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July 29, 2015

Richmond American Homes-Tucson
3091 West Ina Road
Tucson , Arizona

Re: Document Review

Job: **The Pines Lots 1, 2, 70, 71, 72, 73, and 74**
North of Cortaro Road and West of Interstate 10
Marana, Arizona

ProTeX Project No. : 4669

Attention: James Gaulin

At your request, the following documents have been reviewed with respect to the existing conditions and proposed remediation plan for the aforementioned site.

-Geotechnical Evaluation by Pattison Engineering LLC, dated March 30, 2015, Project Number 15-034

-Proposal Scope of Work for Injection Grouting by Reliable Structures Inc, Dated June, 2015-Rev 2,

The Geotechnical evaluation was initiated due to ground settlement in yard and driveway areas. Pattison Engineering noted the following items with respect to the site in the report

1. Geotechnical Report and associated addendums prepared by Terracon for the subdivision indicated existing loose deep fills. (Note: These Terracon reports were not made available to ProTeX)
2. Under the direction of Red Point Development and supervision of Terracon removal and compaction of soils were completed. (Note: information to what depth soils were removed as a part of the removal and replacement was not indicated in the Pattison Engineering Report)
3. Many of the driveway and walkway areas have shown significant displacements (i.e. settlement).
4. Soils borings identified loose and wet fill consisting of fine grained material to depths of at least 27 feet. It was suggested that this was the location of the lots is the location of the old concrete truck washout pit.
5. Pattison Engineering Conclusions: The deep fill soils are loose and wet and are anticipated to settle over time.
6. Recommendation: Compaction grouting is recommended at 1 foot intervals to depths of 25 feet. A horizontal spacing was recommended of 10 feet. All grouting operations to be done under supervision of a Pattison Engineering representative.

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The Reliable Structures Inc. proposal indicated the following items:

1. It is their understanding that remediation of the site soils below residential structures has been completed.
2. General scope of work is to grout at intervals of 4.5 feet with rows staggered to depths of 13 to 20 feet

Conclusion:

Reports indicate loose soils from the previous site usage exist to depths of 20 to 27 feet contributing to ongoing settlement resulting in the visible distress of driveways and walks. It is our understanding that there is no reported distress in the residential structures, thus are not part of this effort of the remediation and not addressed in this report. Due to constraints of existing structures we agree with Pattison that removal and replacement of soils is not the best option. The recommendation provided by Pattison was to use compaction grouting. We agree that compaction grouting can be a viable option.

The test plan provided for our review is typical of industry standard of practice for such remediation efforts. Based on the information provided and no field investigation, the methodology stated in the Geotechnical Evaluation by Pattison Engineering, LLC and grouting plan provided by Reliable Structures indicate a process that should densify the subsurface soils, bringing stability to subsurface soil layers, and reducing the potential for future settlements driveways and walks.

Respectfully submitted,



Expires 3/31/2016
Delbert A Rapier, P.E., M.S.E.
President