January 19, 2017

Mr. Preston Steel
30 North 1100 West
Farmington, Utah 84025

RE: Proposed Single-Family Home
Lot 4012-R Stone Ridge Subdivision
The Cottonwoods at Mountain Green Phase 4
3339 Skyview Circle
Mountain Green, Morgan County, Utah
CMT Job No. 9343

1. INTRODUCTION

This report presents our geotechnical review of the drawing identified as "Site Plan, 3339 Skyview Circle, Lot #4012-R Cottonwoods Subdivision Phase 4, Mountain Green City, Morgan County, Utah" dated December 20, 2016 and prepared by Habitations Residential Design Group for the residential lot 4012-R within the Stone Ridge Subdivision located at 3339 Skyview Circle in Mountain Green, Utah. This review was performed in accordance with the requirements developed and stated by Morgan County Planning Department. It should be noted that Morgan County Planning Department has designated Lot 4012 as restricted "R." CMT Engineering Laboratories (CMT) was retained by Mr. Preston Steel to provide this geotechnical review.

2. REFERENCES

In performing this review study, we have referenced the following:

- Report, Geotechnical Study, Phase II Portion of Cottonwood Hills PUD Subdivision, North of Old Highway 30 and East of Mountain Green, Morgan County, Utah, dated June 21, 2006 by GSH, Job No. 0023-006-06.

- Report, Geotechnical Study, Phase III and IV, Cottonwood Hills PUD Subdivision, Northeast of Phases I and II, The Cottonwoods at Mountain Green, Morgan County, Utah, dated January 15, 2007 by GSH, Job No. 0023-009-07.

3. GEOTECHNICAL ENGINEERING AND GEOLOGY DISCUSSIONS

3.1 GENERAL

General geotechnical discussions and recommendations pertaining to the overall development were summarized in the above-referenced reports. In the reports, it was stated that active faulting, liquefaction, and rock fall would not detrimentally affect design and construction of the proposed facilities within Phase 4. In addition, overall guidelines pertaining to foundations, final cut and fill slopes, stability of overall slopes, and, to some extent, retaining structures were discussed.

3.2 LOT SPECIFIC

Specific requirements, many of which pertain to the geotechnical setting of the site, need to be satisfied as per Morgan County. These particular elements include:

1. The driveway location and maximum slope.
2. The proposed and existing contour lines.
3. Engineering design and calculations for all retaining walls taller than 4 feet.
4. Engineering (including slope stability analyses).
5. All cut and fill slopes.
6. Finished floor elevations of home.
7. Slope stability analyses to demonstrate that each home is stable on the slope to a minimum factor of safety of 1.5 under static conditions.
8. The site plan should be based upon geotechnical site evaluations specific to each restricted lot that includes soil sampling and laboratory testing at the footing locations.
9. Discuss the necessity for subdrains.
10. Discuss the moisture sensitivity of the soils.
11. Present bearing pressure recommendations.

Responses to the above items are as follows:

1. Driveway location and maximum slopes are shown on the drawing entitled Site Plan. A copy of this drawing is attached.
2. Existing and proposed grading are shown on the attached Site Plan. Fill are anticipated to be up to about 2 feet at the front of the home and 8 feet at the rear of the home. Excavations for the home are anticipated to extend up to about 10 feet below existing site grades.
3. The Site Plan, shows 4 stacked rock walls at the rear and sides of the home. The stacked rock walls proposed for the site will be about 4.0 feet or less in height per tier. Tier separation (spacing) was not specifically shown on the site plan. In order to be considered a landscape wall and not require specific engineering the wall must not be more than 4 feet of total exposed height and the tiers must be separated by a minimum distance of twice the height of the lower tier from one face to the other face. Otherwise

the stacked rock walls would require engineering design calculations. The top and bottom elevations for the walls are shown on the drawing.

In general, stacked rock walls constructed against cut soils and not exceeding 4 feet in height should be constructed with slopes no steeper than one-quarter horizontal to one vertical (0.25H:1.0V). In fill areas, stacked rock walls not exceeding 4 feet in height should be placed against undisturbed compacted soils no steeper than one-half horizontal to one vertical (0.5H:1.0V).

The lower boulder must be embedded a minimum of 9 inches below final grade. We strongly recommend that the individual boulders be placed against a geotextile fabric, such as Mirafi 140N or equivalent, placed over the exposed cut or fill soils. The top of the fabric should be wrapped over the crest at a depth of at least 12 inches below final grade and anchored to the upslope soils. Final grading/drainage should be such as to minimize the concentration of surface runoff flows over the face of the stacked rock walls.

4. Planned maximum un-retained site grading shown on the attached Site Plan appear to be less than three horizontal to one vertical (3.0H:1.0V). Un-retained slopes must not be steeper than two and one-half horizontal to one vertical (2.5H:1.0V) under long term conditions, per the referenced geotechnical studies.

   All fills placed within the building footprint and under driveways must be considered as engineered fills and be compacted in lifts as specified in the referenced geotechnical report to at least 95 percent of the maximum dry density as determined by the AASHTO[1] T-180 (ASTM[2] D-1557) compaction criteria. The referenced report recommends that for site grading fills in the landscaped areas the fills be compacted to a minimum of 90 percent.

   Prior to placing fills, the existing subgrade must be stripped of vegetation and topsoil as discussed in the referenced geotechnical reports. Additionally, below structures all weathered/loose/disturbed soils must be removed to suitable natural soils prior to placing site grading fill and/or foundations. In the Mountain Green area this could mean up to 18 inches of existing surficial soils. The fills shall be keyed into the existing hillside by cutting a minimum bench one foot into the hillside for each foot of fill placed.

5. General site grading shown on the attached Site Plan indicates maximum final unbraced slopes of less than the specified maximum slope of two and one half horizontal to one vertical (2.5H:1.0V) as part of the final grading. This includes proposed cut areas, as well as existing grades.

   Cut and fill and slope stability discussions and recommendations were presented in detail in the referenced June 21, 2006 and January 15, 2007 reports. Temporary cuts for the basement level can be cut at one-half horizontal to one vertical (0.5H:1.0V). If groundwater is encountered, excavation should be terminated and CMT contacted. If any

1 American Association of State Highway and Transportation Officials

2 American Society for Testing and Materials

signs of instability or excessive sloughing are noted, immediate remedial action must be initiated.

Final cut and fill slopes shall not be steeper than two and one-half horizontal to one vertical (2.5H:1.0V). If more rapid grade transitions are required, retainage structures should be utilized. Up to 4-foot stacked rock walls may be utilized. Above 4 feet, reinforced concrete walls are recommended.

Based on grading it is anticipated that the surface water from the driveway will drain to the street storm drain system. Additionally, if possible the roof water shall also drain to the street. If this is not possible, then roof water shall be collected and piped downslope away from the building.

6. Proposed floor elevations of the home are presented on the attached Site Plan.

7. Detailed analyses pertaining to overall slopes were presented in the referenced geotechnical studies. Detailed analyses were performed on a 2.5 horizontal to 1.0 vertical (2.5H:1.0V) slope utilizing parameters developed in conjunction with detailed laboratory testing. The analyses indicate that stability of the 2.5 horizontal to 1.0 vertical (2.5H:1.0V) slopes under static loading is 1.66 and under dynamic loading is well above 1.1. Data presented on the Site Plan show maximum unbraced cut slopes including existing slopes of less than three horizontal to one vertical (3.0H:1.0V). Therefore, the slopes, if not modified significantly from that shown on the Site Plan, will have a factor of safety of 1.5 or more under static loading conditions and 1.1 or greater under dynamic loading. We strongly recommend that re-vegetation of the cut/fill soils be completed as soon as possible to reduce surface erosion.

8. This requirement was/will be satisfied by the geotechnical reports referenced above in conjunction with a follow-up site observation(s) of the site during home mass grading and mass excavation prior to forming foundations.

9. A discussion regarding subdrains from the referenced report (June 21, 2006) is as follows:

> *It is essential that a foundation/chimney subdrain system be constructed against the up- and side-gradient walls associated with the residential structures and retaining structures. The subdrains will consist of perimeter foundation subdrain and a chimney subdrain extending up from the subdrain to within two feet of final grade. The perimeter foundation subdrain should consist of a minimum of four-inch diameter slotted or perforated PVC or other durable material pipe encased in a "free-draining" granular material, such as one-half to one-inch minus clean gap-graded crushed gravel. The gravel should extend two inches below and laterally and at least 12 inches above the top of the lowest slab or the top of the slope on the down-gradient side of the retaining wall. The gravel should be wrapped in a geotextile fabric, such as Mirafi 140N, to reduce the long-term infiltration and plugging of the*

subdrain gravel and pipe. The subdrain pipe should have a slope of at least 0.25 percent to a suitable point of gravity discharge.

Extending up from the top of the perimeter foundation subdrain to within two feet of final grade should be a chimney subdrain which may consist of a synthetic drain board, such as Miradrain or equivalent, or a minimum of four-inch-wide clean gap-graded permeable gravels previously discussed. The gravel would be separated from the natural soils and/or fine-grained backfills with a geotextile fabric, such as Mirafi 140N or equivalent. The perimeter foundation/chimney subdrain system would ultimately discharge to area subdrains associated with the subdivision roadways or down-gradient into the base of natural drainages.

At portions of the home with the floor slab extending deeper than 4 feet below surrounding grade, the subdrain described is recommended. Further site grading around the home should be completed such that runoff is directed around and away from the foundation.

10. Review of available data indicates that silty clay soils were encountered within the nearest borehole, B-3A in the southwest corner of Lot 4019. Based on our review of the available data, moisture sensitive soils are not anticipated at the subject lot. Further observation of natural soils at the site should be completed by a mass excavation subgrade observation once the foundation is dug.

11. A net bearing pressure of 2,000 pounds per square foot may be utilized in the design of the footings for the proposed residence, as indicated in the referenced reports.

4. SUMMARY

Based upon our review, it is our opinion that the referenced/attached drawing provided generally satisfies the requirements for restricted "R" lots. In addition, it is essential that the discussions and recommendations presented in this geotechnical review study, as well as the referenced June 21, 2006 Phase II geotechnical study and January 15, 2007 Phase III and IV geotechnical study, be part of the drawing documents. If any significant changes to the proposed layout or grading of the lot are initiated and/or if unusual soil conditions are encountered during initial construction, representatives of CMT must be informed immediately so that proper review can be performed.

To complete the site-specific review, a representative of CMT must observe the home mass excavation prior to forming footings.

5. LIMITATIONS

The recommendations provided herein were developed by, evaluating the information obtained from the test pit/boring and site exploration completed as part of the referenced geotechnical studies. The test pit/boring data reflects the subsurface conditions only at the specific locations at the particular time designated on the test pit/boring logs. Soil and ground water conditions may differ from conditions encountered at the actual exploration locations. The nature and extent of any variation in the explorations may not become evident

until during the course of construction. If variations do appear, it may become necessary to re-evaluate the recommendations of this report after we have observed the variation.

Our professional services have been performed, our findings obtained, and our recommendations prepared in accordance with generally accepted geotechnical engineering principles and practices. This warranty is in lieu of all other warranties, either expressed or implied.

6. CLOSURE

We appreciate the opportunity to be of service to you on this project. If we can be of further assistance or if you have any questions regarding this project, please do not hesitate to contact us at (801) 870-6730.

Sincerely,
CMT Engineering Laboratories

Andrew M. Harris, P.E.
Senior Geotechnical Engineer

Bryan N. Roberts, P.E.
Senior Geotechnical Engineer

Attachments: Site Plan by Habitations Residential Design Group