



March 4, 2021

Ref: 52747.02

Mr. Michael Behrendt
Durham Town Planner
8 Newmarket Road
Durham, NH 03824

Re: Traffic Engineer Peer Review
Proposed Student Housing Parking Expansion – 19-21 Main Street

Dear Mr. Behrendt,

Vanasse Hangen Brustlin, Inc. (VHB) has conducted a peer review of the November 23, 2020 Traffic/Parking Evaluation memorandum prepared by Stephen G. Pernaw & Company, Inc. for a proposed expansion of the student housing parking lot located at 19-21 Main Street in Durham, New Hampshire. The parking lot currently provides for approximately 43 vehicles. As part of the proposed project, the parking area would be reconfigured and expanded to provide 183 parking spaces. Access would be provided via the existing full access driveway on Main Street. Subsequently, the applicant submitted a January 14, 2021 Traffic/Parking Evaluation memorandum that evaluated the impacts associated with a reduced build program (from 183 parking spaces to 180 parking spaces).

VHB has reviewed these traffic studies for consistency with standard engineering practice and methodologies, including Town of Durham guidelines and requirements, as applicable. This peer review letter has been prepared to outline concerns and recommendations on these Traffic/Parking Evaluations.

Development Program

Comment 1: The project consists of expanding the existing parking area at 19-21 Main Street to provide an additional 137 spaces (from 43 spaces to 180 spaces). As stated within the January 2021 Traffic/Parking Evaluation, the purpose of the parking lot expansion is to accommodate residents at 19-21 Main Street. In addition, a portion of the proposed parking spaces would be associated with University of New Hampshire (UNH) students who, for the most part, would reside at other student housing developments (e.g., Mill Road Plaza and other locations). **The applicant should clarify if the proposed parking spaces would be assigned/designated and provide a breakdown of how many spaces would be associated with the existing student housing development at 19-21 Main Street versus the other off-site student housing developments.**

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Existing Conditions

Traffic Counts

Turning movement counts were collected at the Main Street intersection with the site driveway on February 12, 2020 (Wednesday) during the weekday PM peak period (2-6 PM), on February 13, 2020 (Thursday) during the weekday AM peak period (7-9 AM), and on February 15, 2020 (Saturday) during the Saturday peak period (10 AM-2 PM).

Comment 2: VHB concurs that the traffic counts were collected in accordance with standard traffic engineering practice.

Comment 3: VHB compared the existing traffic counts with Institute of Transportation Engineers (ITE) trip-generation estimates for a similar use.¹ The existing traffic counts were found to support between 30 and 70 residents.² Based on a review of the Town of Durham's online property assessment information, there are approximately 45 student housing occupants for 19, 19A, 19B, and 21 Main Street.³ The 45 occupants allowed per the Town's assessment information fall within the ITE methodology range for the existing site trips. Therefore, the existing site trips entering and exiting the site are consistent with trip-generation estimates (ITE methodologies).

Parking Observations

Parking demand observations were conducted within the site on February 12, 2020 (Wednesday), February 13, 2020 (Thursday), and February 15, 2020 (Saturday). The parking demand collection program consisted of counting the number of parked vehicles to establish a base condition and then noting vehicles entering and exiting the site throughout the course of the day.

Comment 4: VHB agrees that the parking observation program is consistent with standard traffic engineering practice. The results show that there are not enough parking spaces (supply = 43 spaces) to accommodate the maximum number of vehicles that currently park within the site overnight (demand = 45 vehicles).

Study Area

The Traffic/Parking Evaluation assessed the traffic impacts of the proposed parking lot expansion project at the Main Street and site driveway intersection.

¹ Institute of Transportation Engineers. Trip Generation Manual, 10th ed. Land Use Code 225 Off-Campus Student Apartment. Washington, DC, 2017.

² 30 residents = 4 total trips during the weekday AM peak hour, 70 residents = 20 total trips during the weekday PM peak hour.

³ Durham, NH Online Assessment Database, Vision Government Solutions, Inc., 19 Main Street = 32 occupants, 19A Main Street = 6 occupants, 19B Main Street = 4 occupants, and 21 Main Street = 3 occupants.



Comment 5: In accordance with common traffic engineering practice, a development may have a noticeable impact if the addition of site trips would increase traffic volumes by 100 vehicles or more through an intersection.^{4, 5} The rationale is that this magnitude could change vehicular operations (i.e., drop level of service or increase delay by 10 seconds or more). A safety or capacity deficiency may require the study of a project's impacts at an intersection even if that intersection is projected to experience less than 100 peak hour site trips. If the traffic impacts from downstream or upstream intersections impact the operations of a site driveway, then those nearby intersections may also need to be included within the traffic study evaluation.

Based on field observations, traffic volumes along Main Street westbound may queue back from Madbury Road to the site driveway. Once traffic volumes normalize (post-COVID-19 conditions) and under future traffic-volume conditions, this event could occur more frequently. As a result, vehicles turning left from the site driveway onto Main Street westbound and left turns from Main Street westbound onto the site driveway may experience longer delays than as modeled within the traffic study. **The study area should be expanded to include the traffic impacts from the Main Street and Madbury Road intersection (e.g., intersection analyses, queuing observations, stop delay study on the site driveway approach, etc.).**

No-Build Conditions

As documented in the Traffic/Parking Evaluation, future traffic volumes were evaluated under 2031 conditions. Future traffic volumes on the roadway network include existing traffic, new traffic due to normal traffic growth, and traffic related to significant development by others that are expected to be completed within the design horizon.

Traffic on a given roadway typically fluctuates throughout the year depending on the area and the type of roadway. Based on New Hampshire Department of Transportation (NHDOT) guidelines, traffic volumes must represent the peak of the monthly average peak-hour and daily conditions. Therefore, the 2031 No-Build traffic volumes were developed by applying the following factors to the 2020 Existing traffic volumes:

⁴ Transportation Impact Analyses for Site Development: An ITE Proposed Recommended Practice. Washington, DC: Institute of Transportation Engineers, 2010.

⁵ State of New Hampshire Inter-Department Communication, from Robert E. Bollinger, P.E., PTOE, New Hampshire Department of Transportation Traffic Operations Engineer to Caleb B. Dobbins, P.E., State Maintenance Engineer. 17 Feb. 2010.



- A 1% compounded annual growth rate based on NHDOT historical traffic data collected in the vicinity of the site.⁶
- A 1.20 seasonal adjustment factor based on NHDOT monthly traffic volumes.⁷
- No specific development by others were identified to be included that could impact future traffic volumes within the study area.

Comment 6: Upon review of the historical traffic growth data provided in the Traffic/Parking Evaluation, traffic volumes have experienced a negative trend in traffic growth between 2015 and 2019. For conservative (worse-case) purposes and in compliance with NHDOT guidance, a 1% compounded annual rate was used to account for general population growth and traffic associated with smaller developments in the area. Therefore, VHB finds the historical growth rate methodology acceptable and consistent with standard traffic engineering practice.

Comment 7: Based on NHDOT methodologies, peak-month traffic volume adjustments should be based on the closest permanent recorder station that is on a similar type of roadway. The NHDOT Group Averages could be used should no permanent count station on a similar type of roadway be reasonably nearby. Upon review of NHDOT's database, there is a count station located within 1 mile of the development site along US Route 4 (Piscataqua Road) east of NH Route 108 (Dover Road).⁸ Since Main Street adjacent to the site and US Route 4 have different characteristics⁹ and the Group 4 Averages require a higher seasonal adjustment factor (1.20 vs. 1.11), the methodology used provides a conservative (worse-case) analysis. Therefore, VHB finds the seasonal adjustment method reasonable.

Build Conditions

Trip Generation

To estimate the volume of traffic to be generated by the proposed parking lot expansion project, trip rates were developed based on a ratio of the February 2020 traffic counts¹⁰ to the 43 existing parking spaces. The calculated trip rates were then applied to the proposed 183 parking spaces to determine the total volume of site trips that would be expected to enter and exit the site during the weekday AM, weekday PM, and Saturday peak hours as well as on a weekday and a Saturday daily basis.

⁶ Main Street west of NH 108, Durham, NH, NHDOT Count Station 82133051, 2015-2019. Madbury Road north of Main Street, Durham, NH, NHDOT Count Station 81133085, 2015-2019. Main Street east of Pettee Brook Lane, Durham, NH, NHDOT Count Station 82133087, 2015-2019.

⁷ NHDOT Group 4 Averages (Urban Highways).

⁸ NHDOT Count Station 02133021, February traffic volumes are 11% below peak-month traffic volumes.

⁹ Main Street = Minor Arterial, Town jurisdiction, 2019 Annual ADT (AADT) = 12,157 vehicles per day. US 4 = Principal Arterial, NHDOT District 6 jurisdiction, 2019 AADT = 15,596 vehicles per day.

¹⁰ Traffic counts collected entering and exiting the site at the Main Street intersection.



Comment 8: The site trips associated with the proposed project were estimated based on a ratio of the existing driveway traffic counts per the number of existing spaces applied to the proposed 180 parking spaces. The methodology used in determining the volume of site trips associated with the proposed parking lot expansion project is consistent with standard traffic engineering practice.

Comment 9: The proposed 180 parking spaces are intended to serve the student housing development at 19-21 Main Street. In addition, a portion of the proposed parking spaces would be associated with UNH students who would reside at other student housing developments. Should these parking spaces be purposed for another use, then the volume and frequency of the site trips could differ.

Trip Distribution

The additional site trips developed for the proposed parking lot expansion project were distributed along the adjacent roadway system based on the existing traffic counts collected during the weekday AM, weekday PM, and Saturday peak hours.

Comment 10: VHB finds the trip-distribution methodology to be acceptable. Should the delays exiting the site driveway increase noticeably as a result of the computer model calibration associated with the Main Street westbound queues extending back from Madbury Road (see Comment 5), then motorists destined for Main Street west and Madbury Road north may choose to exit the site by turning right and then reversing direction. **The applicant should conduct an assessment to determine which alternate routes motorists may consider (e.g., based on proximity, travel time, roadway characteristics, legislative class, etc.) should the left turns exiting from the site driveway be projected to experience operational deficiencies.**

Intersection Analyses

Capacity analyses were performed for the Main Street site driveway intersection with the 2020 Existing, 2031 No-Build, and 2031 Build traffic volumes during the weekday AM, weekday PM, and Saturday peak hours based on the concepts and procedures in the Highway Capacity Manual (HCM).

Comment 11: In accordance with Chapter 16, Section 16.4.3 of the Town's Site Plan Regulations, the traffic impacts of a project should be based on the current edition of the HCM. As noted within the footnote on page 11 of the Traffic/Parking Evaluation, the HCM 2000 version was used. Within the Attachments – Section H of the Traffic/Parking Evaluation, the intersection operational analyses are shown to be based on the HCM 2010 version. At this time, the HCM 6th edition is the current version that was published in 2016. **The applicant should revise the intersection analyses based on the current HCM 6th edition or provide support and clarification for using the older version.**

Comment 12: As documented within the Traffic/Parking Evaluation, the exiting movements from the site driveway onto Main Street are projected to operate with long delays (LOS F) during



2031 Build weekday PM peak hour traffic-volume conditions. Based on standard traffic engineering practice, there are other measures of effectiveness to delays and levels of service that assist traffic engineers in making transportation decisions.¹¹ Volume-to-capacity (v/c) ratios indicate a roadway's ability to accommodate the vehicle demand.¹² When a roadway's capacity is reached, the vehicular demand is equivalent to the capacity (i.e., v/c ratio = 1.00). Estimating vehicular queues helps to identify whether there would be storage available to accommodate stopped vehicles.

Although the site driveway exiting movements would be anticipated to experience long delays during the weekday PM peak hour, ample capacity is shown to be available (v/c ratio = 0.59), vehicle queues would be minimal (95th percentile queue = 3 vehicles), and delays would occur on site. **Further evaluation of the intersection operations should be conducted due to the impacts associated with Main Street westbound vehicles extending from Madbury Road to the site driveway that may impact delays, v/c ratios, and queuing (see Comments 5 and 10).**

Sight Distance

Comment 13: In compliance with Chapter 16, Section 16.3 of the Town's Site Plan Regulations, a sight distance evaluation is required to be conducted based on the American Association of State Highway and Transportation Officials' (AASHTO's) Policy for the Geometric Design of Highways and Streets. **Therefore, the applicant should conduct an evaluation of the available sight lines at the Main Street and site driveway intersection to ensure that all season safe sight distances will be provided in accordance with the Town's standards.**

Findings

In general, the traffic study was developed in accordance with the Town of Durham's Site Plan Regulations¹³ and standard traffic engineering practice. As detailed within this traffic peer review document, the applicant should clarify the assignment of proposed on-site parking spaces (19-21 Main Street versus other off-site UNH student housing developments) and the HCM methodology used in evaluating intersection operations (2000, 2010, or 6th edition). In addition, the applicant should provide a sight distance evaluation for the Main Street site driveway intersection and expand the study area to

¹¹ As per HCM 6th edition: In evaluating the overall performance of two-way stop controlled (TWSC) intersections, it is important to consider various measures of effectiveness such as v/c ratios and queue lengths for individual movements in addition to delays.

¹² The v/c ratio is a measurement of the operating capacity of a roadway or intersection and whether the physical geometry provides sufficient capacity for the subject movement. If the v/c ratio < 1.00, then the facility has additional capacity available. If the v/c ratio > 1.00, then more vehicles demand to use the roadway than can be accommodated.

¹³ Sections 5.1.1 and 5.1.2: Traffic Impact Analysis, and Section 16.4: Traffic Impacts.

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include the traffic impacts associated with Main Street westbound vehicles queueing back from Madbury Road to the site driveway.

Please do not hesitate to contact us if you have any questions or if we can be of any further assistance.

Sincerely,

Vanasse Hangen Brustlin, Inc.

A handwritten signature in blue ink that reads "Jason R. Plourde".

Jason R. Plourde, P.E., PTP

Transportation Systems Team Leader

JPlourde@vhb.com