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Ross Povenmire, Planning Agent
Planning Board
Town of Boxford
7A Spofford Road
Boxford, MA 01921

March 5, 2021

Re: The Willows at Boxford, Willow Road, Boxford, MA
Traffic Engineering Peer Review

Dear Mr. Povenmire and Members of the Planning Board:

On behalf of the Town of Boxford, TEC, Inc. (TEC) reviewed documents as part of the traffic engineering peer review for a residential development proposed along Willow Road approximately 650 feet east of Deer Run Road. The subject project site has historically been a farm and currently provides an unpaved turn-a-round with an old farm structure. The project proposes to raze the existing on-site structures and construct a 66-unit active senior living development; generally consisting of duplexes and a clubhouse/amenities area. Access to the site would be provided via one full-access driveway connecting to Willow Road, approximately 925 feet east of Deer Run Road. An emergency vehicle access driveway would be located opposite Deer Run Road.

Toll Bros., Inc., ("Applicant") submitted the following documents which were reviewed by TEC for conformance with Town and industry standards for traffic impact and safety:

- *Traffic Impact Study – Active Senior Residential Development – Willow Road (Route 133, Boxford, MA*; prepared by McMahon Associates, Inc.; dated November 2020.
- Site Plans titled *Site Plan of Land for The Willows at Boxford; prepared by The Morin-Cameron Group, Inc.; dated November 19, 2020.*

Upon review of the documents and plans, TEC has compiled the following comments for the Board's consideration:

Traffic Impact Study

1. Willow Road, signed as Route 133, is under the jurisdiction of the Town of Boxford and therefore no coordination between the Applicant and the Massachusetts Department of Transportation (MassDOT) for the issuance of a Permit to Access State Highway is required.
2. The traffic study area includes three (3) intersections in the vicinity of the site. Based upon the size, scope, and location of the development, TEC finds that the study area as provided in the Traffic Impact Study (TIS) is sufficient to capture the effects of the project on surrounding roadways based on Traffic Impact Assessment (TIA) guidelines set forth by MassDOT. This includes an evaluation of intersections in which the site generated trips increase the peak hour traffic volume by more than 5 percent and/or by more than 100 vehicles per hour per MassDOT's *TIA Guidelines* (Section 3.I.C).

3. The Applicant has provided traffic data collection during the weekday morning and weekday evening peak periods as conducted on March 11, 2020. The traffic counts were collected prior to statewide COVID-19 pandemic restrictions and therefore should not be affected by the pandemic changes on the regional and daily traffic flows.
4. The Applicant has adjusted the traffic counts to reflect seasonal fluctuation as March represents a month lower than the average month conditions. TEC concurs with the usage of the 9.0% seasonal adjustment factor as published. TEC notes that Willow Road and I-95 are different roadways; however, both exhibit significant and similar commuter flows during the peak hours as analyzed. For comparison, the MassDOT statewide average seasonal adjustment for urban minor arterials (U4) in March is typically -5.0%, or higher than an average-month condition. This indicates that the factor used by the Applicant is conservative.
5. The ATR data provided by the Applicant in Table 1 has not been adjusted to reflect a current year Average Daily Traffic (ADT). Although not updated for the current year, the data provided in this table does not affect the operational analysis within the TIS.
6. Traffic counts provided by the Applicant in the TIS for the intersection of Willow Road / Deer Run Road depicts traffic volumes of zero (0) in and out of Deer Run Road during the weekday morning peak hour and limited volumes during the weekday evening peak hour. At the time of the traffic counts in March 2020, these observed volumes may have been inaccurate as the single-family homes along the roadway were partially still under construction. The Applicant should adjust the traffic volumes in/out of Deer Run Road to reflect a standardized condition for the number of dwellings along the cul-de-sac. This would most likely include projecting traffic volumes based on standard trip rates published in the Institute of Transportation Engineers (ITE) publication, *Trip Generation, 10th Edition*.
7. The TIS provides a crash analysis generally centered on the two intersections in the vicinity of the site, as well as the proposed site driveway vicinity. TEC's review the data as provided in comparison to the MassDOT's online Interactive Mapping Portal for Analysis and Crash Tracking (IMPACT) website and found the level of crash history to be consistent. TEC concurs with the Applicant that the data suggests no specific crash trends in the vicinity.
8. The TIS did not provide support materials related to the ambient growth rate of 1.0% per year as provided by the Merrimack Valley Planning Commission (MVPC). At a minimum, the Applicant should provide a listing of documents reviewed to confirm the utilization of this ambient growth factor.
9. TEC concurs with the Applicant's use of Land Use Code (LUC) 251 – Senior Adult Housing Detached as it represents a conservative estimate of site generated traffic as compared to LUC 252 (Senior Adult Housing Attached) presented in the ITE publication, *Trip Generation, 10th Edition*.
10. TEC reviewed the ITE publication, *Trip Generation, 10th Edition* for the estimated site generated traffic and confirmed the peak hour generation as noted in the TIS. Note that the daily traffic projected for the site is 390 (195 entering and 195 exiting) new vehicle trips based on 66 dwelling units.
11. Projecting trip distribution for a senior housing development is typically more difficult as compared to a standard residential development because many seniors will no longer be working. The use of US Census Journey-to-Work data, as completed by the Applicant,

may therefore not provide a useable model. That being said, the industry has not produced a perfect model for senior living distribution based on work vs. play during peak hours. TEC therefore has no issue with the use of the Journey-to-Work data based on the overall size of the development. Any minor modifications in the percentage to/from each zone will not result in any significant changes to the traffic projection model.

12. The results of the capacity analysis depicted in Table 3 is missing information related to projected 95th percentile queuing. The Applicant should add this to the table.
13. TEC concurs with operational findings of the TIS that the introduction of additional traffic along Willow Road and the surrounding street network as a result of the project will have a negligible impact on operations and result with overall volumes well below capacity indicating that significant reserve capacity is still available along the roadway networks.
14. The TIS did not provide a date for which the sight distances along Willow Road were observed and measured. The vegetation along the north side of pavement typically grows thick and near the edge of pavement during the summer months and therefore the intersection sight distance as reported in the TIS may be less than described. TEC does not believe that this will affect the overall exceeding of the minimum requirements; however, TEC does recommend that the Applicant commit to maintaining vegetation clearing within the public right-of-way and along the project's property line to ensure minimum / desired sight lines are met beyond the opening of the project.

Site Plan - Transportation

15. The Applicant should provide turning templates showing the ability of a typical garbage vehicle and emergency vehicles to access, circulate, and egress the site through the circulation pattern without leaving the paved surface. This includes a Town of Boxford and Town of Georgetown fire apparatus which may be a faster respondent to this location.
16. The Applicant should coordinate with the Town of Boxford Fire Department and Public Works Department for preferred locations of fire lanes (if needed), confirmation of hydrant / cistern locations, and sign requirements for fire lanes within the site. TEC does note that the current plans as provided include two (2) locations for fire hydrants / cisterns.
17. The plans as provided depict an on-site sidewalk network along one side of the roadway throughout the site with no sidewalk provided on Private Drive B accessing Units #9 to #14. At a minimum, the Applicant should provide an accessible ramp, crosswalk, sidewalk stub, and appropriate pedestrian signage crossing Private Drive A to access Private Drive B.
18. Parking spaces on-site adjacent to the club house and visitor parking along Private Drive A are defined as 9'x18' in compliance with Sec. 196-26D of the Boxford Zoning Bylaws.
19. The site plans show a 24-foot-wide pavement cross-section along Private Drive A and the residential section of Private Drive B. TEC finds this width acceptable. In comparison, the Deer Run Road subdivision roadway is 20 feet in width.
20. The site plans as provided depict several horizontal curvatures in the roadway, most notably along Private Drive A. Along 30 mph roadways (prima facie for thickly settled), the AASHTO minimum recommendation for stopping sight distance (SSD) is 200 feet. The horizontal curve location in the vicinity of STA 0+00 to STA 2+00, STA 4+50 to STA 9+50 (S-curve), and STA 15+00 to STA 19+00 provides locations where the sight lines may be

impeded by vegetation on the side of the roadway and therefore do not attain a full 200-foot distance for at least one direction of travel. The landscaping plan depicts several trees immediately beyond the edge of pavement or back of sidewalk. The Applicant should evaluate the sight triangles along the travel lane centerlines to denote those locations where street trees should be set further from the roadway or relocated.

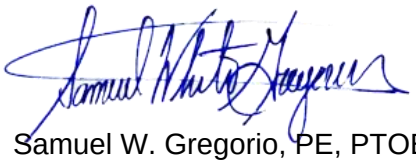
21. The site plans as provided depict several crest and vertical curves along Private Drive A and Private Drive B which are designed with K-values that are at or above the AASHTO minimum recommendations for sight distance along 30 mph roadways. The design K threshold for crest curves is 19 and for sag curves is 37. Note that all crest curves in the site plans are also in excess of the Town 'subdivision' threshold of K=28. No further response required.
22. The maximum centerline grade within the project is 5.2% (along Private Drive B) which is acceptable for the minor street nature of the roadway. Note that Sec 300-12(5) of the Subdivisions of Land Regulations notes that the maximum grade on an intersection approach is 2%. The Applicant should confirm that this is acceptable with the Fire Department as this grade will be experienced along the emergency access.
23. The plan set should be revised to include both intersection sight distance and stopping sight distance measurements for both directions at the access points for Private Way A and Private Way B onto Willow Road. Intersection sight distance measurements should be taken from a point 14.5-feet from the proposed edge of travel way along Willow Road (edge of pavement). The sheet should denote all areas of vegetation clearing and grading modifications resulting from the sight lines both on the public ROW and land under the control of the Applicant.
24. Sight lines exiting Private Drive B at Willow Road may cross over private property at #60 and #62 Willow Road. The Applicant shall seek and discuss with the Town grading and/or sight line easements, as needed, at these locations in order to maintain the sight lines from future vegetation plantings and other potential obstructions.
25. Sheet 24 of the site plans depicts a bituminous concrete detail with a 1.75% maximum cross-slope. The Applicant should revise the plans to denote a preferable 1.5% cross-slope with 0.5%± tolerance to ensure all sidewalks are below the Massachusetts Architectural Access Board (AAB) maximum of 2.0%.
26. Sheet 24 of the site plans depicts an accessible curb (handicap) ramp construction detail. The detail denotes reference to Note 9 at the gutter line in front of the detectable warning panel. There is no Note 9 in the detail.
27. Based on the sidewalk layout, it appears a few styles of accessible curb (handicap) ramps are missing from the construction details. These should be added by the Applicant. Locations of all accessible ramps should be denoted on the plan set.
28. The Applicant shall provide a mounting height to the accessible parking space sign construction detail.
29. The Applicant should provide pedestrian warning signage and advance signage at and in advance of designated crosswalks across Private Drive A.
30. The construction details do not depict a typical driveway detail in relation to the proposed sidewalk. The Applicant should provide such a detail which also denotes the maximum

cross-slope of the driveway within the pedestrian travel path and the slope from the pedestrian path to Private Drive A's curbline.

31. The Applicant shall provide a sign summary for all traffic signage within the project limits including notations for the sign legend, sign size, and sign lettering dimensions in compliance with the Manual on Uniform Traffic Control Devices (MUTCD).

Please do not hesitate to contact me directly if you have any questions concerning our comments at 978-794-1792. Thank you for your consideration.

Sincerely,
TEC, Inc.
*"**T**he **E**ngineering **C**orporation"*



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