September 4, 2025

Ms. Alison Manugian
Community Development Director
Town of Dracut
62 Arlington Street
Dracut, MA 01826

Subject: Traffic Engineering Peer Review
Dracut Apartments
2041 Bridge Street
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 consists of forty (40) rental units, including ten (10) affordable units. The proposed development is on a 230,868 square foot (sf) site located on Bridge Street (Route 38) and Marsh Hill Road in the Town of Dracut. The proposed development will include eighty-one (81) parking spaces. The scope of our review included preforming two (2) reviews of the Comprehensive Permit Application under this proposal: an initial review of the application, and a second review of the revised application.

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

- Document titled "Application for a Comprehensive Permit " prepared by The RENO Companies, dated April 3, 2025, and containing sixty-nine (69) sheets;

- Plans titled "Ex 3 Site Development Plans", prepared by Hancock Survey Associates, Inc, dated February 28, 2025, and containing eight (8) sheets;

- Document titled "Traffic Impact and Access Study & Stormwater Report " prepared by The RENO Companies, dated January 8. 2024, and containing forty-three (43) sheets;

In addition to the above documents, Green visited the project site and surroundings on August 21th, 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 & Stormwater Report (TIAS) and concerns put forth by the Planning Board:

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

2. The TIAS or Comprehensive Permit did not include an appendix with relevant data to the analysis, thus Green was not able to review the raw data or calculations. Green requests that the traffic impact calculations be provided in the appendix.

3. The TIAS identified the segment of Bridge Street within the study area as a "rural minor arterial." Upon reviewing the "MassDOT Road Inventory Viewer" provided by MassDOT "MygeoDOT" GIS database Bridge Street is identified as a "Principal Arterial - Other." Upon reviewing the "Urban Boundaries 2020" provided by the "MassGIS Data Hub" the project location is within the Boston, MA-NH urbanized area. Thus, Green concludes that Bridge Street is classified as an Urban Principal Arterial - Other. Upon reviewing the "MassDOT Road Inventory Viewer" provided by MassDOT "MygeoDOT" GIS database Marsh Hill Road is identified as a "Major Collector." Marsh Hill Road is within the Boston, MA-NH urban boundary. Thus, Green concludes that Marsh Hill Road would be classified as an Urban Major Collector.

4. Cross Road and Old Pasture Road are included in the study intersection analysis. Green recommends including an existing conditions roadway description for Cross Road and Old Pasture Road. Green recommends providing lane widths for the study roadways. The TIAS identified the "Bridge Street at Marsh Hill Road and Cross Street" as a study intersection. Green concurs with the general intersection description; however, the west leg of the intersection is "Cross Road."

5. In the executive summary and in Section 2, the TIAS indicates that the traffic counts were collected in November 2023. The traffic counts consisted of automatic traffic recorders (ATRs) and turning movement counts (TMCs). Green concurs with applying the seasonal factor. Green recommends including the traffic count narrative in the "Section 2 - Existing Traffic Volume" as well for consistency. The narrative is in the "Executive Summary" while the data is in "Section 2 - Table 1."

6. The TIAS or Comprehensive Permit did not include an appendix with relevant data to the analysis, thus Green was not able to review the raw data or calculations. In order to determine the Seasonal Adjustment Factor that was referenced, Green reviewed the 2019, 2021, 2022, 2023, 2024 MassDOT Weekday Seasonal Factors. The TIAS indicated that, "November volumes to be slightly lower than average month conditions. Therefore, the November traffic volumes were adjusted upward by a factor of 1.012 and used to represent average month conditions." As previously noted, Green concurred that the roadway classification for Bridge Street was inconsistent with MassDOTs resources. Green referred to the U3 or Urban Principal Arterial calculation to evaluate if a seasonal adjustment factor needed to be applied to the data. Based on the MassDOT Seasonal Adjustment Factors for 2019, 2021, 2022, 2023, and 2024, traffic volumes collected in November on U3 classified roadway do not need a seasonal adjustment factor. This indicates that typically traffic volumes are higher than the average daily traffic, meaning the traffic volumes do not need to be rounded up or adjusted. As such, seasonal adjustment was not strictly necessary; however, due to the traffic volumes being rounded up rather than down, this results in a more conservative analysis and Green does not take issue with this assumption

7. The TIAS crash analysis summarized the crash analysis in Section 2 Table 2 - Motor Vehicle Crash Data Summary. The crash data analyzed a six-year timeframe from 2017-2022. According to the MassDOT TIAS guidelines, the analysis should be based on five years of data, or a minimum of three years. The TIAS indicates that there were 27 crashes at the Bridge Street at Cross Street and Marsh Hill Road during the six-year timeframe. 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. If so the TIAS may require a collision diagram, unless otherwise

directed by MassDOT. The intersection safety narratives shall discuss the potential crash causes and potential remediation strategies. The collision diagram shall be based on actual crash reports with collision diagrams and narratives. Based off the six-year time frame, the study intersection averaged 4.5 crashes per year. In accordance with the State Highway Access permitting process the Applicant should confirm if MassDOT will request this analysis.

8. Intersection crash data is typically presented by year in order to identify trends in the yearly crashes. The TIAS reported this information as the total number rather than by year. For example, there were thirteen angle collisions during the six-year timeframe. The TIAS reported the total number of angle crashes, rather than the total angle total for each year. Green recommends summarizing the crash data by year in order to identify crash trends and if there is any yearly variation.

9. Green request that relevant information from the Lowell Regional Transit Authority (LRTA) and the Massachusetts Bay Transportation Authority (MBTA) be provided. Green concurs with the TIAS public transportation narrative. According to the Site Developments "Layout and Materials Plan" there is a proposed bus shelter located at the northern side of the site driveway at Marsh Hill Road. Please confirm that the shelter and adjacent walkway conform to ADA/PROWAG requirements.

10. A future analysis year of 2030 was selected based on MassDOT TIAS standards to utilize a seven-year traffic volume projection. The TIAS indicates that the background growth rate information was supplied by the Central Transportation Planning Staff (CTPS). The TIAS reported that the "the Central Transportation Planning Staff (CTPS) indicate that a 0.17 percent (minor arterials) to 0.08 percent (interstate) compounded growth rate would be appropriate to develop future No-Build conditions." The TIAS utilized a background growth rate of 1%. Green concurs that 1% is an appropriate background growth rate in order to have a conservative analysis. Green requests that the correspondence with CTPS be included in the appendix.

11. The TIAS report states that the Town was contacted to identify planning developments in the vicinity of the study that could impact future traffic conditions. The Town identified one potential project location on Avis Avenue that could impact traffic flows in the surrounding area. The development consists of 19 single-family detached homes. The TIAS states that the provided Trip Assessment conducted by TEPP LLC was referred to for the trip generation. Green requests that the trip generation worksheets be included in the appendix.

12. The following Land Use Code (LUC) from the Institute of Transportation Engineer's (ITE) *Trip Generation Manual* was used to estimate trips expected to be generated by the proposed development:

    a. LUC 220 – Multi-family housing (Low-Rise) applied to the 40 residential department units

    Green concurs with the LUCs utilized for the trip generation calculation. However, the ITE *Trip Generation Handbook* calculates an R^2 value (R-square) that indicates how strong of 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 4 – Trip Generation Summary, the ITE calculated trips did not take into account the R^2 value. Below is a summary of the discrepancy in the data for the 40 residential unit analysis when referring to the weekday, AM and PM peak hour volumes:

a. Weekday results: 0.86 R^2 value (strong correlation)
    a. Average Rate: 270 (Total), 135 (Entry), 135 (Exit)
    b. Fitted Curve: 332 (Total), 166 (Entry), 166 (Exit)

b. AM Peak Hour results: 0.79 R^2 value (strong correlation)
    a. Average Rate: 16 (Total), 4 (Entry), 12 (Exit)
    b. Fitted Curve: 35 (Total), 8 (Entry), 27 (Exit)

c. PM Peak Hour results: 0.84 R^2 value (strong correlation)
    a. Average Rate: 20 (Total), 13 (Entry), 7 (Exit)
    b. Fitted Curve: 38 (Total), 24 (Entry), 14 (Exit)

The report utilized the "Average Rate" for the daily, AM and PM peak hour volumes. Due to the high R^2 or strong correlation the "Fitted Curve" trip generation should have been used. Green recommends the analysis utilize the Fitted Curve trip generation before conducting the future condition analysis. Green recommends revising the trip generation, trip distribution, and Synchro analysis.

13. 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. Green requests that the census data be provided in the appendix in order to confirm the trip distribution percentages.

14. Green requests for the Synchro reports to be provided in the appendix in order to evaluate the level of service results. The Synchro analysis should be updated to account for the updated trip generation and trip distribution.

15. Green requests that the "Table 9 – Unsignalized Level-of-Service Analysis Summary" show the level-of-service results for each approach rather than just the southbound direction. Table 9 only shows the Synchro results for the southbound movements, for example from the site driveway or from Old Pasture Road. Green requests that the delay, LOS, V/c and queue length be provided for all movements.

16. "Table 11 - Sight Distance Summary" indicates that the stopping sight distance and intersection sight distance used the AASHTO "A Policy on Geometric Design of Highways and Streets, 2018, 7th Edition" for the sight distance calculations. Based on the non-standard intersection sight distances depicted in Table 11, Green surmises the AASHTO "Table 3-2. Stopping Sight Distance on Grades" was considered in evaluating the sight analysis. Green requests confirmation of (if used) roadway grades used for the sight distance calculations. Green conducted a field visit to confirm existing conditions and sight distance at the existing driveway. Table 1 depicts the sight distance analysis comparison.

Table 1 – Sight Distance Analysis Comparison

Location	Sight Distance			
	Peer Review Measured (ft)	TIAS Measured (ft)	Minimum Required (ft)	Desirable (ft)
Stopping Sight Distance				
Marsh Hill Road and Proposed Site Driveway				
Marsh Hill Road approaching from the east	360'	350'	327'	-
Marsh Hill Road approaching from the west	240'	240' *	253'	-
Intersection Sight Distance				
Marsh Hill Road and Proposed Site Driveway				
Site Driveway looking to the east	365'	350'	373'	430'
Site Driveway looking to the west	240'	240' *	373'	430'
* Distance to the center of Bridge Street				

17. The following parking space requirements are noted in the Table 6.1.6 of Off-Street Parking Requirements from Town's Zoning By-Laws. Green concurs with the number of proposed parking spaces.

18. Green reviewed the parking requirements depicted on sheet 3 of the "Comprehensive Permit Site Plan." Green concurs that 80 parking spaces are to be provided to meet the minimum requirements of two parking spaces per unit according to the Town's bylaws.

19. The U.S. Department of Justice Civil Rights Division published accessible parking space requirements in sections 208.2 of the 2010 ADA Standards for Accessible Design. The ADA Standards for Accessible Design indicates that in parking lots with 76 to 100 parking spaces four ADA parking are two be provided, one of which is van accessible. The current site plans meets the minimum requirements to satisfy the ADA parking standards.

20. A waiver has been requested to reduce the width and depth of the proposed parking spaces. The current site plans indicates that all of the proposed parking will have a width of nine feet and depth of 18-feet, with a maneuver width of 22-feet. All of the proposed parking spaces fall in the 45 to 90 degree standard. According to the Town's bylaws, in section 6.1.8.1 General Standards D. Parking Dimensions the "Minimum Parking Stall Dimensions" for a standard 45 to 90 degree parking space shall be ten-feet-wide, 20-feet deep, with a maneuver width of 22-feet. According to the Town's bylaws, in section 6.1.8.1 General Standards D. Parking Dimensions the "Minimum Parking Stall Dimensions" for an accessible 45 to 90 degree parking space shall be 12-feet-wide, 19-feet deep, with a maneuver width of 22-feet. Due to the minimum maneuver width of 22-feet requirement being met, Green concurs that the parking waiver should be considered to be granted.

21. A previous peer review conducted by Green was submitted and the plan set was revised in August 2025. The Green peer review had a comment of "The applicant is requesting a waiver for smaller parking depth from 20' to 18'. We recommend aisle with be a minimum of 24' for 18' long parking spaces. Please revise." The applicant response was "The required drive aisle width is 22'. Increasing the drive aisle width would increase site impacts and push the development closer to the adjacent resource area." The revisions are not compliant with the Town's regulations or the industry practices in the Urban Land Institute's *Dimensions of Parking* recommends. Green requests the site plans and

proposed parking be revised to be compliant with the town's regulations and the industry practices in the Urban Land Institute's *Dimensions of Parking* recommends.

22. Green reviewed the "Layout and Materials Plan" depicted on sheet 3 of the Site Development Plans. There is a proposed accessible ramp located near the two proposed accessible parking spaces outside of the building. There is no proposed accessible ramp provided for the accessible parking spaces in the parking garage to access the elevator room. Green requests that an ADA compliant curb ramp be provided within the parking garage in order to access the elevator.

23. Green recommends conducting apparatus 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 confirm that fire trucks will be able to maneuver the entire site in the case of emergencies.

24. Due to the discrepancies noted previously in the seasonal adjustment, trip generation calculations and trip distribution, Green cannot evaluate the Synchro results for their accuracy. Green recommends that the errors in the seasonal adjustment, trip generation and trip distribution be addressed then the Synchro analysis can be conducted. Green recommends updating the capacity analysis based on the recommended trip generation. However, Green recognizes that the additional 18 to 19 trips per hour should not significantly worsen the operations presented in the report.

25. Green recommends using the latest Synchro 12 software to conduct the capacity analysis, The site driveway analysis should use the HCM 7th TWSC analysis, as it is the most updated Synchro analysis methodology. 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. In addition, for Synchro analysis for future year conditions, a Peak Hour Factor (PHF) of 0.92 shall be used per MassDOT standards.

26. Green concurs with all of the TIAS recommendations.

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