June 16, 2021

Mr. Ross Povenmire
Office of the Conservation Commission
Town of Boxford
7A Spofford Road
Boxford, Massachusetts 01921

Re: Stormwater Engineering Review
Harry Lee Cole School
Boxford, Massachusetts

Dear Mr. Povenmire:

Roux Associates, Inc. ("Roux") has performed an engineering review and alternatives analysis (Peer Review) related to stormwater drainage design for the proposed modifications to the Harry Lee Cole School ("HLC School") at 26 Middleton Road in Boxford, Massachusetts (the "Site"), for the Boxford Conservation Commission ("ConsCom"). Roux has reviewed and relied upon the following documents for our Peer Review:

- *Stormwater Report for Harry Lee Cole School*, prepared for Town of Boxford by Weston and Sampson, inc. ("W&S", the "Designer") date May 13, 2021 (the "Stormwater Report");
- A plan set titled *Town of Boxford, Boxford Public Schools Site Renovation Project, Harry Lee School* prepared by W&S dated May 13, 2021 (the "Civil Drawings");
- A letter prepared for the Boxford ConsCom by Licensed Site Professional (LSP) Prasanta Bhunia, of W&S titled *Stormwater Infiltration Spofford Pond and Harry Lee Cole Schools* and dated May 12, 2021 (the "LSP Letter"); and
- A memorandum to Scott Morrison, Superintendent of Tri Town by Chris Olbrot, PE, Superintendent of Public Works/Town Engineer titled *Cole School Parking Lot Improvements* and dated February 15, 2021 (the "Town Memo").

This Peer Review is limited to the following tasks:

- A review of the Stormwater Report and associated drainage design by the project's Designer;
- An evaluation of potential stormwater low impact design (LID) elements; and
- An evaluation of potential impacts to Middletown Road flooding.

As depicted on the majority of the Civil Drawings, true north (magnetic north) is oriented clockwise to the approximate 8 o'clock position. As this rotation can become cumbersome to narrate, we will be describing the Civil Drawings in relation to the top of the printed pages (or "Plan" north).

12 Gill Street, Suite 4700 ■ Woburn, Massachusetts 01801 ■ +1.781.569.4000 ■ www.rouxinc.com
California ■ Illinois ■ Massachusetts ■ New Jersey ■ New York ■ Texas

Proposed Development

The HLC School is located at 26 Middleton Road and comprises approximately five acres. It is our understanding that the Town of Boxford is seeking to make modifications to the grading, drainage, paving, and landscaping at the Site to improve access and traffic circulation. In general, these proposed modifications include, but are not limited to:

- Increasing impervious surfaces by approximately 6,600 square feet (an approximate 6% increase in area); however, the total runoff volumes for all design storms (2, 10, 25, 50, and 100 year) are less than existing conditions (with an approximate 11% reduction in total runoff for the 100 year design storm);

- A subsurface detention system (Stormtech SC-740, "DS-1") to attenuate and treat flows from (mostly) deep hooded catch basins in the impervious areas by Main Street (northeast portion of the Site);

- A subsurface infiltration system (Stormtech MC-3500, "IS-1") to accept flows from (mostly) deep hooded catch basins to the south and west of the building and a "bioretention pond" ("BR-1") by Middleton Road for groundwater recharge; and

- A network of deep hooded catch basins to treat flows from the impervious area to the north of the building which discharge directly to the municipal storm sewer in Main Street.

Stormwater Design Review

Roux reviewed the Stormwater Report for completeness, correctness and compliance with the Massachusetts Stormwater Management Standards as defined in the *Massachusetts Stormwater Handbook* ("MA SW Handbook"). Our comments and questions are included below.

1. Although deep hooded catch basins are specified, no dedicated petroleum (including oil, grease, petroleum hydrocarbon) removal BMPs (e.g., oil water separators) are included in the design, which includes stormwater flows from paved areas. Recommend Designer provide justification for why dedicated petroleum removal is not warranted for the project or if petroleum removal is sufficiently provided in accordance with applicable standards for the proposed improvements.

2. Based on the information presented in the LSP Letter, the absence of detectable arsenic concentrations in groundwater monitoring wells MW-1 through MW-4 is a valuable line of evidence; however, we noted the following concerns:

   - Based on the concentrations of arsenic present in soils shown on the plan in the LSP Letter, it is presumed that the arsenic is a natural background condition and therefore, may be ubiquitous and variable throughout the Site;

   - The infiltration BMP is located almost directly hydraulically upgradient from the Site drinking water well based on the groundwater contour map provided in the LSP Letter;

   - Infiltration BMPs may cause groundwater mounding and mobilization of arsenic; and

   - Unlike the Spoffard School, the LSP Letter does not indicate that Harry Lee Cole School currently provides pre-treatment for arsenic.

     Recommend Designer engage in discussions with the Town of Boxford and the Town fully understands the rational and implications of installing an infiltration BMP at this Site.

3. A Checklist for Stormwater Report was not included. Recommend Designer include the Checklist for Stormwater Report

4. It appears that sufficient TSS removal is incorporated into the design; however, individual TSS removal calculation sheets were not provided for all flow trains which discharge to the Main Street storm sewer. Recommend Designer provide TSS removal calculation worksheets (including contributory TSS removal by deep-hooded catch basins) for at least the following trains:

   - A1 → A;
   - A2 → DS-1 → A;
   - A3 → BR-1 → IS-1 → A;
   - A4 → IS-1 → A;
   - A5 → A (if appropriate); and
   - A8 → A (if appropriate).

5. The north arrows in Fig-1 and Fig-2 are reversed in Attachment D. Recommend Designer revise the figures.

6. There are no details for ICS-1, ICS-2, and ICS-3 (assumed inlet control structures) for the Stormtech systems. Recommend Designer provide details for the inlet control structures.

7. Based on groundwater elevation included with the LSP Letter, the groundwater elevation in the vicinity of the MC-3500 infiltration chambers is approximate Elev. 90-92 and, based on the information in Civil Drawings Sheet No. C134, the bottom of the MC-3500 system is Elev. 92.5. Two feet of separation should be provided between infiltration BMPs and the seasonal high groundwater table. Recommend Designer indicate whether the groundwater elevations depicted in the LSP Letter reflect seasonal high conditions and provide justification for the applicability of an infiltration BMP in this location.

8. Based on information in the Civil Drawings detail sheets (No. C507) and the inverts shown in the drainage plan (No. C134), it is uncertain if there is sufficient vertical space is provided for the installation of the MC-3500 (IS-1) infiltration system to meet the minimum cover requirements listed in the detail sheet. Recommend Designer include elevations on the detail sheets for IS-1 (also for DS-1).

9. The details included with the Civil Drawings (Sheet No. C505) for the “Bioretention Area” (BR-1) are inconsistent with the rain garden treatment BMP requirements in the MA SW Handbook:

   - There does not appear to be pretreatment which is necessary to achieve the 90% TSS removal credits for sheet flows to bioretention areas (per the MA SW Handbook);
   - It is uncertain if filtering is occurring because no impermeable liner with an underdrain was shown on the details, nor, in the case of an infiltration BMP, was exfiltration included with the HydroCAD reports; and
   - The soil layer is less than 2 feet in thickness and trees and bushes are shown to be planted within BR-1 (L101).

Recommend Designer provide additional details regarding the construction of the proposed rain garden (BR-1) and, if necessary, review and revise TSS Removal calculations for flows which are treated by the proposed rain garden.

10. The following items were identified with respect to the Operations and Maintenance Plan (Attachment H).
    - Item 4.2 states, "The site is considered a land use with a higher potential pollutant load, therefore if catch basins are found to be filled to capacity with sediment during a cleaning, the frequency of cleaning shall be increased." Recommend Designer address this statement which is inconsistent with the Standard 5 statement in the Stormwater Report ("This site is not considered a LUHPPL, as such, Standard 5 does not apply").
    - Operations and Maintenance plan does not include considerations for pre-treatment BMPs for the bioretention areas (beyond catch basin cleaning).
    - The inspection for the bioretention basin (Item 4.7) states, "Basin inspection should include checking for rilling and other signs of erosion." Recommend Designer add "and gullying" to the inspection criteria.
    - The inspection for the bioretention basin (Item 4.7) states, "Care must be taken to maintain the plants in the basin. Salt use must be restricted where runoff flows to the bioretention areas to maintain the plantings." At the same time, however, the Long Term Pollution Prevention Plan (Attachment F) states, "The operation will utilize salt and sand to treat the paved surfaces of the site during snow and ice events." Recommend Designer address this conflict.
    - Item 5 states, "The onsite stormwater basins will be shielded from public access by fencing." However, no fencing was observed around bioretention areas in the Civil Drawings.
    - The Operations and Maintenance Plan does not include a plan showing the location of all stormwater BMPs.

    Recommend Designer address these items.
11. The Illicit Discharge Compliance Statement (Attachment I) included with the Stormwater Report does not make a statement that no illicit discharges exist nor document efforts to investigate illicit discharges. Recommend Designer provide a signed statement which states there are no illicit discharges that meets the requirements outlined in the MA SW Handbook.
12. By reference, Roux includes recommendations presented in the Town Letter.

Evaluation of Potential Low Impact Design (LID) Alternatives

As documented in the LSP Letter, W&S has recommended to the ConsCom that infiltration improvements be limited to the portion of the parking area located near Middleton Road (Plan south) as arsenic is present in the environmental and the property includes a wellhead protection area. It has been assumed by Roux that the ConsCom has adopted the recommendation from the LSP letter; therefore, we do not believe that additional LID alternatives are appropriate at this time.

Evaluation of Impacts on Middletown Road Flooding
Based on review of the Civil Drawings and the HydroCAD report, the proposed areas of the Site that will discharge to Middletown Road are smaller and include less impervious surfaces, resulting in slightly reduced volumes and rates. As such, the project, as designed, is anticipated to have a positive impact on Middletown Road flooding in the immediate vicinity of the Site.

Roux appreciates the opportunity to assist the ConsCom in the evaluation of this development project. Please contact us to discuss this evaluation in further detail if needed. We look forward to your questions and comments regarding this Peer Review.

Sincerely,

ROUX ASSOCIATES, INC.

William Hansen, PE
Senior Engineer

Meredith Harris
Project Principal