



April 27, 2018

Mr. Scott Emmett
Emmett Phair Construction
6305 SW Rosewood Road, Suite E
Lake Oswego, Oregon 97035

Dear Mr. Emmett:

**Re: Supplemental Geotechnical Consultation Services, Evaluation and Recommendations for
Proposed Support of Continuous (Strip) Perimeter Footing, Proposed Belmont Family
Dentistry Building, 5901 SE Belmont Street, Portland (Multnomah County), Oregon**

In accordance with your request, we have completed our supplemental geotechnical consultation services with regard to providing geotechnical design and construction recommendations with regard to the proposed support of a continuous (strip) perimeter footing at the above subject proposed new Belmont Family Dentistry building project. As you are aware, we recently performed a Geotechnical Investigation for the project the results of which were presented in our formal report dated December 1, 2017.

Project Background

We understand that development of the site will result in the construction of a new drywell storm water infiltration system that will be located within ten (10) feet of the northwest corner of the new dental building. However, some uncertainty exists with regard to the potential for long-term and/or post-construction settlement beneath the northwesterly continuous (strip) perimeter foundation(s) of the proposed new dental building. In this regard, we are generally of the opinion that the northerly and/or northwesterly continuous (strip) perimeter footing be underpinned (supported) with drilled helical piers where the perimeter footing(s) are located within ten (10) feet of the proposed new storm water drywell(s).

17-288894-REV-1-CO 2

Conclusions and Recommendations

In this regard, based on the results of our recent geotechnical investigation at the site as well as our past experience with the use of drilled steel helical piers, we are of the opinion that suitable vertical support for the proposed northerly and/or northwesterly continuous (strip) perimeter footing(s) can be developed by means of the installation of 2.875-inch diameter high strength drilled steel helical piers such as Ram Jack piers or an approved equivalent.

As such, we are of the opinion that hydraulically drilled vertical helical piers advanced to a practical torque resistance of at least 8,000 foot pounds (3,000 psi gauge pressure) will produce an allowable vertical (downward) working load capacity of at least 36,000 pounds (72,000 pounds ultimate) where a 6.5 kip or larger hydraulic head (motor) is used. Spacing and/or location of the vertical helical piers should be determined by the structural engineer. Based on the results of our previous exploratory test boring performed on November 3, 2017 as well as our past experience in the area, we anticipate that practical torque resistance of the drilled helical piers will be found within the underlying stiff to medium dense, clayey, sandy silt to silty sand soil deposits found at a depth of approximately twelve (12) feet or more beneath the existing site and/or surface grades. However, we recommend that the vertical drilled helical piers be installed to a depth of at least fifteen (15) feet beneath the bottom of the proposed new perimeter foundations. The underpinning piers should be installed in accordance with the manufactures recommendations and/or under the criteria as outlined in the ICC-ES Report 1854. Additionally, the installation of the underpinning piers should be monitored by the Geotechnical Engineer. Further, the underpinning piers should be proof tested as recommended herein.

Proof Testing

Proof testing of the underpinning drilled helical piers should be performed and shall consist of loading at least one (1) of the vertical drilled helical piers in six (6) equal increments up to 150 percent of the design load. Each load increment up to the 150 percent of design load should be held for five (5) minutes and the vertical strain monitored and measured to the nearest 0.001 inch. If the recorded strain between 1 and 5 minutes is less than 0.04 inches, the helical pier may be considered acceptable. However, if the recorded strain exceeds 0.04 inches, the helical pier should either be deepened and retested or abandoned and a new helical pier shall be installed and tested. Additionally, the combined (total) strain under all six (6) of the incremental loads shall not exceed 0.25 inches.

We appreciate this opportunity to be of service to you at this time and trust that the above information is suitable to your present needs. Should you have any questions regarding the above information or if you require any additional information or assistance with this project, please do not hesitate to call.

Sincerely,



Daniel M. Redmond, P.E., G.E.
President/Principal Engineer



Cc: Mr. Dustin Elmore
AAI Afghan Associates, Inc.

Mr. James Smith
Ankrom Moisan Architects

Mr. Mark Hughes
Kramer Gehlen & Associates