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June 21, 2024

WICP
Attention: Mr. Mark Weldon
2642 West 400 North, #500
Lindon, UT 84042

Re: **Addendum 1**
**Orem North 4**
**625 North 2800 West**
**Lindon, Utah**
**Project No: 240363G**

Mr. Weldon:

This letter is an addendum to the previously completed geotechnical study[1] completed by Earthtec Engineering on June 17, 2024. Earthtec Engineering was contacted about the seismic loads, potential for aggregate piers under spot footings, and lateral earth pressures for retaining wall.

**Seismic Design**
The State of Utah has adopted the 2021 International Building Code (IBC) for seismic design and the structure should be designed in accordance with Chapter 16 of the IBC. We encountered some potentially liquefiable soil layers, but for structures having fundamental periods of vibration equal to or less than 0.5s, site-response analysis is not required to determine spectral accelerations for liquefiable soils as per ASCE 7-16 Section 20.3.1.1 Exception. No additional site testing for site class determination will change the limiting liquefaction numbers. We recommend designing the building to reduce the fundamental period of vibration to 0.5s or less and using Site Class E for design.

The site is located at approximately 40.348 degrees latitude and -111.773 degrees longitude. Using Site Class E, the design spectral response acceleration parameters are given below.

Design Accelerations

| $S_S$ | $F_a$ | $S_{MS}$ | $S_{DS}$ |
|---|---|---|---|
| 1.298 g | 1.2 | 1.558 g | 1.038 g |
| **$S_1$** | **$F_v$** | **$S_{M1}$** | **$S_{D1}$** |
| 0.472 g | 1.5 | 0.708 g | 0.472 g |

**Strip/Spread Footings**
We recommend that conventional strip foundations be constructed entirely on a minimum of 24 inches of properly placed, compacted, and tested structural fill extending to undisturbed native soils for structural loads up to 5,000 pounds per linear foot for bearing walls. Strip foundations from 5,000 to 6,000 pounds per linear foot for bearing walls should be constructed entirely on a

[1] Geotechnical Study, Orem North 4, 625 North 2800 West, Lindon, Utah, Earthtec Engineering, Project No. 240363G, June 17, 2024.

minimum of 36 inches of properly placed, compacted, and tested structural fill extending to undisturbed native soils. The structural fill should extend a minimum of 5 feet beyond the outer edge of the footings.

Spread footings should be constructed on properly designed rammed aggregate piers.

**Rammed Aggregate Piers**

This method involves placing compacted aggregate columns which extends into the soft soils. These provide several benefits in that the stone columns transfer the building load past the inapt soils, they tend to densify the surrounding soil reducing settlement and liquefaction risk, and they act as vertical drains to dissipate pore pressures which further reduce the risk of loss of bearing capacity due to liquefaction. Aggregate columns are a specialized system and we recommend they be designed by an engineer experienced with this type of system. Foundation design should be coordinated with the rammed aggregate pier design professional. A maximum allowable bearing pressure of 4,000 psf for spot footings founded on aggregate piers should be obtainable if properly designed by the engineer.

**Lateral Earth Pressures**

Below grade walls act as soil retaining structures and should be designed to resist pressures induced by the backfill soils. The lateral pressures imposed on a retaining structure are dependent on the rigidity of the structure and its ability to resist rotation. Most retaining walls that can rotate or move slightly will develop an active lateral earth pressure condition. Structures that are not allowed to rotate or move laterally, such as subgrade basement walls, will develop an at-rest lateral earth pressure condition. Lateral pressures applied to structures may be computed by multiplying the vertical depth of backfill material by the appropriate equivalent fluid density. Any surcharge loads in excess of the soil weight applied to the backfill should be multiplied by the appropriate lateral pressure coefficient and added to the soil pressure. For static conditions the resultant forces are applied at about one-third the wall height (measured from bottom of wall). For seismic conditions, the resultant forces are applied at about two-third times the height of the wall both measured from the bottom of the wall. The lateral pressures presented in the table below are based on drained, horizontally placed native soils as backfill material using a 28° friction angle and a moist unit weight of 120 pcf.

Lateral Earth Pressures (Static and Dynamic)

| Condition | Case | Lateral Pressure Coefficient | Equivalent Fluid Pressure (pcf) |
|---|---|---|---|
| Active | Static | 0.36 | 43 |
| | Seismic | 0.64 | 77 |
| At-Rest | Static | 0.53 | 64 |
| | Seismic | 0.81 | 97 |
| Passive | Static | 2.77 | 332 |
| | Seismic | 3.02 | 363 |

*Seismic values combine the static and dynamic values

These pressure values do not include any surcharge and are based on a relatively level ground surface at the top of the wall and drained conditions behind the wall. It is important that water is not allowed to build up (hydrostatic pressures) behind retaining structures. Retaining walls should incorporate drainage behind the walls as appropriate, and surface water should be directed away from the top and bottom of the walls.

Lateral loads are typically resisted by friction between the underlying soil and footing bottoms. Resistance to sliding may incorporate the friction acting along the base of foundations, which may be computed using a coefficient of friction of soils against concrete of 0.35 for structural fill meeting the recommendations presented herein. For allowable stress design, the lateral resistance may be computed using Section 1807 of the 2021 International Building Code and all sections referenced therein. Retaining wall lateral resistance design should further reference Section 1807.2.3 for reference of Safety Factors. Retaining systems are assumed to be founded upon and backfilled with granular structural fill. If backfilling with clay or silt, it is required to contact Earthtec prior to construction for further review and recommendations. The values for lateral foundation pressure can be increased by one-third for wind and seismic conditions per Section 1806.1 when used with the Alternative Basic Load Combinations found in Section 1605.3.2 of the 2021 International Building Code.

The information presented in this addendum applies to the same general conditions in the geotechnical report. The information and recommendations presented in this letter were conducted within the limits prescribed by our client, with the usual thoroughness and competence of the engineering profession in this area at this time. No warranty or representation is intended in our proposals, contracts, reports, or letters. All other recommendations in the referenced report should be followed.

We appreciate the opportunity of providing our services on this project. If we can answer questions or be of further service, please call.

Respectfully;

**EARTHTEC ENGINEERING**

Jeremy A. Balleck, E.I.T.
Staff Engineer

PROFESSIONAL ENGINEER
No. 5567049-2202
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Electronically generated on 06/21/2024
STATE OF UTAH

Timothy A. Mitchell, P.E.
Vice President