

## Memorandum

By: Roger Dickinson, P.E, PTOE  
Date: December 12, 2011  
RE: Hinesburg Hannaford

During the course of the review of this Project to date by the Town of Hinesburg DRB, the traffic study has been reviewed on the Town's behalf by Jason Charest of the Chittenden County Metropolitan Planning Organization (CCMPO) and by Richard Bryant, P.E. of Llewellyn-Howley. The traffic study has also been reviewed by the Vermont Agency of Transportation (VTrans), and by Michael Oman on behalf of the citizen group Responsible Growth Hinesburg.

The most recent traffic study for this Project, dated July 20, 2011, was updated to respond to the results of those reviews where possible. A summary of the major review comments made prior to July 2011, and how they were incorporated into the Project and the updated traffic study was previously provided to the Town of Hinesburg. Subsequently Richard Bryant offered additional comments, dated August 8, 2011, on the July 20, 2011 traffic study. Responses to those comments are contained in a memorandum dated December 11, 2011 appended hereto as Attachment A.

More recently, it became apparent a better understanding of the existing afternoon peak hour traffic congestion conditions on Route 116 was necessary. To that end, this office videotaped traffic flow at the Route 116/Charlotte Road intersection, performed a saturation flow rate study of southbound traffic at the Charlotte Road intersection, and performed additional traffic counts, queue studies and delay studies at the Mechanicsville Road and Silver Street intersections. Most importantly, though, during the course of this work, L&D's transportation engineers spent considerable time actually observing afternoon peak hour traffic flow in an effort to better analyze existing conflicts and issues impeding the flow of southbound traffic through Hinesburg village.

This effort has led to the following. First, this office identified modifications to the Route 116/Charlotte Road signal phasing and geometry to improve future traffic flow, presented those proposed modifications to VTrans and has obtained VTrans approval to implement them. Secondly, to supplement the traditional intersection capacity analyses contained in the traffic study, we calibrated a widely used and accepted traffic simulation computer program (*SimTraffic*) to model existing Route 116 traffic flow through Hinesburg village and have used that software to better analyze both existing and future traffic congestion conditions.

### Route 116/Charlotte Road Signal Phasing Modifications

The more we examined traffic flow and the existing split phasing of Charlotte Road and Lantman's exit at the Route 116/Charlotte Road intersection, the more we became convinced that the existing split phasing was unnecessary. It also, particularly given the current signal timings, was responsible for a significant amount of additional lost time that could otherwise be used to improve through traffic flow on Route 116.

This office presented our findings and a proposal to replace the split phasing with a combined eastbound/westbound signal phase (similar to what normally exists at other similar four-way intersections) at a meeting with VTrans on October 31<sup>st</sup>. The proposed intersection modifications also included creating a short pocket left-turn lane for traffic entering Lantman's just south of the intersection and moving the stop bar and sidewalk closer to Route 116 at Lantman's existing exit. Additional information was requested at that meeting and submitted to VTrans shortly thereafter. The Town of Hinesburg, through its Director of Planning, Alex Weinhausen, supported the proposed changes at this intersection in a memo dated November 28, 2011. VTrans recently indicated their approval of all three proposed modifications in a email dated December 1<sup>st</sup>. The foregoing correspondence is appended hereto as Attachment B.

### SimTraffic Modeling & Traffic Simulations

In his November 9<sup>th</sup> Memorandum to the Hinesburg DRB, Michael Oman noted that "...simulation may offer a better analysis tool than the more deterministic HCM method." After observing southbound afternoon peak hour traffic flow at the Commerce Street, Mechanicsville Road and Charlotte Street intersections, we agree.

A critically important first step in performing any traffic simulation is to first calibrate the software to model existing conditions as accurately as possible. This step required collecting queue length data, performing actual delay studies and observing actual traffic operations during afternoon peak hour conditions. That field work resulted in the following key observations:

1. The queuing of southbound traffic through Hinesburg village is the combined result of three intersections, Commerce Street, Mechanicsville Road and Charlotte Road, not just from Charlotte Road. It can be best characterized as a slow-moving rolling queue for much of its length. It is important to understand that the simulation modeling software considers a vehicle to be queued only if it is traveling less than 10 ft/s (7 mph). Also, a vehicle will only become queued in the model when it is either at the stop bar or behind another queued vehicle. This means that when vehicles are "rolling" in the queue at speeds equal to or greater than 7 mph, as is often the case in some areas on Route 116

southbound during the pm peak hour, they are not considered by the software to be queued. The software then terminates the queue for the intersection.

2. When the queue of southbound traffic backs up from Charlotte Road such that it begins to slow southbound traffic flow at the Mechanicsville Road intersection; at that point southbound Route 116 traffic (being the courteous motorists that they are) begins to let Mechanicsville Road left-turns in on an alternating basis. The Route 116/Mechanicsville Road intersection begins to operate much like a multi-way stop, which creates a third southbound flow restriction in this corridor and causes southbound Route 116 traffic to then queue further north towards Commerce Street.
3. The alternating southbound Route 116 vehicle/Mechanicsville Road left-turn vehicle flow pattern at the Mechanicsville Road intersection considerably reduces the delays and maximum queue lengths being experienced on Mechanicsville Road under existing conditions. A peak hour delay of 40 seconds per vehicle was observed (level of service E at an unsignalized intersection). The observed maximum queue length equaled 9 vehicles (for a total of 30 seconds during the 4:15-5:15 pm peak period). The observed 95<sup>th</sup> percentile queue length equaled 5 vehicles.
4. At the Silver Street intersection, the peak hour delay equaled 19 seconds per vehicle (level of service C). The observed maximum queue length equaled 7 vehicles (again for a total of 30 seconds during the 4:15-5:15 peak period). The observed 95<sup>th</sup> percentile queue length equaled 4 vehicles. The lower actual delays at this intersection were observed to be the direct result of distinct platoons in southbound traffic created by the upstream Charlotte Road traffic signal.
5. Observations of southbound saturation flow rates at the Charlotte Road intersection revealed an actual saturation flow rate of approximately 1,500 vph. With that finding, we reduced the ideal saturation flow rate for this movement from 1,700 vph to 1,600 vph. This results in an adjusted saturation flow rate (after taking into account the uphill southbound approach grade, the effects of trucks plus the effects of turning vehicles) of 1,475 vph.
6. While not directly linked with any of our observations of existing traffic operations in Hinesburg village, we noted that the new 2010 Highway Capacity Manual released this past summer reduces the default ideal saturation flow rate at signalized intersections from the previously used 1,900 vph to 1,750 vph in areas having less than 250,000 population. We have therefore reduced all other saturation flow rates to this new lower default value.



The simulation modeling presented herein utilizes the reduced saturation flow rates described in #5 and #6.

A key adjustment to better calibrate the simulation modeling to existing conditions concerns the existing signal timing. Currently, VTrans has both the Charlotte Road and Commerce Street intersections operating in the coordinated mode with a background 66 second cycle length. The exclusive pedestrian phase at both intersections, when activated, adds 19 seconds to the cycle length at Commerce Street and 24 seconds at Charlotte Road. The most accurate simulation of how these two signalized intersections actually operate was obtained by modeling them in the uncoordinated mode. Because coordinated intersections are required to have a common background cycle length, including the pedestrian phase in the previous analyses artificially produced better than actual results. This occurred because in maintaining the required common background cycle length, the unused pedestrian time always reverted to the Route 116 northbound/southbound through movements. Modeling the two intersections in the uncoordinated mode prevents that. Parenthetically, for purposes of modeling southbound traffic flow during the afternoon peak hour, coordination of the Charlotte Road and Commerce Street intersections is not that critical due to the volume of southbound traffic entering Route 116 from Mechanicsville Road between them.

All three intersections in this corridor (Commerce Street, Mechanicsville Road and Charlotte Road) have an associated southbound queue. In the intersection capacity analyses and simulation modeling, this is reported as three separate queues. In Hinesburg, however, during the afternoon peak hour the Charlotte Road and Mechanicsville Road queues often fill most (and sometimes all) of the distance between these three intersections, giving the appearance of one extremely long queue in the field.

In order to better model this condition and its effect on queuing, the simulation model was set up to include a yield sign for southbound traffic at the Mechanicsville Road intersection for the existing conditions (No-Build) scenario. While it is not a legal requirement for southbound traffic to yield, this is effectively what is happening when the queue from the Charlotte Road intersection extends to Mechanicsville Road. In the future Hannaford Build scenario, eliminating the split phasing at the Charlotte Road intersection reduces the length of the southbound queue at that intersection such that southbound Route 116 traffic may no longer “yield” to traffic entering from Mechanicsville Road. Therefore, the southbound yield control was removed from the simulation model in the future conditions (Build) scenario at that intersection.

Table 1 presents the results of the simulation modeling for this Project. The average results of the recommended minimum of five simulation runs are presented in order to minimize the normal variances inherent in any one simulation run. Changes in the maximum queue lengths

between the No-Build and Build scenarios are also readily apparent by comparing Figures 1 and 2 which are appended hereto as Attachment C.

**Table 1 - 2017 Intersection PM Peak Hour Levels of Service**

	No-Build			Build		
	LOS	Avg. Delay	Max. Queue	LOS	Avg. Delay	Max. Queue
<u>VT 116 &amp; Commerce St</u>						
Farmall Dr LT/TH	C	25	60'	C	23	60'
Farmall Dr RT	B	14	71'	B	11	54'
Commerce St LT/TH	D	41	-	-	-	-
Commerce St RT	A	6	-	-	-	-
Commerce St LT	-	-	144'	D	38	178'
Commerce St TH/RT	-	-	124'	A	9	206'
Route 116 NB LT	C	31	94'	D	36	104'
Route 116 NB TH	B	15	302'	C	21	354'
Route 116 NB RT	A	7	100'	A	9	102'
Route 116 SB LT	D	40	177'	D	36	200'
Route 116 SB TH/RT	C	23	564'	C	24	452'
<b>Overall</b>	<b>C</b>	<b>22</b>		<b>C</b>	<b>24</b>	
<u>VT 116 &amp; Mechanicsville Rd</u>						
Route 116 SB LT/TH	D	36	689'	A	4	95'
Mechanicsville Rd LT/RT	D	38	224'	F	71	318'
<u>VT 116 &amp; Charlotte Rd</u>						
Charlotte Rd LT	D	38	100'	D	50	103'
Charlotte Rd RT	B	13	79'	B	18	195'
Lantman's LT/TH/RT	D	46	192'	C	24	85'
Route 116 NB LT/TH/RT	D	44	631'	C	30	605'
Route 116 SB TH/RT	E	71	1,046'	C	20	842'
<b>Overall</b>	<b>E</b>	<b>58</b>		<b>C</b>	<b>25</b>	

**Lantman's Redevelopment & Future Trip Generation**

Michael Oman's November 9<sup>th</sup> Memorandum and more recent submittals have also presented an alternate opinion of Lantman's potential future trip generation with redevelopment after Hannaford's opens. The most recent submittal, dated December 12<sup>th</sup>, assumes that a video rental store, a drive-in bank and a fast food restaurant without a drive-thru would all co-locate in the existing building with other office uses. It is our opinion that such a combination of land-uses is highly unlikely. We further note that video rental stores are a dying breed. Nonetheless, to illustrate the effect of the absolute worst-case scenario, we ran an additional simulation of future traffic conditions at the Charlotte Road intersection assuming that Lantman's future pm peak hour trip generation remains at existing levels.

The results, which are shown in Table 2, indicate that the proposed signal modifications at this intersection would continue to improve future traffic conditions over existing conditions even with existing Lantman's trip volumes.

**Table 2 - 2017 Intersection PM Peak Hour Levels of Service with Lantman's Existing Trip Generation**

	Build		
	LOS	Avg. Delay	Max. Queue
<u>VT 116 &amp; Charlotte Rd</u>			
Charlotte Rd LT	D	54	101'
Charlotte Rd RT	B	19	162'
Lantman's LT/TH/RT	E	59	299'
Route 116 NB LT/TH/RT	D	49	742'
Route 116 SB TH/RT	C	23	825'
Overall	D	35	

**Route 116/Charlotte Road AM Peak Hour Northbound Left-Turns**

We would also like to take this opportunity to respond to Peter Erb's December 12<sup>th</sup> email concerning future northbound traffic flow at the Charlotte Road intersection during the morning peak hour with the proposed geometric improvements. The most recent traffic count at this intersection (CCMPO - June 2010) shows a total of 37 left-turns from VT 116 onto Charlotte Road during the morning peak hour. During the same time period, there were a total of 747 northbound through vehicles plus 242 southbound through and right-turning vehicles.

The proposed left-turn pocket lane for traffic entering Lantman's will not prevent northbound left-turning vehicles from pulling forward and slightly to the left in order to permit northbound through traffic to pass on the right similar to what presently occurs. With southbound through traffic being shifted laterally 4 ft to the west, the proposed left-turn pocket lane will actually provide additional width within the intersection for northbound traffic flow.

**Route 116/CVU Road/Shelburne Falls Road Crash History**

Michael Oman, in his November 9, 2011 Memorandum, questions whether the nearby CVU high school and the higher proportion of relatively inexperienced drivers at this intersection is responsible, in part, for the number of crashes at this intersection. VTrans' 2005 - 2009 Route 116 crash data shows a total of 21 reported crashes at this intersection. Of the 21 crashes, 7 occurred on days when school was in session and during peak school day start/end

times (7-9 am and 2-4 pm). Three of the seven crashes occurred during the morning, which is also simultaneously a peak time for commuting traffic.

Again, as is noted in the updated July 20, 2011 Traffic Impact Assessment for Hannaford's, this intersection itself is not listed as a high crash location. That a segment of Route 116 bracketing the intersection has been classified as a high crash location illustrates a distinct flaw in the high crash location screening process.

**ATTACHMENT A**

Response to Rick Bryant's  
August 8, 2011 Traffic Review Memorandum

## Memorandum

To: David White  
From: Roger Dickinson, P.E, PTOE  
Date: December 11, 2011  
RE: Rick Bryant's August 8, 2011 Memorandum

As requested, I have reviewed Rick Bryant's August 8, 2011 Memorandum to Peter Erb concerning the traffic review for the proposed Hannaford Supermarket. The following presents our responses to the more significant comments outlined in that Memorandum.

### Commerce Street/Route 116 (unnumbered bullets pp 2-3)

#1 - We have analyzed the impact of potential diversion of Mechanicsville Road left turns to the VT 116/Commerce St/Farmall Dr intersection. We looked at the impact of diverting 50% of the Mechanicsville Road left turns. The results indicate this intersection has sufficient capacity to accommodate this diversion and remain at LOS C. This indicates capacity for even more diversion, should that occur. The results for the 2017 Build scenario with the addition of 50% of the left turns that would otherwise occur at Mechanicsville Road were:

	LOS	Avg. Delay	v/C Ratio	95% Queue
Farmall Dr LT/TH	C	32	0.09	51'
Farmall Dr RT	C	31	0.03	39'
Commerce St LT	E	60	0.85	455'
Commerce St TH/RT	C	32	0.10	71'
Route 116 NB LT	D	51	0.35	24'
Route 116 NB TH	B	15	0.32	148'
Route 116 NB RT	B	16	0.12	35'
Route 116 SB LT	D	48	0.62	182'
Route 116 SB TH/RT	C	22	0.63	665'
<b>Overall</b>	<b>C</b>	<b>31</b>	<b>0.68</b>	

The above results are substantially the same as in TIA Table 5 for this intersection, with the exception that the Commerce St LT lane 95% queue length increases from 302' to 455'. The average queue length increases from 139' to 198'.

#2 - Historical traffic counts at the VT 116/Charlotte Road intersection were examined to compare traffic patterns entering and exiting Lantman's. Those counts include a 2010 turning movement count performed by the CCMPO, and 2003, 2008 and 2009 turning

movement counts performed by VTrans. While only the 2009 VTrans count included traffic entering Lantman's, all four included traffic exiting Lantman's. In examining traffic count data, one must keep in mind that they do not differentiate between primary and pass-by trips. PM peak hour traffic patterns exiting Lantman's are compared in the following table:

Lantman's Exit	2003	2008	2009	2010
Left-Turn (to the south)	63%	51%	51%	48%
Through (to the west)	0%	9%	10%	10%
Right-Turn (to the north)	37%	40%	39%	41%

Aggregate (including both primary and pass-by trips) directional patterns from TIA Figure 6 for the proposed Hannaford Supermarket are:

To/From the south on VT 116 (incl. west on Charlotte Rd)	59%
To/From the north on VT 116	27%
To/From the northeast on Mechanicsville Rd	14%

In comparing the two sets of directional patterns, one must take into account the different locations of Hannaford vs. Lantman's, particularly with respect to trips to/from the northeast via Mechanicsville Rd and to/from the west via Charlotte Rd. With those differences accounted for, the proposed Hannaford directional patterns compare favorably to Lantman's existing directional patterns.

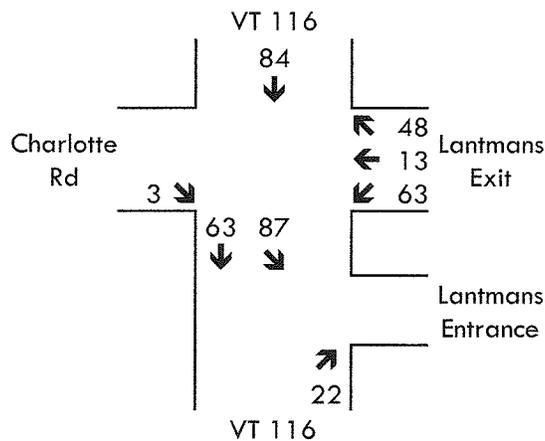
Lantman's Exit	2003	2008	2009	2010	Hannaford
To the south and west	63%	60%	61%	58%	59%
To the north and northeast	37%	40%	39%	41%	41%

- #3 - It is our professional opinion that the proposed lane assignment change from an exclusive right-turn lane (existing) to an exclusive left-turn lane (proposed) on the Commerce St approach to VT 116 represents the most efficient use of lane capacity with the proposed Hannaford Supermarket, particularly if Mechanicsville Rd left-turns to divert to Commerce St as noted above. We examined both alternatives and found the proposed lane assignments to provide somewhat shorter delays.
- #4 - We understand that the Jolley Mobil was contacted concerning possible changes to their driveway(s), and that they were not receptive to any changes. This past August,

the Hinesburg DRB had an opportunity to modify or close Jolley's westerly curb cut closest to Route 116 and decided not to do so.

Traffic Analysis (unnumbered bullets pg 4)

- #1 - Existing PM peak hour traffic volumes entering and exiting Lantman's (from the 2009 VTrans turning movement count) are shown in the following figure. These volumes were included in the intersection capacity analyses at the VT 116/Charlotte Rd intersection. The close proximity of Lantman's existing entrance to the Charlotte Rd intersection creates traffic conflicts that are difficult to analyze quantitatively. Including the northbound right-turn movement in the capacity analyses and reducing the saturation flow rate for the southbound through movement were, in our opinion, the best available methods to compensate for those conflicts.



Subsequently, we further modeled the intersection using *SimTraffic* as discussed in our December 12, 2011 memo. It is our opinion that the *SimTraffic* modeling results more accurately calibrate with what is actually occurring.

- #2 - Research into the Act 250 permits for the Dark Star parcels (Lots #11 and 12) indicate that both lots were granted a combined pm peak hour allocation of 21 trips per hour. There are no other "approved" trip allocations for either of those two lots.
- #3 - The trip reductions shown in TIA Figure 7 for Lantman's future redevelopment were adjusted to include the impact of pass-by trips. In fact, increased through traffic representing removed pass-by trips can be seen in Figure 7 at the VT 116/Charlotte Rd intersection.

- #4 - The ITE Shopping Center land-use category was considered in developing potential redevelopment scenarios for Lantman's. A shopping center by its nature is typically a much larger commercial establishment than is Lantman's and has an anchor store (e.g. a supermarket). The average size of shopping centers in the ITE database exceeds 300,000 sf; with the maximum size being 2.2 million sf. A small commercial establishment, such as Lantman's at approximately 15,000 sf, is not typically considered to be a "shopping center". With much larger establishments dominating the ITE shopping center database, it is our engineering opinion that applying the shopping center category to Lantman's redevelopment would be inappropriate.
- #5 - The Vermont Agency of Transportation publication "Guidelines for Traffic Engineering Issues", dated August 1994, revised August 1995, provides specific guidance on the use of peak hour factors. It states:
- "When analyzing existing signalized intersections using a Design Hourly Volume (DHV), a peak hour factor of 1.0 should be used, unless there is justification for increasing the DHV higher than the 30<sup>th</sup> highest hour."*

This standard of practice is reiterated in the current VTrans Traffic Impact Study Guidelines.

- #6 - As requested, we performed an analysis of the MUTCD signal warrants #1 - Eight Hour Volume, #2 - Four Hour Volume and #3 - Peak Hour Volume at the VT 116/Silver St intersection. The results determined that none of those three warrants would be met under projected 2017 background traffic volumes or with added Hannaford generated trips.

**ATTACHMENT B**

Correspondence with VTrans concerning  
VT 116/Charlotte Road Intersection/Traffic Signal Modifications

## Roger Dickinson

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**From:** Gupta, Rajnish [Rajnish.Gupta@state.vt.us]  
**Sent:** Thursday, December 01, 2011 4:31 PM  
**To:** 'roger@ldengineering.com'  
**Cc:** Schultz, Joshua; French, Timothy; 'David White'; Nyquist, Bruce; Gruchacz, John  
**Subject:** RE: Hinesburg Hannaford  
**Attachments:** Proposed Intersection Improvements.pdf

Roger,

As per our meeting on Oct 31<sup>st</sup> and your memo dated Nov 3<sup>rd</sup>, we agree at the following traffic mitigation/improvements proposed for the signalized intersection of VT 116 /Charlotte Rd in Hinesburg by Hannaford Supermarket:

1. Change the existing split EB/WB (Charlotte Rd-Lantman's Exit) signal phasing to concurrent EB/WB signal phasing.
2. Relocate the cross walk and stop bar for the Lantman's exit westbound as proposed, the design should be submitted to VTrans for further review.
3. Add left turn lane/markings as proposed on VT116 SB for Lantman's entrance, the plan should be submitted to VTrans for further review.

The above proposal will also require the overlay and re-striping at this intersection. Please submit the updated TIS including the above improvements as well as the improvements suggested for the intersection of VT 116 and Commerce St. We will provide you our comments once we receive the updated TIS. Please let me know if you have any questions.

Thanks,

Raj

Rajnish Gupta, P.E., PTOE  
Traffic Research Manager  
Policy, Planning & Intermodal Development Division  
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**From:** Gupta, Rajnish  
**Sent:** Thursday, November 17, 2011 12:16 PM  
**To:** 'roger@ldengineering.com'  
**Cc:** Schultz, Joshua; French, Timothy; David White  
**Subject:** RE: Hinesburg Hannaford

I have set up internal meeting on Dec 1<sup>st</sup>, it should be able to get back to you after that.

Thanks,

12/13/2011

Town of Hinesburg  
Planning & Zoning Department  
10632 Route 116, Hinesburg, VT 05461  
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**MEMORANDUM**

**TO:** Josh Schultz, VT Agency of Transportation  
**FROM:** Alex Weinhagen, Director of Planning & Zoning  
**DATE:** November 28, 2011  
**RE:** Proposed Improvements to Route 116, Charlotte Road Intersection

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I understand that representatives for the proposed Hannaford project in Hinesburg have asked the VT Agency of Transportation (VTrans) for feedback on potential improvements to the Route 116, Charlotte Road intersection. As explained to me by David White, of White & Burke Real Estate Investment Advisors (representing Hannaford), three key changes are proposed:

1. Convert the east-west legs from split phasing to concurrent phasing.
2. Add a south bound left turn lane for vehicles entering Lantmans store.
3. Move the sidewalk and the stop bar at Lantmans exit drive out closer to Route 116, and allow right turn on red at Lantmans exit.

As you know, the Town is very interested in finding solutions to the Route 116 congestion problem we are having in the Hinesburg village area during the morning and evening peak traffic times. I discussed the three proposed changes listed above with the Town Administrator, Road Foreman, Director of Buildings and Facilities, and Police Chief. **We agree that these constitute real improvements to the existing intersection design, and we recommend that these changes be made as soon as possible, regardless of the final outcome of the Hannaford project.** It seems that shifting the phasing of the traffic light could be accomplished very quickly, while new striping and the changes at the Lantmans exit probably have to wait until the 2012 construction season.

David White indicated that VTrans personnel would be meeting on December 1 to review these proposed changes. I trust you'll consider our municipal staff's strong support for these improvements as VTrans staff discusses the pros and cons. I'm very interested in the outcome, so please copy me on whatever VTrans feedback is provided to Hannaford.



November 3, 2011

Rajnish Gupta, P.E., PTOE, Traffic Research Engineer  
Vermont Agency of Transportation  
Traffic Research Unit  
National Life Building  
Montpelier, VT 05633-5001

RE: Hannaford Traffic Impact Assessment Review  
Hinesburg, VT

Dear Rajnish,

As requested at Monday's (October 31<sup>st</sup>) meeting, enclosed is an intersection sketch showing turning paths of a WB-67 exiting Charlotte Rd and a WB-50 exiting Lantman's simultaneously (in the extremely rare case this would ever occur).

We appreciated the discussion of the three basic intersection improvement alternatives outlined in your June 1, 2011 Memorandum to Tim French. Those alternatives included:

- Adding a southbound right-turn lane on VT 116 at Charlotte Rd.
- Closing the northerly Lantman's access, which is presently a one-way exit, and converting their existing southerly access to serve as a combined entrance/exit.
- Converting the existing exclusive pedestrian phasing to concurrent pedestrian phasing.

The above three alternatives are grouped in your memorandum in various combinations to form seven different options. We have reviewed each of those options, and propose to address the three basic improvement alternatives individually for simplicity's sake.

**Southbound VT 116 Right-Turn Lane**

This alternative would add a new right-turn lane; displacing the existing three parallel parking spaces in front of the Town Hall and narrowing the remaining green strip between Route 116 and the adjacent sidewalk. That green strip is currently the location of utility poles carrying multiple overhead wires (electrical, telephone and cable) paralleling VT 116.

As I pointed out at Monday's meeting, analyzing the benefit produced by adding a southbound right-turn lane using traditional intersection capacity analysis procedures can be misleading.

The Highway Capacity Manual procedures basically assume that auxiliary lanes have unlimited length and thus vehicles are always able to enter them.

Examining southbound traffic patterns at this intersection indicates that this will not be the case. A field review of existing utility locations determined that attempting to construct anything longer than an 100 ft long right-turn lane having an 180 ft entry taper on the southbound approach will likely encounter severe (and very expensive) utility conflicts. Those lengths were used to perform multiple SimTraffic microsimulations.

The results of those simulations indicated that entry to the right-turn lane would be effectively blocked 31% of the time. This may not seem to be a lot, but it primarily occurs during the critical red time when vehicles need to enter that lane in order to effectively relieve existing pm peak hour congestion on VT 116. Figures 1 and 2 illustrate the prevailing inability of vehicles to enter the right-turn lane. Both illustrations were captured right at the point when the VT 116 NB/SB signal phase turns green. Southbound right-turning vehicles waiting in the VT 116 queue are shown as yellow-colored vehicles.

With that limitation, the SimTraffic results show the southbound through and right-turn movements experiencing LOS D (41 sec/veh avg. delay) and LOS D (35 sec/veh avg. delay), respectively. The estimated 95<sup>th</sup> percentile southbound queue length is relatively unchanged at 1,036 ft.

In a preliminary discussion of this alternative with the Town, they expressed serious concern relative to the potential loss of the three parallel parking spaces in front of the Town Hall, and indicated that this alternative would not be favorably received on their end. They also noted that this on-street parking is needed for handicapped and elderly residents attending public meetings on the Town Hall's main floor.

Given the above results, it is our opinion that this alternative would be very costly, unacceptable at the local level, and would not provide the desired level of improvement in southbound pm peak hour traffic flow.

#### Modifying Lantman's Access

As we reiterated at Monday's meeting, Hannaford is purchasing only the Lantman Supermarket business. The purchase option agreement between Hannaford and Brian Busier, owner of Lantman's, specifies that Lantman's Supermarket will close upon the opening of the new Hannaford. Mr. Busier would then be free to redevelop the property and its existing building under the condition that another supermarket or similar retail use is prohibited. Hannaford will have no involvement with the future use of this property other than the foregoing restriction.

The suggested modifications to Lantman's VT 116 accesses would close the northerly access, presently the designated exit directly opposite Charlotte Rd at the existing traffic signal, and consolidate all entering and exiting movements at the existing southerly access located approximately one car length behind the northbound VT 116 stop bar. This change would also impact Lantman's internal traffic circulation, which given the narrowness of this parcel and existing on-site parking layout, would trigger additional internal parking and circulation changes.

Traffic entering Lantman's at its southerly access presently does so with the help of Do Not Block Intersection markings and a sign on the northbound VT 116 approach. The ability of traffic to enter at this location depends on northbound VT 116 traffic being stopped or on there being sufficient gaps between moving northbound vehicles.

Analyzing the proposed southerly access as a combined point of ingress and egress to the Lantman's property is complicated by the extreme close proximity of the Charlotte Rd signalized intersection and the resulting tightly platooned traffic flow on VT 116. Traditional capacity analyses are not able to accurately model those conditions. We therefore again turned to SimTraffic microsimulation to analyze this. As expected, delays are considerably reduced and levels of service improved at the Charlotte Rd intersection with the elimination of Lantman's north access and its existing split signal phase. However, at Lantman's south access, exiting vehicles experienced average delays of 257 sec/veh; over 4 minutes (using Lantman's reduced "redevelopment" volumes).

This proposed alternative would also generate the following new safety and congestion issues not presently being experienced at Lantman's south access:

- Northbound queued vehicles will block sight lines to the north for left-turning vehicles exiting Lantman's. The likely result will be exiting vehicles pulling part-way out into VT 116; blocking northbound traffic and waiting for an acceptable gap in southbound traffic.
- Those same exiting vehicles will obstruct southbound left-turns entering Lantman's, causing additional conflicts between those vehicles and southbound through traffic.
- With VT 116 having over 60% of the available green time each cycle (80% when the ped phase is not used), moving northbound traffic will render the existing Do Not Block Intersection zone largely ineffective. This will be particularly true during the morning peak hour, when traffic patterns are reversed.

Internally, Lantman's would also have to extensively modify their parking and traffic circulation patterns to accommodate this change. Needless to say, that is not something they would be particularly excited about having to do. The loss of the existing signalized exit would also negatively impact the future redevelopment potential and marketability of this property.

### Modifying the Pedestrian Phasing

In recent years the Town of Hinesburg has actively expanded its sidewalk network to encourage and permit safe pedestrian circulation with Hinesburg village (applying complete street principles). This is ongoing, as I pointed out at the meeting, with the just opened new sidewalk extending to the west on the south side of Charlotte Rd. The elementary school, churches and recreation fields are all located nearby such that there is considerable pedestrian traffic through this intersection. The June 2010 CCMPO turning movement count at this intersection included pedestrian counts. A peak of 41 pedestrians traveled through this intersection during the morning peak hour. During the early evening (6-7 pm), 29 pedestrians crossed. During other mid-day and pm peak hours 10-20 pedestrians cross.

Eliminating the exclusive pedestrian phasing in favor of concurrent pedestrian phasing would create additional risk to pedestrians, particularly children. Given the high traffic volumes and large numbers of heavy trucks traveling through Hinesburg, this is not a change that we would recommend.

### Modifying the EB/WB Signal Phasing

Although this alternative was not included in your June 1<sup>st</sup> Memorandum, it is an additional alternative deserving of serious consideration. We have examined it in detail; the results of which were presented at Monday's meeting. To summarize, we found that changing the existing split EB/WB signal phasing to concurrent EB/WB signal phasing is both feasible and desirable for the following reasons:

- The Charlotte Rd eastbound approach and Lantman's exit westbound approach do line up directly opposite each other.
- There is ample intersection width to permit simultaneous left-turns from both approaches without conflicting or overlapping.
- There is excellent visibility from each approach towards the other.
- The changed signal phasing would reduce delays and improve levels of service for VT 116 through traffic.
- The existing signal phasing can be changed with minimal expense and inconvenience.

Table 1 on the following page illustrates the traffic congestion benefits of this alternative.

Table 1 - Analysis of Split vs. Concurrent EB/WB Phasing

	2017 No-Build				2017 Build			
	LOS	Avg. Delay	v/C Ratio	95% Queue	LOS	Avg. Delay	v/C Ratio	95% Queue
<b>Split EB/WB Phasing</b>								
Charlotte Rd EB LT	D	47	0.64	124'	D	52	0.71	176'
Charlotte Rd EB RT	D	38	0.04	0'	D	37	0.03	0'
Lantman's WB LT/TH/RT	D	49	0.69	188'	D	39	0.26	61'
VT 116 NB LT/TH/RT	B	10	0.42	318'	B	10	0.45	366'
VT 116 SB LT/TH/RT	F	92	1.01	1,081'	E	76	1.00	1,101'
Overall	E	62	0.93		D	53	0.89	
<b>Concurrent EB/WB Phasing</b>								
Charlotte Rd EB LT	D	54	0.72	143'	D	46	0.68	165'
Charlotte Rd EB RT	C	35	0.04	0'	C	35	0.04	0'
Lantman's WB LT/TH/RT	D	44	0.65	175'	D	36	0.20	59'
VT 116 NB LT/TH/RT	A	6	0.36	232'	A	6	0.39	261'
VT 116 SB LT/TH/RT	C	20	0.87	965'	B	20	0.87	996'
Overall	C	21	0.85		B	19	0.84	

**Conclusion**

In conclusion, at your request we have examined the suggested alternatives and find them to have marginal benefit (right-turn lane), transfer congestion from one location to another (modified Lantman's access), and create additional safety concerns (modified Lantman's access and modified pedestrian phasing).

We further find that all three are likely to generate significant local opposition. We continue to be of the opinion that changing the existing split EB/WB signal phasing at the Charlotte Rd intersection to concurrent EB/WB signal phasing provides the most cost-effective means of reducing traffic congestion at this intersection without any of the negative impacts associated with the three suggested alternatives.

To reiterate a point made at Monday's meeting, Hannaford has already effectively mitigated its traffic impact through its purchase agreement with Lantman's. Thus, there should not be any further mitigation or improvements required at this intersection as part of the proposed Hannaford's. Simply put, Hannaford has proposed changing the EB/WB signal phasing and striping a southbound left-turn pocket lane for traffic entering Lantman's as a goodwill gesture to help further improve future traffic conditions at this intersection. Should VTrans wish to add a southbound right-turn lane, modify Lantman's access and/or change the pedestrian phasing at this intersection; those are measures that are well within its ability and

Rajnish Gupta, P.E, PTOE  
November 3, 2011  
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authority to implement on its own initiative (with local input as desired) either presently or once the redeveloped uses at Lantman's are known.

Should you have any questions concerning the above, please feel free to contact me.

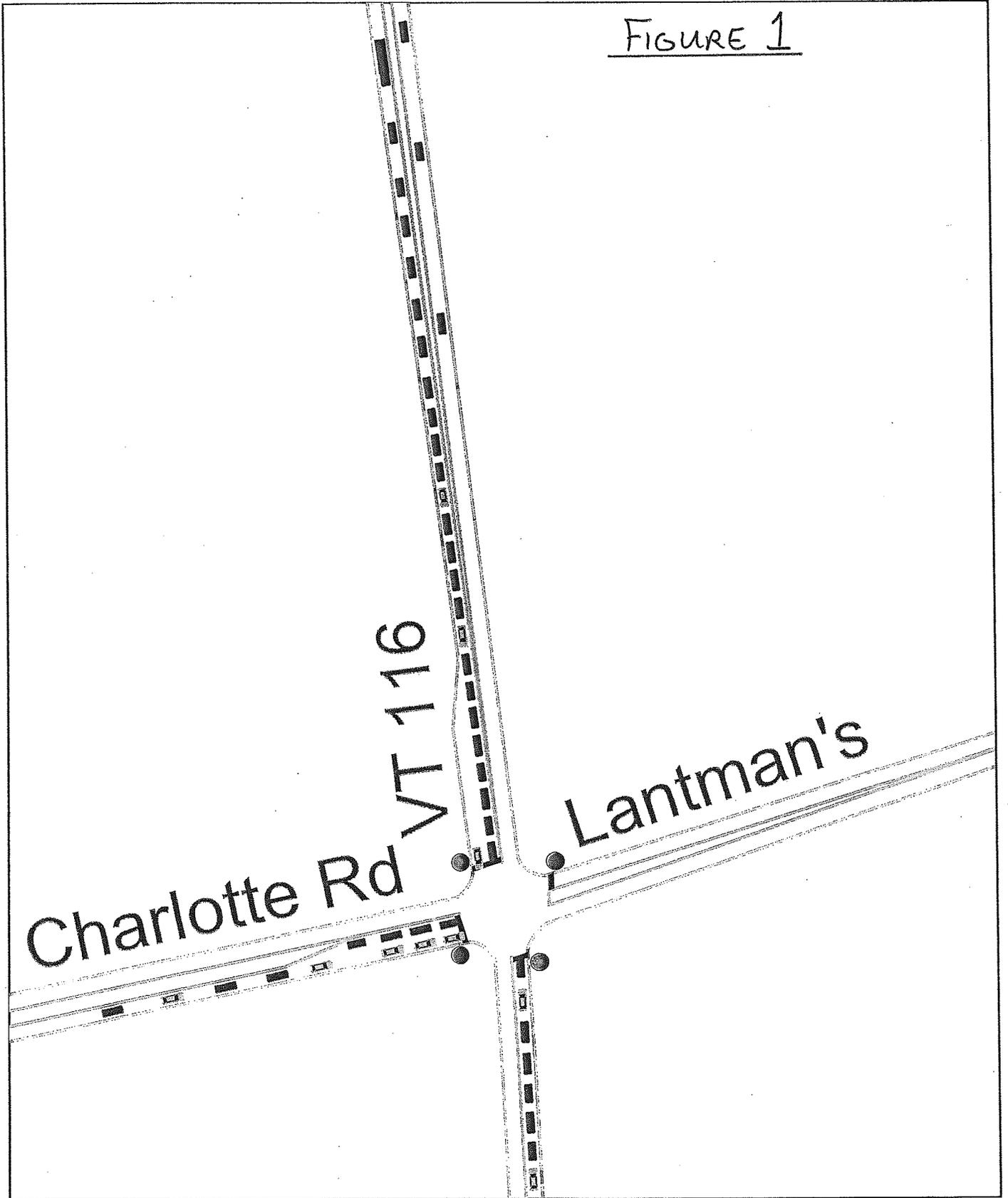
Sincerely,

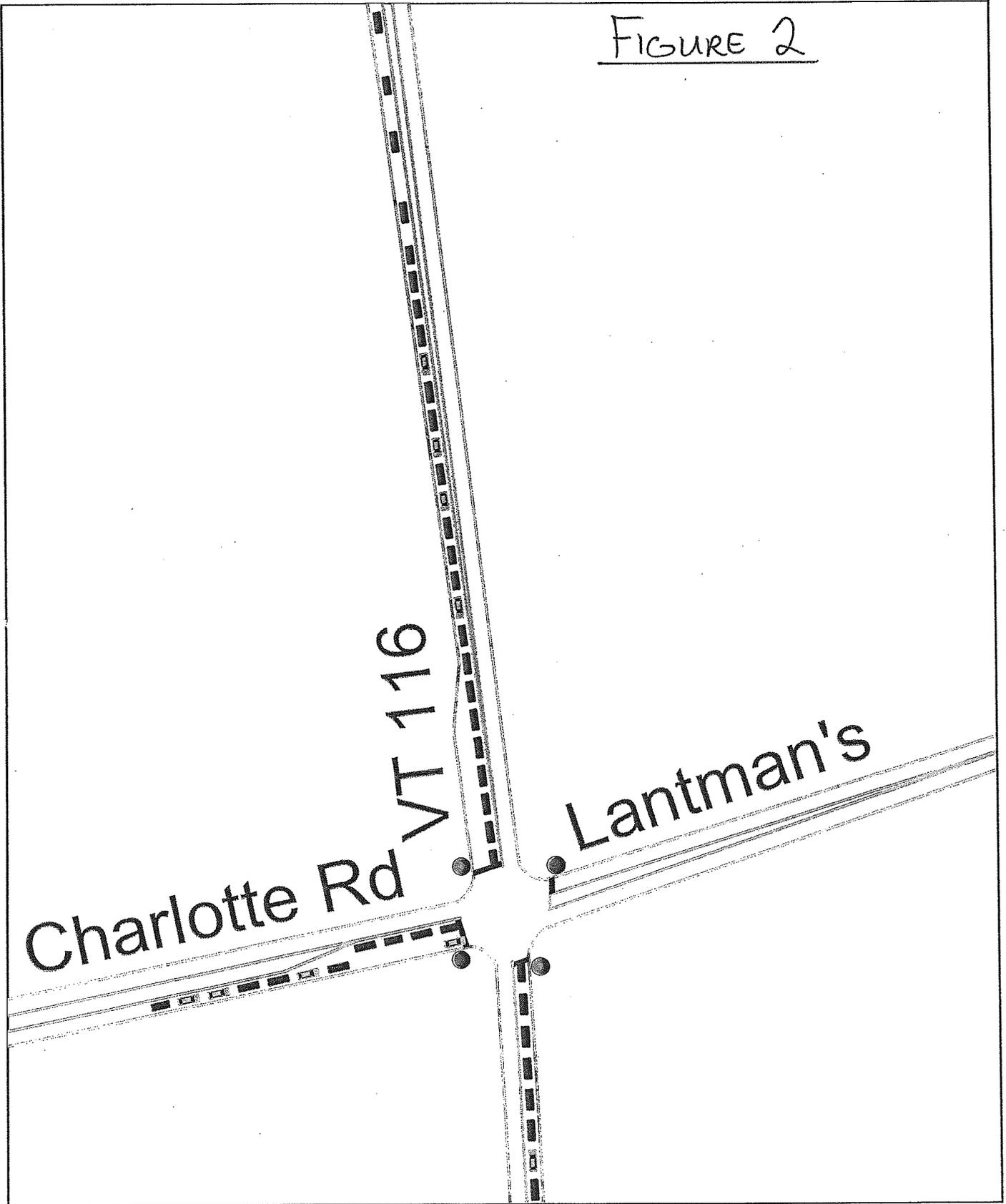
A handwritten signature in cursive script that reads "Roger Dickinson".

Roger Dickinson, P.E., PTOE

cc Doug Boyce  
David White  
Tim French  
Joshua Schultz, P.E.

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ATTACHMENT C

*SimTraffic* Queue Length Illustrations

Figure 1 - 2017 No-Build Queues

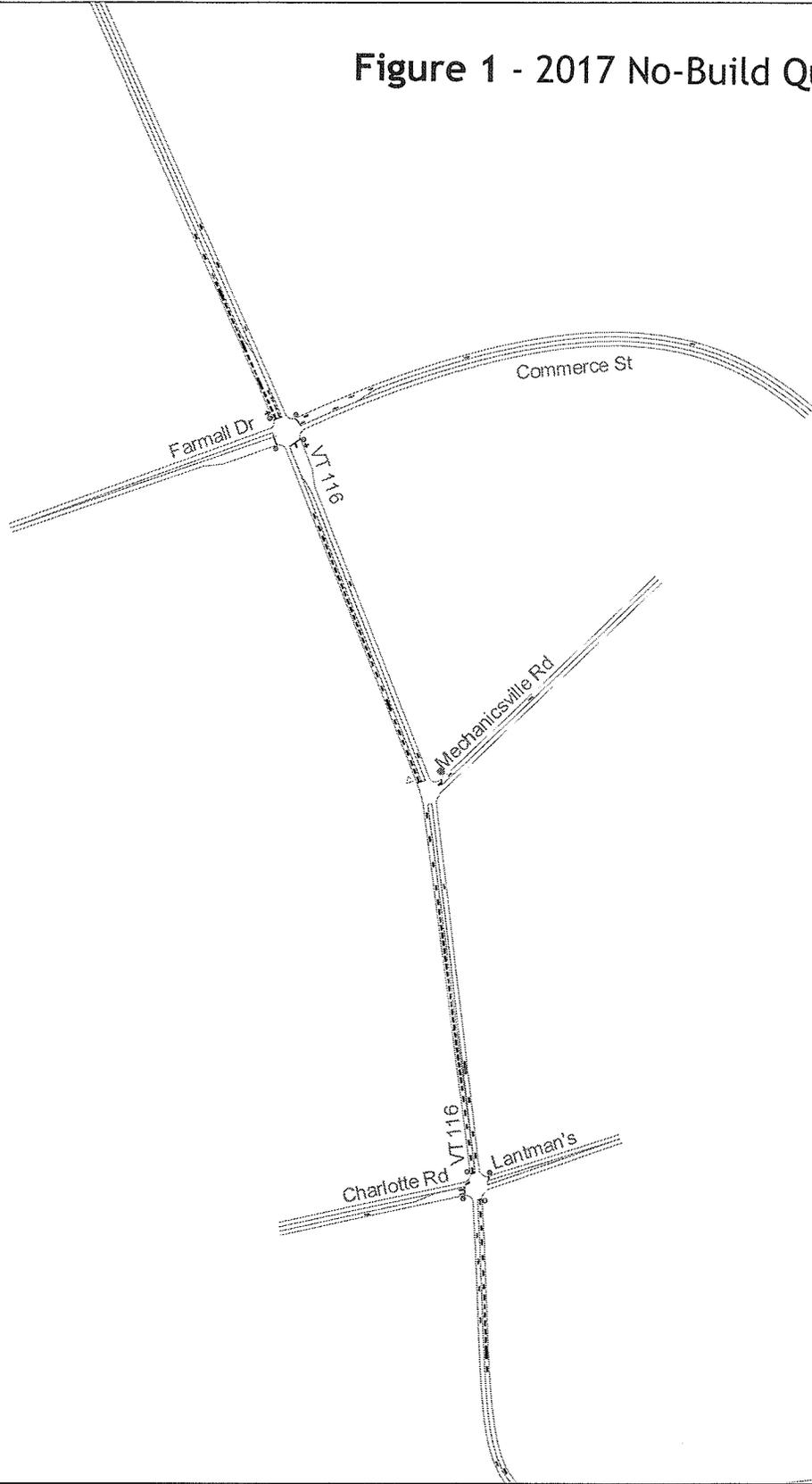


Figure 2 -2017 Build Queues

