

# AMORY ENGINEERS, P.C.

WATER WORKS • WATER RESOURCES • CIVIL WORKS

25 DEPOT STREET, P.O. BOX 1768  
DUXBURY, MASSACHUSETTS 02331-1768

TEL.: 781-934-0178 • FAX: 781-934-6499  
WWW.AMORYENGINEERS.COM

April 26, 2018

Ms. Emily Wentworth, Senior Planner/Zoning Administrator  
Hingham Zoning Board of Appeals  
210 Central Street  
Hingham, MA 02043

Subject: **River Stone – Comprehensive Permit**

Dear Ms. Wentworth:

This is to advise that we have reviewed the following supplemental documents, prepared by McKenzie Engineering Group, Inc. (MEG), pertaining to the subject Comprehensive Permit Application:

- Comprehensive Permit Plan, River Stone (17 sheets), revised April 25, 2018
- Preliminary Hydrologic Analysis, revised April 25, 2018
- Response to comments letter (with attachments), dated April 25, 2018

The documents have been prepared to address comments raised in a number of correspondence from the Board's consultants, Town Boards and Departments and testimony at the public hearings.

Below are the comments from our April 9, 2018 letter in plain text following by the current status of each in **bold text**.

## Incomplete or Missing Information:

1. The revised list of requested waivers, dated February 12, 2018 is not complete and needs to be revised to reflect the current plan. Again, we note that the waivers should explain the exact regulation from which relief is being requested so that the Board fully understands the implications of each requested waiver. We believe that it is extremely important to identify where the project will not comply with Planning Board Rules and Regulations (R&R) Section 4 – Design Standards and Section 5 – Specifications for Construction of Required Improvements. This is required to determine if the design complies with generally accepted public safety requirements and good engineering practice. **The Applicant has submitted a revised list of requested waivers, dated April 17, 2018. We understand that the waiver requests will be discussed in the public hearing. We note that the revised list may not accurately reflect the most recent plans.**
2. The Board asked for a photometric plan at the February 6, 2018 public hearing. No lighting plan has been received to date. **The Applicant's engineer has advised that he does not believe a photometric plan is required and if the Board requires one it will**

**be submitted with the final plans. Should the Board approve the project, we suggest submission of a photometric plan be a condition of approval.**

3. Soil information/test pits at all proposed infiltration systems. MEG has stated that “additional location specific soil testing will be performed in conjunction with the development of final construction plans.” We have maintained that testing at this point would be a safer course of action for the developer but the required testing could be included as a condition of approval should the Board approve the project. Our suggested condition would be:

*Prior to the submission of final site development plans, a minimum of one test pit shall be excavated at each proposed infiltration system to verify soil textural analysis and depth to seasonal high groundwater. Test pits shall be excavated to a minimum depth of four feet below the proposed bottom of each infiltration system and shall be witnessed by an agent of the Town. Test pit logs shall be submitted to the Zoning Board of Appeals. The following actions shall be required based on test pit results:*

- a. *If the test pits confirm assumed soil textural analysis and depth to seasonal high groundwater then no further action is required.*
  - b. *If the test pits indicate more-restrictive soil texture, then the design of the infiltration system(s) shall be reevaluated. Results of the reevaluation shall be submitted to the ZBA for review.*
  - c. *If the seasonal high groundwater is found to be less than four feet from the bottom of any infiltration system a mounding analysis shall be performed and results submitted to the ZBA for review.*
  - d. *If the seasonal high groundwater is found to be less than two feet from the bottom of any infiltration system the system shall be redesigned to provide a minimum of two feet of separation.*
  - e. *Any modifications to an infiltration system design shall be submitted to the ZBA for review. **No comment required.***
4. Documentation to demonstrate that adequate water supply is available for domestic use and fire protection. The revised plan shows only one proposed fire hydrant. Additional hydrants are needed and we suggest the Applicant consult with the Fire Department about the location and number of hydrants. **We understand that a hydrant flow test was scheduled for April 25, 2018. The Applicant’s engineer indicated that the results of the flow test will be reviewed by Aquarion and if the results are favorable, a will-serve letter, as well as the test results, will be provided to the Board. In the event that the information is not provided, and should the Board approve the project, we suggest submission of the will-serve letter and hydrant flow test results be a condition of approval.**
  5. Full septic system design information to verify compliance with Title 5 (310 CMR 15) and to determine where the project will not comply with the Hingham Board of Health Supplementary Rules and Regulations for the Disposal of Sanitary Sewage. MEG has stated that “full septic system design plans will be submitted in conjunction with the

development of final construction plans.” Without the full design we cannot determine where the project will not comply with state and local regulations. **The Applicant’s engineer has stated that this will be completed with preparation of final plans. Should the Board approve the project, we suggest submission of final septic design plans be a condition of approval.**

6. Information to document that the proposed septic system components (tanks and the soil absorption system) shown under proposed roadways are designed for loading as required by the Fire Department apparatus. **The revised plans show that no tanks will be located under the proposed roadway, only leaching system piping. Load calculations were included as an attachment to the April 25, 2018 response letter. We don’t believe that the calculation of the load in pounds per square inch (9.97 psi) is accurate. We also note that Lt. DiNapoli forwarded information on the Town’s new platform ladder truck which is heavier than the vehicle the calculations have been based on. We have calculated the loads and maximum deflection of the PVC pipe in the leaching field. Based on our calculations (see attached), Schedule 40 PVC will not support the load. The piping in the leaching system should be specified to be Schedule 80 PVC which will adequately support the load. Should the Board approve the project, we suggest requiring Schedule 80 pipe in the septic leaching system as a condition of approval.**
7. Updated pipe sizing calculations should be provided to reflect the revised drainage design. **Addressed – revised pipe sizing calculations have been provided.**

### **Technical Comments**

#### **General/Roadway Comments**

1. The proposed retaining wall between Units 23-25 on the subject site and 64 Ward Street will be up to nineteen feet high (previously fifteen feet). **The design has been revised to reflect a fifteen foot high wall.**
  - a. We question whether this wall can be constructed without disturbing the 64 Ward Street property. **It is stated in the response letter that the Applicant’s engineer has “been in contact with a representative from the wall supplier, Redi-Rock, and they have represented that the wall can be built as shown on the plan without disturbing the 64 Ward Street property.” The Applicant should provide the methods of construction that will be employed to insure that there will be no disturbance to the 64 Ward Street property during construction of the wall. Should the Board approve the project, we suggest submission of this information be a condition of approval.**
  - b. A portion of Unit 23 is only two feet off the wall and there is a roof drain pipe shown between the unit and the wall. Access to the roof drain pipe for maintenance would be limited. Also, proximity of the wall would block natural light and essentially render Unit 23 undesirable. **This unit has been moved such that the closest point is now proposed to be seven feet off the wall and there is no roof drain pipe located**

- between the unit and the wall. We understand that the Fire Department has requested a minimum clearance of ten feet around structures.**
- c. The proposed decks/patios of Units 24 and 25 abut the wall. This will cause similar issues regarding natural light and visual impacts. **The proposed decks/patios are now shown about a foot off the wall. Maintenance of the decks/patios would be difficult.**
  - d. A fence is proposed along the top of the wall but we have safety concerns with a wall of this height. **No response from the Applicant, safety concerns remain.**
2. There also appears to be a six foot high retaining wall behind units 13-17, at the sediment forebay, yet this is not labeled on the plan. **Addressed – the retaining wall is labeled on Sheet C-1.**
  3. We concur with Mr. Dirk’s comment that the roadway widths should be a minimum of 24-feet. **An attachment to the April 25, 2018 response letter is an April 24, 2018 letter from the Applicant’s traffic engineer expressing his opinion that the 20-foot wide roadway is sufficient for a development of this size. We defer to Mr. Dirk.**
  4. In Mr. Dirk’s April 3, 2018 letter to Ms. Wentworth, he notes that Road C has a grade of approximately 8 percent approaching Ward Street and recommends “a leveling area with a grade of 2 percent or less should be provided for a minimum distance of 50- feet approaching Ward Street.” We agree that a leveling area should be provided and note that the R&R require a grade of not greater than three percent for a distance of 100 feet. **Addressed – Road C has been redesigned to provide a leveling area with a grade less than 2 percent for a minimum of 50-feet.**
  5. Roadway slopes are not shown on the Road C profile and between Sta. 2+00 and 3+00 on the Viking Lane profile (Sheet C-3). **Addressed – roadway slopes are now shown.**
  6. The proposed trench drain at about Sta. 2+81 on Road C should be shown on the profile on Sheet C-3. **Addressed – the trench drain is now shown.**
  7. As noted in Mr. Dirk’s April 3, 2018 letter, the sidewalk in front of Units 28 and 29 would be blocked if a vehicle were parked in either driveway. **Addressed – Units 28 and 29 have been moved to provide 21 feet from the back edge of sidewalk to the garages.**

#### Drainage and Utilities

1. The infiltration rates used for depression D-4 should be modeled in inches per hour (in/hr) to be consistent with the modeling of the other three depressions. **Addressed – infiltration rates have been revised accordingly.**
2. The post development HydroCAD results show that volume of stormwater runoff will be increased to the wetland area at the east side of the development. The calculations show

that the rate of runoff will be decreased and the level of flooding in the wetland will not be increased. In our February 6, 2018 letter to the Board we questioned how the outlet from the wetland was modeled and asked for MEG to verify the outlet configuration and that the increase in runoff volume will not impact adjacent properties. In the March 9, 2018 response letter, MEG states that "additional information will be forwarded under separate cover." The revised calculations model the outlet from the wetland differently but no information has been provided to verify the outlet modeling (i.e. topography around the entire wetland to clearly show the outlet(s)). **We reserve further comment until revised calculations have been provided. Please see the attached email we sent to the Applicant's engineer this morning.**

Board of Health Letter dated March 6, 2018:

1. The Board of Health (BOH) has indicated that the subject project is located within a nitrogen sensitive area (NSA) because there are nearby private drinking water wells. The Applicant has not responded to the BOH's letter. We believe that the BOH's letter raises valid health concerns and a response from the applicant is required. **An attachment to the April 25, 2018 response letter is an April 24, 2018 letter from Mr. Peter Dillon, PG of Geoscience. Mr. Dillon states that nitrogen loading limits do not apply under 310 CMR 15, The State Environmental Code, Title 5. While we agree with Mr. Dillon's interpretation of Title 5, we believe that the private wells down gradient from the proposed soil absorption system may be adversely impacted by the proposed system and protection of these wells from contamination should be afforded. Compliance with the Town of Hingham Board of Health Supplementary Rules and Regulations for the Disposal of Sanitary Sewage (BOH Regulations) would afford such protection of public health. The Applicant has requested waivers from the BOH Regulations which would not afford that protection. Should the Board grant those waivers, we believe that an advanced treatment, denitrifying system should be considered to provide protection of the wells and public health.**

Please give us a call should you have any question.

Very truly yours,

AMORY ENGINEERS, P.C.

By:



Patrick G. Brennan, P.E.



PGB  
enc.



Pat Brennan <pbrennan@amoryengineers.com>

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## River Stone - Drainage

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Pat Brennan <pbrennan@amoryengineers.com>

Thu, Apr 26, 2018 at 11:42 AM

To: "McKenzie, C. Bradley" <BMckenzie@mckeng.com>, Susan Spratt <sspratt@mckeng.com>

Cc: Emily Wentworth <wentworthe@hingham-ma.gov>

Brad & Susan,

In an effort to save time I'm emailing a few comments about the drainage:

1. The outlet from the existing basin is missing the five foot weir at El. 58.71. The attached photo shows the outlet structure with the 5 foot weir inside the trash rack. It is clear that the weir elevation is slightly above the outlet culvert invert of 58.12, but not as high as your lowest modeled weir which is 59.38 (above the pipe). Please modify your existing conditions model to reflect the outlet with the 5 foot weir.
2. Post Development subcat 3A-17R is labeled as Roofs 19-21 FB, it is actually Roofs 16-18 FB and 22-23 FB. The area of roofs is correct, just the label is wrong. This isn't a big deal because it doesn't change the calculations but I wanted to put it out there.
3. CB's 8 and 11 appear to be drawn with double grates but aren't labeled as double grates. These are the only two with more than 2 cfs of flow so they should have and be labeled with double grates.
4. You need additional treatment for the roadway runoff that discharges to infiltration system P-9. I suggest a treatment unit in place of DMH D-1.
5. One septic question: Is the 'bump-out' on Unit 1 an elevated feature or part of the foundation? If part of the foundation, the nearby septic tank is not ten feet away from it.

Pat

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Patrick G. Brennan, P.E.  
Amory Engineers, P.C.  
25 Depot Street, PO Box 1768  
Duxbury, MA 02331  
p 781-934-0178  
f 781-934-6499  
[pbrennan@amoryengineers.com](mailto:pbrennan@amoryengineers.com)  
Website: [www.amoryengineers.com](http://www.amoryengineers.com)



## River Stone

### Fire Department Loading on Septic Leaching Piping

Please refer to McKenzie Engineering Group's Proposed Soil Absorption System Vehicle Loading document dated April 25, 2018.

Maximum recommended diametric deflection is 7.5% for sewer/drain PVC.

See below W=Live Load (psi)

2.085 P=Prism load (psi)

307 PS=Pipe Stiffness (psi) Schedule 40 PVC

3000 E'=Modulus of soil reaction (psi)

$$\% \text{ Deflection} = 1 + \frac{0.1(W+P)100}{(0.149 \times PS + (0.061 \times E')}$$

#### Hingham Fire Apparatus:

2019 Pierce Velocity Platform Tower

84,800 Gross Vehicle Weight (pounds)

24,000 GAWR Front (pounds)

62,000 GAWR Rear (pounds)

Assume 11-inch wide front tires and 8-inch wide rear tires.

#### Loading of front tires:

176 sq/in 11-inch wide x 8-inch long x 2 tires

136.4 psi 24,000 lbs / 187.5 sq/in

#### Loading of rear tires:

512 sq/in 8-inch wide x 8-inch long x 8 tires

121.1 psi 62,000 lbs / 512 sq/in

#### Front tires have higher load.

$$\% \text{ Deflection} = 1 + \frac{0.1(136.4+2.085)100}{(0.149 \times 307 + (0.061 \times 3000))} = 1 + \frac{1384.85}{228.743} = \mathbf{7.05\% < 7.5\% \text{ ok}}$$

Add weight of 2,000 gallons of water = 16,600 pounds.

Assume weight is distributed 30% on front and 70% on rear.

Loading of front tires: 24,000 + 4,980 = 28,980 pounds

164.7 psi 28,980 lbs / 187.5 sq/in

Loading of rear tires: 62,000 + 11,620 = 73,620 pounds

143.8 psi 73,620 lbs / 512 sq/in

#### Front tires have higher load.

$$\% \text{ Deflection} = 1 + \frac{0.1(164.7+2.085)100}{(0.149 \times 307 + (0.061 \times 3000))} = 1 + \frac{1667.85}{228.743} = \mathbf{8.29\% > 7.5\% \text{ no good}}$$

#### Use Schedule 80 PVC, PS=949

$$\% \text{ Deflection} = 1 + \frac{0.1(226.4+2.085)100}{(0.149 \times 949 + (0.061 \times 3000))} = 1 + \frac{1667.85}{324.401} = \mathbf{6.14\% < 7.5\% \text{ ok}}$$