



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

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5 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 prepared by FTA and 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).

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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. The details of this error message can be found in that appendix, which is attached.

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
<b>SCENARIO 1</b>		31	29	51	48
<b>SCENARIO 2</b>		12	9	31	27
<b>SCENARIO 3</b>		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.

**Site plans have been updated and revised as needed.**

- 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.

The 16 September 2014 TIS has been revised to reflect:

- A new cover page which is dated 4 December 2014;
- A revised Appendix A (documentation), to reflect additional letters and correspondence received / issued subsequent to 16 September 2014; and
- A new Appendix M, as previously referenced.

It is my understanding that the University will submit a complete land development application package – including a revised complete TIS as noted above – to the township later today. If you would like electronic copies of any of the materials referenced herein, please contact me at your convenience.

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
- Updated Appendix A plus new Appendix M for September 2014 TIS

cc: Radnor Township (c/o Steve Norcini, P.E.)  
Villanova University (c/o Marilou Smith)

*ALL VIA ELECTRONIC MAIL ONLY*



**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](http://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 95<sup>th</sup> 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.

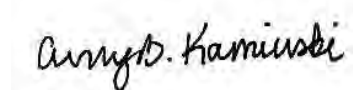
- J. Verify the 2023 PM Peak Hour traffic volumes for the eastbound right turn lane at the intersection of Lancaster Avenue and Ithan Avenue and revise as needed. It appears the PM Peak Hour 2023 traffic volumes are less than the existing conditions and the 2018 conditions; verify and revise as necessary.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

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

**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.

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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

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" &lt;akaminski@gilmore-assoc.com&gt;

To: "Frank Tavani" &lt;frank@ftavaniassociates.com&gt;

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

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](mailto:akaminski@gilmore-assoc.com)

\* Please consider the environment before printing.

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**From:** Frank Tavani [<mailto:frank@ftavaniassociates.com>]  
**Sent:** Wednesday, September 26, 2012 4:16 PM  
**To:** Amy Kaminski  
**Cc:** SteveNorcini; [Kkochanski@radnor.org](mailto: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

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Frank Tavani, P.E., PTOE  
Principal

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

From: Amy Kaminski <[akaminski@gilmore-assoc.com](mailto:akaminski@gilmore-assoc.com)>  
Subject: Villanova Lancaster Avenue Expansion  
To: "Frank Tavani" <[frank@ftavaniassociates.com](mailto:frank@ftavaniassociates.com)>  
Cc: "Norcini, Steve" <[snorcini@radnor.org](mailto:snorcini@radnor.org)>, [Kkochanski@radnor.org](mailto:Kkochanski@radnor.org), " Dave Leh " <[DLEH@gilmore-assoc.com](mailto:DLEH@gilmore-assoc.com)>, "Michael Shinton" <[mshinton@gilmore-assoc.com](mailto: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*

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**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](mailto:akaminski@gilmore-assoc.com)

\* Please consider the environment before printing.

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**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](mailto: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

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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.

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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:

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](http://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.

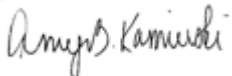
#### **INTERSECTION:**

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:

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](http://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, 4<sup>th</sup> 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.

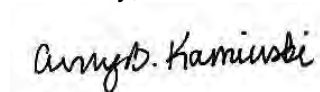
4. **Pike Parking Garage Location** Although perhaps premature as this is a land development comment, we recommend the Township consider having the applicant investigate altering the location of the Pike Garage to a more campus neutral site near the proposed pedestrian bridge. Moving the parking structure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



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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](mailto: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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- 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:

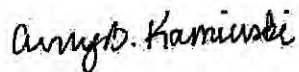


- a. Executive Summary
  - b. List of intersections for study area.
  - c. Provides dates for when counts were conducted.
  - d. Intersection Level of Service (LOS) Table with LOS and delay for each approach and critical movement.
  - e. Provide a description of the existing roadways and intersections 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 95<sup>th</sup> 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

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August 1, 2014

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

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

Dear Mr. Tavani:

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

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

Our comments on your preliminary submission are as follows:

### **PRELIMINARY COMMENTS**

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

- ii) S.R. 0030, from S.R. 0320 to Garrett Avenue
- iii) S.R. 0320 and County Line Road
- c. Based on the magnitude of the anticipated modifications associated with the proposed development, including roadway modifications and traffic re-distribution, the submitted document is considered a Transportation Impact Study and should conform to the Department guidelines as such. As previously noted, this includes:
  - i) Land Use Context
  - ii) Roadway Classification (reference the Smart Transportation Guidelines)
  - iii) Pedestrian and Bicycle Facilities
  - iv) Photographs of study intersections and accesses
  - v) Sight distances at access
  - vi) Turn lane warrant analysis for site accesses and intersections serving the site (e.g. Ithan Avenue)
- d. The study should consider an alternative that includes providing an eastbound right turn lane on S.R. 0030 approaching Ithan Avenue. The right turn lane is a recommended improvement and not a requirement from the Department.
- e. As previously noted, tables and figures should be organized so that there is a clear flow from trip generation to trip distribution and the resulting Levels-of-Service.
- f. The crash history noted six accidents involving pedestrians. Additional information should be provided to determine if there is a correctable pattern or other elements that should be considered as part of this project.
- g. As previously noted, additional information is also needed for the Performing Arts Center accesses, addressing proximity to the signal, flow and restrictions, etc. Specific issues include the manner in which previous submissions appeared to direct traffic away from Ithan Avenue and the operation of the full-movement access to S.R. 0030, including evaluation of the access pre and post event.
- h. Please note that the various materials submitted in relation to this project include minor discrepancies in the campus-wide parking supply figures. These are generally minimal and are not expected to change the results of the analyses; however they should be addressed as part of future submissions.
- i. As previously noted, Level-of-Service data tables should include the delay in seconds for each lane group operating at LOS F.
- j. Verify that the figures clearly illustrate proposed volumes at all accesses to state roads, including but not limited to the proposed right in and right out access to the modified commuter lot along S.R. 0030.



- k. The Synchro analyses should address the following:
  - i) Ensure that Future Build volumes are consistent with the submitted figures.
  - ii) Per the current Highway Capacity Manual the overall intersection peak hour factor should be used.
  - iii) Ensure that all turn lanes are coded appropriately.
  - iv) As previously noted, ensure that the pedestrian phase clearance intervals are coded appropriately. In particular, for S.R. 0030 and Ithan Avenue:
    - (1) Ensure that pedestrian times meet or exceed the minimums for existing (26 seconds per the current Traffic Signal Permit) and future conditions.
    - (2) Enter an appropriate number of pedestrian calls. If the number of calls is assumed to be reduced under future conditions due to proposed improvements, include documentation of the methodology used to develop the assumed number of calls.
  - v) Ensure the appropriate coordination and recall settings are utilized.
- l. The submitted Conditional Use Plan shows two lanes exiting Chapel Drive to S.R. 0030; verify that this is addressed in the analyses.

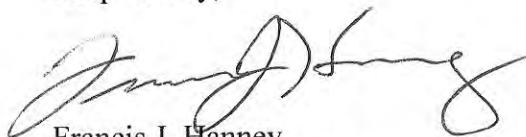
### 3. Conditional Use Plans

- a. Note that all improvements will be required to comply with current ADA standards.
- b. To the maximum extent feasible existing accesses to S.R. 0030 within the project limits should be removed where new access is provided as part of the proposed development (e.g. the two story buildings adjacent to the West Lancaster Parking).
- c. Future submissions should include calculations supporting the proposed transition taper lengths.
- d. The westbound stop bar for S.R. 0030 approaching Church Walk appears too far west; adjusting this will impact the proposed eastbound transition taper.
- e. The eastbound stop bar for the S.R. 0030 left turn lane approaching Ithan Avenue may need to be adjusted to account for the shifting of the northbound left turn lane.
- f. Consideration of re-aligning the crosswalks at S.R. 0030 and Ithan Avenue may be warranted as a means to reduce pedestrian crossing distances.
- g. Ensure that appropriate visibility is maintained for the pedestrian crossing of the Performance Arts Center access; the magnitude of the setback may warrant reconsideration.



The Department has performed this preliminary review based only on the limited information provided. We reserve the right to make future, additional, detailed comments based on the formal submission and application for a Highway Occupancy Permit. If you have any questions pertaining to the technical aspects of this review, please contact Albert Federico, P.E., PTOE of McCormick Taylor, Inc. at 215.592.4200 or [apfederico@mtmail.biz](mailto: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](http://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 95<sup>th</sup> 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.

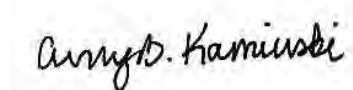
- J. Verify the 2023 PM Peak Hour traffic volumes for the eastbound right turn lane at the intersection of Lancaster Avenue and Ithan Avenue and revise as needed. It appears the PM Peak Hour 2023 traffic volumes are less than the existing conditions and the 2018 conditions; verify and revise as necessary.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

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
	<b>SCENARIO 1</b>	31	29	51	48
	<b>SCENARIO 2</b>	12	9	31	27
	<b>SCENARIO 3</b>	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).

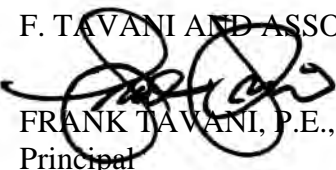
Additionally, alternative travel patterns for inbound special event traffic (to include the WLL driveway and/or the PAC driveway, not to mention other parking locations such as HSB, SAC, et al) do not utilize the mentioned right turn lane. This has been identified and discussed in A-18 as well as the 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:

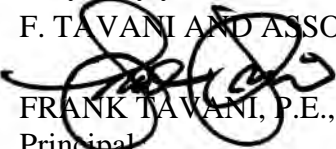
At the last conditional use hearing, some township exhibits made reference to pedestrian (ped) phase calculations at the intersection of Lancaster Avenue and Ithan Avenue. I write to you today to provide some clarification on this matter.

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

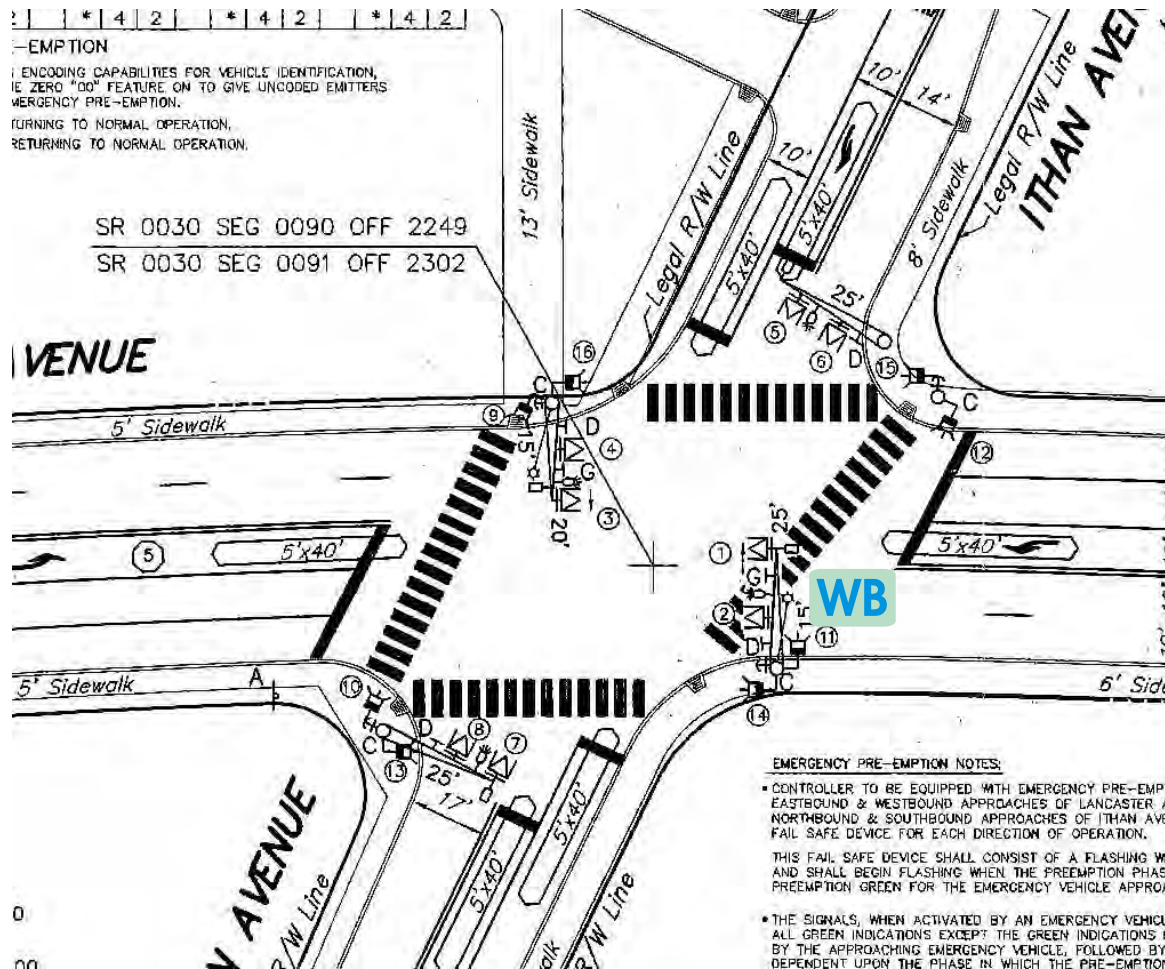
cc: Gilmore & Associates, Inc. (Amy Kaminski, P.E., PTOE)  
Radnor Township (c/o Steve Norcini, P.E.)  
Villanova University (c/o Marilou Smith)

# 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

<b>EB</b>	<b>65 ft</b>
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.



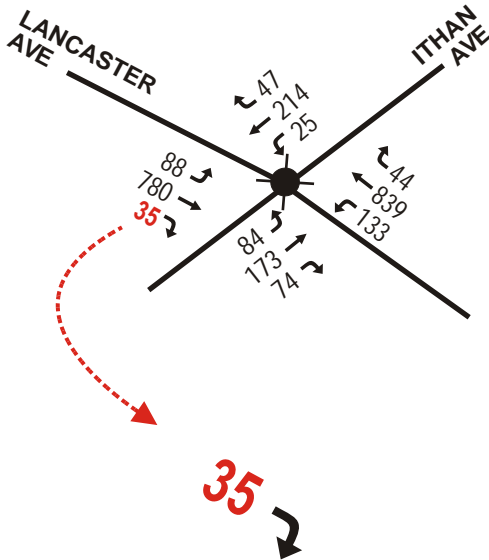
The duration of the existing ped phase can be maintained and possibly even shortened provided no new EB right turn lane is introduced.

## Existing Weekday Traffic Volumes

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

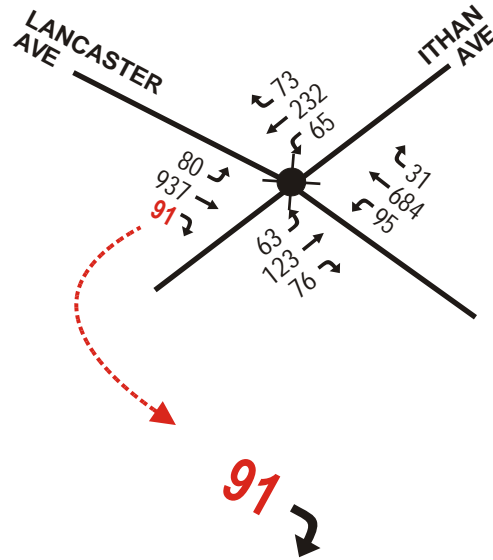
Excerpted from A-18

### 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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**105 Kenilworth Street • Philadelphia • PA • 19147 • (215) 625-3821 Phone • (484) 792-9495 Fax**  
**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).

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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)**

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	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)**

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	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
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**AVERAGE NEW TRIPS**

		AM PEAK HOUR		PM PEAK HOUR	
		IN	OUT	IN	OUT
<b>SCENARIO 1</b>		31	29	51	48
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	AVERAGE	19	16	38	35
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	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 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*

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

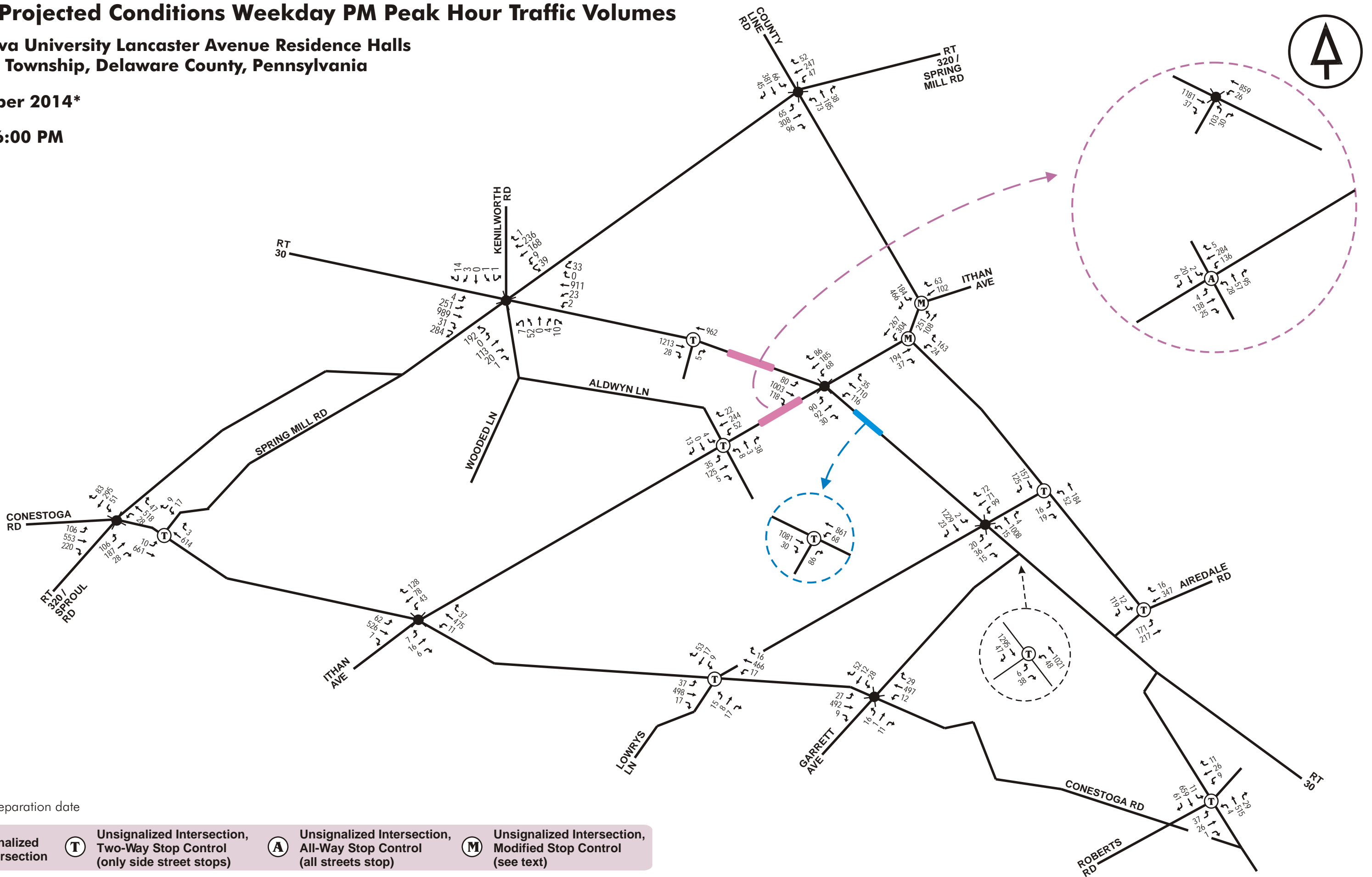
*Item J*

# 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

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