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M E M O R A N D U M

DATE: November 11, 2020

TO: Mr. Ze Wen Hu
c/o: Mr. James Ma

FROM: Khaled M. Shawish, PE
Katelyn S. Brower, GIT

RE: Shoring Wall Tiebacks
30XX – 69th Avenue SE
Mercer Island, Washington
NGA File No. 11448B20



This memorandum presents our supplemental geotechnical recommendations and opinions regarding the proposed Hu Residence development project located at 30XX – 69th Avenue SE in Mercer Island, Washington.

Introduction

We previously prepared a geotechnical report titled “Geotechnical Engineering Evaluation – Hu Residence Development – 30XX -69th Avenue SE – Mercer Island,” dated July 10, 2020. We understand that as part of the residence development, significant cuts will need to be made to accommodate the planned residence basement foundation. Within the report, we gave recommendations for a soldier shoring wall for the planned cuts. We understand this wall will be of significant height and will require tiebacks. You have requested tieback recommendations.

Tieback Anchors

General: If tiebacks are needed to support lateral loads, we recommend that these systems consist of drilled, grouted tieback anchors. If tiebacks are utilized to support lateral loads for the shoring wall, we anticipate these systems may extend into neighboring properties and easements. Permission to extend these systems onto the neighboring properties and/or easements should be obtained prior to finalizing plans utilizing tieback anchors. All nearby existing utilities and structures should also be fully understood prior to finalizing the tieback design.

We recommend that at least two of the anchors be performance tested to a minimum of 200 percent of the design loads to confirm design values. We recommend that measurements be made by the contractor in the field at the time of tieback installation to ensure that tiebacks do not encounter any existing structures or underground utilities.

No-Load Zone: The anchor portion of all tiebacks must be located a sufficient distance behind the wall face to develop resistance within a stable soil mass. We recommend the anchorage be obtained behind an assumed no-load zone at an inclination of 15 degrees below horizontal. The no-load zone is defined by a line extending horizontally from the base of the shoring wall back towards the cut a distance of six feet. This line should then extend up from the base elevation at an angle from the horizontal of 60 degrees. We recommend that we monitor soil conditions during anchor installation in order to evaluate adequate penetration into competent soils.

Soil Design Values: The tiebacks must terminate in native, competent soil interpreted to exist below the fill. For use in design of the anchors, we estimate an allowable grout to soil adhesion of 2,000 pounds per square foot (psf) be utilized for sizing the bonded portion of anchors terminated within the competent native soils. This value should be verified through two performance tests prior to ordering the production anchors.

Tieback Installation and Testing: The contractor should be responsible for using equipment suited for the site conditions. We do not recommend the use of an open-hole method for the purpose of installing the tiebacks due to the potential for soil caving. Secondary grouting to increase soil adhesion may be used; however, if secondary grouting is used, the anchors should be tested using the methods outlined for the performance testing. All anchors should be installed at an approximate inclination of 15 to 20 degrees below horizontal.

Two anchors should be performance-tested to 200 percent of the anchor design capacity. The performance test should consist of cyclic loading in increments of 25 percent of the design load, as outlined in the Federal Highways Administration (FHA) report No. FHWA/RD-82/047. The test locations should be determined in the field by NGA, based on soil conditions observed during anchor installation. All other tiebacks should be proof-tested to at least 130 percent of design capacity.

All other recommendations outlined in our previous report should be followed. We trust this memorandum should satisfy your needs at this time. Please contact us if you have any questions or require additional services.