July 06, 2020

David Genereux, Town Administrator

Town of Leicester
3 Washburn Square
Leicester, MA 01524

Re: Leicester Middle School
Leicester, MA
Schematic Site Design Peer Review

Dear Mr. Genereux:

BETA Group, Inc. (BETA) has completed its peer review of the civil and stormwater related elements of the site plans and supporting engineering documents for the above-referenced project, based on the following materials:

- Schematic Design Submittal binder, Leicester Middle School, 70 Winslow Avenue, Leicester MA, dated February 13, 2020 prepared by Finegold Alexander Architects;
- DESE Submission, Leicester Middle School, 70 Winslow Avenue, Leicester MA, dated Revised March 20, 2020 prepared by Finegold Alexander Architects;
- Schematic Design Review Comments, Leicester Middle School, 70 Winslow Avenue, Leicester MA, submitted to the MSBA February 13, 2020, forwarded to the Leicester Select Board on dated March 12, 2020;
- Response to MSBA Review Comments, Leicester Middle School, 70 Winslow Avenue, Leicester MA, dated March 25, 2020;
- Schematic Design Plan set, Leicester Middle School, 70 Winslow Avenue, Leicester MA, one hundred eighty (180) sheets, dated February 13, 2020 prepared by Finegold Alexander Architects;
- Preliminary Foundation Engineering Report, Leicester Middle School, Leicester, MA, dated April 1, 2019, prepared by McPhail Associates;
- Preliminary Geotechnical Review of Proposed Building Location Memorandum, Leicester Middle School, Leicester, MA, dated October 1, 2019, prepared by McPhail Associates;
- Final Foundation Engineering Report, Leicester Middle School, Leicester, MA, dated January 8, 2020, prepared by McPhail Associates;
- MassDEP Stormwater Management Standards (SMS)

The following are our comments on the plans and supporting documents.

General

BETA Group was retained to perform a “high level” review of the schematic design for the proposed Middle School replacement project. Part of this review includes an overall analysis of the project site to

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confirm its suitability for the proposed project. At this schematic design phase, it is understood that the proposed site utilities such as the stormwater management system have not been fully designed and are shown more conceptually with some minimal calculations generated to use for general sizing purposes. An in-depth review of hydrologic models for the project site would be undertaken at a later date when the site design is at a more advanced phase.

Existing Conditions

The Leicester Middle School project is proposed to be situated between the existing Leicester Middle and High School buildings located off Winslow Avenue in Leicester. A site visit was conducted by BETA staff including myself and William McGrath on June 11, 2020. The purpose of the site visit was to visually inspect existing site conditions and get a better understanding of the proposed project in relation to the existing site features.

Discussions with Municipal Town Staff indicated a consistent history of surface water issues experienced at the project site, especially during the typical wet season of later winter/early spring. These surface water issues often caused the existing playing fields and lawn areas to become saturated which conflicted with routine field maintenance, mowing, etc. It was also noted to us that surface runoff from the baseball field between the High School and Middle School buildings would sometimes drain overland in a southerly direction and actually drain into the Middle School building along the north side doorway entrance. We observed some evidence of erosion occurring in this area at the edge of the lawn area along the driveway adjacent to the north side of the Middle School building. During our site visit, no standing water or saturated field conditions were observed in any of the existing baseball or football fields.

A review of the Existing Conditions plans indicated that the project site featured two general wetland receiving areas, one located on the east side and one on the west side of the Middle School building. The east side wetland area included a pond located adjacent to Winslow Avenue. This pond appeared to drain beneath Winslow Avenue via an existing pipe culvert located east of the project site. No flow was observed draining through the culvert at the time of the site visit.

Geotechnical Conditions

McPhail Associates issued a Final Foundation Engineering Report for the project site dated January 8, 2020. The report summarizes the results of soil borings, test pits and groundwater monitoring wells conducted throughout the project site including the area to be occupied by the proposed school building footprint, as well as the existing baseball and football fields.

According to the report, the soils encountered generally consisted of a topsoil layer less than one foot, a sandy fill material to a depth ranging from four to eight feet, then a dense glacial till down to a depth greater than twelve feet. The fill material was not a typical gravel fill but appeared to be a compacted silty sand fill with relatively minimal amounts of gravel.

The dense glacial till is effectively impervious, which likely creates a perched water condition within the silty sand fill across the project site. Surface runoff infiltrating down through the topsoil and fill layer would “perch” on top of the glacial till and then primarily drain horizontally, following the existing topography to a downgradient receiving area.

The compacted silty sand fill is also less pervious than expected for a fill layer and would tend to become saturated after rainfall events. Groundwater migration through this fill zone was not measured as part of the McPhail Geotech study but would tend to be slow, thus keeping this zone saturated long after a rainfall event has concluded. The wet surface conditions routinely experienced onsite would most likely reflect the extended saturation of this silty sand fill layer.

Proposed Conditions

The proposed project includes the construction of the new Middle School building in the area of the existing baseball field located between the existing Middle and High School buildings. The project also includes the demo of the existing Middle School building, the construction of new playing fields adjacent to Winslow Avenue and a new baseball/soccer field in the general location of the existing baseball/soccer field on the east side of the site. As part of the project, new site utilities including a new stormwater management system will also be constructed.

The schematic design plans show multiple stormwater detention Best Management Practices (BMPs) located a various points within the site. These underground systems generally appear to consist of 36-in diameter pipe equipped with outlet controls. At present our understanding is that some preliminary HydroCAD modeling has been done to generally size these systems, but a detailed stormwater analysis has not yet been completed.

In addition to the stormwater detention systems, a network of drainage piping is proposed to collect and convey surface runoff from the project site to the two existing wetland receiving areas previously mentioned. Once a detailed HydroCAD model is generated for the project site, it should be reviewed to confirm that the PRE/POST Development peak runoff to each of the wetland receiving areas will be adequately mitigated and that general drainage patterns are maintained.

Based on the Geotechnical site evaluation, we offer the following comments:

1. Onsite stormwater recharge is likely minimal given the compacted fill and impervious glacial till throughout the site. Shallow underground stormwater detention systems appear to be a reasonable BMP for peak rate mitigation.

2. A 36-in perforated pipe infiltration system is proposed alongside the northwest corner of the new school building. The effectiveness of an infiltration BMP would need to be determined once the design is more advanced. Its proximity upstream of the building foundation should also be reviewed to confirm that stormwater will not impact the foundation. It is likely given the soil conditions that over-excavation of existing soils and replacement with new soils will be required to allow the system to function as intended.

3. Additional perforated pipe infiltration systems are proposed along the east and south sides of the new school building apparently to receive roof runoff. Similar to Comment #2, their effectiveness in recharging stormwater will need to be verified when during a future design phase.

4. 6-inch perforated underdrains are proposed along the northerly side of the proposed Middle School building at the bottom of the existing grassed slope that runs along the High School access driveway.

The proposed building footprint and surrounding impervious parking/driveway area will help minimize perched groundwater throughout this portion of the site. However, open space areas such as the proposed playing fields northwest of the proposed building will retain much of the existing silty-sand fill encountered onsite. This silty sand fill likely drains slowly, and we question if a single perimeter underdrain will effectively lower the water table throughout this flat open space area to maintain a dry playing field surface. We recommend the Applicant further investigate whether the perimeter underdrains as shown are sufficient to effectively impact the water table. We believe that a more substantial subdrain system under the fields will be required to mitigate the perched water table.

5. Similar to Comment #4, perimeter perforated underdrains are proposed around the football field. Test Pit #9 located in the middle of the football field shows 2-ft of topsoil and silty sand fill over glacial till down to 14-feet. As the field is essentially flat, and the silty sand fill layer is likely to drain slowly, we question if a single perimeter underdrain is enough to effectively lower the water table beneath the field to maintain a dry playing field surface. Similar to Comment #4, we believe that a more substantial subdrain system including a series of drains under the field will be needed to effectively mitigate the perched water table.

6. Similar to Comment #5, Test Pit #8 within the east side baseball/soccer field shows much the same existing soil conditions. Like the football field, a 6-inch perimeter underdrain is also proposed for the baseball/soccer field. Similar to Comment #5, we recommend the Applicant investigate whether perimeter underdrains as shown are sufficient or if additional subsurface underdrains installed at various points beneath the playing fields would be warranted.

7. The proposed discharge location at FES 4 in the southwest corner of the playing field appears to encroach within the 25-ft No-Disturb Zone to BVW. Consideration should be given to relocating the proposed FES outside of the 25-ft No-Disturb Zone.

8. Similar to Comment #6, the proposed field drains near FES 3 in the northwest corner of the site appear to encroach within the 25-ft No-Disturb Zone to BVW. Consideration should be given to relocating the proposed drains outside of the 25-ft No-Disturb zone. It is assumed that suitable outlet protection will be incorporated at all proposed stormwater discharge outlets to prevent erosion.

9. 4,300 CF subsurface detention systems using 36-in diameter pipe are proposed in the southwest and southeast corners of the site near Winslow Avenue. These systems appear to provide storage for stormwater from the east and west access driveways. The systems discharge to the drainage system in Winslow Avenue and subsequently to the pond adjacent to the Senior Center. We believe the general concept for the subsurface detention is sound. We note that the systems should be sized not only to mitigate peak flows to predevelopment conditions, but also to ensure that the discharge does not exceed thee capacity of the existing Winslow Street drainage.

10. It is recommended that all proposed underdrains and foundations drains have a positive connection to the site drainage system to maximize their functioning.

Site Grading

We offer the following comments related to future site grading:

11. Has the Applicant yet determined if excess soil will be transported offsite or if fill material will need to be imported onsite to facilitate the proposed grading scheme?

12. Recommend the Applicant investigate removing some amount of the existing silty sand fill and replacing with a more permeable gravel fill to better facilitate onsite drainage, especially in the areas of the proposed playing fields which are prone to prolonged saturation.

Construction Site Dewatering

13. Given the relatively shallow depth to dense glacial till (6 to 8-ft) within the proposed building footprint, groundwater dewatering will likely be required during the construction phase. A comprehensive dewatering plan should be developed for the site during later design phases.

Conclusions

At the schematic design phase, the design appears to have provided sufficient detail regarding the disposition of site-generated stormwater runoff such that the proposed project is likely to satisfy MassDEP Stormwater Management Regulations. This will be confirmed once a detailed Stormwater Runoff Report has been generated for the proposed project.

The proposed stormwater management approach utilizes recharge/infiltration in certain areas, generally for roof runoff. Given the perched water table condition and underlying glacial till there is concern about the short and long-term operation of these systems. Significant removal of existing soil and replacement with new material may be required to allow the systems to function. Additional subsurface investigation is warranted to better identify the actual scope of work & cost involved

The proposed utility layouts (sewer/water/drain/electric) are shown schematically and appear reasonable. Additional information including invert elevations will ultimately be provided during later design phases to verify that no conflicts exist between the various utilities.

The Geotechnical study of the site, while performed for foundation analysis, seems sufficient to identify the existing soil conditions that have likely contributed to the surface saturation issues encountered during wet weather periods. Several potential mitigative measures to help alleviate the surface saturation issues have been suggested for further review.

The design proposes a system of perimeter underdrains to address potential issues associated with the perched water table. Given what is likely a fairly static water table, the perimeter drains may only lower groundwater locally around the subdrains. It appears that a more extensive system of subdrains will be required to effectively lower the water table sufficiently to provide dry playing fields. Additional subsurface investigation is warranted.

The proposed site grading plans appears to demonstrate that the proposed surface grading of the site will allow it to drain properly, and that surface stormwater runoff can be effectively managed.

Based on our review of the schematic design and related information, we do not find any “fatal flaws” related to constructability of the site. However, further investigation and analysis should be undertaken to better identify the extent and costs of the underdrain system to ensure that will operate effectively.

If you have questions about any of the preceding comments, please feel free to contact either Bill McGrath or myself at (401) 333-2382.

Very truly yours,
BETA Group, Inc.

Todd Undzis, P.E.
Project Manager

cc: Bill McGrath, P.E. – BETA Senior Associate
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