Stantec

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South Burlington, VT 05403

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November 9, 2015
File: 195310941

Attention: Ms. Abigail A. Dery, P.E.
Trudell Consulting Engineers
478 Blair Park Road
Williston, Vermont 05495

Dear Abby,

Reference: 12 Gardenside Lane, Essex, VT

We understand that you are resuming the local permitting process for the above referenced project in light of slight changes proposed in the land use plan. The current project will include 48 multi-family housing units and 16,500 square feet commercial floor space. The commercial uses range from small dry goods, services and/or a deli-salad/hot bar within a grocery. The food service use could have up to 20 stations for standing or seating. The land use program considered in our February 27, 2015 traffic impact study for this project included 58 residential units and 16,500 square feet of commercial space albeit with a slightly different mix of tenants. Given the proposed reduction in the housing component of the project and the nominal change in trip generation forecasts for the entire project the February 27, 2015 Stantec traffic study for this site remains valid. No update of the study is required.

We compared the trip generation forecasts developed for the prior land use program with those you developed for the current program. Your calculations show a reduction in the number of housing units and a corresponding reduction in the number of AM and PM peak hour trips generated by the housing component. You have also reduced traffic forecasts for the commercial component in the AM peak hour and show a very modest increase of only 14 trips during the PM peak hour. We find that the added 14 peak hour trips will have an inconsequential impact on area traffic operations.

In our traffic study the worst performing intersection during the PM peak hour was the Susie Wilson Road/VT 2A intersection. At this location the project generated 117 PM peak hour trips only increased the calculated delay by 0.9 seconds. Adding 14 trips to the project total would still result in an approximate one second increase in delay at this intersection due to the project. Consequently, an updated traffic impact study would show only a 0.1 second change in delay at this intersection due to the proposed project change. This is not a significant difference.

In light of the above we conclude that the February 27, 2015 traffic impact study provides a valid and accurate assessment of traffic impacts for the currently proposed project. Preparation of an updated traffic impact assessment is not warranted.

Reference: 12 Gardenside Lane, Essex, VT

We are available, if necessary, to assist you in the project permitting process. Please do not hesitate to call should you require further support.

Regards,

Stantec Consulting

Richard S. Bryant, P.E.
Senior Project Manager
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c. Al Senecal

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Stantec

February 27, 2014
File: 195310915

Mr. Alan Senecal
A&C Realty
31 Commerce Avenue
South Burlington, VT 05043

Dear Mr. Senecal,

Reference: 12 Gardenside Lane, Essex, VT

Per your request we have completed a traffic impact analysis for your proposed mixed-use development project at 12 Gardenside Lane in Essex, Vermont. Based on our analysis the proposed project will have only a nominal impact on area traffic flows. The project is expected to increase PM peak hour volumes VT 2A adjacent to the project site by approximately 2.7 percent. These increases are not expected to significantly change traffic operations at adjacent intersections along VT 2A. Furthermore, a monitoring of peak hour vehicle queues along VT 2A southbound at its intersection with Susie Wilson Bypass indicate that the proposed right-in/right-out site driveway on VT 2A can operate without obstructing VT 2A traffic flows. Implementation of potential long-range improvements along VT 2A under consideration by VTrans will allow all of the intersections included in this study to operate below capacity during future peak traffic hours.

1.0 PROJECT DESCRIPTION

The proposed project is the development of 58 residential townhouse units and 16,500 square feet of commercial floor space at 12 Gardenside Lane in Essex, Vermont. Tenants have not yet been determined for the commercial space. Assumed commercial uses for the purpose of this study will include 11,500 square feet of specialty retail space and a 4000 square feet food market with a delicatessen. The site is currently occupied by four residential dwelling units. Site access is proposed by way of two driveways: a full access driveway at Gardenside Lane; and, a right turn in/right turn out (RI/RO) only drive on VT 2A just south of Gardenside Lane. The project site location is shown in Figure 1. A project site plan is provided in Figure 2.

Reference: 12 Gardenside Lane, Essex, VT

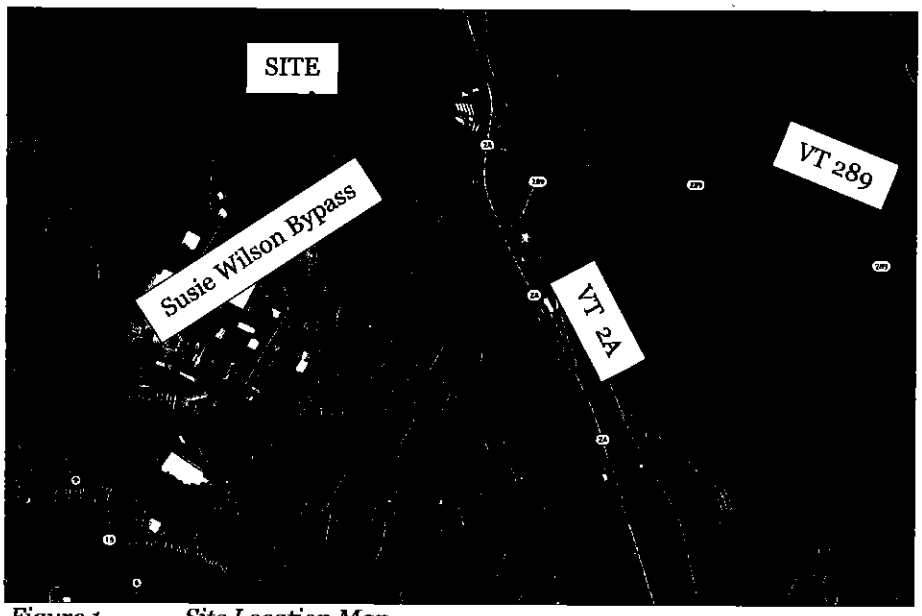

Figure 1 *Site Location Map*

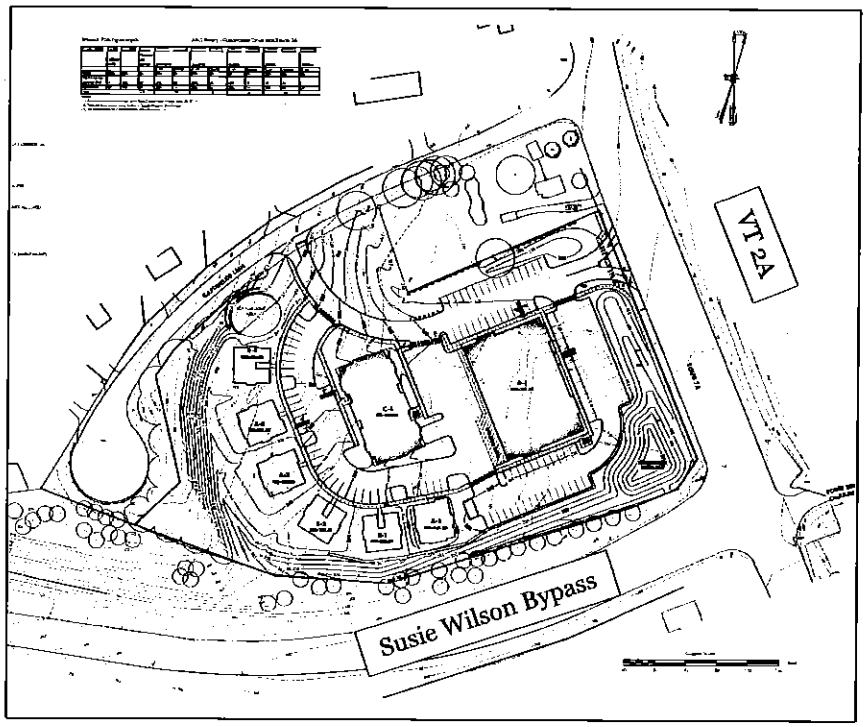

Figure 2 *Project Site Plan*

Reference: 12 Gardenside Lane, Essex, VT

2.0 STUDY APPROACH

This traffic impact study quantifies the project's expected impact on area peak hour traffic operations. The study area includes the following intersections:

- Gardenside Lane/VT 2A
- Proposed Site Driveway/VT 2A
- VT 2A/VT 289 Westbound
- VT 2A/VT 289 Eastbound/Susie Wilson Bypass

For this study area a three-step planning process was completed. First, existing roadway and traffic conditions were established. Second, traffic forecasts were prepared to reflect future traffic conditions with and without the proposed development. Traffic operations analyses were conducted to compare "No Build" traffic operations without the proposed development to "Build" condition traffic operations with the proposed development. Third, traffic mitigation measures are considered to mitigate the minor impacts of the proposed development.

3.0 EXISTING CONDITIONS

Existing conditions in the study area were determined through field visits, a review of VTrans and Chittenden County Regional Planning Commission (CCRPC) traffic data files and a traffic counting program. The results of the existing conditions analysis are described below.

3.1 Roadway Conditions

The project site is located on the west side of VT 2A between VT 289 westbound and VT 289 eastbound/Susie Wilson Bypass. VT 2A north of and south of the VT 289 intersections is primarily a two-lane, two-way principal arterial. Additional travel lanes however, are present at these two signalized intersections. North bound VT 2A at Susie Wilson Bypass has two lanes including a dedicated left-turn lane. Eastbound Susie Wilson Bypass has a similar cross section with a dedicated left-turn lane and shared through/right-turn lane on the intersection approach. Southbound VT 2A at this location has three lanes one each for the left-turn, right-turn and through movements. Approximately 1400 feet to the north at the VT 289 eastbound intersection VT 2A provides only a single through lane in each direction. The VT 289 westbound approach includes a dedicated left-turn lane and a dedicated right-turn lane. The traffic signals at the two intersections were recently upgraded to operate with Adaptive Traffic Control (ATC). The ATC operations allow signal cycle and phase lengths to vary based on real time traffic queues measured on the individual intersection approaches. This type of operation helps to minimize vehicle queuing and has proven to be effective at this location based on "before/after" observations of traffic flow at this location. Queues formerly observed on VT 289 eastbound in the AM peak hour and on Susie Wilson Bypass during the PM peak hour have been greatly diminished.

Gardenside Lane enters VT 2A from the west to form a stop-controlled, T-type intersection. Gardenside Lane is a two-lane, two-way, dead-end roadway providing access to approximately four homes. Gardenside Lane enters VT 2A approximately 600 feet north of Susie Wilson Bypass.

Reference: 12 Gardenside Lane, Essex, VT

3.2 Traffic Volumes

Peak hour vehicle turning movement counts for the two signalized study area intersections were obtained from VTrans and CCRPC traffic data files. Vehicle turning movement counts were taken in August 2011. Additional counts were conducted by Stantec in June 2013 as part of a study of the ATC signal system. Traffic volumes entering and exiting Gardenside Lane were not counted but calculated based on the land uses that it serves. The August 2011 data were found to be representative of Design Hour Volumes (DHV's) as defined by VTrans. (The count data and DHV calculations are attached.) The August 2011 DHV's were compared to the 2013 volumes. The higher volumes from the two count years were selected and balanced to create the composite 2013 peak hour traffic flow networks shown in Figure 3 (attached) for the AM peak hour and Figure 4 for the PM peak hour. Selection of the higher volumes represents a worst case analysis condition. As shown, approximately 1700 vehicles pass the project site during the AM peak hour and 1825 vehicles per hour pass the project site during the PM peak hour. During both peak hours the peak flow direction is southbound as the southbound direction connects VT 289 westbound to Susie Wilson Bypass.

3.3 Traffic Operations

Existing peak hour traffic operations for the study area intersections were analyzed following procedures defined in the *Highway Capacity Manual*. The *Highway Capacity Manual* defines procedures to calculate intersection operating "levels of service". Level of service is term use to describe the quality of traffic flow on a roadway at a given point in time. For intersections it is determined by comparing intersection capacity to intersection travel demands (volume-to-capacity ratio) and then calculating expected travel delays. Level of service ratings range from Level of Service (LOS) A to LOS F with LOS A representing little or no delay and LOS F representing very long delays or travel demands in excess of roadway capacity. For the study area the Synchro software package was employed to apply the analysis procedures of the Highway Capacity Manual. The Synchro software does not consider the potential added capacity available with the use of ATC systems and may therefore overestimate travel delays at the two signalized intersections studied.

As shown in Table 1, the two signalized intersections in the study corridor presently operate at or near their theoretical capacity under existing Design Hour conditions for one peak hour. (Design Hour conditions represent the 30th highest hourly volumes of the year. Operations will be well below capacity during most other hours of the year.) For the VT 289 Westbound/VT 2A intersection the AM peak hour operates worse than the PM peak hour as commuter traffic demands on VT 289 headed west towards Burlington are heavier in the morning. At the Susie Wilson Bypass intersection the situation is reversed with the PM peak hour condition being more critical as commuter traffic is headed east at this time of day on Susie Wilson Bypass. The low volume of traffic exiting Gardenside Lane does so with calculated long delays. The calculated delays however, do not account for the possible benefits associated the adjacent signals creating gaps in the VT 2A traffic stream. These gaps would make it easier for traffic to enter VT 2A from Gardenside Lane. The low volumes on Gardenside Lane represent no more than five percent of the capacity of the Gardenside Lane approach. The intersection capacity analysis worksheets are attached.

Reference: 12 Gardenside Lane, Essex, VT

VT 289 Westbound/VT 2A (signalized)	AM	0.96	40.5	D
	PM	0.76	22.0	C
Gardenside Lane/VT 2A	AM	0.05	54.9	F
	PM	0.02	22.4	C
VT 289 Eastbound/Susie Wilson Bypass /VT 2A (signalized)	AM	0.84	12.9	B
	PM	1.01	43.3	D

Note: V/C Ratio = Volume-to-capacity ratio; Delay = Average delay per vehicle in seconds; LOS = Level of Service. For unsignalized intersections the reported conditions relate to just the minor street approach.

Table 1 2013 Existing Peak Hour Operations

3.4 Vehicle Queues

Vehicle queues on VT 2A southbound upstream of the Susie Wilson Bypass intersection were measured during the morning commuter peak period on two days. As noted above, the southbound flow on VT 2A is heavier during the AM commuter peak period. Vehicle queues during this period could potentially spill back and temporarily block egress from the project site. (The proposed project site driveway is located approximately 260 feet north of Susie Wilson Bypass.) Nominal queues were observed on the southbound VT 2A approach at Susie Wilson Bypass during site visits made in the PM commuter peak hour. The AM peak period queue observations were made on Tuesday, February 11, 2014 and on Tuesday, February 18, 2014.

Figures 5 and 6 show vehicle queues by approach lane at 30-second intervals during the AM commuter peak period for each of the survey days. As shown, the longest queues generally occur in the southbound through lane indicated by the red spikes in the figure. The queues rarely exceed eight vehicles which represent a queue length of approximately 200 feet. The left-turn lane on VT 2A southbound to Vt 289 eastbound is approximately 220 feet long so a queue of more than nine vehicles in the through lane would block access to the left-turn lane. As shown, this condition rarely occurs and is never sustained over an extended period of time. Consequently, existing peak hour queue conditions on VT 2A southbound do not materially affect egress from the project site nor do they materially restrict access to the VT 2A southbound left-turn lane.

3.5 Safety

Vehicle crash data from the VTrans crash database was used to assess existing safety conditions in the study area as part of the ATC system evaluation. The VTrans high crash location (HCL) list was also reviewed.

Reference: 12 Gardenside Lane, Essex, VT

Stantec's analysis of five years of crash data (attached) shows that the two signalized intersections have crash rates that are less than the statewide average crash rates for similar intersections. This was confirmed by a check of the intersection HCL list which did not include these two intersections. The calculated crash rate for the roadway segment between the two signalized intersections did show an above average crash rate. This may be due in part to crashes occurring within the vehicle queues formed between the two intersections prior to the installation of the ATC system. The HCL for roadway segments indicates that VT 2A in this area is on the list, number 569, with an actual crash rate that barely exceeds the critical crash rate for this type roadway segment. Again, the crash data relates to the period 2008 through 2012 and does not reflect conditions with the new signal control in place.

4.0 FUTURE CONDITIONS

Traffic conditions in the study area were projected to a 2018 design year. Forecasts were developed for 2018 No Build conditions which account for background traffic growth but do not include traffic from the proposed development. 2018 Build traffic conditions were also forecasted which superimpose traffic from the proposed development on the 2018 No Build traffic flow networks.

4.1 2018 No Build Traffic Conditions

The 2018 No Build traffic conditions comprise existing peak hour traffic flows increased by an overall background traffic growth rate. VTrans compiles traffic volume data from a variety of permanent traffic count stations around the state for the purpose of noting historic traffic growth trends. The trend data is then used to extrapolate forecasts of future traffic growth. These data generally indicated nominal traffic growth rates. To represent conservative traffic analysis conditions, a one percent per annum traffic growth rate was applied to the existing traffic flow networks. The resulting 2018 No Build condition AM and PM peak hour traffic flow networks are shown in Figures 7 and 8, respectively.

4.2 2018 Build Traffic Conditions

As noted, the 2018 Build traffic conditions were determined by superimposing anticipated site generated traffic volumes on the 2018 No Build traffic flow networks. Trip generation estimates for the proposed development were prepared as part of the local permitting process in the Town of Essex. The trip generation estimates are based on the Institute of Transportation Engineer's (ITE) *Trip Generation*, Ninth Edition. The calculations prepared by Trudell Consulting Engineers are attached and summarized in Table 2. As shown, the project is expected to generate 88 AM peak hour vehicle trips and 117 PM peak hour vehicle trips. The split between residential and commercial (retail) trips is noted in the table.

Reference: 12 Gardenside Lane, Essex, VT

Residential Condominium	58 units	In	7	29
		Out	26	9
		Total	33	38
Specialty Retail/Market	16,500 sf	In	33	35
		Out	22	42
		Total	55	77
Combined		In	40	66
		Out	48	51
		Total	88	117

Note: Trip estimates based on *Trip Generation, 9th Edition*, published by the Institute of Transportation Engineers (ITE), 2011 for Land Use Codes 230(Residential Condominium), 826 (Specialty Retail), 850 (Supermarket) and 933 (Fast Food Restaurant without a Drive Through).

Table 2 Anticipated Weekday Site Trip Generation

Anticipated project related traffic volumes shown in Table 2 were assigned to the area roadway system. Different trip distributions were assumed for the residential and commercial components of the project. For the residential component it was assumed that a majority of the peak hour trips would be work trips and that these trips would be primarily oriented to the west by way of Susie Wilson Bypass. Susie Wilson Bypass provides a link to Burlington and the numerous employment opportunities in the greater Burlington area. The remaining trips were distributed relatively evenly among the other three approach directions, (north, south and east), as shown in Table 3. Retail trips generated to and from the site were distributed more evenly assuming that the proposed retail uses will provide a more convenient shopping opportunity for residents in the immediate area and for motorists already passing through the area. The proposed stores are not likely to draw heavily from the west as there are already many competing retail stores serving residents to the west. The assumed trip distribution for retail trips is also shown in Table 3.

All residential traffic was assumed to enter and exit the site by way of the proposed driveway on Gardenside Lane. Similarly, all retail traffic making left-turns into or out of the site was assumed to use Gardenside Lane. Retail trips turning right into or out of the site were assigned the site driveway on VT 2A.

[illegible]	[illegible]	[illegible]	[illegible]
North	VT 2A	15%	25%
South	VT 2A	15%	25%
East	VT 289	10%	25%
West	Susie Wilson Road	60%	25%
	Total	100%	100%

Table 3 Assumed Trip Distribution

The 2018 Build traffic conditions are shown in Figures 9 and 10 for the AM and PM peak hours, respectively. Comparing the No Build networks to the Build networks indicates that the proposed development will add approximately 75 PM peak hour vehicle trips through the Susie Wilson Bypass intersection, an approximate 2.7 percent increase over No Build conditions.

4.3 Future Traffic Operations

Peak hour intersection operating levels of service were calculated for future No Build and Build conditions following the procedures used for Existing conditions and described above. As shown in Table 4, future traffic growth will generally result in minor degradation in traffic operations at each of the study area intersections. The signalized intersection volume-to-capacity ratios increase by 0.04 to 0.06 due to background traffic growth indicating that application of a one-percent per year traffic growth rate to existing volumes will use from four to six percent of the available intersection capacity over a five-year span. The impacts of the proposed development project are much less using up only one to three percent of the capacity available the signalized intersections. The site driveway intersection is expected to operate with modest delays in the Level of Service C or better range due to the right-turn only restrictions applied here. Longer delays are expected at the existing Gardenside Lane intersection where left-turn movements will be maintained. However, even under AM peak hour build conditions Gardenside Lane will only operate at 60 percent of capacity. Again, this result does not consider the positive benefit that the adjacent signals may have on traffic operations at Gardenside Lane by introducing gaps in the passing traffic stream.

Reference: 12 Gardenside Lane, Essex, VT

VT 289 Westbound/VT 2A	AM	0.96	40.5	D	1.00	48.7	D	1.01	51.0	D
	PM	0.76	22.0	C	0.80	24.0	C	0.82	24.6	C
Gardenside Lane/VT 2A	AM	0.05	54.9	F	0.06	67.0	F	0.60	128.8	F
	PM	0.02	22.4	C	0.02	26.0	D	0.16	33.7	D
Proposed Site Driveway/VT 2A	AM	N/A	N/A	N/A	N/A	N/A	N/A	0.06	17.6	C
	PM	N/A	N/A	N/A	N/A	N/A	N/A	0.08	14.1	B
VT 289 Eastbound/Susie Wilson Bypass /VT 2A	AM	0.84	12.9	B	0.90	14.3	B	0.93	14.8	B
	PM	1.01	43.3	D	1.07	52.8	D	1.07	53.7	D

Note: V/C Ratio = Volume-to-capacity ratio; Delay = Average delay per vehicle in seconds; LOS = Level of Service. N/A=Not Applicable. For unsignalized intersections the reported conditions relate to just the minor street approach.

Table 4 Future Intersection Peak Hour Operations

The above Build condition traffic analysis results are conservative in that they do not consider the possibility that some of the traffic generated to/from the project site will be pass-by traffic. Pass-by traffic represents vehicle trips to/from a site that are drawn from the passing traffic stream rather than generated as new trips to the site area. Pass-by trips have less of an impact on area traffic operations as they do not add volume to the area roadway network. They only introduce new turning movements at the site driveway. For convenience retail uses pass-by traffic may comprise 25 to 75 percent of the total site traffic. The above analysis assumes that 100 percent of the site generated retail trips are new trips on the roadway system adding to traffic demands at the two signalized intersections.

4.4 Post Build Traffic Operations

As noted above, VTrans recently implemented signal operations changes at VT 2A intersections with VT 289 Westbound and with Susie Wilson Bypass to alleviate traffic congestion. Further improvements are proposed to include geometric changes as defined in a scoping report prepared for VTrans. At the VT 2A/VT 289 Westbound intersection the suggested changes include the addition of a southbound through lane on VT 2A and the addition of a second left-turn lane from VT 289 to VT 2A southbound. VT 2A would be widened to provide two southbound through lanes between VT 289 and Gardenside Lane. (Two southbound lanes are already provided south of Gardenside Lane.) These improvements are shown in

Reference: 12 Gardenside Lane, Essex, VT

Figure 11. At the VT 2A Susie Wilson Bypass intersection through lanes would be added to the eastbound and northbound intersection approaches. With the added lanes, traffic operations in the project study area improve significantly as noted in Table 5. All intersections will operate below capacity (calculated volume-to-capacity ratios drop below 1.0) for all time periods with the improvements. Delays for the left-turns out of Gardenside Lane will diminish during the AM peak hour to the LOS D range.

VT 289 Westbound/VT 2A	AM	1.00	48.7	D	1.01	51.0	D	0.65	12.4	B
	PM	0.80	24.0	C	0.82	24.6	C	0.65	11.9	B
Gardenside Lane/VT 2A	AM	0.06	67.0	F	0.60	128.8	F	0.23	34.4	D
	PM	0.02	26.0	D	0.16	33.7	D	0.18	40.1	E
Proposed Site Driveway/VT 2A	AM	N/A	N/A	N/A	0.06	17.6	C	0.05	15.4	C
	PM	N/A	N/A	N/A	0.08	14.1	B	0.07	13.3	B
VT 289 Eastbound/Susie Wilson Bypass /VT 2A	AM	0.90	14.3	B	0.93	14.8	B	0.91	12.5	B
	PM	1.07	52.8	D	1.07	53.7	D	0.77	19.6	B

Note: V/C Ratio = Volume-to-capacity ratio; Delay = Average delay per vehicle in seconds; LOS = Level of Service. N/A=Not Applicable. For unsignalized intersections the reported conditions relate to just the minor street approach.

Table 5 Post-Build Intersection Peak Hour Operations

5.0 CONCLUSIONS AND RECOMMENDATIONS

Based on the analysis presented above the proposed development is expected to increase peak hour traffic demands on the adjacent roadway system by approximately two and one-half percent. The impact of the projected traffic increases will not change calculated peak hour operating levels of service at any of the study area intersections. The field observations show that the ATC signal system on VT 2A effectively manages vehicle queues at the signalized intersections such that traffic flow from the proposed site driveway will not be substantially impacted by vehicle queues on VT 2A. Similarly, traffic exiting the site driveway should not negatively impact vehicle queuing and traffic flow on VT 2A.

In consideration of the above, it is recommended that the project site be developed as proposed with full access by way of a driveway at Gardenside Lane and right-turn-in/right-turn-out only access by way of a

Reference: 12 Gardenside Lane, Essex, VT

new driveway at VT 2A. Provision of the VT 2A driveway will lessen travel demands on Gardenside Lane where longer delays are anticipated due to vehicles waiting to turn left onto VT 2A northbound. It is also recommended that traffic operations be monitored after project construction, particularly at the Gardenside Lane/VT 2A intersection, to assess the left-turn operations. If appropriate, adjustments may be made to the adjacent signal timings to introduce more gaps in the VT 2A traffic stream to aid left-turn movements from the project site via Gardenside Lane.

We appreciate having the opportunity to provide this evaluation of the traffic impacts associated with your proposed development. We are available as necessary to present the findings of our investigation to you, the Town and VTrans. If you have any questions regarding this study please do not hesitate to contact us.

Regards,

Stantec Consulting

Richard Bryant
Senior Project Manager
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Fax: (802) 864-0165
Richard.Bryant@stantec.com

Attachments:

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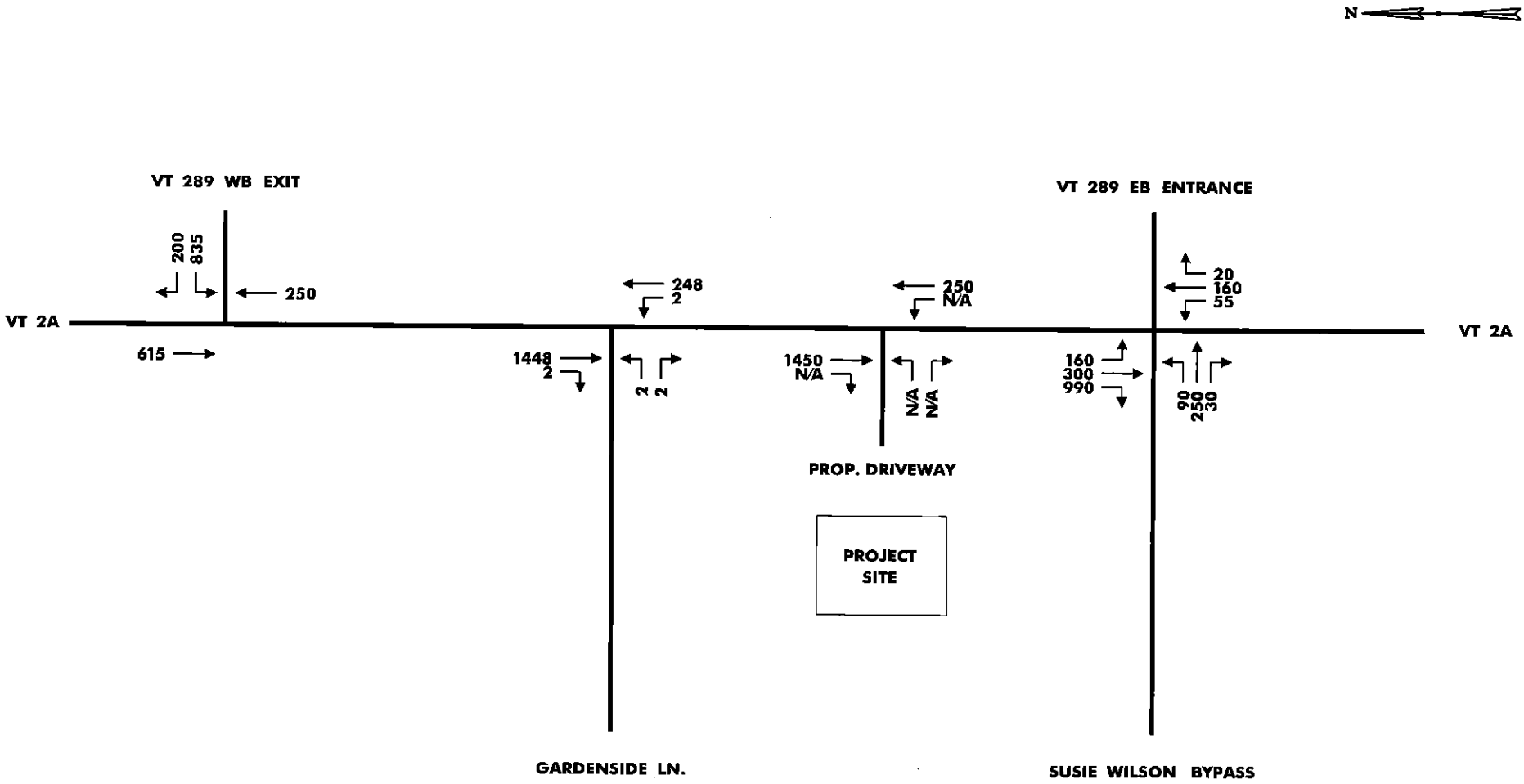

NOT TO SCALE

Figure 3 Existing AM Peak Hour Traffic Volumes

Stantec **EXISTING AM**

ESSEX JUNCTION, VT