
PAC	WB L	60	66 / 71	1 / 1	75	100+75	OK
LAH/GAR	NB L	60	5 / 4	<1 / <1	75	50+50	OK (W/ TAPER)
	SB L	60	158 / 143	2 / 2	100	100+75	OK

Recall that the entire Projected Condition analysis of the TIS is based on ALL parking spaces treated as peak-hour moving traffic.

PAC DWY

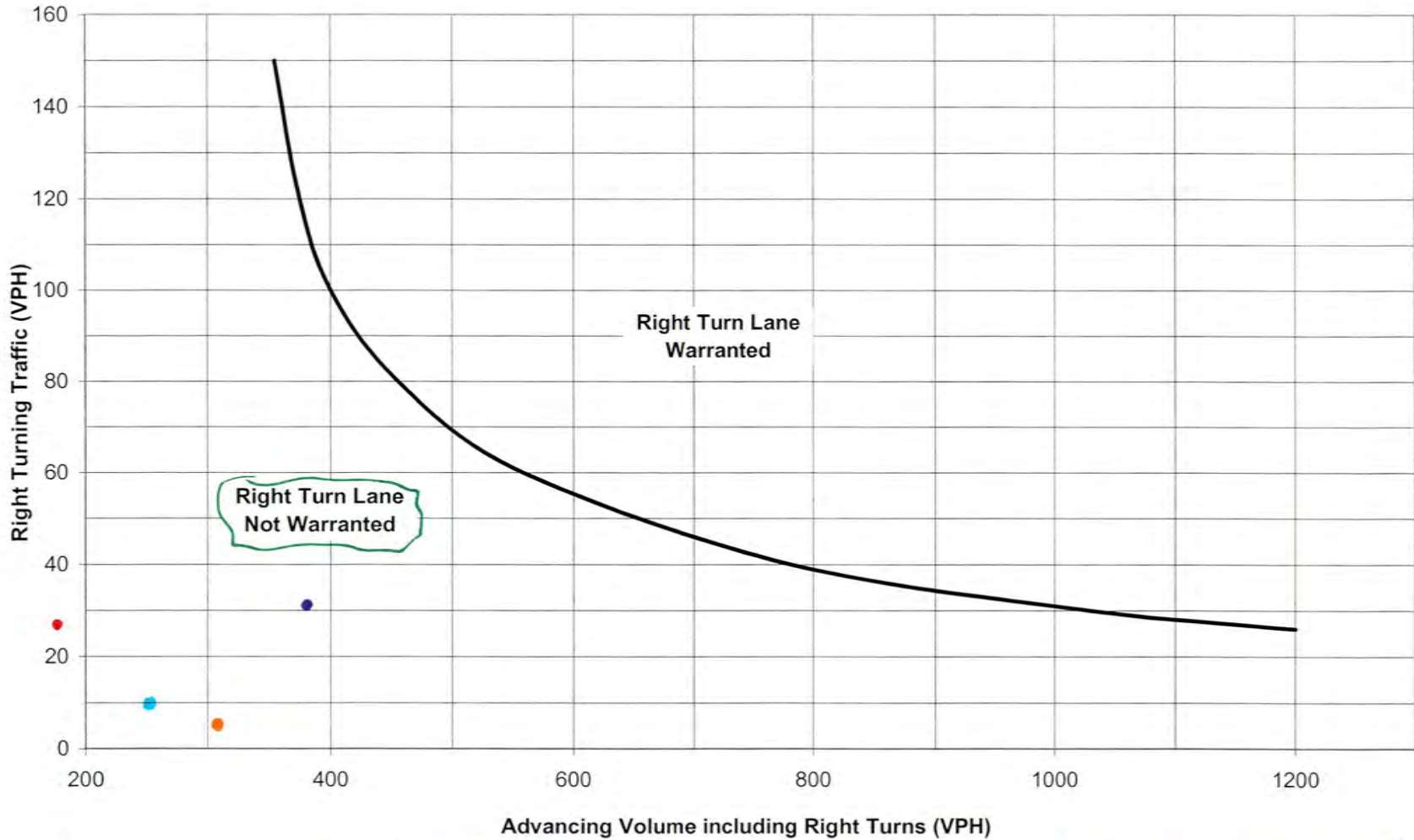
Figure 11. Warrant for right turn lanes on four-lane roadways (40 mph or lower speeds, unsignalized and signalized intersections)



- 36,984 PAC EB RT 2023 AM
- 32,1167 " " " " PM

ITHAW DWAY'S

Figure 9. Warrant for right turn lanes on two-lane roadways (40 mph or lower speeds, unsignalized and signalized intersections)



- Advancing Volume including Right Turns (VPH)
- 31,384 LAH/GAR NB RT 2023 AM
 - 27,172 PM
 - 10,243 ... SB RT 2023 AM
 - 6,304 PM

T Factor 1.05

Location PAC EB Rt ITHAN NB Rt ITHAN SB Rt

Time AM PM AM PM AM PM

				5	4	150	136
	903	1081	336	138	222	284	
	34	30	29	25	9	5	
	937	1111	365	163	231	289	
	983.85	1166.55	383.25	171.15	242.55	303.45	
V advance	984	1167	384	172	243	304	
V right	36	32	31	27	10	6	

APPENDIX L

Parking

Villanova University Parking Lot Inventory - Class Days

Lot Name	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
	# of Spaces	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

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	

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 parking 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	STATE <small>(PA if blank)</small>	SEE KEY TO LEFT					TURNOVER?
			10:00	10:30	11:00	11:30	12:00	
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	
<u>IN</u>	<u>OUT</u>
2	2

The traffic counts at the gate shown the following student resident turnover activity during the peak hour:

<u>IN</u>	<u>OUT</u>
30	23

F. Tavani and Associates, Inc.

105 Kenilworth Street
Philadelphia, PA 19147

pass given includes those given
access but no physical 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

Start Time	Southbound			App. Total	Int. Total
	ins	outs			
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

Start Time	Southbound			App. Total	Int. Total
	ins	outs			
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 M

December 2014 Supplemental Items

DECEMBER 2014 ITEMS

Appendix A contains a letter from FTA dated 4 December 2014 which references certain items. More details are provided below, followed by additional information on the next several pages, as appropriate.

- *Item F* – Synchro evidence regarding the intersection of Church Walk / Route 30.
- *Item J* – A corrected version of Figure 14 (note that while Figure 14 contained errors, all of the Synchro worksheets from the September 2014 TIS reflected the correct volumes).
- *Item K* – The only inconsistency between Existing volume figures and previously-submitted Synchro worksheets is at the intersection of Garrett Ave Lane/Route 30. This intersection is signed No Left Turn on the Garrett Ave approach, so the Synchro worksheets reflect only right-turn movements leaving Garrett Ave. The volume figures reflect the actual turning movement volumes which were counted during data collection and demonstrate how the number of motorists violating the restriction is low (for example, 1 vph during the AM peak hour). Since the volume is low and the movement illegal, it was omitted from the analysis.
- *Item O* – Synchro worksheets reflecting TWSC (vs AWSC) at the proposed access along Ithan Avenue. As shown, all levels of service remain C or better for all turning movements during both peak hours except for one turning movement which is LOS D (with a delay of 25.2 seconds, or essentially approximately the same as LOS C operation).

Other notes:

- One condition of approval required the applicant to install an Adaptive Signal System at the intersections of:
 - Lancaster Avenue and Ithan Avenue,
 - Lancaster Avenue and Church Walk, and
 - Lancaster Avenue and Route 320/Kenilworth Rd/Aldwyn Ln

The September 2014 TIS identifies that the applicant is (was) including signal timing adjustments at those three locations as an offered improvement. Pursuant to the edict of the conditional use approval, the applicant further agrees not only to adjust signal timings at these three (3) locations, but also agrees to modify/install equipment as required to provide an Adaptive Signal System.

- All other offered improvements as further discussed and identified in the September 2014 TIS remain unchanged.

Item F

HCM 2010 Computation does not support turning movement with Shared and Exclusive lanes.

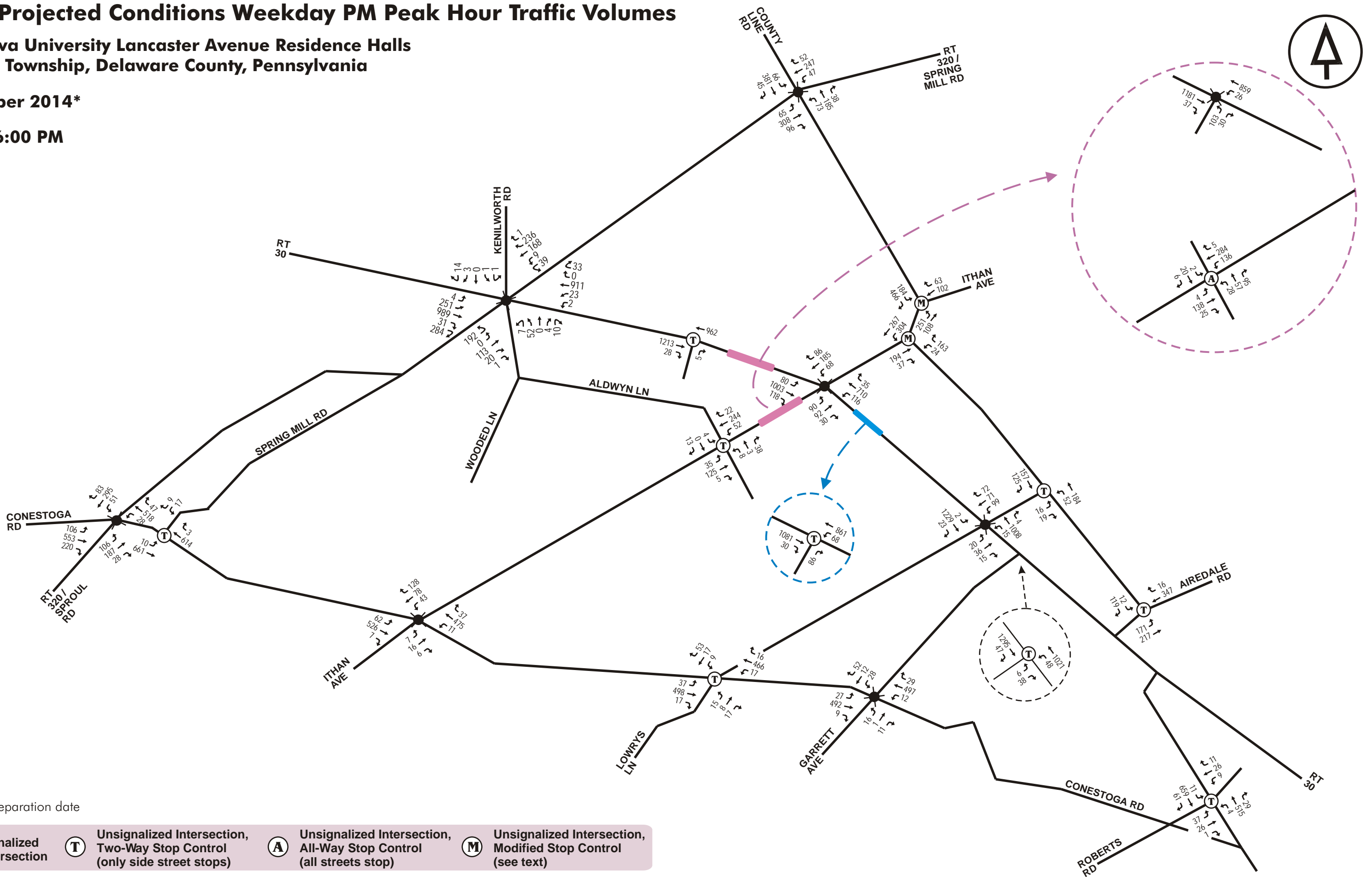
Item J

2023 Projected Conditions Weekday PM Peak Hour Traffic Volumes

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

December 2014*

5:00 - 6:00 PM



* figure preparation date

Signalized Intersection	Unsignalized Intersection, Two-Way Stop Control (only side street stops)	Unsignalized Intersection, All-Way Stop Control (all streets stop)	Unsignalized Intersection, Modified Stop Control (see text)
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Item O

Intersection

Int Delay, s/veh 3.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	SBL	SBR	NWU	NWL	NWR
Vol, veh/h	5	336	29	150	222	9	23	2	4	7	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	-	-	100	-	-	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	5	365	32	163	241	10	25	2	4	8	14

Major/Minor	Major1	Major2	Minor2	Minor1							
Conflicting Flow All	251	0	0	397	0	0	971	246	0	978	381
Stage 1	-	-	-	-	-	-	572	-	0	392	-
Stage 2	-	-	-	-	-	-	399	-	0	586	-
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	1314	-	-	1162	-	-	232	793	0	230	666
Stage 1	-	-	-	-	-	-	505	-	0	633	-
Stage 2	-	-	-	-	-	-	627	-	0	496	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	1314	-	-	1162	-	-	196	793	0	186	666
Mov Cap-2 Maneuver	-	-	-	-	-	-	196	-	0	186	-
Stage 1	-	-	-	-	-	-	503	-	0	631	-
Stage 2	-	-	-	-	-	-	610	-	0	401	-

Approach	EB	WB	SB	NW
HCM Control Delay, s	0.1	3.4	23.2	25.2
HCM LOS			C	D

Minor Lane/Major Mvmt	NWLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	186	1314	-	-	1162	-	-	226
HCM Lane V/C Ratio	0.041	0.004	-	-	0.14	-	-	0.125
HCM Control Delay (s)	25.2	7.8	-	-	8.6	-	-	23.2
HCM Lane LOS	D	A	-	-	A	-	-	C
HCM 95th %tile Q(veh)	0.1	0	-	-	0.5	-	-	0.4

Intersection

Int Delay, s/veh 7.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	SBL	SBR	NWU	NWL	NWR
Vol, veh/h	4	138	25	136	284	5	20	6	28	57	95
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	-	-	100	-	-	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	4	150	27	148	309	5	22	7	30	62	103

Major/Minor	Major1	Major2	Minor2	Minor1							
Conflicting Flow All	314	0	0	177	0	0	831	311	0	793	164
Stage 1	-	-	-	-	-	-	607	-	0	172	-
Stage 2	-	-	-	-	-	-	224	-	0	621	-
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	1246	-	-	1399	-	-	289	729	0	306	881
Stage 1	-	-	-	-	-	-	483	-	0	830	-
Stage 2	-	-	-	-	-	-	779	-	0	475	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	1246	-	-	1399	-	-	193	729	0	262	881
Mov Cap-2 Maneuver	-	-	-	-	-	-	193	-	0	262	-
Stage 1	-	-	-	-	-	-	481	-	0	827	-
Stage 2	-	-	-	-	-	-	670	-	0	400	-

Approach	EB	WB	SB	NW
HCM Control Delay, s	0.2	2.5	17.6	22.9
HCM LOS			C	C

Minor Lane/Major Mvmt	NWLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	262	1246	-	-	1399	-	-	316
HCM Lane V/C Ratio	0.236	0.003	-	-	0.106	-	-	0.096
HCM Control Delay (s)	22.9	7.9	-	-	7.9	-	-	17.6
HCM Lane LOS	C	A	-	-	A	-	-	C
HCM 95th %tile Q(veh)	0.9	0	-	-	0.4	-	-	0.3