

July 18, 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 supplemental transportation review comments for the above-referenced project. These comments have been prepared based on review of Applicant's responses to our May 3, 2023 review letter as documented in a technical memo by Bayside Engineering dated June 20, 2023.

In summary, Applicant responses properly and adequately address our May 3, 2023 comments. MDM concludes that Applicant-sponsored access and roadway improvements and commitment to Transportation Demand Management (TDM) proposed development reasonably address project traffic impacts, safety needs and circulation requirements. Proposed post-occupancy traffic and safety monitoring is proposed and may at the Board's discretion be memorialized in potential conditions for the project; this monitoring will provide a basis for potential follow-on design commitments by the Applicant for future signal control at the Main Street intersections of Mill Street and Champney Street and implementation by the Town and/or MassDOT.

## **Traffic Impact and Access Study Comments**

### Existing Conditions

*Comment 1. Study Area: 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.*

Applicant Response: Bayside Concurs.

**Final Comment: No further comment.**

*Comment 2. Traffic Volumes: 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.*

Applicant Response: Bayside Concurs.

**Final Comment: No further comment.**

*Comment 3. Accidents/Crash Data: 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.*

Applicant Response: Expanded crash analysis is provided by Bayside indicating 16 additional crashes at study intersections over the 2020-2022 period. However, crash rates remain well below MassDOT district-wide averages and none of the crashes appear to involve pedestrians. An increase in crashes is noted for 2022 at Champney Street; most crashes at this location are angle or rear-end type collisions. No notable change in crash rates/volume are noted at remaining study locations.

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**Final Comment:** Champney Street crash experience and type reinforces the need for sight line enhancements at the intersection as noted under Comment 17. Applicant acknowledges the need for roadside vegetation maintenance to improve visibility to oncoming (eastbound) vehicles and has contacted MassDOT maintenance division to alert them to need for this work which is within their jurisdiction. No further comment.

*Comment 4. Vehicle Speeds: 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 85<sup>th</sup> 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.*

Applicant Response: Bayside Concurs.

**Final Comment:** No further comment.

*Comment 5. Driveway Sight Distance: 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."*

Applicant Response: Site plans have been updated to incorporate requested sight line triangle and note.

**Final Comment:** No further comment.

*Comment 6. Public Transportation: 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*

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*medical appointments, social engagements, shopping, errands and more. Applicant should acknowledge and promote this service to qualified residents at time of lease.*

Applicant Response: The TDM program for the project will include notification by a designated Transportation Coordinator of available Groton Council on Aging can service to eligible seniors who lease at the project.

**Final Comment: No further comment.**

Future Conditions

*Comment 7. Traffic Growth: 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.*

Applicant Response: Bayside Concurs.

**Final Comment: No further comment.**

*Comment 8. Planned Area Improvements: MDM concurs on the basis of review of MassDOT project database. No further comment.*

Applicant Response: Bayside Concurs.

**Final Comment: No further comment.**

*Comment 9. Trip Generation: 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.*

Applicant Response: Bayside Concurs.

**Final Comment: No further comment.**

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*Comment 10. Trip Distribution: 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.*

**Applicant Response:** Bayside Concur.

**Final Comment:** No further comment.

*Comment 11. Operations Analysis: 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.*

**Applicant Response:** Requested calibrated analysis is provided indicating more reasonable delay results that are in line with observed conditions. These revised results indicate Level-of-Service (LOS) D or better operations at study intersections.

**Final Comment:** MDM Concur with calibrated analysis results which indicate ample capacity exists along Main Street to accommodate project traffic; delay increases on side streets are modest (less than 5 seconds) as a result of the project and change in side-street queues are also modest (1 additional vehicle or less). No further comment.

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## **Site Parking, Access and Circulation Comments**

### **Comment 12. Site Parking:**

*(a) MDM finds the proposed parking supply adequate to accommodate anticipated peak parking demands per ITE Parking Generation (5<sup>th</sup> 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 5<sup>th</sup> Edition rates and methodology to determine warrant/feasibility of reducing or banking parking to levels that are in line with peak (85<sup>th</sup> 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.*

*(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.*

**Applicant Response:** Bike parking (5 locations) are shown on site plans; a car share space will be identified on the site at a future date should a service provider opt in.

**Final Comment:** Applicant has addressed sufficiently; no further comment.

### **Comment 13. Site Access Design:**

*(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 85<sup>th</sup> 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."*

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- (c) The relatively high rate of speed along Main Street (85<sup>th</sup> 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.*
- (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.*

Applicant Response: Requested modifications to site plans to include sight line triangles and notes are provided; requested AutoTurn® modeling is provided that confirms adequate maneuvering areas on the site are provided; widening of Main Street is no longer proposed for acceleration/deceleration zones based on MassDOT consultation. Conceptual design/location for a RRFB-controlled pedestrian crossing is provided and will be reviewed by MassDOT for final design/approval.

**Final Comment:** Site plan modifications, notes and AutoTurn® modeling acknowledged. Review of conceptual RRFB pedestrian crossing indicates the location and proposed traffic controls are consistent with similar locations in the Commonwealth and subject to MassDOT review and approval. No further comment.

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Comment 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).*

Applicant Response: Requested AutoTurn® modeling is provided that confirms adequate maneuvering areas on the site are provided; pick-up/drop-off spaces at each of the three buildings are added to accommodate short-term delivery activity.

**Final Comment: AutoTurn® modeling acknowledged; drop-off/pick-up spaces acknowledged. No further comment.**

Comment 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.*

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*(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.*

Applicant Response: Dee Bus Company has agreed to on-site pick-up and drop-off of students and locations for bus stops within the site will be identified. A total of 64 EV locations have been added to site plans. Applicant acknowledges that all pedestrian crossings, sidewalks and wheelchair ramps will comply with the Americans with Disabilities Act (ADA) requirements. All signs and markings will be MUTCD compliant.

**Final Comment: On-site bus stops (locations to be determined in consultation with Dee Bus Company) acknowledged. Compliance requirement with ADA and MUTCD acknowledged. Applicant should clarify EV-equipped locations (only 12 cited on updated site plans in vicinity of apartments buildings); EV equipped spaces typically include dual-port chargers that serve two spaces concurrently and infrastructure (conduit and required transformers/power source sizing) should be shown for areas of potential expansion to the supply of 64 spaces referred to in the response. Are the townhomes to be equipped separately for EV charging?**

#### **Transportation Demand Management (TDM) Programming**

*Comment 16. 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.*

Applicant Response: As stated in the response to Comment No. 12, the applicant has reached out to Zipcar about the possibility of providing service in this area. At this time, Zipcar has no interest in providing service in this area. A ride hail/delivery space has been provided at each apartment building and the front of the clubhouse to facilitate tenant pick-up/drop-off and parcel delivery vehicles. As part of the Transportation Demand Management (TDM) component of the project, the Transportation Coordinator (TC) of the TDM program will coordinate with

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eligible seniors. Bicycle parking areas are being provided throughout the site. Five (5) different areas are shown on the site plans.

**Final Comment: Acknowledged; no further comment.**

#### **Offsite Mitigation Commitments**

*Comment 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 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.*

Applicant Response: As indicated in the response to Comment No. 13, the need/feasibility of providing an acceleration lane/zone and/or “recovery lane” along Main Street west of the driveway is not required as the widening of Main Street to provide a deceleration lane into the site is not being contemplated. This was discussed with MassDOT who concurred that the volume of traffic turning right into the site is not sufficient to warrant this widening.

**Final Comment: Acknowledged; elimination of acceleration zone and “recovery lane” results in narrower width of Main Street facilitates pedestrian crossings at the proposed RRFB-equipped crossing that is subject to MassDOT review and approval. No further comment.**

*17 (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.*

Applicant Response: The TIAS recommended that upon completion and occupancy of the Project, the intersection of Main and Mill Street and the intersection of Main Street and Champney Street be monitored. If at that time, the traffic volumes meet the MUTCD traffic signal warrant criteria, the project proponent will design a traffic signal system for the intersection. 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.

The Applicant will develop a Traffic Monitoring Program (TMP) to begin six months after initial 85% occupancy of the site is achieved and include the following:

- a) Monitoring will include turning movement counts at the Main Street intersections with the site driveway, Main Street and with Champney Street. The monitoring counts for the site driveway intersection will occur between the hours of 6:00 AM and 9:00 AM, and between 4:00 PM and 7:00 PM to capture the residential peak generating periods.
- b) The monitoring counts for the Main Street intersections with Mill Street and with Champney Street will occur between the hours of 6:00 AM and 7:00 PM to capture the residential peak generating periods, as well as to provide sufficient data for a traffic signal warrant analysis.
- c) Initiation of monitoring will allow for early identification of operational deficiencies that may require immediate action/countermeasures by the Applicant.
- d) Automatic traffic recorder counts with classification on the site driveway to include a continuous 48-hour period over two (2) weekdays, contiguous with the monitoring counts.
- e) Evaluate motor vehicle crash data at the Project site driveway and with the Main Street intersections with Mill Street and with Champney Street.

The results of the monitoring program will be summarized in a report to be provided to the Town of Groton upon completion of the data collection. The report will document the traffic volumes associated with the project and any delays, queuing and crash rates at the intersections.

**Final Comment: Commitment to monitor post-occupancy traffic and safety conditions acknowledged; commitment to design signal improvements subject to applicable warrant criteria acknowledged.**

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

Applicant Response: Widening for deceleration/acceleration zone is not supported based on MassDOT consultation.



**Final Comment: Acknowledged; no further comment.**

*17 (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.*

Applicant Response: A Highway Access Permit will be submitted to MassDOT by the Applicant for the site access and the RRFB and any work within the State Highway Layout (SHLO). A copy of the application will be sent to the Town at the same time. Shown on the attached Figure 1 is the Conceptual Improvement Plan showing the proposed location for the Rectangular Rapid Flashing Beacon proposed for the pedestrian crossing of Main Street. The applicant will review the location and details of the crossing with MassDOT.

**Final Comment: Acknowledged; no further comment.**

*17 (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.*

Applicant Response: Bayside concurs that there is no marked pedestrian crossing across the Mill Street approach to Main Street, sidewalk landing areas at Mill Street are located behind the marked STOP and the crossing lacks tactile warning panels. These areas as described are located on private property and the responsibility for any improvements would be at the Town's or the landowner's discretion.

**Final Comment: Acknowledged; no further comment.**

*17(e) 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*

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*oncoming (eastbound) vehicles. MDM advises that measures be identified and implemented to improve sight lines at this location (a safety concern) as feasible.*

Applicant Response: Field review indicates that sight lines looking west from the Champney Street stop position are limited by vegetation. Visibility to oncoming (eastbound) vehicles is reduced due to the tree canopies. The applicant has contacted MassDOT to alert them to the described conditions as Main Street is under MassDOT jurisdiction.

**Final Comment: Acknowledged; no further comment.**

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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