



TO:	Melissa Rodrigues Town Manager, Town of Sudbury	DATE:	November 21, 2018
FROM:	Keri Pyke, P.E., PTOE Andrew Fabiszewski	HSH PROJECT NO.:	2018218
SUBJECT:	Transportation Peer Review Melone Residential Development, Sudbury, Massachusetts		

As requested, *Howard Stein Hudson (HSH)* conducted a peer review of the materials prepared for the proposed development at North Road in Sudbury, Massachusetts. Our evaluation is based on the following documents:

- *Melone Residential Development, Traffic Impact Study (TIS), Sudbury, McMahon Associates, Inc., dated October 2018;*
- *Appendix for Traffic Impact Study Residential Development, North Road, Sudbury, MA, McMahon Associates, Inc., dated October 2018; and*
- *Melone Residential Traffic Mitigation Memorandum, McMahon Associates, Inc., dated October 19, 2018.*

The Project site is located on North Road (Route 117) in Sudbury, Massachusetts. The proposed Project would involve the construction of 274 rental apartment units of which 60 would be age-restricted. The Project will primarily be accessed by a driveway on Route 117, with two additional driveways for service and emergency access.

The purpose of this review is to ensure that the traffic analysis conforms to industry standards, to confirm that the traffic study methods are appropriate for the setting, and to ensure that the recommendations and proposed mitigation adequately address potential project impacts and are consistent with the Town of Sudbury's guidelines for transportation improvements. The key findings of our review of these documents are summarized below and presented in the following sections. The comments are organized by the same headers provided in our outlined scope of services.

Summary of Review

HSH conducted a comprehensive peer review of the TIS for the proposed residential development located on Route 117 in the Town of Sudbury. This memorandum consists of a review of the methodology and assumptions used in the TIS, the key findings of the TIS, and the appropriateness of the proposed mitigation.



The review of the methodology and assumptions used in the TIS indicates that in general, the traffic study conforms to industry standards and best engineering practices. The TIS includes an analysis of Existing, No-Build (future conditions without the Project), and Build (future conditions with the Project) conditions. The Applicant identified the potential transportation-related impacts of the Project by estimating the number of trips expected to travel to and from the Project site during the weekday a.m. and p.m. peak hours of traffic operations. Data provided in the Institute of Transportation Engineers' (ITE's) *Trip Generation Manual* and empirical count data was used, and projected traffic volumes were assigned to the study area to develop the Build conditions.

In summary, the proposed Project is expected to generate approximately 110 new trips (27 entering, 83 exiting) in the weekday a.m. peak period and 136 new trips (85 entering, 51 exiting) in the weekday p.m. peak period. Based on the analysis provided in the TIS, the surrounding roadways and intersections have capacity to handle the increase in traffic volumes, but it is unclear whether the proposed mitigation will be adequate to maintain the same or better traffic operations as before the Project.

Scope of Review

The following issues were reviewed:

- Study Area Boundaries
- Traffic Data Collection
- Selection of Peak Hour
- Off-site Changes
- Non-site Traffic
- Trip Generation
- Site Traffic Distribution and Assignment
- Traffic Impact Analysis
- Mitigation Measures

Existing Conditions

STUDY AREA BOUNDARIES

The Applicant study area was based on the intersections expected to be affected by traffic generated by the project. The intersections included are:

- Fitchburg Turnpike (Route 117)/Sudbury Road (Signalized);
- North Road (Route 117)/Dakin Road/Pantry Road (Signalized);
- North Road (Route 117)/Powder Mill Road/Mossman Road (Unsignalized); and
- North Road (Route 117)/Site Driveway (Unsignalized).



The roadway network defined by the Applicant includes the following streets:

- North Road/Fitchburg Turnpike (Route 117);
- Sudbury Road;
- Dakin Road;
- Pantry Road;
- Powder Mill Road; and
- Mossman Road.

HSH agrees with the defined study area boundaries.

TRAFFIC DATA COLLECTION

The Applicant conducted turning movement counts (TMC) at each of the study area intersections during the weekday morning peak period (7:00 – 9:00 a.m.) and weekday evening peak period (4:00 – 6:00 p.m.). The counts were conducted on September 27, 2018. Traffic volumes during the month of September tend to be higher than the average month so the volumes were not seasonally adjusted to provide a conservative analysis. Automatic Traffic Recorder (ATR) counts were conducted on September 27, 2018, on North Road near to the site to obtain weekday daily traffic volumes, speeds, and vehicle classifications.

HSH agrees with the Applicant's data collection methodology.

SELECTION OF PEAK HOUR

The Applicant studied a weekday morning peak period of 7:00 – 9:00 a.m. and a weekday evening peak period of 4:00 – 6:00 p.m. The peak hours using this data were determined to be 7:45 – 8:45 a.m. for the weekday morning peak hour and 5:00 – 6:00 p.m. for the weekday evening peak hour. The peak hour traffic volumes are shown in Figures 2 and 3 of the TIAS.

HSH agrees with the Applicant's selection of peak hour.

Future Conditions

OFF-SITE CHANGES

The Applicant consulted with the Town and reviewed MassDOT's Project Database to determine that there are no roadway improvement projects proposed in the vicinity of the study area.

HSH agrees with the Applicant's methodology in determining relevant off-site transportation changes.



NON-SITE TRAFFIC

The Applicant consulted with the Town of Sudbury Planning Department to determine any specific planned developments in the area that would potentially affect traffic in the study area. The only such development identified was the Maynard Crossing mixed-use development at 129 Parker Street. The trip generation from the traffic impact study for this project prepared by Green International Affiliates, Inc. was used to account for the impact on the study area.

The Applicant reviewed historic count data by the MassDOT continuous count station on Elm Street (Route 2) in Concord to determine a background growth rate. Based on this review and discussion with the Sudbury Planning Department, a 1.0% annual growth rate was used.

HSH agrees with the Applicant's methodology in determining specific planned development traffic and with the background growth rate applied.

TRIP GENERATION

To estimate the site-generated traffic for the proposed mixed-use development, ITE's *Trip Generation, 10th Edition* was utilized based on Land Use Code (LUC) 220 – Multifamily Housing (Low Density) and LUC 252 – Senior Adult Housing (Attached).

The Applicant estimates that 110 new trips (27 entering, 83 exiting) will be generated by the Project in the weekday a.m. peak period and 136 new trips (85 entering, 51 exiting) will be generated by the Project in the weekday p.m. peak period. These were the new trips that the Applicant applied to the No-Build volumes to calculate Build volumes.

HSH agrees with the Applicant's trip generation methodology and notes that if the mix of units is changed to favor more Senior Adult Housing then the trip generation will go down from the values projected in the TIS.

SITE TRAFFIC DISTRIBUTION AND ASSIGNMENT

The TIS asserts that the trip distribution was developed based on expected travel routes to and from the site based on the U.S. Census Journey-to-Work data. Based on this assessment, 55% of the new site traffic is expected to come from and head to the east along Route 117 with 25% heading north along Sudbury Road and the other 30% continuing east along Route 117. The other 45% of new site traffic is anticipated to head west along Route 117 with 30% heading south along Pantry Road and the remaining 15% continuing west along Route 117.

HSH generally agrees with the trip distribution and assignment based on U.S. Census Journey to Work data.



TRAFFIC IMPACT ANALYSIS

To assess the potential traffic impact of the development on the adjacent traffic network, several steps are involved, as follows:

- Determine existing volumes and analyze existing traffic operating conditions for the study intersections;
- Generate and analyze No-Build traffic volumes by applying a background growth factor to the existing traffic volumes and adding approved/pending developments as well as planned transportation improvements;
- Determine the traffic volumes to be generated by the proposed development; distribute and assign traffic throughout the study area network; and
- Combine the background traffic volumes with the proposed traffic volumes to establish Build traffic volumes, analyze traffic operations, and identify mitigation of potential impacts.

The traffic operations analysis presents detailed measures of effectiveness (MOEs) to assess the operating characteristics of the study intersections. The MOEs reported are average vehicle delay, level of service (LOS), volume-to-capacity ratio, and queue lengths. The LOS is a letter grade that is assigned to a range of vehicular delays at the intersection. LOS A represents little delay and is usually associated with low volume movements. LOS F represents higher delays and could indicate issues related to traffic congestion.

The Applicant used Synchro traffic engineering software to analyze all the intersections in the network. Synchro engineering software is an industry standard that allows engineering practitioners to model traffic operations based on various inputs such as traffic volumes and traffic control devices (stop signs, traffic signals, etc.).

As shown in the analysis, between the No-Build and the Build Condition there is not a substantial increase in delays from the Project as the only movement that decreases to LOS E or worse is the Sudbury Street southbound left-turn lane at the intersection of Route 117/Sudbury Street. All of the other intersection movements that operate at LOS E or F in the Build Condition also do so under the No-Build Condition, signifying that the poor operation will not be a result of the Project.

The analysis at the intersection of Route 117/Powder Mill Road/Mossman Road shows LOS F with extremely high volume to capacity ratios during both the a.m. and p.m. peak hours across all three conditions. These results seem unrealistically poor and HSH recommends that these results be reexamined and potentially calibrated with a gap-acceptance study and/or queueing observation to portray more accurate operations before a traffic signal is considered.



HSH generally agrees with this assessment. HSH encourages the Applicant to further investigate the long queuing on Powder Mill Road and determine whether it is being accurately modeled.

MITIGATION MEASURES

The TIAS recommended mitigation measures including site-related improvements, off-site improvements, and Transportation Demand Management (TDM) policies.

SITE IMPROVEMENTS

The Applicant recommends constructing (or contributing funds towards) a sidewalk along North Road to connect the site to Davis Field. Additionally, the Applicant recommends constructing a sidewalk on-site to North Road with a safe bus stop area and to remove vegetation and landscaping that blocks site lines of the driveway. The Applicant recommends that a traffic monitoring study be conducted 1 year after substantial occupancy to determine whether the mitigation measures are adequate for the actual impact that the Project has. Should this monitoring study find that future volumes warrant a traffic signal at the site driveway, then a traffic signal should be installed.

HSH agrees with the proposed site improvements but notes that the Town is not interested in a sidewalk to Davis Field.

OFF-SITE IMPROVEMENTS

The Applicant recommended intersection improvements at seven locations. The locations and mitigation measures are outlined below along with their estimated costs:

Table 1. Mitigation Cost Estimates

Location	Mitigation	Approximate Cost
Route 117/Mossman Rd/Powder Mill Rd	Signage and pavement marking improvements	\$2,000
	Evaluation for a future traffic signal	\$5,000
	New traffic signal (if deemed necessary)	\$350,000 ^a
Route 117/Dakin Rd/Pantry Rd	Optimize signal timings	\$1,000
	Evaluate existing loop detectors (Assuming upgrade)	\$5,000



	Signage and pavement marking improvements	\$2,000
	Long-term pedestrian improvements and adaptive signal control	\$55,000
Route 117/Davis Field	Investigate turn lanes to reduce congestion during peak field use, which would require roadway widening	\$105,000 ^b
Route 117/144 North Rd	Investigate turn lanes to reduce congestion which would require roadway widening	\$140,000 ^c
Route 117/Melone Site Driveway	Consideration for turn lanes	\$140,000 ^c
	Intersection warning signage and sight line improvements	\$2,000
	New traffic signal (if deemed necessary)	\$350,000 ^a
Route 117/Plainfield Rd	Short-term signage and pavement marking improvements along with vegetation trimming to improve sight lines	\$5,000
	Investigate turn lanes that would require roadway widening	\$140,000 ^c
Route 117/Sudbury Rd	Optimize signal timings	\$1,000
	Consider protected turning movements to reduce accident risks	\$5,000- \$10,000
	Signage and pavement marking improvements	\$2,000
	Long-term signal upgrade for adaptive signal control	\$50,000
Route 117/Route 126	Short-term signal timing and phasing improvements	\$1,000
	Long-term signal upgrade for adaptive signal control.	\$50,000
General	Corridor study	\$100,00 to \$250,000
	Traffic Monitoring Study	\$8,000

a. Only includes signal equipment, no associated site work

b. Assumes 75 ft long left-turn lane and no utility or right of way related costs

c. Assumes 100 ft long left-turn lane and no utility or right of way related costs



The supporting analysis behind the proposed mitigation measures was not provided to HSH, and as such we cannot determine the effectiveness of the proposed improvements and whether they are adequate to mitigate the projected impact of the Project.

HSH generally agrees with the proposed improvements. HSH encourages the Applicant to provide supporting analysis regarding the effectiveness of the proposed signal timing improvements to ensure that they mitigate the impacts of the Project.

TRANSPORTATION DEMAND MANAGEMENT (TDM)

The Applicant has recommended the following TDM measures:

- Construction of sidewalks connecting to North Road;
- Construction of sidewalks to connect Davis Field to North Road; and
- Provision of bicycle racks or bicycle storage areas on site in a central location.

HSH generally agrees with the proposed TDM measures but encourages the Applicant to consider additional TDM measures to reduce single occupancy vehicle trips to and from the site.

Conclusions

Based on the overall review of the TIS, HSH generally agrees with the methodology used in the TIS. The Project is expected to generate approximately two new vehicle trips per minute during the weekday morning and evening peak hours.

HSH recommends that the Applicant investigate the extreme delays being modeled at the intersection of Route 117/Mossman Road/Powder Mill Road. They should provide supporting analysis for their proposed mitigation measures to ensure that they adequately mitigate the impact of the Project and address the sparse recommendations for TDM.