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March 17, 2025

Estill County Schools

% Deco Architects and Sams & DeGough Engineering

sent via email: s.toby@decoarchitects.com and logan@sd-eng.com

**Subject: Site Work Geotechnical Report-Addendum**

New Estill County Middle School

Irvine, Kentucky

CETCO Project No. 1606-24-0102

Dear Sirs:

**CETCO** provided our preliminary geotechnical report for the site work and mass grading of the new Estill County Middle School site, with the report dated January 17, 2025. This letter (cover letter and the following two pages) serves as an addendum to that report, specifically addressing the primary concept for the overall proposed new main building foundations and building pad construction. The information presented in the January 17 report remains the same. This addendum letter serves only to add to that information.

We appreciate the opportunity to provide our geotechnical services to you and the design team. Please do not hesitate to contact us for questions or comments about the information contained herein.

Cordially,

A handwritten signature in blue ink, appearing to read 'Joe Cooke', written over a circular professional engineer seal.

Joseph S. Cooke, P.E.

Principal

Licensed KY 21244



Attachments: Body of addendum letter



## **SUMMARY INFORMATION**

CETCO's initial site development geotechnical report (dated January 17, 2025) discussed the mass site grading and "mountain top removal" of a large ridge top area required to achieve a mass building pad. The geotechnical drilling findings included shallow/thin soil cover on the ridge top (less than about 2 to 3 feet of soil) overlying dark gray to black "New Albany" shale bedrock. Coring revealed that the shale bedrock extended down below the cut elevation limits. This would indicate that the mass "flat" area of the building pad would be shale bedrock cut material with the spoils filled into the surrounding valleys. The report discussed the risk of "swelling shale", which is widely known in the area and existing school campus, including causing structural damage (heave) at the existing middle school building. Several options to lessen/control this risk were discussed. The primary control recommended included a mass "cap"/"cover" over the shale bedrock to seal the material (primarily with clay soil) from the weathering/chemical process that causes the swelling of the shale material (pyrite lenses within the shale material content).

### **Subsequent Design and Construction Team Meetings and Discussions**

Since the date of that initial report, CETCO, the design team, construction team (Codell) and the Owner have discussed this "capping" option and have arrived at a concept for the overall process during several meetings.

- This includes the use of over 4 feet total of material: a lean concrete cap ("mud mat"), covered by compacted clay soil.
- Also, we have discussed and reviewed the initial foundation system concept (from Sams & DeGough). This concept includes a pier system into the underlying shale bedrock, with immediately placed concrete to seal the shale. A structural slab is also proposed with an underlying "void box". The slab would be designed to resist swelling movement and the void box could accommodate (absorb) portions of the movement.
- The overall concept is a combination of reduction of swell potential by sealing of the shale, resisting movement (structural system of piers and reinforced structural slab) and swell movement accommodation (void boxes).

### **Construction Process Notes Recommended**

Note 1: The clay cap should be constructed in accordance with our initial geotechnical report and the project concept bid specifications. Since the time of our initial report, we have modified some of the soil placement recommendations (Section 4.2, pages 19 and 21 of that initial report), as follows:

- Maximum plasticity index (PI) of less than 25.
- Liquid Limit (LL) of less than 45.
- Moisture content: On-site silty soil will not be used for the mass fill (minimal soil is available). Borrow soils shall be classified as "clay" (CL) soils and the moisture content shall be maintained to between plus or minus 2% of optimum moisture content (determined by standard Proctor-ASTM D698).



- Soils shall be rolled (compactive effort) until at least 98% of standard Proctor maximum dry density is achieved.
- Other recommendations mentioned in the initial site geotechnical report, not modified by this addendum letter, shall be applied.

Note 2: The overall process for site work includes mass rock removal/mass cut of the ridge top to “level” the pad area to about 5 feet below finished grade elevations. It is critical that the concrete “mud mat” cover the exposed shale as soon as possible to minimize weathering potential of the exposed shale bedrock. This may require a phased rock-removal approach. We recommend that the exposed rock be covered within 24 hours of exposure.

Once the mud mat is placed, at least 7 days of curing time should be allowed prior to clay soil cover and earthwork traffic.

After the pad is to finished soil sub grade (i.e., top of soil clay cap placement), pier foundation construction can commence. The pier drilling will again expose the shale material. Once the suitable embedment depth is obtained, the pier should be “reamed” clean of loose shale, then pier concrete placed by the end of the day and not allowed to remain exposed overnight (or more than 6 hours, whichever less). This may limit the day’s production of drilled piers completed.

Note 3: The lean concrete mud mat shall have a minimum 28-day compressive strength of 2,000 pounds per square inch (psi). Casting of test cylinders should include 7-day compressive strength specimens to assess initial strength. At least 70% strength (1,400 psi or greater) shall be achieved at 7 days to allow the aforementioned clay soil cover placement.

Note 4: Final recommendations for bearing verification, construction and inspection of the piers and foundation systems will be established at the completion of the final geotechnical exploration report (after mass grading is complete).

## **CLOSURE**

This addendum letter should be used in conjunction with the January 17, 2025 initial geotechnical report. Also, the final, design geotechnical report will further amend this letter and the initial report. At that time all of these documents will, together, form the complete geotechnical report.

We appreciate the opportunity to provide our continued geotechnical services to you and the project team. Please do not hesitate to contact us for questions or comments about the information contained herein.