Professional Services Corporation, PC

Memorandum

Date	January 11, 2021
To	Sherborn Zoning Board of Appeals
From	Thomas C. Houston, PE
Project	The Pines Residences and Apple Hill Estates Comprehensive Permit Projects
Subject	Peer Review of Transportation Impact Assessments

Professional Services Corporation, PC (PSC) reviewed the Transportation Impact Assessments (TIAs) for The Pines Residences and Apple Hill Estates Comprehensive Permit Projects (Proposed Projects) on behalf of the Sherborn Zoning Board of Appeals. The Pines Residences, 41 North Main Street (Rte. 27) proposes construction of sixty (60) residences in two mid-rise buildings plus a common building with principal access provided by a proposed access drive connecting to the current west terminus of Powderhouse Lane. A total of 118 at grade parking spaces are provided (1.97 parking spaces/dwelling unit). Apple Hill Estates will provide 28 dwellings including one single-family residence to remain, one single-family residence to be constructed, and 26 duplex residential units in 13 buildings to be constructed. The plans for the new units show garage parking spaces and driveway parking spaces in a stacked configuration.

With respect to this memorandum, we have not stated an opinion as to whether The Pines Residences and Apple Hill Estates are a single project or two independent projects. In either case the 2027 Build Traffic Volumes in both TIAs include the trips generated by the other project by including these trips in the 2027 No-Build Traffic Volumes as a "Specific Development by Others." So, the total post development conditions are identified, However, by including the transportation impacts of one project in the Build Case and including the transportation impacts of the other project in the No-Build Case, the transportation impacts (i.e., the difference between no-build and build) are understated in comparison to the impacts of the

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two sites considered as a single project. Should the Zoning Board of Appeals determine that these two projects should be evaluated as a single project, the TIA would have to be substantially revised.

The MassDOT Transportation Impact Assessment (TIA) Guidelines dated March 13, 2014 (TIA Guidelines) provide a methodology for transportation impact assessments subject to the Massachusetts Environmental Policy Act (MGL Ch. 30 S. 61-62) (MEPA). However, many provisions of the TIA Guidelines have become standard practice for preparation of TIAs in Massachusetts. We have therefore evaluated the adequacy of The Pines Residences TIA and the Apple Hill TIA with respect to applicable provisions of the TIA Guidelines.

Overall, we find that The Pines Residences Transportation Impact Assessment (The Pines TIA) and the Apple Hill Estates Transportation Impact Assessment (Apple Hill TIA) are properly prepared and comply with applicable provisions of the TIA Guidelines and with standard engineering practice. We offer the comments that follow for consideration.

BASIS

A. Transportation Impact Assessment, The Pines Residences, 41 North Main Street (Route 27), Sherborn, Massachusetts prepared for Barsky Estate Realty Trust prepared by VAI-Vanasse & Associates, Inc. (VAI) dated October 2020 (The Pines TIA).

B. Transportation Impact Assessment, Apple Hill Estates, 31 Hunting Lane, Sherborn, Massachusetts prepared for Barsky Estate Realty Trust prepared by VAI-Vanasse & Associates, Inc. (VAI) dated October 2020 (Apple Hill TIA).

C. Site Development Plans for The Pines Residences, 41 North Main Street, Sherborn, MA 01770 prepared by Allen & Major Associates, Inc. (Allen & Major) as Issued for ZBA Application October 1, 2020.

D. Site Development Plans for Apple Hill Estates, 31 Hunting Lane, Sherborn, MA 01770 prepared by Allen & Major Associates, Inc. (Allen & Major) as Issued for ZBA Application October 1, 2020.

PART I – THE PINES TIA

Site Access: The primary site access drive for The Pines Residences will connect at the current end of Powderhouse Lane.

TSA: The Transportation Study Area (TSA) includes the Hunting Lane/North Main Street (Rte. 27) Intersection, the Eliot St. (Rte. 16) /North Main Street (Rte. 27) Intersection, and the Powderhouse Lane/North Main Street (Rte. 27) Intersection. As discussed in Part II of this memorandum, the Butler Street//North Main Street (Rte. 27) Intersection should be evaluated for inclusion in the TSA.

Inventory: The Pines TIA properly inventories relevant characteristics of roads, intersection, pedestrian, bicycle, and public transportation facilities.

Counted Traffic Volumes: Due to reduced current traffic volumes attributed to the Covid-19 Pandemic, The Pines TIA states that automatic traffic recorder (ATR) counts and manual turning movement/vehicle classification counts (TMCs) were used that were performed December 2016. It further states that counts were calibrated by comparing the December 2016 ATR count on North Main Street north of Eliot Street with the April 2020 ATR count in the same location. However, the 2016 ATR count provided is for Eliot Street east of North Main Street. and the locations of new 2020 TMCs are not specifically documented.

1. Provide a copy of the 2016 ATR count on North Main Street north of Eliot St.
2. The 2020 Existing Traffic Volumes were adjusted upward from the volumes counted in 2016. Document the 2016 vs 2020 volume adjustment which are greater than 1.5% per year.
3. Provide copies of any 2020 TMCs.
4. Verify that the 2020 ATR count of 17,375 (adjusted?) on North Main Street north of Eliot St. is 234% of the actual counted 2020 volume.

Travel Speed: The TIA uses recorded vehicle speed from the April 2020 ATR on North Main Street and properly quantifies the mean speed of 32 mph NB and 30 mph SB and 85th percentile speed of 37 mph NB and 34 mph SB.

Crash Data: The TIA properly analyses motor vehicle crash data for the most recent five years available (2013-2017) and the calculated crash rates were below the District and State crash rates for unsignalized and signalized intersections respectively at all locations and are not considered to be significant.

2027 No-Build Traffic Volumes: The TIA evaluates future traffic growth considering both Specific Development by Others and general background growth.

The TIA properly includes trips generated by the 59 North Main Street Project as Specific Development by Others.

The Pines TIA includes traffic volumes generated by the Apple Hill Estates Project as Specific Development by Others. If the Zoning Board of Appeals determines that The Pines Residences and the Apple Hill Estates are actually a single project, then the TIA would have to be updated to include The Pines Residences trips and Apple Hill Estates trips as trips generated by a single project.

Additionally, as documented in Part II of this memorandum, we believe that trips generated by the Apple Hill Estates should be forecast using the Institute of Transportation Engineers trip generation for "Single-Family Detached Housing (210)[1]".

The TIA properly determines a background growth factor of 1.5% per year using MassDOT counting station data.

Trip Generation: The Pines TIA properly uses "Multifamily Housing (Mid-Rise) (221)" for 60 multifamily dwelling units to forecast trip generation as 326 vehicle trips per average weekday, and 21 vehicle trips for the weekday AM peak hour and 27 vehicle trips for the PM peak hour.[1]

Trip Distribution and Traffic Assignment: The TIA properly uses US Census Journey to Work data to develop trip distribution and assignment as 45% (North Main Street north), 25% (North Main Street south), 25% (Eliot Street east), and 5% (Hunting Lane west).

2027 Build Traffic Volumes: Powderhouse Lane, a segment of the route serving as the sole access to The Pines Residences, is most directly impacted by trips generated by the Proposed Project. Trips generated by The Pines Residences comprise 21 vehicle trips (which equals 40% of total traffic volume on Powderhouse Lane) during the AM peak hour and comprise 27 vehicle trips (which equals 25% of total traffic volume on Powderhouse Lane)during the PM peak hour. Trips generated by The Pines Residences comprise relatively small percentages of traffic volumes on North Main Street and Eliot Street.

Intersection Levels-of-Service and Queues: The Pines TIA analyses intersection levels-of-service, delay, and queue length considering The Pines Residences as an independent project. On that basis, Table 10 of the TIA shows that during the AM peak hour, the signalized Eliot Street (Rte. 16) /North Main Street (Rte. 27) Intersection operates at LOS B[b] overall with the

[1] Institute of Transportation Engineers, Trip Generation Manual, Version 5.0 (Updates),10th Edition (September 2017)+Supplement (February 2020)

2020 Existing, the 2027 No-Build, and the 2027 Build Traffic Volumes. However, the 95th queue reaches 761 ft.[d] for the northbound through and 480 ft.[d] for the southbound through/left. During the PM peak hour, the intersection operates at LOS D[b] overall with the 2020 Existing Traffic Volumes and at LOS E[b] (capacity) with the 2027 No-Build and the 2027 Build Traffic Volumes. The 95th queue reaches 669 ft.[d] for the westbound left and 624 ft.[d] for the southbound through/left.

a. Average control delay per vehicle (seconds).
b. Level-of-service.
c. 95th queue length in vehicles.
d. Queues are maximum after two cycles. Volume exceeds capacity, queue may be longer.

Table 9 of the TIA shows that during the weekday AM peak hour the eastbound approach to the unsignalized Hunting Lane/North Main Street (Rte. 27) Intersection operates at LOS C [b] with the 2020 Existing Traffic Volumes and at LOS D [b] with the 2027 No-Build and the 2027 Build Traffic Volumes. Delay[a] increases to 34 seconds and the 95th queue[d] is 1 vehicle with the 2027 Build Traffic Volumes. The TIA states that during the weekday PM peak hour the eastbound approach operates at LOS C [b] with the 2020 Existing Traffic Volumes and at LOS D [b] with the 2027 No-Build and with the 2027 Build Traffic Volumes. Delay[a] increases to 33 seconds and the 95th queue[d] is 1 vehicle with the 2027 Build Traffic Volumes.

The Powderhouse Lane/North Main Street (Rte. 27) Intersection is characterized by unacceptable operations. TIA shows that during the weekday AM peak hour the eastbound approach to the unsignalized intersection operates at capacity (LOS E[b)] with the 2020 Existing Traffic Volumes and at LOS F[b] with the 2027 No-Build and the 2027 Build Traffic Volumes. Delay[a] increases and the 95th queue[d] increases to 5 vehicles with the 2027 Build Traffic Volumes. During the weekday PM peak hour, the eastbound approach operates at LOS F[b] with the 2020 Existing Traffic Volumes, the 2027 No-Build, and the 2027 Build Traffic Volumes. Delay[a] increases and the 95th queue[d] increases to 8 vehicles with the 2027 Build Traffic Volumes.

Intersection Blockage: Due to limitation on the methodology, the above analysis of the Powder House Lane/North Main Street (Rte. 27) Intersection does not reflect additional delays due to blockage of the intersection. During the AM peak hour both the 50th percentile queue and the 95th percentile queue extend southerly from the Eliot Street (Rte. 16) /North Main Street (Rte. 27) Intersection past the Powder House Lane/North Main Street (Rte. 27) Intersection blocking the intersection for left turns. Left turns comprise 45% of exiting trips. If vehicles exiting from Powderhouse Lane enter the intersection and then are blocked from turning left, the heavy

southbound through movement on North Main Street will be blocked by the vehicle trapped in the intersection.

5. The TIA should be revised to discuss delays for left turns exiting from Powderhouse Lane due to blockage of the intersection by vehicle queues from the Eliot Street (Rte. 16) /North Main Street (Rte. 27) Intersection.
6. The TIA should also estimate the duration queues long enough to block the intersection.
7. The TIA should also address potential blockage of southbound vehicles by vehicles trapped in the intersection.

Sight Distance: The Pines TIA properly calculates stopping sight distance (SSD) and intersection sight distance (ISD) for the Powderhouse Lane/North Main Street (Rte. 27) Intersection for an approach speed of 40 mph on North Main Street. Available SSD exceeds measured SSD for both the North Main Street approaches. The desirable ISD looking to the south is 445 ft. and the measured sight distance of 365 ft. is not sufficient.

Project Access Recommendations: The TIA includes recommendations for safe project access on pages 26-27. We concur with the VAi recommendations and suggest that they be shown on the plans or incorporated as Conditions of Approval.

Signal Optimization Recommendations: The TIA includes recommendations for optimized signal timing for the Eliot Street (Rte. 16) /North Main Street (Rte. 27) Intersection which result in improved operations (LOS E to LOS D) and improves the Eliot Street westbound left turn (LOS F to LOS E). We concur with the VAi recommendation. Recommendation[2]: That the Board include a Condition of Approval requiring that VAi assist (if desired by the Town) in implementing the optimized signal timing.

Long Term TDM Plan: The TIA includes recommendations for a Long-Term Transportation Demand Management (TDM) Plan which will help to minimize single occupant vehicle trips. We concur with the VAi recommendations. Recommendation[2]: That the Board include a Condition of Approval requiring implementation of a Long Term TDM Plans be incorporated as a Condition of Approval.

[2] Recommendation for Condition of Approval are provided should the Zoning Board of Appeals determine that the Comprehensive Permit should be granted.

Construction Phase TDM Plan: The Pines TIA should be amended to include a plan for Construction Phase Transportation Demand Management. As the Applicant will control the scheduling and means of construction, therefore the Applicant has the ability implement TDM measures that will reduce single occupant vehicle trips and overall construction trips.

Heavy vehicle trips required for earthwork operations will impact area roadways. The site plan shows substantial alteration of existing topography. A preliminary earthwork balance calculation should be provided. Recommendation[2]: If the current site grading requires substantial net excess cut or fill is required, that the Board require submission of a revised final grading plan prior to construction which minimizes net excess cut or fill. An estimate of truck trips required for the current site plan should be provided.

8. Revise the TIA to provide a Construction Phase TDM Plan.
9. Provide an order of magnitude estimate of heavy vehicle trips required to complete earthwork shown on the current site plan grading.

Recommended Construction Phase Mitigation: We recommend that the Board consider restricting use of the Eliot Street (Rte. 16) /North Main Street (Rte. 27) Intersection by heavy construction vehicles from 7:00 to 9:00 AM and from 4:00 to 6:00 PM weekdays.

Access, Circulation, and Parking. The Pines Residences will provide its principal access by connecting the primary site access drive at the end of Powderhouse Lane. Currently, the commercial developments at 5 and 31 Powderhouse Lane have perpendicular parking layouts that rely on using Powderhouse Lane as a parking access aisle. With the introduction of through traffic past these points of conflict, alternative parking layouts should be developed.

A total of 118 at grade parking spaces are provided (1.97 parking spaces/dwelling unit). While the total parking supply should accommodate peak demand, provisions are required to accommodate parking for visitors, service vehicles, social gatherings, and households with additional vehicles. Recommendation[2]: That the Board include a Condition of Approval that prior to occupancy a parking management plan be provided to allocate available parking.

Hammerhead turning area are provided at the terminus of the two principal parking areas. However, the layout of these hammerhead areas may not accommodate fire apparatus.

Accommodation of turns by vehicles servicing the dumpster is not clear.

With perpendicular parking, there are no formal provisions for designated fire lanes.

Confer with the Fire Department and obtain information on the Department's "design vehicle." Also determine the Fire Department's requirements for designated fire lanes.

10. Develop alternative parking layouts for 5 and 31 Powderhouse Lane and seek the cooperation of the impacted property owners in modifying the parking layouts. Upon review, the Zoning Board of Appeals will determine, the Applicant's specific responsibilities to implement these parking changes.

11. Provide a swept vehicle path plan showing Fire Department apparatus access including the ability of the hammerhead turning areas to accommodate turns at the terminus or each parking field. The plan should also show maneuvers by vehicles servicing the dumpster.

12. Adjust the site plan as required to accommodate designated Fire Lanes in compliance with Fire Department requirements.

13. Obtain a letter of concurrence from the Fire Department.

PART II – THE APPLE HILL TIA

Site Access: Apple Hill Estates will provide principal access by connecting the primary-site access roadway to Hunting Lane. Hunting Lane is characterized by a narrow pavement and limited sight distance. At full development, trips generated by Apple Hill Estates will significantly increase the total traffic volume on Hunting Lane long term. Greater concern arises from use of Hunting Lane by heavy construction vehicles. See Comment 24.

TSA: The Transportation Study Area (TSA) includes the Hunting Lane/North Main Street (Rte. 27) Intersection, the Eliot St. (Rte. 16) /North Main Street (Rte. 27) Intersection, and the Powderhouse Lane/North Main Street (Rte. 27) Intersection. The Butler Street//North Main Street (Rte. 27) Intersection should be evaluated for inclusion in the TSA.

For westbound traffic, the total distance traveled to reach Hunting Lane is shorter using Butler Street than using Eliot Street. Particularly with the delays experienced on the Eliot Street westbound approaching North Main Street during the PM peak hour, travel time may be less using Butler Street.

14. Determine whether use of Butler Street minimizes travel time, particularly for westbound traffic during the PM peak hour by conducting timed vehicle runs along both Eliot Street and Butler Street.

15. If warranted, expand the TSA to include the Butler Street/North Main Street (Rte. 27) Intersection.

Inventory: The Apple Hill TIA properly inventories relevant characteristics of roads, intersection, pedestrian, bicycle, and public transportation facilities.

Counted Traffic Volumes: Due to reduced current traffic volumes attributed to the Covid-19 Pandemic, The Apple Hill TIA states that automatic traffic recorder (ATR) counts and manual turning movement/vehicle classification counts (TMCs) were used that were performed December 2016. It further states that counts were calibrated by comparing the December 2016 ATR count on North Main Street north of Eliot Street with the April 2020 ATR count in the same location. However, the 2016 ATR count provided is for Eliot Street east of North Main Street not for North Main Street. Any new 2020 TMCs are not provided.

16. Provide a copy of the 2016 ATR count on North Main Street north of Eliot St.

17. The 2020 Existing Traffic Volumes were adjusted upward from the volumes counted in 2016. Document the 2016 vs 2020 volume adjustment which are greater than the stated 1.5% per year.

18. Provide copies of any 2020 TMCs. In particular, we note that TMCs are not provided for the Hunting Lane/North Main Street (Rte. 27) Intersection for either 2016 or 2020.

19. Verify that the 2020 ATR count of 17,375 (adjusted?) on North Main Street north of Eliot St. is actually 234% of the counted 2020 volume of 7,432.

Travel Speed: The TIA uses recorded vehicle speed from the April 2020 ATR on Hunting Lane and properly quantifies the mean speed of 27 mph EB and 25 mph WB and 85th percentile speed of 30 mph EB and 30 mph WB.

Crash Data: The Apple Hill TIA properly analyses motor vehicle crash data for the most recent five years available (2013-2017) and the calculated crash rates were below the District and State crash rates for unsignalized and signalized intersections respectively at all locations and are not considered to be significant.

2027 No-Build Traffic Volumes: The TIA evaluates future traffic growth considering both Specific Development by Others and general background growth.

The TIA properly includes trips generated by the 59 North Main Street Project as Specific Development by Others.

The Apple Hill TIA also includes trips generated by The Pines Residences as a Specific Development by Others. If the Zoning Board of Appeals determines that The Pines Residences and Apple Hill Estates are actually a single project, then the TIA would have to be substantially revised to include The Pines Residences trips and Apple Hill Estates trips as trips generated by a single Proposed Project.

The Apple Hill TIA properly determines background growth of 1.5% per year using MassDOT counting station data.

Trip Generation: The TIA uses Multifamily Housing (Low Rise) (220) for 28 dwelling units to forecast trip generation for Apple Hill Estates. However, the ITE Trip Generation Manual states that "Land Use: 220 Multifamily Housing (Low-Rise)" is "Low-rise multifamily housing includes apartments, townhouses, and condominiums located within the same building with at least three other dwelling units and that have one or two levels (floors)[3]. All dwelling units within Apple Hill Estates are either units in single-family detached buildings or units in duplex buildings. No units are in buildings of 3 units or more. Table 1 compares the trip generation included in the TIA with trip generation based on "Single-Family Detached Housing (210)."

Table 1 – Comparative Trip Generation for 28 Dwellings

Time Period	Multifamily Housing (Low Rise) (220)[1]	Single-Family Detached Housing (210)[1]	% Change
Average Weekday			
Entering	86	161	87%
Exiting	86	161	87%
Total	172	322	87%
Weekday AM Peak Hour			
Entering	3	6	100%
Exiting	11	19	73%
Total	14	25	79%
Weekday PM Peak Hour			

[3] Institute of Transportation Engineers, Trip Generation Manual, Version 5.0 (Updates),10th Edition (September 2017)+Supplement (February 2020).

Entering	12	19	58%
Exiting	7	11	57%
Total	19	30	58%

While the ITE Trip Generation Manual does not have a category specifically for units in duplex structures, the definition of "Multifamily Housing (Low Rise) (220)" specifically precludes its use for units in buildings containing less than 3 units. Use of on "Single-Family Detached Housing (210)" is more conservative, and we believe is more precise in representing actual future trip generation.

20. Revise the TIA to incorporate trip generation based on "Single-Family Detached Housing (210)" for 28 dwelling units.

Trip Distribution and Traffic Assignment: The Apple Hill TIA properly uses US Census Journey to Work data to develop trip distribution and assignment as 45% (North Main Street north), 25% (North Main Street south), 25% (Eliot Street east), and 5% (Hunting Lane west).

2027 Build Traffic Volumes: Hunting Lane between the site entrance and North Main Street is most directly impacted by trips generated by the Proposed Project. Trips generated by Apple Hill Estates comprise 24 vehicle trips (28% of total traffic volume on the segment of Hunting Lane east of the site) during the AM peak hour and comprise 29 vehicle trips (32% of total traffic volume on the segment of Hunting Lane east of the site) during the PM peak hour. Trips generated by the Apple Hill Estates comprise relatively small percentages of trips on North Main Street and Eliot Street.

Intersection Levels-of-Service and Queues: The Apple Hill TIA analyses intersection levels-of-service, delay, and queue length considering Apple Hill Estates as an independent project. On that basis Table 10 of the TIA shows that during the AM peak hour, the signalized Eliot Street (Rte. 16) /North Main Street (Rte. 27) Intersection operates at LOS B[b] overall with the 2020 Existing, the 2027 No-Build, and the 2027 Build Traffic Volumes. However, the 95th queue reaches 761 ft.[d] for the northbound through and 480 ft.[d] for the southbound through/left. During the PM peak hour, the intersection operates at LOS D[b] overall with the 2020 Existing Traffic Volumes and at LOS F[b] with the 2027 No-Build and the 2027 Build Traffic Volumes. The 95th queue reaches 669 ft.[d] for the westbound left and 624 ft.[d] for the southbound through/left.

a. Average control delay per vehicle (seconds).
b. Level-of-service.

c. 95th queue length in vehicles.
d. Queues are maximum after two cycles. Volume exceeds capacity, queue may be longer.

The TIA shows that during the weekday AM peak hour the eastbound approach to the unsignalized Hunting Lane/North Main Street (Rte. 27) Intersection operates at LOS C [b] with the 2020 Existing Traffic Volumes and at LOS D [b] with the 2027 No-Build and the 2027 Build Traffic Volumes. Delay[a] increases to 34 seconds and the 95th queue[d] is 1 vehicle with the 2027 Build Traffic Volumes. The TIA shows that during the weekday PM peak hour the eastbound approach operates at LOS C [b] with the 2020 Existing Traffic Volumes and at LOS D [b] with the 2027 No-Build and with the 2027 Build Traffic Volumes. Delay[a] increases to 33 seconds and the 95th queue[d] is 1 vehicle with the 2027 Build Traffic Volumes.

The Project Roadway/Hunting Lane Intersection operates at LOS A[b] during both the AM peak hour and the PM peak hour with the 2027 Build Traffic Volumes.

Intersection Blockage: Due to limitation on the methodology, the above analysis of the Hunting Lane/North Main Street (Rte. 27) Intersection does not reflect additional delays due to blockage of the intersection. During the PM peak hour, the 95th percentile queue extend northerly from the Eliot Street (Rte. 16) /North Main Street (Rte. 27) Intersection past the Hunting Lane/North Main Street (Rte. 27) Intersection blocking the intersection. All eastbound vehicles exiting from Hunting Lane are blocked from turning left or right. The 50th percentile queues do not block the intersection.

21. The TIA should be revised to discuss delays for all eastbound turns exiting from Hunting Lane due to blockage of the intersection by vehicle queues from the Eliot Street (Rte. 16) /North Main Street (Rte. 27) Intersection.

22. The TIA should also estimate the duration queues long enough to block the intersection.

Sight Distance: The Apple Hill TIA properly calculates stopping sight distance (SSD) and intersection sight distance (ISD) for the Hunting Land/Project Roadway Intersection for an approach speed 33 mph eastbound and 31 mph westbound on Hunting Lane. Available SSD exceeds measured SSD for both the Hunting Lane approaches. The desirable ISD looking west is deficient but can be made sufficient by clearing within the sight triangle. Desirable ISD looking east is 345 ft. and the measured sight distance can be improved to 242 ft. by clearing within the sight triangle but remains in sufficient.

Project Access Recommendations: The TIA includes recommendations for safe project access on page 25. We concur with the VAi recommendations and suggest that they be shown on the plans or incorporated as Conditions of Approval.

Signal Optimization Recommendations: The TIA includes recommendations for optimized signal timing for the Eliot Street (Rte. 16) /North Main Street (Rte. 27) Intersection which result in improved operations (LOS E to LOS D) and improves the Eliot Street westbound left turn (LOS F to LOS E). We concur with the VAi recommendation. We suggest that as a Condition of Approval, VAi should be required to assist the Town (if desired) in implementing the optimized signal timing.

Construction Phase TDM Plan: The Apple Hill TIA should be supplemented to include a plan for Construction Phase Transportation Demand Management. As the Applicant will control the scheduling and means of construction, there is potential to reduce single occupant vehicle trips and overall construction trips.

23. Revise the TIA to provide a Construction Phase TDM Plan.

Recommended Construction Phase Mitigation: We recommend that the Board consider restricting use of the Eliot Street (Rte. 16) /North Main Street (Rte. 27) Intersection by heavy construction vehicles from 7:00 to 9:00 AM and from 4:00 to 6:00 PM weekdays.

The Hunting Lane pavement is narrow and there are sight distance limitations, particularly vertical sight distance limitations. Grades of 6 to 10%± occur between the site roadway and North Main Street particularly impacting heavy construction vehicles. Intersection sight distance (ISD) is restricted at the Hunting Lane/North Main Street (Rte. 27) Intersection looking right. Key sight distance and operational deficiencies should be identified. Safety improvements should be developed in the context of the rural character of the roadway. The Zoning Board of Appeals can determine the responsibility of the Applicant in addressing these deficiencies with improvements intended for the long term. Temporary improvements intended for the construction phase should be the responsibility of the Applicant. As a Condition of Approval, heavy construction vehicles should be restricted on Hunting Lane during times of school bus use.

24. The Applicant's Team should develop a plan and profile of Hunting Lane between North Main Street and the site entrance and identify locations where sight distance is not sufficient for a design speed of 35 miles per hour (recommended to accommodate a posted speed of 30 mph. The plan should also recommend long term improvements to

remain in place after construction. Recommended improvements should respect the rural character of the roadway and improvements may be minimized to preserve the rural character of the roadway. Care should be taken to avoid increasing travel speed.

25. A plan should be provided showing recommended temporary improvements for the construction phase. It may be appropriate to remove some of these improvements following completion of construction.
26. The Applicant's Team should confer with the Sherborn Police Department and initiate consideration of construction phase traffic controls including use of uniformed traffic officers.

On-Site Access, Circulation, and Parking. The architectural plans show garages that although narrow may be intended to accommodate two vehicles. The text of the TIA stated that "Off street parking will be provided for a minimum of two (2) vehicles per unit in individual driveways and garages." Which can be variously interpreted. We recommend that a minimum of four parking places be provided for each dwelling, two garage spaces and two driveway spaces in a stacked configuration.

Even with 4 parking spaces per unit, parking on the site roadway will be required to accommodate visitors, service vehicles, social gatherings, and households with additional vehicles. Parking on both sides of a roadway with a 24 ft. pavement width restrict through movements potentially interfering with emergency vehicle access. We recommend that the Board restrict parking to one side of the on-site roadway. Restrictive covenants in homeowners association documents or other legal means of enforcing parking restrictions should be developed prior to occupancy.

27. Revise the architectural and site plans to provide four off-road parking spaces per dwelling unit.
28. Revise the site plans to show regulatory signs restricting parking to one side of the on-site roadway.
29. Review the site plan with the Fire Department and obtain a letter of concurrence.