

May 3, 2023

Zoning Board of Appeals
Town of Groton
173 Main Street
Groton, MA 01450

Attn: Bruce Easom, Chair

Subject: Transportation Consulting Services
500 Main Street 40B Development ("The Groton Farms 40B")
Groton, MA

Dear Chair and Board Members:

MDM Transportation Consultants, Inc. (MDM) is pleased to provide you with the following transportation review comments for the above-referenced project. These comments have been prepared based on a site visit in May 2023 and review of the documents identified below. To facilitate response by Applicant, review items requiring response are noted in ***Bold Italic***.

In summary, MDM finds that the Traffic Impact and Access Study (TIAS) for The Groton Farms 40B Application has been prepared in general conformance with industry standards and reasonably quantifies existing/baseline traffic conditions for study locations along Main Street, traffic generation characteristics for the Site, and traffic impacts/operations at the Site driveway and nearby study intersections. However, areas of expanded or updated analysis are identified requiring Applicant response that include an expanded safety evaluation, updated (calibrated) capacity analysis, parking analysis, site access and circulation swept path analysis, and confirmation of certain potential mitigative actions including and expanded Transportation Demand Management (TDM) program, pedestrian crossing implementation and certain recommended intersection pedestrian and safety-related improvement actions.

Documents Reviewed

MDM has reviewed the following documents to gain an understanding of the project and determine if industry standards have been applied in determining the potential impacts of the project. The following relevant documents were reviewed:

- *Traffic Impact and Access Study, Proposed Mixed-Use Development, 500 Main Street, Groton Massachusetts, prepared by Bayside Engineering, dated December 9, 2023.*
- *Proposed Comprehensive Permit Plan Set, Groton Farms, 500 Main Street, prepared by Dillis & Roy Civil Design Group, dated February 9, 2023*

Proposed Development

The proposed site development, as presented in the TIAS and associated Comprehensive Permit Plan Set, consists of 200 residential units comprised of three (3) residential apartment buildings totaling 168 units and eight (8) 4-unit townhome buildings totaling 32 townhome units. Access to the Site is to be provided by a single unsignalized driveway located along Main Street (Route 111/Route 119) – a state jurisdiction roadway – approximately 250 feet west of Mill Street; a secondary, gated emergency-access only driveway is also proposed to connect at Taylor Street. Parking includes a total of approximately 405 parking spaces representing a per-unit parking ratio of approximately 2.02 spaces per residential unit overall inclusive of clubhouse and visitor parking spaces.

Traffic Impact and Access Study Comments

Existing Conditions

1. *Study Area:* The study area includes the subject property driveway plus eight (8) locations along Main Street that include intersections at Fitchs Bridge Road/Nod Road, driveways at Anytime Fitness/Groton Residential Gardens, driveways at Groton Residential Gardens/Country Kids Child Development Center, Mill Street, Taylor Street, Arlington Street and Champney Street.

The selection of these study locations is consistent with guidelines for study area selection published by MassDOT (locations sustaining 100 vehicle-trip increases or that may experience more than a 5% change in volume); MDM concurs that these study locations are appropriate and in context with the likely traffic impacts for the Project.

2. *Traffic Volumes:* Traffic volumes for study locations were conducted in February 2022 for the weekday AM peak period (7:00 AM to 9:00 AM) and weekday PM peak period (4:00 PM to 6:30 PM), adjusted to reflect seasonal and Pandemic correction factors derived from MassDOT seasonal correction factor data and regional permanent count station data.

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MDM has reviewed these seasonally- and Pandemic-adjusted data and finds that adjusted traffic volumes presented in the TIAS present a reasonable representation of typical/average traffic volume conditions for weekday peak AM and PM peak hours along Main Street in the study area.

3. *Accidents/Crash Data:* The TIAS presents relevant crash data for the study intersections for the period 2015-2019; these data indicate crash rates that are below MassDOT district average for all locations and none of the study locations are listed on the MassDOT high crash location database.

MDM acknowledges that crash data for the 2015-2019 period presents crash rates that below MassDOT averages, no fatalities are noted for the period evaluated and that study locations are not listed in the MassDOT HSIP list of high crash locations. However, MDM recommends that the crash database review be expanded to include the period 2020-2022 as these data are presently in the MassDOT crash portal and reflect several years additional data including the Pandemic period when crash severity in particular were generally at higher levels throughout the Commonwealth. These additional data may be used to confirm TIAS findings and to validate that safety countermeasures along Main Street in the study area are not warranted, particularly for pedestrians and bicyclists.

4. *Vehicle Speeds:* Vehicle speeds presented in the TIAS are derived from 48-hour automatic traffic recorder (ATR) counts conducted by an independent third-party vendor at a location proximate to and south/east of the proposed driveway. The TIAS relies on these data to calculate average and 85th percentile travel speeds along Main Street as the basis for calculating driveway sight line requirements.

Travel speed data are also provided in the TIAS based on automatic traffic recorder (ATR) counts conducted over a 48-hour period in February 2022. Resulting 85th percentile travel speeds (the speed at which regulatory speed limits are typically established and that serve as the basis for determining driveway sight line requirements) is 43 miles per hour (mph) in both travel directions in the site vicinity. This is generally consistent with the 40 mph posted speed limits for this segment of Main Street and is generally consistent with observed conditions based on MDM field review in May 2023.

5. *Driveway Sight Distance:* Calculated minimum stopping sight distance (SSD) requirement for the proposed driveway is 335 feet (minimum) based on measured 85th percentile travel speeds following AASHTO and MassDOT guidance and a design speed (85th percentile) of 43 mph. Ideal sight distance (ISD) is calculated at up to 474 feet from the driveway. For both SSD and ISD, measured sight lines exceed 500 feet in both view/travel directions of the driveway and hence meet or exceed applicable AASHTO sight line criteria.

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MDM observed sight lines at the driveway that are in excess of 800 feet in both travel/approach directions for the site driveway location, and notwithstanding minor grade corrections for the westbound approach (which is less than a 1 percent down-grade within 350 feet of the subject driveway) MDM concurs applicable sight line criteria are met or exceeded. MDM recommends that the applicable sight line triangles be shown on the Site Layout Plan along with measured sight lines indicating that minimum sight line criteria are met. The Site Layout Plan should also include a note citing that "Signs, landscaping and other features located within sight triangle areas shall be designed, installed and maintained so as not to exceed 2.5-feet in height. Snow windrows located within sight triangle areas that exceed 3.5-feet in height above driveway grade or that would otherwise inhibit sight lines shall be promptly removed."

6. *Public Transportation:* The TIAS indicates that public transportation is not available within the study area/project vicinity; the nearest public transportation station is the MBTA commuter rail station at Wachusett Station in Fitchburg.

MDM notes that the Groton Council on Aging operates a van service serving qualified senior residents of the town which may also service the site upon request. Door-to-door transportation services provided through these vans pick up qualified residents at home and take them anywhere in town, to surrounding towns, and even to Boston area hospitals. Rides are provided for medical appointments, social engagements, shopping, errands and more. Applicant should acknowledge and promote this service to qualified residents at time of lease.

Future Conditions

7. *Traffic Growth:* Future traffic volumes are projected to a 7-year horizon using a 0.5 percent annualized growth and additional traffic for specific background projects that include two smaller residential developments (Village at Shepley Hill and Hayes Woods) as well as the Music Center. The applied growth rate of 0.5 percent annual exceeds regional growth trends derived from Central Transportation Planning Staff (CTPS) data of 0.02 percent for the Town of Groton.

MDM concurs that the annualized growth rate of 0.5 percent exceeds the area historic average annualized growth rate for area roadways; inclusion of project-specific trip increases for area approved development fall well within the more conservative assumption of area growth and are appropriately included for analysis purposes. Resulting 7-year horizon traffic volumes in the TIAS present a reasonable (and likely conservative) basis for analysis of future-year conditions.

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8. *Planned Area Improvements:* Consultation with MassDOT indicates no planned area roadway improvements within the study area.

MDM concurs on the basis of review of MassDOT project database. No further comment.

9. *Trip Generation:* Trip estimates for the Project are appropriately based on characteristics published by the Institute of Transportation Engineers (ITE) in Trip Generation 11th Edition for mid-rise residential use, Land Use Code (LUC) 221 and Single-Family Attached Housing LUC 215. Resulting peak-hour trip estimates are modest and range from 73 to 81 vehicle-trips during AM and PM peak hours, respectively using this methodology. When compared to prior/historic use of the property as an office, ITE-based trip estimates for residential use are lower on both an hourly and daily (weekday) basis. Office-based trip estimates range from 204 to 208 vehicle-trips for weekday peak hours and approximately 1,442 daily (weekday) trips.

MDM concurs that appropriate methodology was employed in the TIAS to estimate project-related trips for weekday peak hour and daily conditions. Although comparison to historic site use as an office is presented, there is no credit taken in the analysis for these trips; project impact under future 7-year horizon Build conditions is properly based on only those additional trips that are associated with the residential project relative to No-Build conditions under which the site is inactive/vacant.

10. *Trip Distribution:* Regional trip patterns for Site traffic presented in the TIAS are based on existing area travel patterns, US Census Journey-to-Work data for the Town of Groton and a population-based gravity model to assign project trips to area roadways. MDM finds that the resulting trip distribution is generally consistent with observed patterns including the intersection travel patterns observed/documented in the TIAS for peak hours. The vast majority (more than 95 percent) of trips to/from the site are oriented to/from the east where major employment centers exist; Mill Street and Champney Street are expected to accommodate 6 and 11 percent of the project trips respectively based on these patterns.

MDM finds that basis for site trip distribution to be sound and consistent with recommended industry practices and consistent with observed/documented trip patterns for area roadways which exhibit highly directional orientation, consistent with commuter travel to/from employment centers located east of the project site. Resulting trip increases on area roadways represent a relative change of less than 5 percent beyond the project site driveway on Main Street to/from the east and less than 0.5 percent west of the site.

11. *Operations Analysis:* Operational analyses are presented in the TIAS follow generally accepted traffic engineering practices and protocols, indicating ample capacity at study intersections to accommodate project trip increases. While longer delays are reported for turns

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from side-street approaches to Main Street (particularly left-turns the Site Driveway), modest trip increases due to the Project are not expected to materially change operations, delays or LOS designation relative to “No Build” conditions.

MDM notes that the capacity analysis presented in the TIAS does not reflect calibration and is likely to overstate side-street delays and vehicle queues when compared to actual conditions. To illustrate this point, the TIAS includes a delay and queue study for a similar volume side street location (Mill Street) which indicates average delays of less than 30 seconds and maximum vehicle queues of 5 to 6 vehicles during peak hours; modeled results using uncalibrated Synchro® software are highly conservative and show average delays ranging from 60 to 293 seconds and queues of up to 15 vehicles.

MDM advises that the capacity and queue analyses presented in the TIAS be updated to calibrate the Synchro® model to better represent actual measured field conditions (delays and queues) for side streets – specifically at Mill Street and at the Site driveway. These calibrated analysis results are likely to show lower delay values and queues than reported in the TIAS and associated incremental changes in delays/queues under Build conditions.

Site Parking, Access and Circulation Comments

12. *Site Parking:* The proposed parking supply for the project in the aggregate represents a parking ratio of approximately 2.02 spaces per residential unit inclusive of clubhouse and visitor spaces. A more detailed accounting of spaces include 311 spaces for the apartment units representing a parking supply ratio of 1.85 spaces per unit; 64 spaces for the townhome units representing a parking supply ratio; plus additional spaces for the clubhouse (20 spaces) and townhome visitor spaces (10).

(a) MDM finds the proposed parking supply adequate to accommodate anticipated peak parking demands per ITE Parking Generation (5th Edition) standards. In fact, the proposed parking supply appears to exceed potential peak demands, allowing the possibility of reducing or banking parking spaces that may not be required to support the project. Applicant should provide an assessment of peak parking demands for the project based on ITE Parking Generation 5th Edition rates and methodology to determine warrant/feasibility of reducing or banking parking to levels that are in line with peak (85th percentile) demands – particularly for the apartment units.

(b) Bicycle parking should be provided at appropriate locations and quantity within the Project site and shown on the Site Plans including covered parking.

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(c) Applicant should consider designating spaces for a car share service such as Zip Car to encourage lower vehicle ownership rates/use, noting however that implementation of such service is subject to a car share provider opting to place vehicles at the subject property.

13. *Site Access Design:* Proposed Site driveway at Main Street is proposed to be modified to include a deceleration lane and modified curb radii. The driveway design is subject to MassDOT review and approval under the Access Permit process and will need to comply with commercial driveway standards on state highways. MDM notes the following aspects of driveway design should be considered by the Applicant:

- (a) MDM recommends that the applicable sight line triangles be shown on the Site Layout Plan along with measured sight lines to confirm that minimum sight line criteria are met, and if possible the ideal Intersection Sight Distance (ISD) as calculated based on measured 85th percentile travel speeds along Main Street.*
- (b) The Site Layout Plan should also include a note citing that "Signs, landscaping and other features located within sight triangle areas shall be designed, installed and maintained so as not to exceed 2.5-feet in height. Snow windrows located within sight triangle areas that exceed 3.5-feet height above driveway grade or that would otherwise inhibit sight lines shall be promptly removed."*
- (c) The relatively high rate of speed along Main Street (85th percentile speed of 43 mph, classified as a high-speed roadway per MassDOT criteria) will require significant deceleration to navigate the right-turn movement into the proposed driveway given the curb radius, perpendicular alignment of the driveway and lack of shoulders along Main Street. Likewise, delivery vehicles (ie, box trucks or equivalent such as UPS or Fed X vehicles) and service/emergency vehicles (ambulances for instance) are likely to make wider turns from Main Street that could potentially encroach into the exiting/departure lane of the driveway if these features are not dimensioned properly. Accordingly, the Applicant proposes a roadway widening along Main Street to provide a dedicated deceleration lane to facilitate such movements. Applicant should validate that the proposed driveway curb radius and entry lane dimensions are adequate to accommodate these vehicle movements as supported by AutoTurn® vehicle turn analysis/exhibits.*

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- (d) The TIAS identifies a proposed pedestrian crossing of Main Street with controls that include a Rectangular Rapid Flashing Beacon (RRFB). Integration of this crossing relative to the Site driveway should be clarified by the Applicant; the crossing placement within the proposed deceleration lane area should be avoided.*
- (e) Applicant should evaluate the need/feasibility of providing an acceleration lane/zone and/or "recovery lane" along Main Street west of the driveway through consultation with MassDOT. MDM experience suggests that in cases where a deceleration/turn lane is provided at an intersection that a corresponding widening opposite the lane (referred to as a "recovery lane") is typically required by MassDOT to provide a consistent roadway width through the intersection and to reduce potential curb impacts during snow plowing operations. Such recovery lane may also facilitate vehicle acceleration/merging for turns from the site driveway heading west.*

14. Site Circulation:

- (a) Applicant should confirm that the Site Layout Plan provides sufficient maneuvering area to accommodate the Town's largest responding fire apparatus (ladder truck) and service vehicles (SU-30 type design vehicles or equivalent) by conducting AutoTurn® vehicle turn analysis/exhibits.*
- (b) Applicant should consult with the Groton Fire Department to determine requirements for emergency vehicle circulation around proposed apartment buildings. The need for additional structured/reinforced travel ways sufficient to accommodate emergency apparatus between proposed Building B and Building C should be determined.*
- (c) Prepare AutoTurn® vehicle turn analysis/exhibits for service vehicles accessing/circulating to the refuse removal area at the site.*
- (d) Consideration should be made for a designated ride hail/delivery zone at apartment buildings to accommodate short-term delivery activity (parcel delivery vans, food delivery service, tenant pick-up/drop-off).*

15. General Site Plan Comments:

(a) The potential for school bus access to the site with centralized pick-up/drop-off area should be considered and discussed with the school department. Alternatively, a school bus waiting area/shelter should be considered at an appropriate location near the Site driveway.

(b) Applicant in the Comprehensive Permit Application commits to installing electric vehicle (EV) charging stations throughout the Project Site. Potential location/number so EV stations/spaces should be identified as well as potential to expand the EV infrastructure in future years as demand for EV vehicles increases over time.

(c) Confirm that Americans with Disabilities Act (ADA) compliant wheelchair ramps and crossings are to be provided at all pedestrian crossings internal to the Project site.

(d) MUTCD-compliant signs and markings should be identified in the site development plans at the site driveway and within the site to ensure positive driver guidance and pedestrian awareness/visibility.

Transportation Demand Management (TDM) Programming

16. TDM Programming: The TIAS identifies elements of a Transportation Demand Management (TDM) program for the site that encourages tenant use of and access to alternative travel modes.

MDM generally concurs with the recommended TDM program, noting that expansion of the program should be considered to also include: designating spaces for a car-share program; designation of a ride hail/delivery zone at apartment buildings to facilitate tenant pick-up/drop-off and parcel delivery vehicles; notification/promotion of Groton Council on Aging van service and programming for qualified residents at lease-up as part of the "welcome packet"; provision of secure, covered bicycle parking on-site; potential banking of parking spaces as appropriate.

Offsite Mitigation Commitments

17. Applicant proposes offsite mitigative actions that include implementation of a new pedestrian crossing of Main Street in the site vicinity to be equipped with Rapid Rectangular Flashing Beacon (RRFB) indicators; widening of Main Street for a deceleration lane at the site

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driveway; monitoring of the intersections at Mill Street and at Champney Street post-occupancy to determine need for signal controls and commitment to advance design of signal plans if applicable warrants are met.

(a) Project-related traffic increases do not independently trigger the need for capacity enhancements at area intersections; however, MDM acknowledges Applicant commitment to advancing design plans for signal control at the cited intersections, subject to meeting applicable warrant criteria. To the extent that signal warrants are met and plans are advanced, implementation of signal improvements is the assumed responsibility of others subject to MassDOT approvals.

(b) Access-related comments cited under Comment 13 should be addressed and updated by Applicant based on MassDOT consultation.

(c) Main Street Pedestrian Crossing. Integration of this crossing relative to the Site driveway should be clarified by the Applicant; the crossing placement within the proposed deceleration lane area should be avoided. MDM understands that one potential location of the new RRFB-equipped pedestrian crossing is at Mill Street; a conceptual improvement plan should be developed by the Applicant indicating approximate location and design features for such a crossing to ensure it is feasible and can be implemented in such a manner that it meets applicable MUTCD guidance and MassDOT design criteria.

(d) Mill Street Pedestrian Crossing. Field review indicates that there is no marked pedestrian crossing across the Mill Street approach to Main Street; likewise, sidewalk landing areas at Mill Street are located behind the marked STOP bar (which itself is faded/poorly visible) and the crossing lacks tactile warning panels. MDM advises that the pedestrian crossing be improved to ensure ADA compliance including tactile warning panels, appropriate ADA-compliant sidewalk/ramp grading, marked crossing per MUTCD guidance and that the STOP position be adjusted (or crossing be relocated) to ensure that approaching vehicles are in an appropriate stop position before crossing the ped walk. These improvements should be coordinated with the proposed Main Street RRFB crossing design.

(c) Champney Street Sight Line Enhancements. Field review indicates that sight lines looking west from the Champney Street stop position are limited by vegetation, substantially reducing visibility to oncoming (eastbound) vehicles. MDM advises that measures be identified and implemented to improve sight lines at this location (a safety concern) as feasible.

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MDM appreciates the opportunity to provide Transportation Planning & Engineering Services to the Town of Groton and look forward to discussing our findings at the upcoming Zoning Board hearing. If you have any questions or concerns, please feel free to contact this office.

Sincerely,



Robert J. Michaud, P.E.
Managing Principal

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