

MEMO

TO: Rick Taintor

FROM: Erica Wygonik, PhD, PE

DATE: March 19, 2021

SUBJECT: Peer Review of TIS for the Mill Plaza Redevelopment

RSG has completed a peer review of the Traffic Impact and Access Study (TIS), dated August 14, 2020 for the Mill Plaza Redevelopment located at 7 Mill Road in Durham, New Hampshire.

Summary:

The study overall finds no significant impacts to vehicular operations. The study suggests installation of a Rectangular Rapid Flashing Beacon at the midblock crossing on Mill Road. The study suggests the town considers relocating the crosswalk at the Main Street/Madbury Road intersection across Main Street to the west to shorten the crossing distance.

The RSG review of the study identified a need to provide additional documentation in a number of places in the study. While the study finds no significant impacts to vehicular operations, additional documentation for the supporting analysis is needed before RSG is able to review these findings. RSG also recommends additional analysis of the Main Street/Newmarket Road/Dover Road intersection.

The following additional mitigation measures may be appropriate:

- providing funds to update and optimize the signal timings at the Main Street/Newmarket Road/Dover Road intersection.
- providing additional bicycle racks.
- relocating the Mill Road/Plaza Drive crosswalk to the south of the drive entrance, in line with south side pedestrian desire line.
- implement the suggested shift of the crosswalk at Main Street/Madbury Road.

Review of Traffic Impact Assessment:

ITEM 1: Volumes Documentation

The text of the report outlines appropriate and necessary adjustments to make to the volumes to support the analysis. However, it is not clear how they have been applied, and the volumes included in the report figures are not readily reproduced.

Additional information should be provided to indicate how peak hour volumes were selected, what adjustments were applied to which movements at each intersection, and what changes were made due to balancing.

As an example, 368 westbound lefts were observed at the Main Street/Newmarket Road/Dover Road intersection (Appendix B, Sheet 145) during the 12:00 PM to 1:00 PM peak hour on Saturday 26 October 2019. This movement would not be expected to be affected by balancing, but it should be subject to seasonal and annual adjustments. Applying the 5% seasonal adjustment to this movement would result in a volume of 386 vehicles, however Figure 4 (page 22) indicates a volume of 373 vehicles for the existing conditions. This particular volume is used as an example here, but the concern applies to all the volumes in the report. These types of discrepancies were noted throughout the volume figures.

ITEM 2: Trip Distribution

The TIS states:

Trip distribution patterns for the Project were based on existing traffic patterns throughout the study area. (page 4-2/sheet 13)

The existing trip distribution shown on Figure 9 (page 27) is different than the proposed trip distribution in Figures 10-12 (pages 28-30). Please explain why the trip distribution changes.

It appears the same distribution was used for both the PM peak hour and Saturday peak hour conditions. Additional information justifying this assumption is necessary.

It is not clear how the existing trip distribution was developed. Additional information documenting the development of the existing trip distribution is necessary.

ITEM 3: Trip Generation: Internal Capture

The internal capture estimation presented in Appendix E does not align with the information in Appendix F. The number of exiting retail trips is different between the two sheets; Appendix E does not include any residential trips; and Appendix E estimates 6 internal entering and exiting trips in the PM peak hour, while Appendix F estimates 36 entering and exiting trips in the PM peak hour and 33 entering and exiting trips in the Saturday afternoon peak hour. Additional information explaining these discrepancies is necessary.



ITEM 4: Saturday Pedestrian Generation

The TIS did not include information regarding existing or projected Saturday pedestrian activity. Additional information is requested.

ITEM 5: Operational Impact of Pedestrians at Intersections

The TIS stated that pedestrian trips “were incorporated into the traffic capacity analyses to assess the impact of the additional pedestrian crossings on traffic operations”.

- The Highway Capacity Manual on which this analysis relies states:
“major-street movements of Rank 1 [through movements without conflicting traffic] are assumed to be unimpeded by pedestrians at a TWSC intersection, even though research indicates some degree of Rank 1 vehicular yielding to pedestrians... The assumption that pedestrians do not impede Rank 1 major-street movements is a known limitation in the procedure.”¹

Including the pedestrian volume in two-way stop control analysis will only impact delay calculations for turning movements and minor street approaches.

- Pedestrian volumes, lane width, and crossing speed were included in the Main Street / Mill Road intersection. Lane width was recorded as 10-feet in the Build condition and 12-feet in the no build condition. Lane width relates to the crossing length for pedestrians, and the resulting pedestrian blockage factor. In this case, the crossing width is skewed, and the pedestrian is crossing two lanes of traffic.
 - Unless modifications are proposed in the build condition, the lane width should be consistent between build and no-build conditions.
 - The walk speed or lane width should be modified to reflect the longer crossing distance resulting from the skewed, multilane crossing.

ITEM 6: On-Site Pedestrian Features

- Consider relocating the Mill Road crosswalk at the Mill Road / Plaza Drive intersection to the south side of drive entrance:
 - Pedestrian desire lines to / from new residential buildings will either follow along frontage of existing building and across at the existing Mill Road midblock crossing, or along new pedestrian path on south side of drive entrance.
 - South side crossing eliminates driveway conflict.
 - South side crossing could be installed with median refuge.

¹ HCM 6th Edition, Chapter 20, page 20-33

- Consider reconstructing sidewalk landing at northeast quadrant of Mill Road / Drive intersection with concrete material and detectable warnings.

ITEM 7: Off-Site Pedestrian Features

- As this development is projected to increase pedestrian generation, improvements should be done to ensure adequate and safe infrastructure is available to serve the anticipated pedestrian activity. The report suggests “the town should consider shifting the Main Street crosswalk at Madbury to the west to shorten the crossing distance.” (page 4-3) This improvement could be considered as mitigation for the project.

ITEM 8: Sight Distance Documentation

- Please explain the location of the Main Street Driveway.
- Table 4-4 is captioned “Intersection Sight Distance”; the header row of Table 4-4 refers to “SSD”, defined as stopping sight distance. Please confirm.
- Please explain the difference between “calculated” and “available” sight distance.
- Stopping sight distance is typically measured along a roadway in a direction of travel at a specific location, such as “northbound Mill Road at Site Drive”. Please explain “Left” and “Right” columns for Mill Road Driveway and Main Street Driveway rows with respect to stopping sight distance, Table 4-5.

ITEM 9: Sight Line Exiting Garage

Sight lines exiting the garage may be impacted near the pedestrian crossing. Recommend stop sign and stop bar striping prior to the crosswalk, and consider installation of other features to encourage slow vehicle speeds at exit.

ITEM 10: Signal Timing at Main / Newmarket Road / Dover Road Intersection

Regarding signal timing at the Main / Newmarket Road / Dover Road intersections, the TIS states:

The signal operates with two distinct signal timings. From 12:00 a.m. to 4:00 p.m., it operates with two phases and an exclusive actuated pedestrian phase with an overall cycle length of 120 seconds and most of the time given to the westbound left movement and northbound right movement. From 4:00 p.m. to 12:00 a.m., the signal operates with the same phase set up, but a cycle length of 110 seconds with the majority of the time given to the northbound approach.

The PM peak hour signal timing in Synchro results includes a cycle length of 88 seconds, with 19 seconds dedicated to the northbound approach, 69 seconds dedicated to the eastbound / westbound approach, and no exclusive pedestrian phase. The Synchro results included in the report do not include the northbound right turn overlap with the westbound left turn movement. The capacity analysis appears to use a different



signal timing plan than currently programmed into the signal. Please explain this discrepancy.

ITEM 11: Queuing at Main / Newmarket Road / Dover Road Intersection

The capacity at this location may be insufficient. The Synchro HCM reports indicate a “#” following the reported 95th percentile queue for the eastbound through and northbound through/left movements. The “#” is defined as “95th percentile volume exceeds capacity, queue may be longer”. The result indicates an anomaly in the HCM analysis and further consideration of queuing at the intersection may be warranted.

RSG recreated the Synchro model and was able to duplicate the HCM analysis. RSG developed a SimTraffic microsimulation model of the intersection which revealed significant northbound queueing, extending beyond the ¼ mile model limits.

Operations and capacity at this intersection should be more carefully reviewed. SimTraffic or other microsimulation tools may be suitable.

ITEM 12: Mitigation Recommendation: Signal Timing Review

The capacity analysis appears predicated on an optimized signal timing. If optimized timings are included, it would be reasonable for the developer to implement signal timing updates at this location as mitigation.

ITEM 13: Lane Utilization

It appears the traffic models assume equal lane utilization for the eastbound through and northbound right approaches to the Main Street/ Mill Road intersection. Generally, the no build volumes illustrated in Figures 5-8 indicate a 1/3 – 2/3 split between turning volumes at the downstream Main Street/Madbury Road intersection. Site observations indicate vehicles generally are in the aligned lane for these downstream movements through the Main Street / Mill Road intersection. This imbalanced lane utilization potentially impacts operations and capacity at the intersection.

ITEM 14: On Site Bicycle Features

Bicycle racks were noted only at the western corner of the grocery store. The proposed development does not appear to provide on-site parking for residents. Bicycle use is expected to be high.

- Recommend providing convenient exterior bicycle racks for residents and commercial businesses near entrances, preferably protected from rain and snow.
- Recommend providing convenient interior / long term / secure bicycle parking for residents.
- Recommend providing a bicycle wash station for maintenance.
- Recommend bicycle racks are u-style with appropriate clearances per standard practice.

- Recommend considering additional on- or off-road bicycle features, particularly on identified bicycle demand routes. For example, the 10-foot bituminous path ends at a 5-foot concrete sidewalk with no apparent bicycle treatment.

ITEM 15: Incomplete Raw Traffic Count Data

Appendix B did not appear to include the PM peak hour raw data for the Main / Newmarket Road/Dover Road intersection. Please provide this information.