BERRY SURVEYING & ENGINEERING
335 Second Crown Point Road
Barrington, NH 03825
Phone: (603) 332-2863
Fax: (603) 335-4623
www.BerrySurveying.Com

September 26, 2019

Barrington Planning Board
Attention: Marcia Gasses
PO Box 660
333 Calef Highway
Barrington, NH 03825
RE: Drew Pond LLC
NH Route 9

Ms. Gasses, Mr. Chairman, Members of the Barrington Planning Board,

On behalf of the applicant, Drew Pond LLC, we are submitting materials for the hearing on October 1, 2019. At that time we would like to discuss the project, the response to DB&K, and the waiver requests. As you know the board has weighed in on the past on the geometric design, which we have now modified resulting in modification to the waiver requests. The review by DB&K has found that some additional requests are required.

At this time, we have resubmitted to DB&K, but do not expect they will have the required time afforded to them to finalize a review. Therefore we are requesting the board discuss the application and possibly vote on the waivers if found to be appropriate, and continue the hearing to the second meeting in October. At that time we would suspect the project is ready for finalization.

BERRY SURVEYING & ENGINEERING

Christopher R. Berry – Project Manager
Principal, President

LAND USE OFFICE
SEP 26 2019
RECEIVED

BERRY SURVEYING & ENGINEERING
335 Second Crown Point Road
Barrington, NH 03825
Phone: (603) 332-2863
Fax: (603) 335-4623
www.BerrySurveying.Com

September 25, 2019

Barrington Planning Board
Attention: Marcia Gasses Town Planner
PO Box 660
333 Calef Highway
Barrington, NH 03825

RE: Subdivision & Site Plan Review: Response to Dubois & King Inc.
Drew Pond, LLC
Tax Map 238, Lot 16
Barrington, NH 03825

Ms. Gasses, Mr. Chairman, Members of the Barrington Planning Board,

On behalf of the applicant, Drew Pond, LLC, Berry Surveying & Engineering (BS&E) is submitting for your review the revised Subdivision and Site Plan responses to Dubois & King Inc. for the project on N.H. Route 9 (Franklin Pierce Highway), Tax Map 238, Lot 16. We submit our response letter for the comments made by Dubois & King Inc. dated, May 23, 2019. Our Responses are in **bold.**

1. We acknowledge that the applicant is requesting a waiver from Subdivision Regulations 12.2.1, Table 1, the maximum 9% road grade requirement for a private driveway. We recommend that the applicant modify the proposed site drive to provide maximum grade on Hanovarian Drive that is less than 9%.
   Hanovarian Drive has been modified to a maximum grade of 9%. See Hanovarian Drive Grading Plan & Profile, sheets #15 & #16.

2. We acknowledge that the applicant is requesting a waiver from Subdivision Regulations 12.2.1, Table 1, the minimum tangent length of 100' between reverse curves. DuBois & King has no objections to this request.
   No further comment required.

3. We acknowledge that the applicant is requesting a waiver from Subdivision Regulations 12.2.1 Table 1, the minimum shoulder width of 6 feet in a cut and 3 feet in a fill. The waiver request mentions snow storage as the primary driver for the shoulder width requirements in the Road Design standards. In addition to snow storage, these minimum widths assist with ensuring adequate transverse drainage on the roadway and increase the overall lifespan. We recommend that the applicant re-evaluate the design to attempt to meet the requirements of the Subdivision Regulations.

The design has been reviewed with it being determined that using a standard practice of 20' traveled surface with a 2' shoulder is appropriate for this design. Additionally the Guidelines for Geometric Design of Very Low – Volume Local Roads was consulted and Exhibit 1. Guidelines for Total Roadway Width for New Construction of Very-Low Volume Local Roads in Rural Areas is noted as recommending a traveled surface which includes shoulders of 18 feet up to 40 MPH. A low volume road is considered roads with an ADT of less than 400. Each of the proposed roads will have far less than 200 ADT. We find that the proposed cross section of 20' paved surface with 2' shoulders meets and exceeds the national standard.

4. We acknowledge that the applicant is requesting a waiver from Subdivision Regulations 12.7, Table 2, the requirement of 2% maximum road grade within 100 feet of an intersection. Due to the regulations of NHDOT, the applicant is proposing a platform on Oldenburg Drive at the intersection with Route 9 that is 3% or less for 75', and 4% for 25' Due to the fact that this waiver is being requested in order to meet the requirements of NHDOT, DuBois & King has no objections to this request.
No further comment required.

5. We acknowledge that the applicant is requesting a waiver from Subdivision Regulations 12.8.8(4) and 12.8.9 which require no ditches at grades above 8%, or grades 6% exceeding 250-ft developed length. We recommend that the Planning Board make the final decision on these waivers.
No further comment required.

6. We acknowledge that the applicant is requesting a waiver from Site Plan Review Regulations 4.7.7(1), which require a minimum pipe diameter of 15". The drainage report and associated hydraulic model results suggest that the 12" diameter pipes meet the required stormwater design criteria, however, we recommend that diameters are increased to 15 inches to reduce the likelihood of pipes clogging from debris and leaves.
All 12" diameters HDPE culverts on Hanovarian Drive have been replaced with 15" diameter HDPE culverts. A 12" diameter RCP under Oldenburg Drive will remain as the outlet pipe from Rain Garden #103. This is necessary because of issues with cover due to NHDOT intersection requirements.

7. The General Notes on Page 3 of 59 do not indicate the waivers requested in accordance with Site Plan Review Regulations 3.2.10(14).
The notes on page 3 of 59 are associated with the Existing Conditions Plan. The waivers requested for the Site Plan are located on the detail Site Plans, sheets #8-10.

8. Drainage Analysis, W-2 Proposed Watershed Overview (Sheet 6 of 9), revise the soils legend table to include hydrologic soil group as shown in the table on sheet 1 of 9.
The soils legend has been revised and HSG labels have been added

BERRY SURVEYING & ENGINEERING
335 Second Crown Pt. Rd., Barrington, NH 03825
(603) 332-2863 / (603) 335-4623 FAX
www.BerrySurveying.Com

accordingly. See W-2 Proposed Watershed Overview, sheet #6.

9. We recommend that the rain gardens are designed to provide a minimum of 1 foot of freeboard in the 50-year storm event.
One foot of freeboard is not a required standard per the Alteration of Terrain regulations. The rain gardens were designed such that, they would treat the necessary flow, while maintaining a modest size. This request would require the Rain Gardens to be unnecessarily large. The Alteration of Terrain regulations require the 50 year event to pass without topping. The current design allows for the 100 year event to pass the pond without topping the designed berm.

10. Rain Garden #101, Filtration Practice Design Worksheet: the sediment forebay volume provided is less than 25% of the calculated WQV. Please revise.
The sediment forebay for Rain Garden #101 has been revised to store more than the minimum of 25% WQV. See Rain Garden #101, sheet #17 and associated Filtration Practice Design worksheet.

11. Rain Garden #101's spillway is defined in the Hydrocad model to have width of 25.0 feet. The plans show 15 feet. Please revise these values to match.
The spillway has been reviewed and corrected in HydroCAD to match the plans. See Rain Garden #101, sheet #17.

12. Rain Garden #102's spillway is defined in the Hydrocad model to have an invert elevation of 209.50'. The plans show 210.00'. Please revise these values to match.
Both the plans and HydroCAD model have been reviewed and the emergency spillway was correctly graded at 209.50. This can be seen in the emergency spillway detail and plan view. An intermediate 209.50 contour has been added in the vicinity of the spillway to remove confusion. See Rain Garden #102, sheet #18.

13. Sheets 17-19 of 59, we recommend that note 1 on the berm detail shown on Sheets R-101, R-102, R-103 is revised to indicate that the compacted loam material shall meet the low permeability material gradation provided.
This has been added to note #1 of the berm detail for all three plans. See Rain Garden plans, sheets #17-19.

14. Provide infiltration testing results for the test pit associated with Rain Garden #103.
Test Pit #3004B provided similar results to Test Pit #3004. The soil in the vicinity of the practice is Deerfield Loamy Sand, which has a published low Ksat of 6 in/hr from the document "Ksat Values for New Hampshire Soils". Utilizing a factor of safety of 2, the Ksat for the Rain Garden would be 3 in/hr. The provided infiltration rate of 2.79 in/hr is more conservative than the published value and is used for Rain Garden #103.

BERRY SURVEYING & ENGINEERING
335 Second Crown Pt. Rd., Barrington, NH 03825
(603) 332-2863 / (603) 335-4623 FAX
www.BerrySurveying.Com

15. We were unable to determine if the design velocities of the proposed drainage system meet the requirements of Article 4.7.7, Section 2 of the Site Plan Regulations. We recommend that the Applicant include a table on Sheet 4 identifying the minimum and maximum velocities of each drainage pipe.
Pipe velocities are included in the HydroCAD model and can be found there for reference. All pipes meet the 2 FPS required at the 50 year design event.

16. Sheet 5 of 9 of the Watershed plans does not depict existing topography for the entirety of the subcatchments. Update the plan to show the existing topography. We were unable to confirm the watershed delineation.
Existing topography has been provided as part of the resubmission. See sheet #5. Additional off-site topography has been provided as part of this resubmission. See sheet #5.

17. We recommend that the Town of Barrington Fire and Rescue review the proposed vehicle fire turn around hammer heads to confirm that they meet their requirements.
This has been reviewed during a technical meeting which included the Fire Chief.

18. The lighting plan proposed does not meet the recommended site lighting levels provided in Table 7 of Article 4.12.2 of the Site Plan Regulations. We recommend that the applicant revise the lighting design to meet the minimum recommended levels.
Lighting has been revised to be more compliant with the regulations. A waiver from the Table 7 is being requested for a reduction in uniformity ratio (a betterment) and to allow the minimum lumen at the darkest location to be 0.4 where the regulation requires 0.6

19. We recommend that the Applicant add a note to Sheet 7 of 59 that states the following: "If, during construction, it becomes apparent that deficiencies exist in the approved design drawings, the owner shall be required to correct the deficiencies to meet the requirements of the regulations at no expense to the Town.", in accordance with Article 3.2.10(16) of the Site Plan Regulations.
This note has been added to the Overview Site Plan as note #34. See sheet #7.

20. We recommend that the Applicant add a note to Sheets 20-22 of 59 that states the following: "If, during construction, it becomes apparent that additional erosion control measures are required to stop any erosion on the construction site due to actual site conditions, the Owner shall be required to install the necessary erosion protection at no expense to the Town.", in accordance with Article 3.2.10(17) of the Site Plan Regulations.
This note has been added to the Erosion & Sediment control plans as note #14. See sheets #20-22.

21. We recommend that the Applicant add a note to Sheet 7 of 59 that states the following: "In accordance with Town Regulations and RSA 676:13, all improvements specified on these site plans shall be constructed, completed, inspected and approved by the Town of Barrington prior to the issuance of a certificate of occupancy.", in accordance with Article 3.2.10(19) of the Site Plan Regulations.
This note has been added to the Overview Site Plan as note #35. See sheet #7.

22. The index of drawings indicated that Cross Section Sheets 49 - 51 of 59 are "pending". A portion of the cross sections provided appear to be in draft form. The cross sections could not be reviewed in full. We recommend that the Applicant revise the sections and present them at 1 inch = 5 feet (horizontal and vertical) in accordance with Article 3.1.3 of the Site Plan Regulations.
Full cross-sections for Oldenburg Drive and Hanovarian Drive have been provided at a horizontal scale of 1" = 20' and a vertical scale of 1" = 10'. Cross-sections at the requested scale are unnecessarily large and has not been requested by the Town of Barrington in past projects. A waiver to this requirement has now been requested. The requirement is essentially requiring a 1/5th 1:1 scale of the project sections.

23. We recommend that guardrail is proposed at any location where slopes are proposed greater than 4:1 within the roadway clear zone.
Using the road side design guide published by AASHTO road side barrier is not warranted for slopes of 2:1 up to a vertical distance of 5 feet +/-. We are proposing 3:1 slopes with vertical drops which do not warrant road side barrier.

24. We recommend that the applicant provide building renderings showing the front, side and rear view elevations of the proposed building and conform to the Building Design and Materials requirements in accordance with Article 3.7 of the Site Plan Regulations.
Renderings are included as part of this submission and will be sent to the Barrington Planning Board before project approval.

25. We recommend that the applicant identify the snow storage area for Phase 1 Oldenburg Drive on Sheet 8 of 59 in accordance with Article 4.15.1 of the Site Plan Regulations.
Snow storage leaders have been added to the Site Plans, see sheets #7-10.

26. Sheets 29 - 39. Septic designs for Hanovarian Drive and Oldenburg Drive units have not been included in this submittal. We recommend that the applicant provide the designs on the plans along with certification from the Town of Barrington Health Officer and the NH DES, and provide the State subdivision approval number on the plans in accordance with Article 4.6.1 of the Site Plan Review Regulations.
Completed septic designs and construction approval numbers will be provided to the Town of Barrington before final project signature.

BERRY SURVEYING & ENGINEERING
335 Second Crown Pt. Rd., Barrington, NH 03825
(603) 332-2863 / (603) 335-4623 FAX
www.BerrySurveying.Com

27. Provide community water supply design information in accordance with Article 4.5.2 of the Site Plan Review Regulations.
Well permit numbers and final water designs will be provided for final project signature. Without a flow rate from the drilled well a final water system cannot be produced.

28. Sheets 40 to 42 of 59: It does not appear that the landscaping provided meets the minimum percentage defined in Article 4.9.7(1) of the Site Plan Regulations.
Oldenburg Drive provides approximately 8,600 Sq. Ft. of parking area and Hanovarian Drive provides approximately 9,550 Sq. Ft. of parking area. These values include the parking areas in front of each unit as well as the overflow parking areas. Using the percentages defined in Article 4.9.7(1)(a)-(c) it was determined that Oldenburg Drive requires 456 Sq. Ft. and Hanovarian Drive requires 538 Sq. Ft. of landscaped area. This is currently met for both situations, as they both provide over 600 Sq. Ft. of landscaped area. See Landscaping Plans, sheets #40-42.

29. The traffic assessment memo provided appears to meet the requirements for Short Traffic Impact Analysis. This project is proposing creation of 40 dwelling units, therefore, we feel that a Full Traffic Impact Analysis is required in accordance with Article 4.14.1 (1). We recommend that the full traffic impact analysis includes the turning movements associated with Barrington Middle School at Hailey Drive during peak hours. Additionally, it may be prudent that the applicant evaluates the impacts to traffic if only one driveway is provided instead of two drives as currently configured.
A waiver request to this provision has now been requested of the Barrington Planning Board.

Respectfully Submitted,
BERRY SURVEYING & ENGINEERING

Christopher R. Berry – Project Manager
Principal, President

Kevin R. Poulin, EIT
Engineering Technician

Kenneth A. Berry, PE, LLS,
CPESC, CESSWI, CPSWQ
VP – Technical Operations

LAND USE OFFICE
SEP 26 2019
RECEIVED

BERRY SURVEYING & ENGINEERING
335 Second Crown Pt. Rd., Barrington, NH 03825
(603) 332-2863 / (603) 335-4623 FAX
www.BerrySurveying.Com

BERRY SURVEYING & ENGINEERING
335 Second Crown Point Road
Barrington, NH 03825
Phone: (603) 332-2863
Fax: (603) 335-4623
www.BerrySurveying.Com

March 26, 2019
Revised September 20, 2019

Barrington Planning Board
Attention: Marcia Gasses Town Planner
PO Box 660
333 Calef Highway
Barrington, NH 03825

RE: Site Plan Review
Drew Pond, LLC
Tax Map 238, Lot 16

Mr. Chairman and Members of the Barrington Planning Board

In accordance with the Town of Barrington's Subdivision Regulations, the applicant requests the following waivers:

1. Identification of Waiver Request: 12.2.1 Table one of the Subdivision Regulations, minimum tangent of 100' between reverse curves.

- Proposed roadway with no tangent between reverse curves.

Hanovarian Drive will be constructed off N.H. Route 9 over the existing driveway that provides access to lots 15 & 16-1. An existing access easement is in place between these two lots. This easement will allow the applicant to construct Hanovarian Drive in the proposed location.

2. Waiver Justification:

a. Granting the waiver will properly carry out the purpose and intent of the regulations.

The purpose and intent of the minimum tangent length between reverse curves is to allow for safe vehicular traffic. Although the proposed roadway does not meet the minimum of 100' between reverse curves, safety will not be impeded due to the low traffic volume of the road.

b. Strict conformity to the regulations would pose an unnecessary hardship to the applicant.

Strict conformity to the regulations will pose an unnecessary hardship on the applicant. The proposed road location was designed around an existing wetland and proposed well. Given the close proximity of the wetland and the required location for the well, the road had to be designed as shown. Adding a 100' tangent to Hanovarian Drive would require the applicant to move the well and cause the proposed disturbance to encroach closer to the existing wetlands.

2. **Identification of Waiver Request**: 12.2.1 Table 1 of the Subdivision Regulations, shoulder width of 6 feet in a cut and 3 feet in fill.
   - Proposed roadway with shoulders of 2 feet throughout.

The applicant is proposing to construct 2, 20 feet wide private roadways, each with a 4' at grade sidewalk. The proposed roadways will have a 2 foot gravel shoulder throughout. The roads were designed so that they would conform to the natural topography of the site in order to limit the disturbance generated by the construction of the roads.

2. Waiver Justification:

a. Granting the waiver will properly carry out the purpose and intent of the regulations.

The purpose and intent of the minimum shoulder width in fill slopes is to provide vehicles with ample room to pull off the road if necessary and provide snow storage in cut slopes. The majority of the road construction will be in fill sections, which will eliminate the need for snow storage on the shoulders because the plows can push the snow off the road and down the fill slope. Given the low proposed traffic volume generated from each road, vehicles will have ample room to pull over, if needed.

The purpose and intent of the minimum shoulder width in cut slopes is to provide vehicles with ample room to pull off the road if necessary and provide snow storage in cut slopes. There is a combined 450 feet of roadway in a cut section but the cut generated is minor and is on average +/- 1.5'. Given the relatively low cut, 2' shoulders were deemed sufficient for snow storage. Given the low proposed traffic volume generated from each road, vehicles will have ample room to pull over. In light of the AASHTO Low Volume Design Guide Exhibit 1 stating that 18' including shoulders is sufficient we feel that the current design of 20' paved section with 2' shoulders meets and exceeds the safety requirements.

b. Strict conformity to the regulations would pose an unnecessary hardship to the applicant.

Strict conformity to these regulations would pose an unnecessary hardship on the applicant. The roadway is designed so that there will be the least amount of disturbance possible for the road construction. Requiring the applicant to maintain the minimum shoulder widths would increase the road footprint and greatly increase the overall disturbance generated from the road. In addition, the increased shoulder width will only serve to increase speeds on what is currently design to be a low speed, low volume road.

3. **Identification of Waiver Request**: 12.7 Table 2, maximum of 2% of a road grade within 100 feet of an intersection.
   - Proposed roadway with a platform of 3% or less for 75' and 4% for 25' at Oldenburg Drive.

BERRY SURVEYING & ENGINEERING
335 Second Crown Pt. Rd., Barrington, NH 03825
(603) 332-2863 / (603) 335-4623 FAX
www.BerrySurveying.Com

N.H. Route 9 is a NHDOT controlled roadway. The proposed entrance design was done in order to conform to the regulations of NHDOT which require a road grade of -4% off a DOT controlled roadway, or a continuation of the existing shoulder grade. The proposed roadway was designed at a -3% road grade in order to match the grade coming off the existing shoulder. From there the road will transition into a positive road grade that will not exceed 4% within 100' of the intersection. This proposed sag curve will allow vehicles to come to a natural stop as they approach N.H. Route 9.

2. Waiver Justification:

a. Granting the waiver will properly carry out the purpose and intent of the regulations.

The intent of the maximum road grade of 2% within an intersection is to allow for the safe approach of vehicles to an intersections. The proposed intersection design will only exceed the maximum road grade by 1% for 75' and 2% for 25'. Although the proposed roadway grade is more than the maximum required, it will have no adverse effect on vehicular safety.

b. Strict conformity to the regulations would pose an unnecessary hardship to the applicant.

Strict conformity to these regulations would pose an unnecessary hardship on the applicant and Town. The intersection of proposed Oldenburg Drive and N.H. Route 9 was designed so that it would conform to the NHDOT regulations. Furthermore, the steeper road grade limits the amount of disturbance generated from the proposed road.

4. **Identification of Waiver Request:** 12.8.8(4) & 12.8.9, No ditches at grades above 8%, which require curbing, culverts and basins, or at grades above 6% when the developed length exceeds 250 feet.
    - Proposed roadway without curbing above 8% grade and ditches with a 9.00% grade for a 100 feet. As discussed with the Planning Board curbing has been added to the steepest section of

The applicant is proposing to construct two private roadways off N.H. Route 9, Oldenburg Drive and Hanovarian Drive. Hanovarian Drive was designed so that it would generate the least amount of disturbance as possible. Given the existing topography of the site, there is a portion of Hanovarian Drive that has a 9.25% road grade with an adjacent swale for less than +/- 250 feet.

2. Waiver Justification:

a. Granting the waiver will properly carry out the purpose and intent of the regulations.

The intent of regulation 12.8.8 & 12.8.9 is to limit the use of swales along steep slopes in order to achieve stabilization and prevent washouts.

BERRY SURVEYING & ENGINEERING
335 Second Crown Pt. Rd., Barrington, NH 03825
(603) 332-2863 / (603) 335-4623 FAX
www.BerrySurveying.Com

The proposed swales adjacent to Hanovarian Drive will be rip-rap lined so that they are protected from erosion. Furthermore, the adjacent uphill slopes of the swale will lined with a form of rolled erosion control blanket, in order to stabilize the uphill slopes. In addition, after a discussion with the Planning Board an area of curbing has been added to the steepest section of Hanovarian Drive with the largest fill slope to for a better design and construction standard.

The proposed road design now includes curbing along the steep portion of the road with the remainder of the design allowing for open drainage design. This was done as part of the drainage design so that the runoff generated from the road will sheet off into the adjacent swales. These swales will be constructed with bio-media and stone as part of their drainage design, so that the runoff can be treated as it is directed to adjacent rain gardens and treatment cells.

b. Strict conformity to the regulations would pose an unnecessary hardship to the applicant.

Strict conformity to these regulations would pose an unnecessary hardship on the applicant and Town. Due to the existing topography and layout of the road, the design options were limited. Requiring the applicant to install curbing and remove the section of the swale in the 9% road, would drastically change the proposed drainage design and will require larger treatment cells and generate more disturbance.

5. **Identification of Waiver Request:** 4.7.7(1) minimum pipe diameter of 15" in any drain system.
    - Proposed drain system with 12" culverts. (One Location)

After a discussion with the Planning Board, this waiver has now been revised to only include one location, at the entrance to Oldenburg Drive. This is required due to cover issues over the pipe at that location. A reinforced concrete 12" pipe is proposed at this location.

2. Waiver Justification:

a. Granting the waiver will properly carry out the purpose and intent of the regulations.

The intent of regulation 4.7.7(1) with regard to pipe size is to ensure that the proposed drainage system can accommodate the runoff generated from the proposed development. As part of the site design an intensive drainage analysis was conducted in order to determine the runoff that will be generated from the proposed development. The proposed drainage system was sized so that it would be able to contain the runoff generated from the site. Based on this drainage analysis it was determined that the 12" culvert would be more than sufficient to contain the runoff from the required storm events.

b. Strict conformity to the regulations would pose an unnecessary hardship to the applicant.

BERRY SURVEYING & ENGINEERING
335 Second Crown Pt. Rd., Barrington, NH 03825
(603) 332-2863 / (603) 335-4623 FAX
www.BerrySurveying.Com

Strict conformity to these regulations would pose an unnecessary hardship on the applicant. Requiring the applicant to increase the pipe size to 15" would require the applicant to change the slope into the driveway which would make the design non-compliant with NHDOT standards.

6. Identification of Waiver Request: 4.12.2 Lighting Requirements

- Allow a uniformity ratio less than 4:1
- Allow a minimum foot candle to be 0.4 where 0.6 is required.

2. Waiver Justification:

a. Granting the waiver will properly carry out the purpose and intent of the regulations.

The intent of the uniformity ratio is to be provide for even light between the average lumen calculation and the minimum lumen calculation. The lower the uniformity ratio is, the better uniformed the light is. The design provides for less light with a better uniformity ratio within the parking areas. This is directly related to the minimum foot candle. The regulations prescribe a minimum of 0.6 and the design proposes 0.4. 0.2 is typically considered in other communities. The intent of the regulations is to have an even amount of low lit areas. This design provides for that.

b. Strict conformity to the regulations would pose an unnecessary hardship to the applicant.

The hardship in this case is that the applicant would be required to choose lamps that through more light with larger lamp heights. This is contrary to the spirit and intent of the ordinance, since the current design provides for a safe level of light.

7. Identification of Waiver Request: 3.1.3 Cross Sections

- Allow Cross Section to be a horizontal scale 1" = 20' and a vertical scale of 1" = 10'

2. Waiver Justification:

a. Granting the waiver will properly carry out the purpose and intent of the regulations.

The purpose and intent of the regulation is to provide a construction document that is readable to the contractor as well as others needed to understand its meaning. The requirement of a 1:1 ratio at 5 scale would require 2 or three sections per page. This written requirement may be miss applied by the author.

BERRY SURVEYING & ENGINEERING

LAND USE OFFICE
SEP 26 2019
RECEIVED

BERRY SURVEYING & ENGINEERING
335 Second Crown Pt. Rd., Barrington, NH 03825
(603) 332-2863 / (603) 335-4623 FAX
www.BerrySurveying.Com

b. Strict conformity to the regulations would pose an unnecessary hardship to the applicant.

Strict conformity to the regulations would require an additional 14 pages of cross sections, making for a prolific waste of paper.

8. Identification of Waiver Request: 4.14.1 (1)

- The threshold for a Full Traffic Impact analysis. The requirement requires a full traffic impact analysis for any project that creates more than 20 or more new multi-family units.

2. Waiver Justification:

a. Granting the waiver will properly carry out the purpose and intent of the regulations.

This requirement is not in-line with the NHDOT standard of requiring a full impact analysis based on 1,000 ADT and 100 peak hour trips at any one peak hour. (Noted in Article 4.14.1 (2) The purpose and intent of the regulation is to allow the board an understanding of the impact a project will have on the surrounding network. From a traffic standpoint, this site will operate as two separate sites given the two driveway entrances. This means the turning movements into and out of each driveway will be even lower than if the 40 units were combined. Based on the NHDOT Ms2 during the AM Peak hour 72.7% of the corridor traffic is heading easterly with 27.3% heading westerly. Based on the TEPP LLC generation this means that during the AM peak hour there will be 5.5 trips exiting the site which will be required to make a left turn. During heavy seasonal traffic, these residents will need to wait within the driveway for an opportunity to turn. There is ample queuing availability within each driveway. The afternoon traffic coming to the site will be off peak from the traffic generated by the school, and will be directionally based on the corridor. These turning movements will be primarily right turning into the sites with no restrictions.

b. Strict conformity to the regulations would pose an unnecessary hardship to the applicant.

Strict conformity would require the applicant to engage TEPP LLC to conduct a full traffic analysis that will likely not provide the board with any additional information other that which is provided within the short form.

Respectfully submitted,
BERRY SURVEYING & ENGINEERING

James Hayden
Engineering Technician

Christopher R. Berry
Principal, President

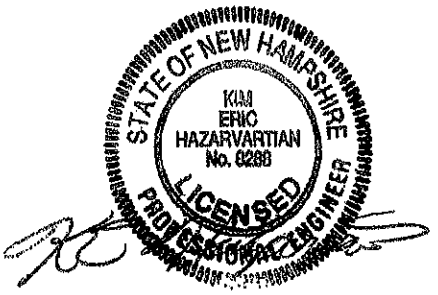
BERRY SURVEYING & ENGINEERING
335 Second Crown Pt. Rd., Barrington, NH 03825
(603) 332-2863 / (603) 335-4623 FAX
www.BerrySurveying.Com

TEPP LLC TRANSPORTATION ENGINEERING, PLANNING AND POLICY

93 Stiles Road, Suite 201, Salem, New Hampshire 03079 USA
800 Turnpike Street, Suite 300, North Andover, Massachusetts 01845 USA
Phone (603) 212-9133 and Fax (603) 226-4108
Email tepp@teppllc.com and Web www.teppllc.com

MEMORANDUM

Ref: 1463
Subject: Traffic Assessment
Proposed Residential Development
Franklin Pierce Highway
Barrington, New Hampshire
From: Kim Eric Hazarvartian, Ph.D., P.E., PTOE
Principal
Date: March 27, 2019



INTRODUCTION

TEPP LLC has prepared this traffic-assessment memorandum regarding:

- a proposed residential development
- in the Town of Barrington, New Hampshire
- along the north side of Franklin Pierce Highway (New Hampshire Route 9 or NH 9)

The site existing site has:

- an area of about 18.2 acres
- residential development and wooded land to the west, north and east
- Franklin Pierce Highway to the south
- one existing single-family-detached house
- one existing building with a floor area of about 1,700 square feet (sf), previously used as a day-care center
- one existing unsignalized driveway along the north side of Franklin Pierce Highway

The proposed residential development:

- adds 40 townhouse units to the site
- improves the existing driveway
- provides a second driveway along the north side of Franklin Pierce Highway about 550 feet (ft) east of the existing driveway

This memorandum concludes that the proposed residential development is anticipated to have no material impact on area traffic operations.

FRANKLIN PIERCE HIGHWAY

Franklin Pierce Highway:

- is oriented approximately east-west
- functions as an arterial highway
- to the west, intersects with NH 125, an arterial highway
- to the east, connects with the City of Dover, New Hampshire
- includes large-radius horizontal curves
- has minor vertical grades
- generally has a two-lane cross-section with one travel lane and one variable-width shoulder per direction
- has ACC pavement in good condition
- has a posted speed limit of 40 miles per hour (mph)
- on the south side, has utility poles
- includes the unsignalized Barrington Middle School intersection, about 220 ft east of the existing site driveway
- is under the jurisdiction of the State of New Hampshire
- has nearby residential development, school development, wooded land and Drew Pond

SIGHT DISTANCES

The American Association of State Highway and Transportation Officials (AASHTO) has established authoritative policy for sight distances at unsignalized intersections in terms of:

- stopping sight distance (SSD)
- optional intersection sight distance (ISD)

SSD:

- provides for safety
- enables a driver, on the major road, to perceive and react accordingly to a vehicle entering the major road from a minor road

- is conservative because it encompasses a wide range of brake-reaction times and deceleration rates[1]

Optional ISD:

- is ordinarily greater than SSD and may enhance traffic operations
- is not required for safety[2]

Table 1 shows relevant available sight distances:

Table 1. Sight distances.

	Sight Distances		
Sight Lines	Available (ft)	Is SSD for Speed (mph)[a]	Is ISD for Speed (mph)
Franklin Pierce Highway/West Driveway Intersection, Sight Lines along Franklin Pierce Highway			
To/from East	At Least 425	50+	About 39
To/from West	At Least 425	50+	About 39
Franklin Pierce Highway/East Driveway Intersection, Sight Lines along Franklin Pierce Highway			
To/from East	At Least 425	50+	About 39
To/from West	At Least 425	50+	About 39

[a] Speed limit is 40 mph.

- for the Franklin Pierce Highway/west driveway intersection
- for the Franklin Pierce Highway/east driveway intersection
- that exceed 400 feet and are adequate

TRIP GENERATION

The Institute of Transportation Engineers (ITE) publishes trip-generation information in the authoritative reference *Trip Generation Manual.*[3] This information is based on empirical data for a variety of land uses including:

[1] AASHTO, *A Policy on Geometric Design of Highways and Streets*, 6th Edition (Washington, DC, 2011), pages 3-2 to 3-6.

[2] AASHTO, pages 9-28 to 9-29.

[3] ITE, *Trip Generation Manual*, 10th edition (Washington DC, September 2017).

- single-family-detached housing, land use 210, based on dwelling units[4]
- multi-family housing (low-rise), land use 220, based on dwelling units[5]
- day-care center, land use 565, based on floor area[6]

Table 2 shows the following calculated added vehicle-trips for the proposed residential development:

Table 2. Calculated weekday trip generation.

Time Period and Direction	Previous Vehicle-Trips: Single-Family-Detached Housing[a]	Previous Vehicle-Trips: Day-Care Center[b]	Previous Vehicle-Trips: Total	**Added Vehicle-Trips for Proposed Residential Development[b]**
Daily	9	81	90	**262**
AM-Street-Peak Hour				
In	0	10	10	**5**
Out	1	9	10	**15**
Total	1	19	20	**20**
PM-Street-Peak Hour				
In	1	9	10	**16**
Out	0	10	10	**10**
Total	1	19	20	**26**

[a] Based on ITE, *Trip Generation Manual*, 10th edition, single-family-detached housing, land use 210, one dwelling unit.

[b] Based on ITE, *Trip Generation Manual*, 10th edition, day-care center, land use 565, 1,700-sf floor area.

[c] Based on ITE, *Trip Generation Manual*, 10th edition, multi-family-detached housing (low-rise), land use 220, 40 dwelling units.

- weekday daily, 262 (total of in and out)
- weekday AM-street-peak hour, 20 (5 in and 15 out)
- weekday PM-street-peak hour, 26 (16 in and 10 out)

[4] ITE, *Trip Generation Manual*, 10th edition, Volume 2: Data—Residential, pages 1 to 28.

[5] ITE, *Trip Generation Manual*, 10th edition, Volume 2: Data—Institutional, pages 224 to 251.

[6] ITE, *Trip Generation Manual*, 10th edition, Volume 2: Data—Residential, pages 1516 to 1570.

TRIP DISTRIBUTION

Calculated trip generation is so low that area traffic operations are not sensitive to trip distribution. Vehicle-trips to and from the east are anticipated to predominate based on:

- traffic volumes on Franklin Pierce Highway
- development and destinations to and from the east

POTENTIAL TRAFFIC IMPACTS

ITE suggests that land developments generating at least 100 peak-hour vehicle trips, in the busier direction, are candidates for consideration of traffic impact analysis.[7] The calculated peak-hour vehicle-trips are well below this level.

Calculated peak-hour vehicle-trips for the proposed residential development are:

- from 20 to 26
- split by direction (in versus out of the site)
- split between two driveways
- further split by direction, to or from the east or west on Franklin Pierce Highway

Therefore, no significant traffic impact is anticipated for the area.

CONCLUSION

This memorandum concludes that the proposed residential development is anticipated to have no material impact on area traffic operations.

[7] ITE, *Manual of Transportation Engineering Studies* (Prentice Hall: Englewood Cliffs, New Jersey, 2000), page 144.