July 29, 2025

Ref: 16694.00

Mr. Takashi Tada
Land Use Director/Town Planner
Groton Planning Board
Town of Groton, Massachusetts
173 Main Street
Groton, MA 01450

Re: Nashoba Satellite Emergency Facility
490 Main Street, Groton MA

Dear Mr. Takashi Tada:

On behalf of UMass Memorial Health Care, (the "Applicant"), VHB is pleased to provide the following responses to the transportation peer review letter prepared by Nitsch Engineering, dated July 15, 2025, regarding the proposed Nashoba Satellite Emergency Facility in Groton, MA (the "Project").

For ease of reference, VHB has provided a copy of each comment in italics followed by VHB's response. The order of the comments follows the format and structure outlined in the peer review letter.

Comment 1. *"During the introductory meeting, Nitsch indicated and confirmed through our review of the TIA there are no trip generation calculations associated with the proposed helipad. VHB confirmed during the introductory meeting that the helipad use would function concurrently with the site, and that the helipad would not be used independently of the medical facility uses. As a result, we recommend the Applicant confirm there would be no additional trips associated specifically with the helipad, and all calculated vehicle trips to the site would include trips associated with the helipad."*

Response: The helipad is intended for use by the Satellite Emergency Facility only. The estimated Project generated trips include all trips associated with the helipad.

Comment 2. *"During the introductory meeting, the Applicant discussed how the existing land use for the study area comprises two residences, one of which is vacant. The Applicant indicated that no credit for vehicle trips associated with the two residences was subtracted for the existing trips when establishing the future Trip Generation. Nitsch concurs with this methodology; however, the Applicant should confirm in their response this is the intended methodology, and confirm it remains appropriate."*

Response: The existing two residences on the Site are currently generating relatively negligible trips and as such, their trip generation (2 to 3 peak hour trips) was not subtracted from the future conditions trip estimates.

Comment 3. *"The TIA interchangeably applies the following terms throughout:*

3a. The street name as "Taylor Road" or "Taylor Street;"

3b. The street name as "Mill Street" or "Mill Road;"

3c. The street name as "Fitchs Bridge Road" or "Fitchs Bridge Street;"

3d. The PM peak hour as "Afternoon" or "Evening;"

3e. Main Street as "Route 119" or "Route 119/Route 111;"

3f. The site-specific project as "500 Mill Street" and "500 Main Street."

The interchangeable terms do not cause significant confusion or impact the overall results of the TIA; however, the Applicant should be mindful in future submissions that consistent terminology should be used to avoid future confusion."

Response: VHB acknowledges the noted terminology discrepancies in the TIA.

Comment 4. *"In the existing Conditions on page 12, the TIA states that the posted speed limit on Main Street (Route 111/119) is 40 miles per hour (MPH). From our assessment, the posted speed limit decreases to 35 MPH in both travel directions between the location of 391/386 Main Street and the southern limits of the study area. There is also a school zone for the Groton-Dunstable Middle School within the 35 MPH zone that would decrease the posted speed limit to 20 MPH when school is in session. Nitsch recommends the Applicant provide further clarity on the posted speed limits throughout the study area and the impact on safety and operations."*

Response: The speed limit along Main Street adjacent to the Project site and through most of the study area is 40 mph. The speed limit decreases to 35 mph approximately 1,000 feet south of Arlington Street, with a school zone located along Main Street that starts approximately 450 feet north of the Groton-Dunstable Regional Middle School driveway. The speed limits along Main Street do not have any impact on the safety or operations analysis that were presented in the TIA.

Comment 5. *"In the existing conditions section, the study intersection of Fitchs Bridge Road and Main Street provides access to Nod Road, which is a local road that continues farther into the Town of Groton. The junction of Nod Road and Main Street is located just south of the Fitchs Bridge Road intersection and has the potential to accommodate a notable volume of bear-right turning northbound vehicles with its skewed angle. Nitsch requests the Applicant clarify why the study area did not account for the junction of Nod Road and Main Street, which is adjacent to the intersection at Fitchs Bridge Road."*

Response: Based on a review of the trip distribution patterns that were presented in the TIA, the Project would generate minimal trips (less than 5 peak hour trips) along Nod Road and as such, Project impacts at the intersection of Main Street at Nod Road would be negligible. Other locations in

the predominant direction of travel for site generated trips were therefore selected for the study, as outlined in the TIA.

Comment 6. *"Consistent with the site visit observations from the VAI TIA, Nitsch observed the following at the intersection of Main Street at Mill Street:*

6a. There are no Americans with Disabilities Act (ADA)- or Massachusetts Architectural Access Board (MAAB)-compliant pedestrian ramps or crosswalk present across Mill Street, despite a sidewalk present on the west side of Main Street.

6b. The available sight distance looking left (to the north) and looking right (to the south) from the Mill Street eastbound approach is impeded by a berm to the south and vegetation to the north. As a result, we observed vehicles inching from the stop line closer to Main Street and into the pedestrian desire line to obtain better visibility of approaching vehicles along Main Street.

6c. The existing curb radii on both corners of Mill Street are large, particularly because heavy vehicles are restricted along Mill Street. This promotes high turning speeds for the free southbound right turn and lengthens the crossing distance for pedestrians traveling on the west side of Main Street.

From coordination with the Town, the Applicant for 63 Gratuity Road developed conceptual design plans to address sight distance constraints and pedestrian safety issues at the intersections of Main Street at Mill Street. Because the applicant will be doing major construction at the Main Street / Mill Street intersection (to construct their north site driveway), we recommend the Applicant coordinate with the Town and MassDOT to implement the safety improvements previously identified at this location."

Response: The Applicant communicated with the Town of Groton Planning Department to discuss this comment. The Town Planner confirmed that the proposed improvements committed to by the applicant for the 63 Gratuity Road project at the intersection of Main Street at Mill Street are not the responsibility of the Applicant to implement.

The Applicant will coordinate with the town staff to ensure that the design of the northerly site driveway takes into consideration future changes planned at the Mill Street intersection by the 63 Gratuity Road applicant.

Comment 7. *"Based on our site visit, there are heavy vehicle restrictions signs present on Mill Street and on Champney Street. We recommend the Applicant confirm that the truck restrictions are present, clarify whether there are additional heavy vehicle restrictions within the study area, and determine how the restrictions may impact safety and operations within the study area as a result of the Project."*

Response: The heavy vehicle restrictions on Mill Street and Champney Street or any other area roadways will have no material effect on Project operations. Non-emergency heavy vehicles that travel to and from the site will adhere to signed travel restrictions on area roadways.

Comment 8. *"The report calls out the Groton-Dunstable Middle School in Figure 1 but does not detail its land use in the report text. We recommend the Applicant outline the following:*

8a. Clarify the exclusion of the school driveway intersection as a study intersection.

8b. In the sub-section describing the Main Street at Champney Street intersection, revise the language on land use to account for institutional land use with the Middle School nearby.

8c. Confirm if any site observations and research were conducted for the school to document pedestrian activity and traffic patterns in the study area during the school peak hours for arrival and dismissal periods. If so, describe how the Middle School would impact the traffic operations in the study area.

Response: The study area selected for evaluation in the TIA was selected to be generally consistent with the recent traffic study[1] prepared for the 500 Main Street project, which also did not include the driveway for the Groton-Dunstable Regional Middle School. The Project related traffic operations along Main Street will have negligible effect on school operations.

Figure 1 in the TIA shows the location of the school in relation to the site and the intersection of Main Street at Champney Road. VHB notes that the school is in the vicinity of the intersection of Main Street at Champney Road and that residential properties are located between the intersection and the school.

Traffic and pedestrian observations were not conducted at the school as part of the TIA. VHB notes that the school operates from around 8:00 AM to 2:30 PM on a typical day. Based on the operating hours of the school, the school would have more of an impact on weekday morning peak hour traffic operations. Since the school day ends around 2:30 PM, the impacts of the school will be much less during the weekday evening peak hour traffic operations which occurs between 4:00 – 5:00 PM.

Pedestrian counts at the nearby intersection of Main Street at Champney Street show a total of 8 pedestrians at the intersection during the weekday morning peak period (7:00 – 9:00 AM) and 1 pedestrian during the weekday evening peak period (4:00 – 6:00 PM). No bicycles were observed at the intersection during either of the peak periods.

Comment 9. *"In the Traffic Volumes Section on page 14, the text does not state how the peak hours were identified for the turning movement counts (TMCs). Nitsch recommends the Applicant to confirm if*

[1] *Traffic Impact and Access Study – Proposed Mixed-Use Development, 500 Main Street, Groton, MA*; Bayside Engineering; December 9, 2022.

they applied a network-wide peak hour or individual peak hours for the eight intersections, provide justification for that selection, and describe how it may impact the results presented in the TIA."

Response: The peak hours for analysis in the TIA (7:15 – 8:15 AM and 4:00 – 5:00 PM) were identified by determining the overall peak of traffic volumes throughout the entire network. The ATR counts conducted along Main Street on Wednesday April 16, 2025 also indicate that these time periods represent the peak hours for traffic through the corridor. The analysis presents a networkwide analysis for the peak traffic conditions along Main Street during the weekday morning and evening peak hours, which is the appropriate methodology to evaluate traffic impacts for the Project's land uses.

Comment 10. *"Nitsch identified a few inconsistences between the summarized crash data in Table 2 and the crash attribute tables in the Appendix, which includes the following:*

10a. Main Street at Mill Run Plaza North Driveway: Table 2 indicates a total of four crashes, but only two crashes are identified by year. Please clarify when the additional two crashes occurred.

10b. Main Street at Arlington Street and Taylor Road: The three rear-to-rear crashes in the summary table are not consistent with the three rear-end crashes presented in the raw attribute tables in the Appendix, while the three unknown crashes in the summary table are not consistent with the three single vehicle crashes shown in the raw attribute tables.

10c. Main Street at Champney Street: The three rear-to-rear crashes in the summary table are not consistent with the three rear-end crashes shown in the raw attribute tables. Nitsch requests the Applicant clarify for consistency between the TIA summary table and Appendix, and to provide reasonings to the causality of the rear-end crashes and if there are any patterns that would be susceptible to mitigation."

Response: It is noted that the Appendix material shows crashes that occurred in 2016, whereas Table 2 provides the most recent five years of complete crash data available from MassDOT (2017-2021). The additional year of data search indicated that two crashes occurred at the intersection of Main Street at Mill Run Plaza North Driveway in 2016. However, based on MassDOT's guidelines for traffic impact assessment, the analysis summary in Table 2 was limited to 2017-2021.

The rear-to-rear crashes listed in the table at the intersections of Main Street at Arlington Street and Main Street at Champney Street should be classified as rear end type collisions and the unknown collisions at Main Street at Arlington Street should be classified as single-vehicle crashes.

A review of the three rear end crashes at the intersection of Main Street at Champney Street indicates that one crash was due to driver inattention. Specific details for the other two crashes are not available within the MassDOT data to identify the causes of the rear end collisions or the directions of travel for the vehicles involved.

Comment 11. *"In the Crash History Section on page 17, the report states the following: "A summary of the MassDOT vehicle crash history is presented in Table 4 and the detailed crash data is provided in the Appendix." Nitsch notes that Table 2 provides the detailed crash data in contrast to the trip generation summary presented in Table 4. We suggest the Applicant clarify this wording to reference the correct table."*

Response: The crash history is presented in Table 2.

Comment 12. *"In Figures 4 and 5, the left and right turn volumes at the intersection of Main Street and Arlington Street indicate no increase in volumes between Existing and No-Build conditions. Nitsch confirms from the Application for the residential development at 63 Gratuity Road that such development would generate additional trips at this intersection of seven vehicles in the AM peak hour and 10 vehicles in the PM peak hour at these two locations. Nitsch notes that 63 Gratuity Road was identified as a Site-Specific Growth project on page 22 along with two additional projects: 500 Main Street, and Village at Shepley Hill. Nitsch recommends the Applicant clarify if Site-Specific volumes were added between Existing and No-Build conditions for the three (3) Site-Specific projects identified on page 22, and if additional site-specific traffic volumes should be added within the study area."*

Response: Based on information presented in the traffic study prepared for the residential development at 63 Gratuity Road, that project will generate a total of 5 trips through the intersection of Main Street at Arlington Street during the weekday morning peak hour and 8 trips during the weekday evening peak hour. The worksheets from the TIA prepared for the proposed 63 Gratuity Road residential development are provided in the attachment to this response letter.

Updated traffic volume networks and operations analysis that add the trips related to 63 Gratuity Road are provided in the attachment to this response letter. The additional 5 trips during the weekday morning peak hour and 8 trips during the weekday evening peak hour generated by the 63 Gratuity Road project will not materially change the operational analysis results at the intersection that were presented in the TIA under the 2032 No-Build and 2032 Build conditions. The revised intersection operations analysis for the intersection of Main Street at Arlington Street is shown in Table 1.

VHB also notes that only the intersection of Main Street at Arlington Street required adjustments to the traffic volumes that were presented in the TIA. The traffic volumes for the 63 Gratuity Road development were accounted for at all other applicable locations.

Table 1 Intersection Operations Analysis – Main Street at Arlington Street

Location / Movement	2025 Existing Conditions				2032 No-Build Conditions				2032 Build Conditions			
	v/c [a]	Del [b]	LOS [c]	95 Q [d]	v/c	Del	LOS	95 Q	v/c	Del	LOS	95 Q
7: Main Street & Arlington Street												
Weekday Morning												
Arlington Street EB L/R	0.14	25.5	D	1	0.12	22.8	C	0	0.12	23.4	C	0
Main Street NB L/T	0.05	10.8	B	0	0.03	10.6	B	0	0.03	10.7	B	0
Main Street SB T/R	0.00	0.0	A	0	0.00	0.0	A	0	0.00	0.0	A	0
Weekday Evening												
Arlington Street EB L/R	0.04	11.3	B	0	0.04	10.9	B	0	0.04	11.2	B	0
Main Street NB L/T	0.02	8.4	A	0	0.02	8.3	A	0	0.03	8.3	A	0
Main Street SB T/R	0.00	0.0	A	0	0.00	0.0	A	0	0.00	0.0	A	0

a volume to capacity ratio
b delay, measured in seconds
c level of service
d 95th percentile queue (in vehicles)
Notes: Future Conditions analyses adjust PHF upward to 0.92 for movements with an existing PHF less than 0.92 in accordance with MassDOT guidelines for traffic impact assessment. Movements with existing PHFs greater than 0.92 were not adjusted.

Comment 13. *"Nitsch coordinated with the Town to confirm the Site-Specific Growth presented on pages 22 and 23. Based on coordination with the Town, construction is underway for the Proposed Residential Development, Hayes Woods Road; however, the Town does not anticipate any occupancy permits being issued in 2025. The Proposed Age-Restricted Multifamily Residential Development at 797 Boston Road was permitted by the Planning Board. Based on the memorandum, the traffic volumes associated with this development within the study area are expected to be relatively minor and would be included in the general background traffic growth rate, especially with its location approximately four miles south of the Project site. We recommend the Applicant confirm with the Town that these additional Site-Specific Projects are still valid for inclusion in the future projections."*

Response: VHB confirmed with the Town Planner that the three projects included as background projects should be included in the study. VHB also reviewed the proposed Hayes Woods Road residential development and determined that due to the size and location of the project, the traffic volumes through the study area would be limited and were assumed to be included in the background traffic growth rate.

Comment 14. *"The Site Access and Parking sub-section on page 20 mentions a proposed total of 16 parking spaces equipped with electric vehicle (EV) charging capabilities, which is not consistent with the 30 EV charging spaces shown in the latest site plan. Nitsch requests the applicant to clarify the number of EV parking spaces proposed for the project site and whether it affects the minimum parking requirements for capacity."*

Response: The Project proposes 30 total EV ready parking spaces, in compliance with the Massachusetts Stretch Energy Code. The EV ready parking spaces are included in the total parking count

provided for the Project. The EV ready parking spaces will not affect minimum parking requirements.

Comment 15. *"As a supplement to proposed parking statistics, Nitsch also recommends the Applicant provide information regarding the quantity of proposed accessible spaces on the Site Plans for compliance with the minimum parking requirements from ADA standards."*

Response: The Project proposes 15 accessible parking spaces (10% of total parking provided) as required by section 23.2.4(a) of 521 CMR Architectural Access Board and section 208.2.1 of the American Disabilities Act (ADA).

Comment 16. *"In Table 3, the measured sight distances are listed as "1000+" feet looking in both directions from the northern site driveway and looking north from the south site driveway, while the measured sight distance looking south from the south site driveway was measured as 595 feet. Based on our site visit, the observed stopping and intersection sight distances adequately reflect the measured values in Table 3. Moreover, the selection of minimum and desirable values for the sight distances are appropriate based on VHB's methodology in accordance with the latest standards from American Association of State Highway and Transportation Officials (AASHTO). No further action is required."*

Response: No response required.

Comment 17. *"On Page 20, the Site Access and Parking sub-section describes the proposed driveway curb cuts, parking statistics and wayfinding signage. We recommend the Applicant verify that the proposed "identity signage" at the site driveways would not inhibit intersection sight lines for exiting vehicles."*

Response: The proposed "identity signage" is anticipated to be located more than 20' from the edge of traveled way of Main Street and will not inhibit sight lines.

Comment 18. *"In the Executive Summary on Page VI and the Project-Generated Traffic Volumes on page 26, the report states the entering trips for the weekday evening peak hour is "356" trips, which is not consistent with how it is presented as "35" trips in Table 4. Nitsch requests the Applicant clarify the discrepancy between these two numbers for maintaining consistency and accuracy of the TIA."*

Response: The Project is expected to generate 35 entering trips and 60 exiting trips during the weekday evening peak hour upon completion of the potential Medical Office Building.

Comment 19. *"Based on the final Project meeting criteria to be classified as a LUHPPL, Nitsch acknowledges that the criteria to be classified as a LUHPPL include parking lots with over 1000 vehicle trips per day. Based on the information contained in Table 4 from the TIA, the total vehicle trips per day for the site is projected at 1,030 vehicles per day; therefore, we agree that the classification as a LUHPPL is appropriate. No response required."*

Response: No response required.

Comment 20. *"Figure 7 shows the exact values of the site-generated trips in the morning and afternoon peak hours, which is not consistent with the rounded volumes shown in Tables 4 and 6, as well as Figures 4,5 and 8. Nitsch recommends the Applicant clarify and confirm if the traffic volumes should be rounded for the figures and capacity analysis, and if using the rounded values impacts the overall results, findings, and recommendations of the TIA. Nitsch also requests the Applicant provide reasoning to justify their methodology of rounding traffic volumes to the nearest five for the figures and analysis, instead of applying the exact values.*

Response: As Comment 20 states, the traffic volumes presented in Tables 4 and 6 are rounded to the nearest 5 vehicles per hour (vph). The rounded values are provided for ease of viewing the tables and graphics and do not impact the overall results, findings, and recommendations of the TIA. The methodology of rounding the traffic volumes results in values within 5 vph of the exact values, which is within typical daily and hourly fluctuations of traffic. Additionally, the future conditions traffic volume networks and trip generation estimates are projections and do not represent actual observed values and rounding to the nearest 5 vph provides accurate projections and forecasting of future conditions.

Comment 21. *"Table 8 indicates that the Mill Street Eastbound approach to Main Street operates at Level of Service (LOS) F with a 95th percentile vehicle queue of 10 vehicles during the Existing Conditions, which is consistent with the analysis conducted by VAI for the same location in the VAI TIA. During Nitsch's site visit, we observed traffic operations at this intersection from 4:00 PM to 5:00 PM, which is the evening peak hour identified in the TIA report. The maximum queue observed during this time period was seven vehicles, which is fewer than the 10 vehicles indicated in Table 8 of the TIA. Therefore, the capacity analysis in the TIA represents a conservative baseline condition for Existing traffic conditions. No further action is required."*

Response: No response required.

Comment 22. *"In Table 8, Nitsch notes that the delays and queues associated with the minor approaches decrease from Existing Conditions to Future No-Build and Build at the following intersections: Main Street & Fitchs Bridge Road, Main Street & Arlington Street, and Main Street & Champney Street. Nitsch recommends the Applicant justify for the decrease in delay when the annual growth rate and site-specific growth trips applied to the Existing Conditions results in an increase in volumes."*

Response: Table 8 presents the traffic operations analysis for the 2025 Existing, 2032 No-Build, and 2032 Build Conditions. In accordance with MassDOT guidelines, the peak hour factor (PHF) was adjusted upward to 0.92 for movements that have existing PHFs below 0.92. Modifying the PHF effectively impacts the traffic volume parameters that are used in the traffic operations analysis, resulting in discrepancies between the Existing and Future conditions that sometimes show better operations under Future conditions when compared to Existing conditions. For this reason, the future Build condition analysis results are compared to the future No-Build condition analysis results, as both sets of analyses use the same PHFs.

Comment 23. *"Based on the signal warrants analysis on page 36, the TIA concludes that a signal is not recommended on the premise that Warrant 3 is only met under the Future conditions. Nitsch concurs with this methodology but recommends the Applicant to include a statement referencing the signal warrants calculations in the Appendix."*

Response: The traffic signal warrants analysis calculations are provided in the Appendix of the TIA.

Comment 24. *"On page 37, the Applicant indicates, "It is recommended that the traffic volumes at this intersection be monitored in the future as additional development is constructed and occupied along Main Street to determine future need for traffic signal control." Nitsch recommends the Applicant participate in a traffic monitoring program approximately six months to one year after occupancy to collect traffic data and perform an additional traffic signal warrant analysis to establish if a traffic signal warrant is met at that time. Nitsch also recommends the Applicant to conduct the follow-up signal warrants analysis using the 11th edition of the 2023 Manual on Uniform Traffic Control Devices (MUTCD), as we anticipate that version to be approved by MassDOT near the time of traffic monitoring."*

Response: The Applicant will commit to a post-construction traffic monitoring program. The details of the post-construction traffic monitoring program will be coordinated with the Town and MassDOT to provide a consistent scope and schedule that works for the review needs of both entities. The most recent analytical methodologies will be used in the traffic monitoring program.

Comment 25. *"Nitsch notes that the Synchro analysis includes the Proposed North Driveway as the fourth leg of the intersection of Main Street and Mill Street under Existing and No Build Conditions. Nitsch recommends the applicant to consider the effects of modeling Mill Street and Main Street as a three-way unsignalized intersection under Existing and Future No-Build conditions, and how it impacts conclusions of the TIA in terms of traffic operations."*

Response: An updated operations analysis for the Existing and No-Build Conditions was conducted that models Main Street at Mill Street as a three-way unsignalized intersection and the results are presented in Table 2 below. The results in Table 2 generally show operations for the Existing and No Build conditions are slightly better when compared to the analysis presented in the TIA. The findings of the operations analysis at the intersection do not change based on this alternative analysis method. The operations analysis worksheets are provided in the attachment to this letter.

Table 2 Intersection Operations Analysis – Main Street at Mill Street

Location / Movement	2025 Existing Conditions				2032 No-Build Conditions				2032 Build Conditions			
	v/c	Del	LOS	95 Q	v/c	Del	LOS	95 Q	v/c	Del	LOS	95 Q
3: Main Street & Mill Street/Proposed North Driveway												
Weekday Morning												
Mill Street EB L/T/R	0.36	40.3	E	2	0.36	37.8	E	2	0.60	73.2	F	3
Proposed North Driveway WB L/T/R	Not in the Existing Condition				Not in the No-Build Condition				0.05	22.8	C	0
Main Street NB L/T/R	0.00	0.0	A	0	0.00	0.0	A	0	0.01	7.9	A	0
Main Street SB L/T/R	0.00	0.0	A	0	0.00	0.0	A	0	0.00	0.0	A	0
Weekday Evening												
Mill Street EB L/T/R	0.93	102.1	F	7	>1.00	>120	F	9	>1.00	>120	F	14
Proposed North Driveway WB L/T/R	Not in the Existing Condition				Not in the No-Build Condition				0.14	26.7	D	1
Main Street NB L/T/R	0.01	8.2	A	0	0.01	8.3	A	0	0.01	8.3	A	0
Main Street SB L/T/R	0.00	0.0	A	0	0.00	0.0	A	0	0.02	10.1	B	0

a volume to capacity ratio
b delay, measured in seconds
c level of service
d 95th percentile queue (in vehicles)
Notes: Future Conditions analyses adjust PHF upward to 0.92 for movements with an existing PHF less than 0.92 in accordance with MassDOT guidelines for traffic impact assessment. Movements with existing PHFs greater than 0.92 were not adjusted.

Comment 26. *"During the site visit, Nitsch observed mobile utility work on Main Street within the study area. We recommend the Applicant coordinate with the Town and MassDOT to confirm if there are any planned roadway projects that may affect future traffic operations and safety affiliated with the Project and confirm with the Town that the utility work is not part of a long-term and/or ongoing utility work that will impact the Project during construction."*

Response: Based on information provided by the Town Planner as well as an initial consultation with MassDOT, there are no roadway projects that will affect future traffic operations beyond those discussed in the TIA. As previously mentioned in Comment 6, the Applicant of the 63 Gratuity Road residential development prepared conceptual improvement plans for the intersection of Main Street at Mill Street. At this time, no definitive plans have been agreed upon to implement the improvements at the intersection.

Should there be any ongoing utility work along the portion of Main Street adjacent to the site during the construction of the Project, the Applicant will coordinate their construction management plan with the applicable utility companies.

Comment 27. *"During site observations, Nitsch identified the following existing advanced warning signage that are subject to improvements:*

27a. The W4-1 Sign, located on Main Street approximately 500 feet north of the intersection at Arlington Street, is inconsistent with the W2-3 sign located south of the intersection for northbound traffic. Because the W4-1 sign implies a yield-controlled intersection instead of

stop-controlled condition, Nitsch expects through traffic on Main Street may be anticipating a vehicle to enter from Arlington Street without stopping. As a result, the driver may be prompted to apply the brakes and be susceptible to a rear-end collision from a trailing vehicle along Main Street. Nitsch recommends the Applicant to work with the Town and MassDOT to apply the proper advanced intersection warning signage (i.e., W2-3) for southbound traffic approaching Arlington Street.

27b. *The existing W2-2 advanced warning sign is located for northbound traffic prior to the three-way unsignalized intersection of Main Street and Mill Street. As part of the recommendations for this project, Nitsch recommends the Applicant to work with the Town and MassDOT to accommodate updated advanced intersection warning signs (i.e., W2-1) for the reconfigured 4-way unsignalized intersection of Main Street at Mill Street and North Site Driveway."*

Response: The Applicant will review the existing W4-1 sign along Main Street southbound in advance of Arlington Street and will request the Town to coordinate with MassDOT to install appropriate advance warning signage in accordance with the guidelines of the Manual on Uniform Traffic Control Devices (MUTCD).

The Applicant will also review the need for advance warning signage along Main Street northbound, south of Mill Street and the proposed site driveway and upgrade or replace as needed. Any signage work by the Applicant along Main Street related to the site driveway will be incorporated into the MassDOT Access Permit application.

Comment 28. *"Nitsch requests the Applicant confirm the hours and operations of the uses on site as well as the expected turnover of emergency vehicles and helicopters using the site during its operating hours. The Applicant should outline how emergency vehicles will impact noise, idling, and resultant pollution levels, while operating within the site."*

Response: The site will be operational 24 hours a day, seven days a week. Based on emergency operations from the former Nashoba Valley Medical Center, the site is anticipated to see, on average, fewer than twenty ambulances per day and one helicopter visit per week. The numbers provided herein are anticipated averages over the course of a year. The site may see isolated exceedances of these numbers due to the unpredictability occurrence of emergency situations. Emergency vehicles are anticipated to operate on the site in accordance with all local, state, and federal laws governing noise, idling, and pollution.

Comment 29. *"Nitsch notes that two additional curb cuts will create vehicle headlight castoff for vehicles entering, exiting, and circulating the site. The Applicant should clarify if any measures are being taken to limit and reduce vehicle headlight castoff."*

Response: Two new driveway curb cuts are proposed by the Project onto Main Street. The proposed southerly driveway curb cut is proposed immediately opposite the low side of a retaining wall, ATM drive through, and existing mature tree at the Mill Run Plaza, a commercial facility. The northerly driveway curb cut is proposed as a fourth leg to the existing Mill Street/Main Street intersection. Therefore, it is not anticipated that headlight castoff will be an issue to any residential properties from either of the new driveway curb cuts proposed by the Project.

Comment 30. *"Nitsch recommends the Applicant to work with the Town on identifying appropriate hours and routes for construction vehicles in a way that will not conflict with the regular peak hours for commuter and school traffic."*

Response: The Applicant will prepare a construction management plan (CMP) that will be subject to review by the Town of Groton in advance of commencing construction of the Project. The CMP will identify specific work hours and construction vehicle routes. The CMP will look to minimize impacts to traffic operations along the surrounding roadways.

Comment 31. *"Nitsch concurs with VHB's acknowledgement that a MassDOT access permit is required for the proposed site driveway curb cuts."*

Response: No response required.

If you have any questions or require additional information, please feel free to contact me at (508) 513-2717 or masantos@vhb.com.

Sincerely,

Michael A. Santos, PE, PTOE

Project Manager

masantos@vhb.com

Attachments

Comment 12 Material

Comment 25 Material

Comment 12 Material

- 63 Gratuity Road Traffic Volume Networks
- Revised No-Build and Build Condition Peak Hour Traffic Volume Networks
- Intersection Operations Analysis – Main Street at Arlington Street

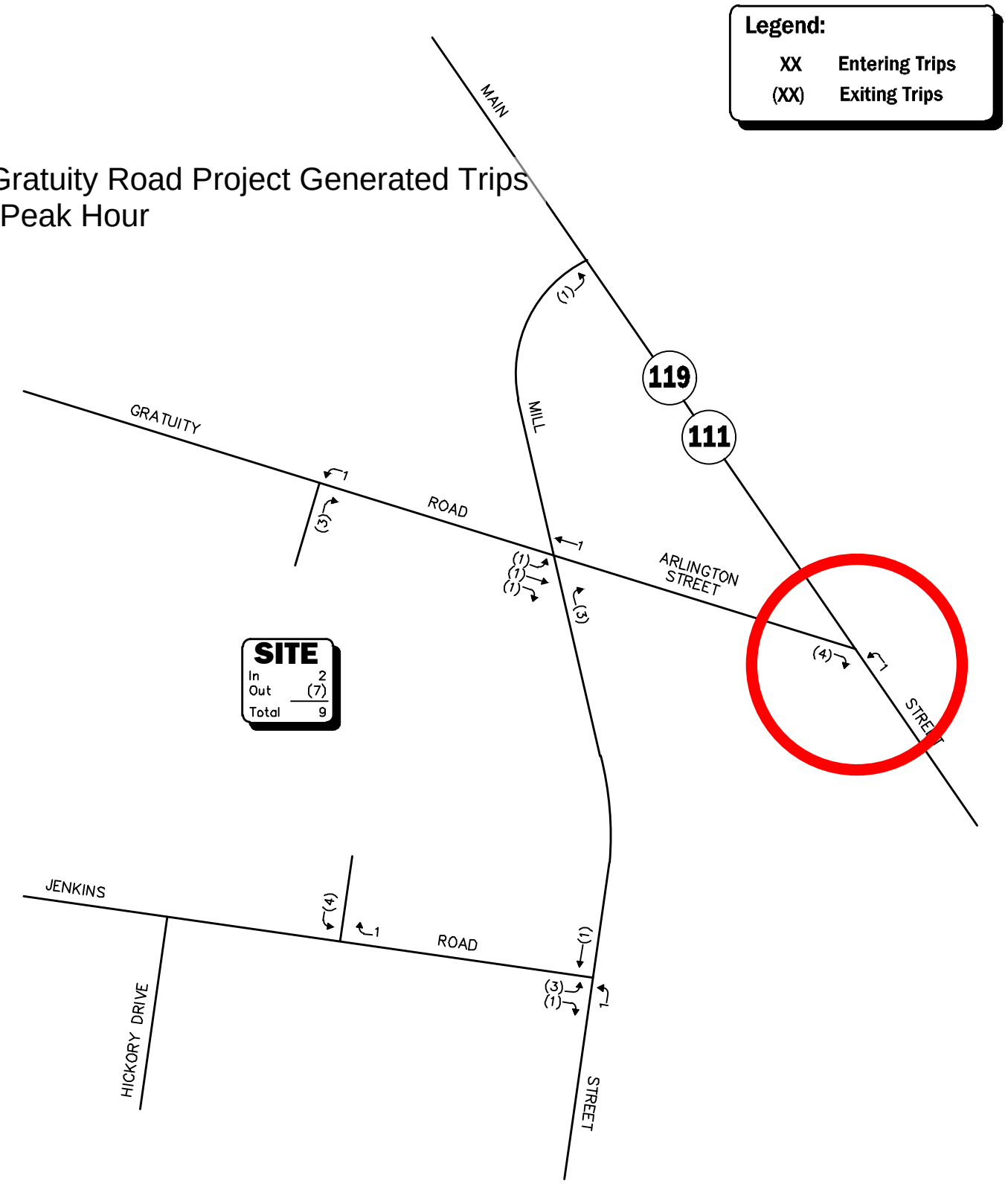


Figure 7

Project-Generated Weekday Morning Peak-Hour Traffic Volumes

Vanasse & Associates inc

63 Gratuity Road Project Generated Trips
PM Peak Hour

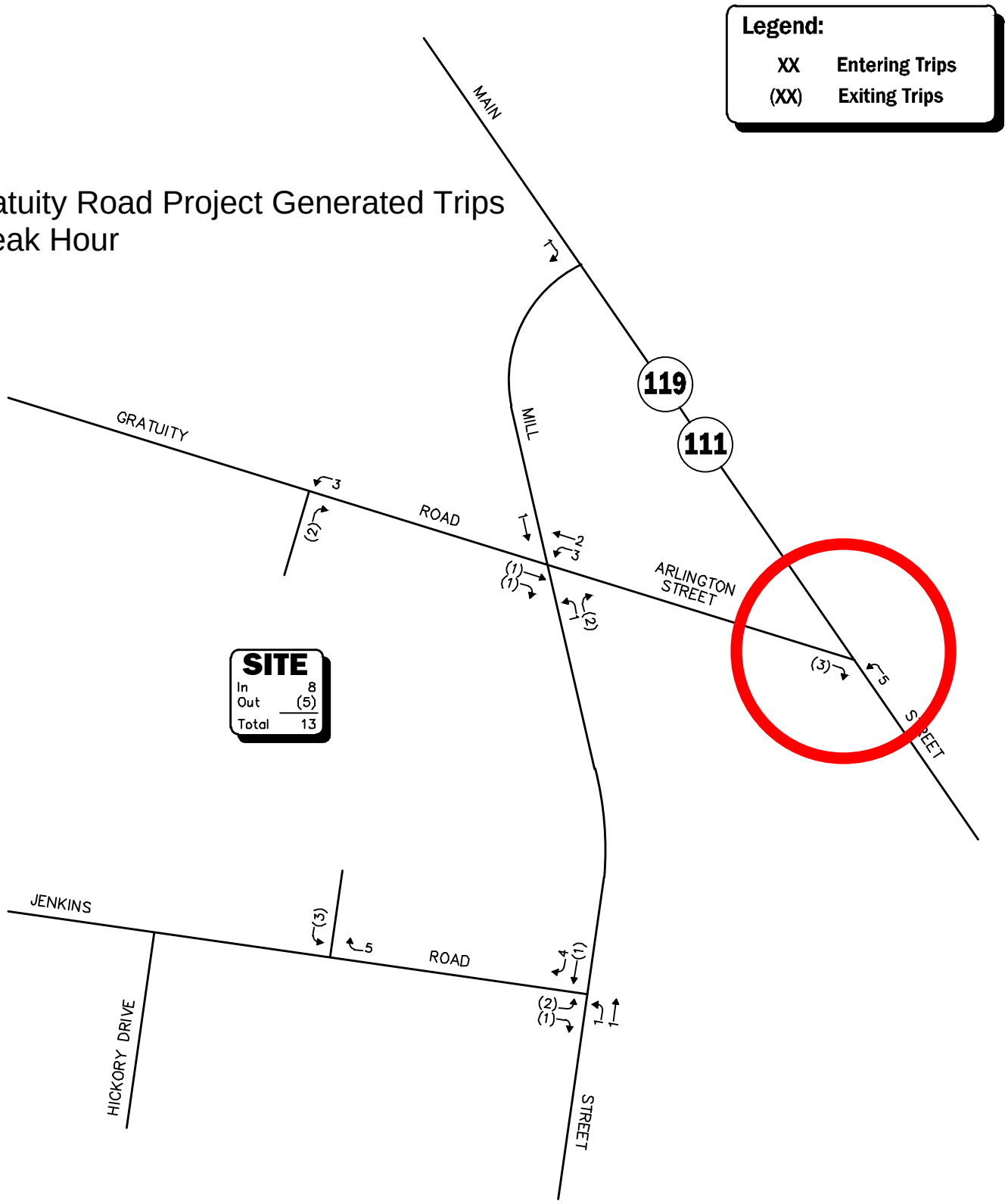


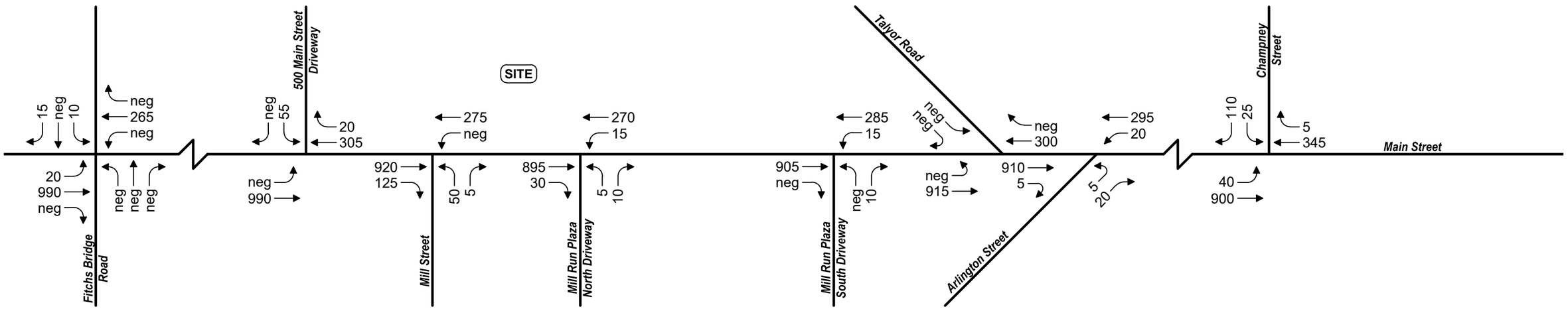
Figure 8

**Project-Generated
Weekday Evening
Peak-Hour Traffic Volumes**

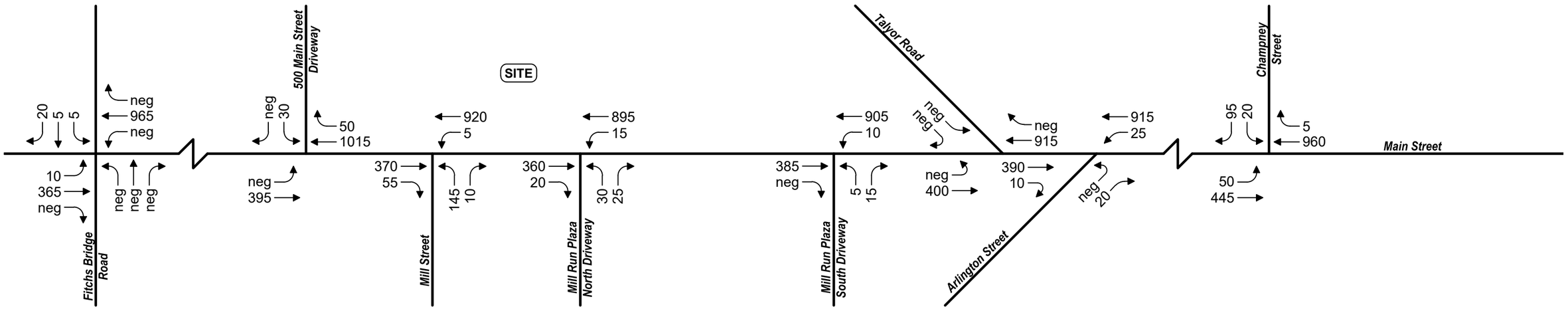
Vanasse & Associates inc

Figure 5R: 2032 No-Build Conditions Peak Hour Vehicle Volumes
Nashoba Valley Satellite Emergency Facility | Groton, MA

neg = **Negligible**



Weekday Morning Peak Hour

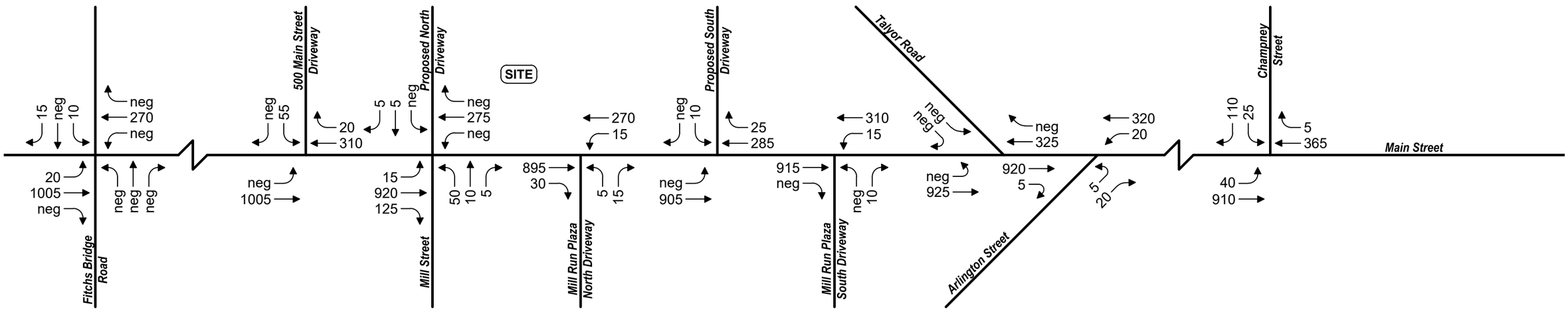


Not to Scale

Weekday Evening Peak Hour

Figure 8R: 2032 Build Condition Peak Hour Vehicle Volumes
Nashoba Valley Satellite Emergency Facility | Groton, MA

neg = **Negligible**



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Intersection	
Int Delay, s/veh	0.6

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	5	20	20	295	910	5
Future Vol, veh/h	5	20	20	295	910	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	36	11	23	9	0
Mvmt Flow	5	22	22	321	989	5

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1357	992	994	0	-	0
Stage 1	992	-	-	-	-	-
Stage 2	365	-	-	-	-	-
Critical Hdwy	6.4	6.56	4.21	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.624	2.299	-	-	-
Pot Cap-1 Maneuver	166	258	661	-	-	-
Stage 1	362	-	-	-	-	-
Stage 2	707	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	159	258	661	-	-	-
Mov Cap-2 Maneuver	159	-	-	-	-	-
Stage 1	348	-	-	-	-	-
Stage 2	707	-	-	-	-	-

Approach	EB	NB	SB
HCM Ctrl Dly, s/v	22.8	0.7	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	661	-	229	-	-
HCM Lane V/C Ratio	0.033	-	0.119	-	-
HCM Ctrl Dly (s/v)	10.6	0	22.8	-	-
HCM Lane LOS	B	A	C	-	-
HCM 95th %tile Q (veh)	0.1	-	0.4	-	-

Intersection	
Int Delay, s/veh	0.3

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	20	25	915	390	10
Future Vol, veh/h	0	20	25	915	390	10
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	0	0	2	1	13
Mvmt Flow	0	22	27	995	424	11

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1479	430	435	0	-	0
Stage 1	430	-	-	-	-	-
Stage 2	1049	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	140	629	1135	-	-	-
Stage 1	660	-	-	-	-	-
Stage 2	340	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	133	629	1135	-	-	-
Mov Cap-2 Maneuver	133	-	-	-	-	-
Stage 1	625	-	-	-	-	-
Stage 2	340	-	-	-	-	-

Approach	EB	NB	SB
HCM Ctrl Dly, s/v	10.9	0.2	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1135	-	629	-	-
HCM Lane V/C Ratio	0.024	-	0.035	-	-
HCM Ctrl Dly (s/v)	8.3	0	10.9	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q (veh)	0.1	-	0.1	-	-

Intersection	
Int Delay, s/veh	0.6

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	5	20	20	320	920	5
Future Vol, veh/h	5	20	20	320	920	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	36	11	23	9	0
Mvmt Flow	5	22	22	348	1000	5

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1395	1003	1005	0	-	0
Stage 1	1003	-	-	-	-	-
Stage 2	392	-	-	-	-	-
Critical Hdwy	6.4	6.56	4.21	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.624	2.299	-	-	-
Pot Cap-1 Maneuver	157	254	655	-	-	-
Stage 1	358	-	-	-	-	-
Stage 2	687	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	150	254	655	-	-	-
Mov Cap-2 Maneuver	150	-	-	-	-	-
Stage 1	343	-	-	-	-	-
Stage 2	687	-	-	-	-	-

Approach	EB	NB	SB
HCM Ctrl Dly, s/v	23.4	0.6	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	655	-	223	-	-
HCM Lane V/C Ratio	0.033	-	0.122	-	-
HCM Ctrl Dly (s/v)	10.7	0	23.4	-	-
HCM Lane LOS	B	A	C	-	-
HCM 95th %tile Q (veh)	0.1	-	0.4	-	-

Intersection	
Int Delay, s/veh	0.3

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	20	25	930	420	10
Future Vol, veh/h	0	20	25	930	420	10
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	0	0	2	1	13
Mvmt Flow	0	22	27	1011	457	11

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1528	463	468	0	-	0
Stage 1	463	-	-	-	-	-
Stage 2	1065	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	131	603	1104	-	-	-
Stage 1	638	-	-	-	-	-
Stage 2	334	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	124	603	1104	-	-	-
Mov Cap-2 Maneuver	124	-	-	-	-	-
Stage 1	602	-	-	-	-	-
Stage 2	334	-	-	-	-	-

Approach	EB	NB	SB
HCM Ctrl Dly, s/v	11.2	0.2	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1104	-	603	-	-
HCM Lane V/C Ratio	0.025	-	0.036	-	-
HCM Ctrl Dly (s/v)	8.3	0	11.2	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q (veh)	0.1	-	0.1	-	-

Comment 25 Material

- Intersection Operations Analysis – Main Street at Mill Street

Intersection	
Int Delay, s/veh	1.5

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	45	5	0	250	840	115
Future Vol, veh/h	45	5	0	250	840	115
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	87	87	67	67	86	86
Heavy Vehicles, %	2	0	0	22	9	3
Mvmt Flow	52	6	0	373	977	134

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1417	1044	1111	0	-	0
Stage 1	1044	-	-	-	-	-
Stage 2	373	-	-	-	-	-
Critical Hdwy	6.42	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	151	281	636	-	-	-
Stage 1	339	-	-	-	-	-
Stage 2	696	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	151	281	636	-	-	-
Mov Cap-2 Maneuver	151	-	-	-	-	-
Stage 1	339	-	-	-	-	-
Stage 2	696	-	-	-	-	-

Approach	EB	NB	SB
HCM Ctrl Dly, s/v	40.3	0	0
HCM LOS	E		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	636	-	158	-	-
HCM Lane V/C Ratio	-	-	0.364	-	-
HCM Ctrl Dly (s/v)	0	-	40.3	-	-
HCM Lane LOS	A	-	E	-	-
HCM 95th %tile Q (veh)	0	-	1.5	-	-

Intersection	
Int Delay, s/veh	11.4

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	135	10	5	845	330	50
Future Vol, veh/h	135	10	5	845	330	50
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	86	86	94	94	86	86
Heavy Vehicles, %	0	0	0	2	1	0
Mvmt Flow	157	12	5	899	384	58

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1322	413	442	0	-	0
Stage 1	413	-	-	-	-	-
Stage 2	909	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	174	643	1129	-	-	-
Stage 1	672	-	-	-	-	-
Stage 2	396	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	172	643	1129	-	-	-
Mov Cap-2 Maneuver	172	-	-	-	-	-
Stage 1	666	-	-	-	-	-
Stage 2	396	-	-	-	-	-

Approach	EB	NB	SB
HCM Ctrl Dly, s/v	102.1	0	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1129	-	181	-	-
HCM Lane V/C Ratio	0.005	-	0.932	-	-
HCM Ctrl Dly (s/v)	8.2	0	102.1	-	-
HCM Lane LOS	A	A	F	-	-
HCM 95th %tile Q (veh)	0	-	7.2	-	-

Intersection	
Int Delay, s/veh	1.5

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	50	5	0	275	920	125
Future Vol, veh/h	50	5	0	275	920	125
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	0	0	22	9	3
Mvmt Flow	54	5	0	299	1000	136

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1367	1068	1136	0	-	0
Stage 1	1068	-	-	-	-	-
Stage 2	299	-	-	-	-	-
Critical Hdwy	6.42	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	162	272	622	-	-	-
Stage 1	330	-	-	-	-	-
Stage 2	752	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	162	272	622	-	-	-
Mov Cap-2 Maneuver	162	-	-	-	-	-
Stage 1	330	-	-	-	-	-
Stage 2	752	-	-	-	-	-

Approach	EB	NB	SB
HCM Ctrl Dly, s/v	37.8	0	0
HCM LOS	E		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	622	-	168	-	-
HCM Lane V/C Ratio	-	-	0.356	-	-
HCM Ctrl Dly (s/v)	0	-	37.8	-	-
HCM Lane LOS	A	-	E	-	-
HCM 95th %tile Q (veh)	0	-	1.5	-	-

Intersection	
Int Delay, s/veh	15.5

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	145	10	5	920	370	55
Future Vol, veh/h	145	10	5	920	370	55
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	94	94	92	92
Heavy Vehicles, %	0	0	0	2	1	0
Mvmt Flow	158	11	5	979	402	60

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1421	432	462	0	-	0
Stage 1	432	-	-	-	-	-
Stage 2	989	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	~ 152	628	1110	-	-	-
Stage 1	659	-	-	-	-	-
Stage 2	363	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	~ 150	628	1110	-	-	-
Mov Cap-2 Maneuver	~ 150	-	-	-	-	-
Stage 1	652	-	-	-	-	-
Stage 2	363	-	-	-	-	-

Approach	EB	NB	SB
HCM Ctrl Dly, s/v	148.3	0	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1110	-	158	-	-
HCM Lane V/C Ratio	0.005	-	1.066	-	-
HCM Ctrl Dly (s/v)	8.3	0	148.3	-	-
HCM Lane LOS	A	A	F	-	-
HCM 95th %tile Q (veh)	0	-	8.6	-	-

Notes	
~: Volume exceeds capacity	$: Delay exceeds 300s
+: Computation Not Defined	*: All major volume in platoon