August 19, 2025

Alison Manugian
Assistant Town Manager
Town of Dracut
62 Arlington Street
Dracut, MA 01826

Subject: **Traffic Engineering Peer Review**
Broadway Villages
341 Broadway Road
Dracut, Massachusetts

Dear Ms. Manugian:

On behalf of the Town of Dracut (the Town), Green International Affiliates, Inc. (Green) is submitting this letter to report the findings from our traffic engineering peer review of the application package for the proposed development. The proposed development is a mixed-use residential development located at 341 Broadway Road (Route 113), Parcel ID: 4924, 8012, and 8011 in Dracut, Massachusetts. The proposed developments includes 300 units of attached residential housing consisting of seven buildings. In addition, the proposed development will include an approximately 7,858 square foot (sf) market, 12,972 sf commercial space, and an approximately 64,383 sf community recreational building. The market, commercial space, and the community recreational building shall be open for public use. The proposed development will include 707 parking spaces. Pending approval from National Grid, an addition 124 parking spaces may be considered in the National Grid Easement. The scope of our review included a review of the operations and characteristics of the study area intersections, crash history and safety, trip generation and distribution analysis, and conclusions and recommendations reached by the Applicant's traffic engineer.

This review included an examination of the following documents submitted in support of the proposed project:

- "Comprehensive Permit Modification Application" prepared by Bohley, 341 Broadway Road, Dracut, Massachusetts, dated on October 1, 2024, containing seven hundred fifty-one (751) sheets

Green's traffic engineering review included a comprehensive assessment of the following sections of the Comprehensive Permit Medication Application:

- Appendix A - Existing Comprehensive Permit
- Appendix B - Proposed Preliminary Site Plan Documents
- Appendix O - Design Guidelines
- Appendix P – Traffic Impact and Access Study
- Appendix R - Waiver Request and Local By-Law Exceptions

In addition to the above documents, Green visited the project site and surroundings on August 15th, 2025, to gain a better understanding of the existing conditions and the context of the proposed project. Our review evaluated the documents for consistency with typical industry practices for traffic studies, the Town of Dracut's regulations and general bylaws, and American with Disabilities Act (ADA) and Massachusetts Architectural Access Board (AAB) design standards.

Green offers the following comments resulting from our initial review of the Traffic Impact and Access Study (TIAS) and concerns put forth by the Planning Board:

1. Green concurs with the study area and intersections for the analysis.

2. Traffic counts were collected in October 2023. The TIAS utilized the MassDOT Standard "2019 Weekday Seasonal Factors," in order to determine if the traffic counts needed to apply a seasonal adjustment factor. According to the 2019 Weekday Seasonal Factors, provided in the appendix, traffic volumes in October are 6% higher than a typical month, thus no seasonal adjustment is required. However, MassDOT has since provided "2023 Weekday Seasonal Factors," thus it would be more appropriate to utilize the updated seasonal adjustment factors. Broadway Road is classified as an urban minor arterial. According to the MassDOT 2023 Weekday Seasonal Factors, traffic volumes collected in October along urban minor arterial have traffic volumes that are 12% higher than a typical month, thus, no seasonal adjustment factor is required. This discrepancy between using the "2019 Weekday Seasonal Factor," versus the "2023 Weekday Seasonal Factor" did not have an impact on the analysis. However, the most updated MassDOT Standard "2023 Weekday Seasonal Factor" should have been the reference point in the TIAS.

3. Green recommends collecting weekend traffic counts at the study intersections due to the recreational facility. Per MassDOT TIAS Guidelines weekend counts may be required, when deemed appropriate, for sport or special event facilities. Saturday midday traffic counts are conducted between 11:00 AM to 1:00 PM.

4. The TIAS crash analysis at the study intersection reviewed a five-year time frame from 2015-2019. The latest guidance from MassDOT indicates that any crash records after 2021 have not been considered "closed," or are subject to change. The TIAS indicates that the crash data from 2020 or 2021 was not reviewed due to the traffic pattern changes as a result of the COVID-19 pandemic. Green concurs that 2020 and 2021 should not be included in the crash history analysis. Green requests that in the Table 4 - Crash Summary that times-of-day and detailed crash data be included in the report. The detailed crash data could also be provided in the appendix for review to determine if additional active site hours may impact or be affected by observed crash patterns.

5. According to the MassDOT TIA Guidelines, collisions diagrams shall be provided for any study intersection with an average of more than three crashes per year unless otherwise directed by MassDOT. This analysis could be triggered as part of the MassDOT permitting process. Given that the project is proposed to access a MassDOT-owned roadway, site access will thus require a State Highway Access Permit. The Proponent should confirm if a collision diagram will be required for the intersection of Broadway Road at Willard Street and Arlington Street, which averaged 4.8 crashes per year, for State access. If so, Green recommends that the 2015 to 2019 crash reports at the Broadway at Willard Street and Arlington Street intersection be requested and collision diagrams be created. The intersection safety narratives shall discuss the potential crash causes and potential remediation strategies.

6. The TIAS report reviewed the public transportation services within the study area. Currently, there is no existing public transportation stop at the undeveloped site area. The Lowell Regional Transit Authority (LRTA) offers a Road-Runner Senior Dial-a-Ride and ADA Paratransit services. These services provide an on-demand, origin to destination services for residents aged 60 or over, or residents with disabilities. Green recommends the Lowell Regional Transit Authority (LRTA) evaluate if a fixed route bus stop be provided at the project location, due to the high number of potential

trips and needs of the residents and given that the LRTA Route 1 currently stops on Broadway Road within 1/2-mile of the proposed site.. Based off the review of the proposed site plan, there is a bus shelter provided near the entrance of the site, adjacent to the proposed retailed building. Green recommends that evaluating the need for one to two additional bus shelters be provided in the vicinity of the residential buildings and recreation building.

7. A future analysis year of 2031 was selected based on MassDOT TIAS standards. A background growth rate of one percent (1%), compounded annually, was utilized to capture traffic growth associated with general changes in population and other developments that may not be known at this time. This growth rate was forecasted using the MassDOT MS2 database, count station #3372443. The TIAS stated the station generally had little to no growth. Thus, a 1% was applied to be provide conservative traffic projections. However, the TIAS does not state or show in the appendix what timeframe was used to calculate the growth rate. In addition, count station #3372443 is not a permanent count station, but rather the traffic volumes are artificially grown by MassDOT to estimate the traffic volumes. The traffic volumes at this location had not been physically collected since May 2016. Green recommends that the background growth rate be calculated using permanent count station locations, which physically record traffic volumes each day to get an annual average daily traffic volume.

8. The following Land Use Codes (LUC) were used to estimate trips expected to be generated by the proposed development:

    a. LUC 221 - Multifamily Housing – Not Close to Rail Transit trip generation rates applied to 300 dwelling units
    b. LUC 495 – Community Recreational Center trip generation rates applied to 64,383 sf
    c. LUC 822 – Strip Retail Plaza trip generation rates applied to 12,972 sf
    d. LUC 850 – Supermarket trip generation rates applied to 7,858 sf.

    Green concurs with the LUCs utilized for the trip generation calculation. However, the ITE calculates an R^2 value (R-square) that indicates a strong correlation between the independent variable and the dependent variable. An R^2 value of 0.75 or higher indicates a strong correlation between the variables. An R^2 value of 0.74 or below indicates a weak correlation between the variables. The ITE calculates the trip generation with fitted curve and average rate. Where the R^2 value is 0.75 or higher, the fitted curve should be utilized. Where the R^2 value is 0.74 or lower, the average rate should be utilized.

    Based on the TIAS Table 5 – Trip Generation Summary, the ITE calculated trips did not consistently take into account the R2 greater than 0.75 for choosing the fitted curve versus the average rate.

    For example, LUC 822 – Retail Trips, average weekday trips has an R^2 of 0.96 or has a strong correlation between the variables. The table and calculation utilized the average rate (706 daily trips) instead of the fitted curve rate (777 daily trips). The LUC 850 – Market Trips, average weekday trips has an R^2 of 0.80 or has a strong correlation between the variables. The table and calculation utilized the average rate (738 daily trips) instead of the fitted curve rate (1,195 daily trips). Green recommends the appropriate trip calculation should utilize the fitted curve rate or the average rate based on the R^2 value. The discrepancy between these two values can skew the future volume projections. Please note that this discrepancy was only observed for the daily trip calculations, not the Weekday AM and PM peak calculations. Thus, the peak hour trip distribution and level of service analysis was not impacted by this error.

9. The residential trip distribution is based on the existing traffic patterns and anticipated commuter patterns. Green concurs that utilizing U.S. Census Journey to Work data for the residents of the Town of Dracut is the correct method for distributing the residential trips. The retail trip distribution was based on the existing travel patterns. The retail trip distribution should utilize the AM and PM peak hour traffic volumes to determine the trip distribution. In TIAS Figure 7 - Trip Distribution Map (Retail Trips) the TIAS utilized the same distribution for the AM and PM peak hour traffic. Two separate trip distribution percentages should be utilized because typical traffic patterns change when comparing the AM and PM peak hour volumes. Thus, since the same trip distribution was used for the AM and PM peak hour volumes, an accurate level of service or future volume projection would not be able to be accurately calculated.

10. Green agrees that a MEPA review will be required based on the projected number of daily trips and the total number of new parking spaces.

11. Green concurs with the proposed driveway width, landscaping, pavement marking and signage recommendations. Green recommends conducting truck turning movements within the proposed site that are modeled based on the largest fire truck owned by the Dracut Fire Department. The turning movements should ensure that fire trucks will be able to maneuver the entire site in the case of emergencies. Due to the close proximity of the City of Lowell Fire Department, located at 99 Moody St, Lowell, MA 01852, fire truck turning movements utilizing the Lowell Fire Departments largest vehicle should also be tested. This will ensure that the City of Lowell fire trucks will be able to maneuver the site in the case of a large-scale emergency.

12. Due to the discrepancies noted previously in the trip generation calculations and trip distribution, Green cannot fully evaluate the synchro results for their accuracy. Green recommends that the issued noted above in the trip generation and trip distribution be addressed then the synchro analysis can be conducted. Green recommends using the latest Synchro 12 software to conduct the capacity analysis, rather than the "Synchro 11 Light Report" software was utilized in the TIAS. The build Synchro analysis at the site driveway utilized the HCM 2000 Unsignalized report. The site driveway analysis should use the HCM 7th TWSC analysis, as it is the most updated Synchro analysis methodology. The TIAS signalized intersection Synchro analysis utilized the "Lanes, Volume, Timings" and "Queue" report results. The "HCM 7th Signalized Intersection Summary" should be used for the analysis where the "HCM 7th Edition Methodology" is supported. The "HCM 7th Edition Methodology" is the preferred analysis for signalized intersections, unless the intersection has a unique or non-HCM signal phasing. Green recommends utilizing the "HCM 7th Edition Methodology" where applicable at the study intersections. The HCM 7th edition was published in 2022, and the HCM 6th edition was public in 2016. The other synchro output results used in the TIAS may produce reasonably accurate results. In addition, for Synchro analysis for future year condition, Peak Hour Factor (PHF) of 0.92 per MassDOT requirements.

13. Below is a more in-depth description of potential errors noted in the "Lane, Volumes, Timings" Synchro reports by intersection. Once reviewed, if these potential errors are confirmed, these would need to be addressed prior to the "HCM 7th Edition Methodology" Reports be generated:

    a. Broadway Road at Loon Hill Road:

        i. Based on the Google Street View from July 2025 and September 2016. The northbound, southbound, and westbound approaches have signal heads with an exclusive left arrow, and "LEFT TURN YIELD ON FLASHING YELLOW" signage. Confirm that these approaches do not have an exclusive left turn phase either in

the field or based on the latest traffic signal report plans. If there is an exclusive left-turn lane, the synchro phasing and timings would need to updated in each synchro analysis scenario.

ii. The same signal timings were used for each synchro scenario are used for both the AM and PM analysis. Confirm that the same signal timings are utilized during the AM and PM peak hours or if the signal timings change during the peak hours. Once this is confirmed, or adjusted, clarify in the report that there are no proposed changes to the signal timings in the build condition. However, based on the updates, confirm that no proposed signal timing changes are needed.

b. Broadway Road at Williard Street and Arlington Street

i. The same signal timings were used for each synchro scenario are used for both the AM and PM analysis. Confirm that the same signal timings are utilized during the AM and PM peak hours or if the signal timings change during the peak hours. Once this is confirmed, or adjusted, clarify in the report that there are no proposed changes to the signal timings in the build condition. However, based on the updates, confirm that no proposed signal timing changes are needed.

c. Broadway Road at Wheeler Road and Jones Street

i. Label the roadways so the street names plot in the synchro reports.

ii. The same signal timings were used for each synchro scenario are used for both the AM and PM analysis. Confirm that the same signal timings are utilized during the AM and PM peak hours or if the signal timings change during the peak hours. Once this is confirmed, or adjusted, clarify in the report that there are no proposed changes to the signal timings in the build condition. However, based on the updates, confirm that no proposed signal timing changes are needed.

14. Also, it was noted in the introduction that there would be minimal driveway queue “amounting to only one to three vehicles during the peak hours, expected on the site driveway approach to Broadway Road.” Based on the current Synchro reports, which will need to be reevaluated, the current queue is 79-feet. It would be more accurate to state a maximum of one to four vehicles at the site driveway would be expected during the peak hours. Due to an average car length accounting for 25-feet per vehicle. In Table 7 - Unsignalized Intersection Level-of-Service Analysis Summary the queue lengths have been rounded to the nearest 25-feet, rounded either up or down. The table should report the actually queue length calculated by the synchro analysis.

15. The following parking space requirements are noted in the Table 6.1.6 of Off-Street Parking Requirements from Town’s Zoning By-Laws. The Town’s bylaws note that “The applicant shall provide adequate parking to serve all anticipated uses on the property, with information detailing the method of computation of parking spaces. The minimum number of parking spaces shall be computed using the requirements of Section 6.1.6. In addition, the Planning board may increase the required parking by up to 10%, or the Planning Board may reduce the required number of spaces. Green reviewed the “Parking Matrix” provided on the title sheet of in the site plan.

16. Green concurs with the required parking space section within the parking matrix calculation for the multifamily dwelling, retail (market), restaurant (market), and retail (residential building). However,

Table 6.1.6 does not provide required parking for "Sports Pavillion." Green requests that the source of the "1 space / 200 sf" be provided for further review.

17. A parking waiver for the site has been requested. The Parking Matrix indicates that the number of parking spaces required for the site is 1,086 parking spaces. Currently there are 707 proposed total spaces, and 124 potential parking spaces pending National Grids approval. The potential total number of spaces could be 831 parking spaces if National Grids approves using their easement. If 707 parking spaces are provided that would meet approximately 65.1% of the total required parking spaces. If 831 parking spaces are provided that would meet approximately 76.5% of the total required parking spaces. Green finds that this reduction, of either 34.9% or 23.5%, would not provided adequate parking if the waiver is granted. If the total parking space requirement is reduced by 10%, the 977 parking spaces would be required. We recommend that the Applicant is able to demonstrate that the number of spaces proposed can be accommodated per review of shared parking demand analysis and/or have stated parking space restrictions residential units.

18. Green concurs that with the current site layout plan adequate pedestrian and bicycle accommodations would be provided.

19. The U.S. Department of Justice Civil Rights Division published accessible parking space requirements in sections 208.1 of the 2010 ADA Standards for Accessible Design. In parking lots with over 500 spaces, 2% of the total number of spaces are required to be accessible. With the 707 parking spaces, 14.14 accessible parking spaces are required. Green recommends that a minimum of 16 accessible parking spaces be provided throughout the site to be conservative. According to the site layout plan, there are 25 accessible parking spaces provided throughout the site. Green concurs that this is an adequate number of accessible parking spaces. In section 208.2.4 of the 2010 ADA Standards for Accessible Design, require one in every six accessible parking spaces to be van accessible. All of the 25 parking spaces are van accessible, Green concurs the site layouts meets the minimum required van accessible parking spaces requirement. Even If the parking waiver for the reduction of total parking spaces is not granted then 21 total accessible spaces would be required for 1,086 total parking spaces, which is exceeded by the currently-proposed number of accessible spaces.

20. Green conducted a field visit to confirm existing conditions and sight distance at the existing driveway. Green concurs that the minimum Intersection Sight Distance (ISD) and Stopping Sight Distance (SSD) meet the minimum requirements in the latest (7th edition) of the AASHTO guideline A Policy on Geometric Design of Highways and Streets and the Town of Dracut sight distance guidelines.

If either the Town staff or Applicant's engineer would like to discuss any of these comments further, please feel free to contact me at (978) 923-0400.

Sincerely,
Green International Affiliates, Inc.

Sergio Musto

Sergio Musto, P.E., PTOE
Technical Manager

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