GREEN INTERNATIONAL AFFILIATES, INC.
239 LITTLETON ROAD, SUITE 3 WESTFORD, MA 01886
T: (978) 923-0400 | F: (978) 399-0033 | WWW.GREENINTL.COM

February 18, 2020

Ms. Pamela Harding
Town Planner / Director of Planning & Development
Town of Holden
1204 Main Street
Holden, MA 01520

Subject: **Traffic Engineering Peer Review – Salisbury Pine Tree Estates Holden, Massachusetts**

Dear Ms. Harding:

On behalf of the Town of Holden (the Town), Green International Affiliates, Inc. (Green) is submitting this letter report of the findings from our engineering peer review of the application package for the proposed residential subdivision between Bailey Road and Salisbury Street. The scope of our review included a review of the traffic study and the proposed site plan, as they relate to vehicular access and pedestrian access at the proposed site and to local traffic circulation at and near the proposed site. The project is before the Planning Board for approval.

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

- Report titled "Traffic Impact and Access Study – Proposed Residential Development, Salisbury Pine Tree Estates, Holden, Massachusetts", prepared by MDM Transportation Consultants, dated October, 2019.
- Plan titled "Definitive Residential Subdivision Plan of Salisbury Pine Tree Estates, Holden, MA", prepared by PLACES Associates, dated October 2019.

In addition to the above documents, Green visited the project site and the surrounding roadways on February 11, 2020 to gain a better understanding of the existing conditions and the context of the proposed project. Our review evaluated the documents for consistency with MassDOT's "Transportation Impact Assessment (TIA) Guidelines" (March 13, 2014), typical industry practice for traffic studies, the Town of Holden's Subdivision Regulation Bylaw and general bylaws, and Americans with Disabilities Act (ADA) and Massachusetts Architectural Access Board (AAB) design standards.

Green offers the following comments resulting from our review of the above documents:

October 2019 Traffic Impact and Access Study

1. The TIAS included the following four study intersections:

    - Main Street (Route 122A) at Salisbury Street
    - Main Street (Route 122A) at Bailey Road
    - Bailey Road at proposed west Site Driveway
    - Salisbury Street at Pine Tree Road

Green concurs with the study area used in the TIAS.

2. Traffic count data were collected in May of 2019. Seasonal data suggests above-average annual conditions during the month of May, hence, no revisions to volumes were made. Automatic Traffic Recorders (ATRs), including 24-hour counts and speed data were collected on Tuesday May 7th and Thursday May 9th. Turning Movement Counts (TMCs) were collected on Tuesday May 7th, 2019. Green concurs with using more conservative traffic data to perform the analysis.

3. Crash data were presented from information provided by the MassDOT Highway Division Safety Management/Traffic Operations Unit for the years 2014-2018 for the three existing study intersections (the intersections on Main Street, and of Salisbury Street at Pine Tree Road). During the five-year period that was examined, the Main Street (Route 122A) at Bailey Road intersection was stated to have experienced 12 crashes, the Main Street at Salisbury Street intersection was stated to have experienced 21 crashes, and the Salisbury Street at Pine Tree Road intersection was stated to have experienced 0 crashes.

   Green reviewed the numbers of crashes with data available from the MassDOT IMPACT Crash Query and Visualization tool, and identifies 28 crashes as being reported at the Main Street / Salisbury Street intersection in the same five-year crash period. This is anticipated to increase the crash rate at this intersection. Green recommends further review of crash history and taking the additional crashes into consideration when evaluating potential impacts and improvements.

4. Green notes a typographical error in the crash history review. Two crashes at the Main Street / Bailey Road intersection were stated to have occurred in 2018 but four crashes were reviewed to have occurred in that year. The total number of crashes and the crash rate stated in the TIAS appear to be correct.

5. Based on field observation, MDM's measurements of the Stopping Sight Distance (SSD) and Intersection Sight Distance (ISD) in both directions at both proposed sight drive locations appears to be accurate.

6. The future conditions were evaluated for a five-year horizon which is not consistent with MassDOT TIA guidelines which require a minimum of seven years. The background growth is indicated to be 0.5% per year, with two specific planned developments in the area consisting of two age-restricted housing developments approximately three miles south of the project. The two projects were stated as not expecting to provide trips onto the study roadways exceeding the background growth rate, even though the two projects total 237 units and are located on one of the study roadways. Green recommends explaining the decision to use a five-year horizon and re-analysis using a seven-year horizon. Green also recommends including the two planned background developments as they could contribute a sizeable number of trips to/from Main Street in Holden. In addition, the background growth rate of 0.5% per year appears to be lower than typically applied the past several years, considering growth occurring along Route 122A in neighboring Rutland, and we request additional supporting documentation for this rate (possibly CMRPC backup data or forecasts) or the background rate may need to be increased.

7. Green recommends including mention and a brief description of MassDOT projects #606563 and #608815 on Main Street, located within approximately one mile from Main Street / Salisbury Street and Main Street / Bailey Road study intersections in the list of background projects, although these are non-development projects.

8. The number of units stated in the TIAS is 102; however the number of units depicted in the plans is 101 and the notes under Table 6 refer to a different number. It should be clarified as to the correct number of units proposed and used in the analysis as well as if it includes the existing house whose driveway is proposed to be reconnected to Henry Way. Green also recommends revising the Table 6 notes to conform the correct number of units used in the analyses.

9. The trip generation was evaluated using the assumption that 90 units are considered as Low-Rise Multifamily Housing (LUC 220) per ITE's *Trip Generation Manual* with the remainder as Single Family Detached Housing (LUC 210). An issue noted is that ITE's description of LUC 220 states that it is defined as residential units "located within the same building with at least three other dwelling units", a description that applies to only 36 of the total proposed units. ITE's description for LUC 210, although generally for detached units, states that "a typical site surveyed is a suburban subdivision." Given these descriptions, Green recommends re-evaluating the trip generation with only the buildings containing three (or more) units as LUC 220.

10. In the TIA, there are minor errors noted in the trip generation volume network diagrams:

    a. The PM Peak Hour volume network is missing one exiting trip since 25 exiting trips are predicted but only 24 trips are shown exiting the site. Green recommends adding this missing trip to the figures and analyses.

    b. The lower-right corner of Figure 5 states "Weekday Evening Peak Hour" although the distribution is intended for both peak hours. Green recommends revising this text to conform with the analyses conducted.

    Note: with the anticipated revisions in estimated trip generation as noted in above Comment #9, the Build networks would be updated for the AM and PM periods.

11. Although Green mostly agrees with the trip distribution external of the study area, the percentage of traffic accessing workplaces within Holden via Bailey Road and Salisbury Street heading south appears high given the residential characteristics within the town along these roadways south of the project site. Additionally, the sum of trip distributions for Holden-only trips exceeds 100%. Green recommends revising the trip percentages for Holden-only trips and updating the analyses accordingly.

12. In the intersection capacity analysis the same peak hour factor (PHF) was used for the overall intersection and heavy vehicle percentages were applied per movement. MassDOT *Transportation Impact Assessment (TIA) Guidelines*, which refer to MassDOT's Traffic and Safety Engineering 25% Design Submission Guidelines, state to apply PHF "on an approach-by-approach basis". These guidelines also state to apply heavy vehicle percentages "on an approach-by-approach basis or by lane group, as necessary". The applicant should re-perform the analyses applying PHF and heavy vehicle percentages per MassDOT guidelines.

13. The intersection capacity analysis was conducted using the *Highway Capacity Manual 2010* rather than using the latest HCM reference that was published in MassDOT's *TIA Guidelines* and MassDOT's *Traffic and Safety Engineering 25% Design Submission Guidelines*. Although it may provide similar results, the applicant should have performed the analyses using *Highway Capacity Manual 6th Edition*, as MassDOT guidelines state to use "procedures from the most recent edition of the Highway Capacity Manual (HCM)". Any updates to the analysis, given the network updates

requested above, should utilize the latest HCM and the available tools that are based on that version.

14. The TIAS referenced a waiver to propose 24-foot wide roadways within the site and that this width meets the minimum AASHTO recommended width for a local roadway. However, the minimum AASHTO recommended width for a local roadway is 26 feet (20-foot travel width plus 3-foot graded shoulders on both sides of the road). If the project proposes to meet AASHTO minimum recommended roadway widths, then the TIAS should be revised accordingly. Green also recommends reconciling the differences between the waiver request and the site design, which proposes 28-foot wide roadways. Furthermore, prior to any final decision on the proposed roadway widths, it is recommended that the applicant evaluate large truck (i.e. WB-50) and appropriate fire apparatus vehicle movement within as well as entering/exiting the proposed site.

October 2019 Site Plan

15. The site plans generally conform to the Town of Holden Subdivision regulations.

16. The proposed internal intersection of Pine Tree Road and Farmer's Way has a 90-degree bend/corner and is proposed to have one of the approaches operate under STOP control, although both approaches meet at approximately the same angle. Green recommends either making both approaches operate under STOP control for safety or provide a curve radius that facilitates travel at the design speed from the Pine Tree Road approach without the need for STOP signs.

17. The proposed crosswalks within the site depict chevron markings. Green recommends that the crosswalks conform with Figure 3B-19 of the *Manual on Uniform Traffic Control Devices* or be of "ladder-style" with perpendicular markings.

18. The internal pedestrian crossings are depicted as upstream of the STOP bar at the east end of Henry Way, the north end of Farmer's Way, and the east end of Pine Tree Road. A car stopped at the Stop sign/bar at these locations will block the pedestrian travel path. Green recommends relocating the STOP bars/signs and the crosswalks such that stopped vehicles are upstream of the pedestrian crossings.

19. Although pedestrian crossings with crosswalks are provided at the ends of the other site roadways, there is no crosswalk proposed across the west end of Henry Way. Green recommends that a pedestrian crossing is also installed across the west end of Henry Way to provide a connection between these sidewalk ends.

20. It is recommended that where possible, driveways openings are consolidated for multiple unit buildings (i.e. Lot numbers 15, 16, 17, 24, and 38).

Additional Mitigation

21. The TIAS recommends installing STOP signs at the approaches exiting the site at each of Salisbury Street and Bailey Road, to maintain sight distances by maintaining low vegetation and other landscaping features near the exiting approaches, and to connect to the existing sidewalk on Salisbury Street. Green recommends also maintaining sight distances for the internal site intersections by maintaining trimmed vegetation and other landscaping features near the exiting approaches.

22. The Town's Complete Streets Prioritization Plan includes a project to install sidewalk along Bailey Road. Green recommends that the Applicant coordinate with the Town regarding the sidewalk proposed along Bailey Road and consider participating in its implementation. The design/construction of any sidewalk will need to be ADA compliant in terms of wheelchair ramps.

23. Green recommends re-evaluating mitigation measures needed at the Main Street study intersections once the traffic analysis and trip distribution have been re-performed.

24. Although the minimum ISD appears to be satisfied for the Bailey Road approach at its intersection with Main Street if the ISD measurement is performed strictly as specified by AASHTO, however, if a vehicle is stopped at the stop line of Bailey Road, vegetation restricts visibility such that the minimum ISD would not be satisfied. This condition was observed to force vehicles to encroach onto the crosswalk to improve visibility of Main Street. Furthermore, the vegetation on Bailey Street also restricts the visibility of its STOP sign. Green recommends that vegetation trimming is performed within right-of-way along the Bailey Road approach and potentially installing a W3-1 Stop Ahead sign on Bailey Road in advance of the intersection.

If either the Town staff or the 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.

Wing Wong, P.E., PTOE
Transportation Planning Group Leader

cc: W. Wong, Green
W. Scully, Green

F:\Projects\2020\20008\DOCS\RPTS\2020-02-14 Traffic Peer Review - Residential Community_ver05.docx