KANSAS CITY
TESTING & ENGINEERING, LLC

December 22, 2017

Mr. Jake Loveless
Griffin Riley Investments.
120 SE 30th St
Lee's Summit, MO 64082
jake@summitcustomhomeskc.com

Re: **Construction Testing**
The Residences at Echelon
Mo 291 and Mo 150
Lee's Summit, Missouri
KCTE Proposal #R20-17-261

Dear Jake,

In accordance with your request, Kansas City Testing & Engineering, LLC (KCTE) is providing construction testing and observation for The Residences at Echelon project. Our recent services have included subgrade preparation for fill placement and testing of site fill. The existing soils that have been encountered at many locations and the material from cut areas intended for use as fill are, in many cases, wetter than the recommended moisture contents for fill on this project and high enough in moisture content to be unstable. The unstable subgrade does not provide a solid base for compaction of new fill. The contractor has requested that KCTE provide opinions as to suitable means to use the onsite soils in their current condition.

The typical recommendation for high moisture subgrades and proposed fill material is to aerate the soil for drying before compaction procedures begin. The onsite soils are a candidate for aeration. Due to anticipated winter conditions, aeration may not yield results in a short timeframe as one of the key factors is air temperature. In addition, exposed materials may often add moisture from condensation overnight. Therefore, we have been asked to comment on some other procedures that can be used if the cost of such procedures is acceptable to the owner. Our recommendations are:

1) Borrow soil with suitable moisture content could be hauled on for use as structural fill. The borrow soil must be inorganic and meet the project requirements for suitable fill soil. The existing subgrade in some areas would have to be dried before new fill can be placed at those locations where the subgrade is unstable.
2) Onsite soils with higher moisture contents can be dried by chemical means if aeration is not expedient. Typically, Class C fly ash, hydrated lime or kiln dust and Portland cement have been used in our area both for soil stabilization and for drying. In the case of fill soils that are placed below the recommended low volume change layer for building slabs, the use of additives would be for the purpose of drying only. In order to be effective, the additive would need to be well-mixed but not necessarily to the degree typically recommended for modification of swelling characteristics. The weight of drying agent required may vary with the wetness of the soil. We expect that a fly ash weight of 5% to 10% of the dry weight of

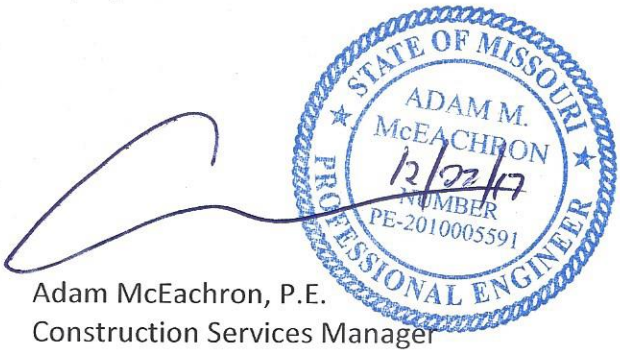
soil treated may be effective. For lime or Portland cement the weight of drying agent may be roughly one third to one half of the amount of fly ash that would be required.

The treated soil should meet all the other requirements of the project for composition of material, compaction and moisture content. During the winter months it is especially important to be aware of the prohibition from filling on top of frozen material or using frozen material in new fill.

Thank you for the opportunity to be of service to you on this project. Please feel free to contact us with any questions.

Sincerely,

James J. Byrnes
Senior Project Manager
Kansas City Testing & Engineering, LLC



Adam McEachron, P.E.
Construction Services Manager