

Architecture
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ROCKY MOUNTAIN GROUP
EMPLOYEE OWNED

Job No. 181817

March 17, 2021

Revised July 30, 2021

Gordon Stegner
Palace Homes
1216 W. Colorado Ave. #110
Colorado Springs, CO 80904

Re: Geologic Hazard Study
5291 Neeper Valley Rd
S-124, Crystal Park
El Paso County, Colorado

Dear Mr. Stegner:

This report presents the findings of an evaluation performed by RMG – Rocky Mountain Group of the above-referenced site in El Paso County, Colorado. The purpose of our report is to evaluate the site conditions and present our opinions of the observed conditions on the proposed development with respect to the intended usage.

Revisions and modifications to the conclusions and recommendations presented in this report may be issued subsequently by RMG based upon additional observations made during grading and construction (which may indicate conditions that require re-evaluation of some of the criteria presented in this report) and/or upon receipt of review comments from El Paso County and/or any third-party reviewing agencies.

Qualifications of Preparers

This Geologic Hazard Study was prepared by a professional geologist as defined by Colorado Revised Statutes section 34-1-201(3) and by a qualified geotechnical engineer as defined by policy statement 15, "Engineering in Designated Natural Hazards Areas" of the Colorado State Board of Registration for Professional Engineers and Professional Land Surveyors. (Ord. 96-74; Ord. 01-42)

The principle investigators for this study are Kelli Zigler, P.G. and Geoff Webster, P.E. Ms. Zigler is a professional Geologist with over 20 years of experience in the geological and geotechnical engineering field. Ms. Zigler holds a Bachelor of Science in Geology from the University of Tulsa. Ms. Zigler has supervised and performed numerous geological and geotechnical field investigations in Colorado. Geoff Webster, P.E. is a licensed Professional Engineer with 35 years

of experience in the civil and geotechnical engineering fields. Mr. Webster holds a Master's degree from the University of Central Florida. Mr. Webster has supervised and performed numerous geological and geotechnical field investigation programs in Colorado and other states.

Existing and Proposed Land Use

The site is to consist of an approximately 30,492 square foot parcel zoned as “PUD” Planned Unit Development per El Paso County zoning. The proposed land use is to create an approximately 0.70 acre single-family parcel known as Site S-124 within the Crystal Park subdivision.

Project Description

The proposed development of this site is to consist of the construction of a single-family dwelling with an onsite wastewater treatment system and well. This geologic hazards study was performed to evaluate geologic conditions that may impact the proposed development and provide recommendations for mitigation and design for residential construction.

Site Evaluation Techniques

The information included in this report has been compiled from

1. Field reconnaissance
2. Geologic and topographic maps
3. Review of previous reports performed by RMG in the same subdivision
4. Available aerial photographs
5. Geologic research and analysis
6. Site development plans prepared by others

Geophysical investigations were not considered necessary for characterization of the site geology.

Previous Studies and Field Investigation

Reports of previous geotechnical engineering/geologic investigations specifically addressed to this site were available for our review and are listed below:

1. *Soils Report, Site #124, Crystal Park, Subdivision, 0 Neeper Valley Road, El Paso County, Colorado*, prepared by Geoquest, Inc., Job #20-1152, dated November 3, 2020.

Site Conditions

We performed a site visit for field reconnaissance on February 12, 2021. At the time of the field reconnaissance, the site consisted of vacant land generally located 0.75 miles from Crystal Park entrance in El Paso County, Colorado. The ground surface within the proposed building area was covered with vegetation consisting of scrub oak, tall grasses, weeds. The driveway area was cleared. The remainder of the site contained a moderate to high growth of coniferous trees, aspens, and boulders scattered throughout the entire property. Topographically, the slopes within and

immediately above and below the footprint of the proposed residence ranged up to approximately 33 percent, but slopes across the remainder of the site ranged up to a 40 percent and up to 60 percent grade in some areas. The site has generally good drainage in the form of surface sheet flow directed to the west. Minor slope creep was not observed on the site. Surficial soil erosion was evidenced east of the proposed residence location along the slope.

General Geology

Based upon mapping presented by the Colorado Geological Survey (CGS) (¹Keller et al, 2003), the bedrock underlying the subject site is comprised The Pikes Peak Granite. Pikes Peak Granite is comprised of light-gray to pink and reddish brown, coarse grained, porphyritic granite. The Pikes Peak Granite often produces grus (disaggregated loose mass of constituent minerals) when weathered. Resistant outcrops typically are round and bouldery. The principal minerals composing the Pikes Peak Granite are perthitic microcline, quartz, biotite and plagioclase (oligoclase).

The surficial deposits observed during our site visit consist of residuum and colluvium generally composed of sands and gravels with varying amounts of silt and clay. Evidence of natural rockfall or debris flow deposits was not observed in the vicinity of the building site.

The site is located in the vicinity of the Ute Pass Fault zone (to the west) and an unnamed fault is mapped approximately 1/2 mile to the east of the site. The Ute Pass Fault is located approximately within 200 to 300 feet to the west of the site. According to information presented by the CGS (²Kirkham et al, 2004-2007), several earthquakes have occurred in the vicinity of the Ute Pass Fault near Colorado Springs and Woodland Park. The earthquakes, with magnitudes in the range of 3.0 to 3.9, occurred approximately from 1962 to 2007.

Subsurface Materials

Based on the review of the Geoquest Soil Report referenced above, one test boring was performed on October 22, 2020. The test boring encountered decomposed granite that extended to the 15-foot termination depth of the test boring. Groundwater was not encountered at the time of drilling.

BEARING OF GEOLOGIC FACTORS UPON PROPOSED DEVELOPMENT

General Geologic Considerations

Based upon our evaluation of the geologic conditions, it is our professional opinion that the proposed residential development is feasible. The geologic hazards identified are not considered unusual for mountainous regions of Colorado. Mitigation of geologic hazards is most effectively

¹ Keller, John W., Siddoway, Christine, Morgan, Matthew L., Route, Erik E., Grizzell, Matthew T., Sacerdoti, Raffaello, and Stevenson, Adair, 2003 *Geologic Map of the Manitou Springs Quadrangle, El Paso and Teller Counties, Colorado*, Colorado Geological Survey, Open File Map 03-19.

² Kirkham, R. M., Rogers, W. P., Powell, L., Morgan, M. L., Matthews, V., and Pattyn, G. R., 2004-2007, *Colorado Earthquake Map Server*. Colorado Geological Survey Bulletin 52b.

<http://geosurvey.state.co.us/Default.aspx?tabid=270>

accomplished by avoidance. However, where avoidance is not a practical or acceptable alternative, geologic hazards should be mitigated by implementing appropriate planning, engineering, and local construction practices.

Potentially Unstable Slopes

Downslope creep, which is the slow downslope movement of superficial soil and rock materials, is common to the area. However, the potential for relatively rapid downslope movement at the site is considered to be low. Nevertheless, the structural design of the residence should consider its placement on the hillside and the additional surcharge pressures that could be generated by downslope creep and by retaining upslope materials. Proper surface grading, and positive drainage away from the structure will reduce, but not eliminate the potential for downslope creep to impact the proposed residence. Any landscaping should utilize xeriscape techniques in order to minimize the amount of irrigation necessary to maintain landscaping. Further, stormwater and snowmelt runoff from parking areas should be directed towards drainage channels and away from foundations and slopes, during construction activities and upon completion of site development.

Rockfall

The subject site does have a steep slope to the west (uphill) of the proposed build area along the roadway cut for Oak Ridge Road. The slope to the east (downhill) of the proposed home is also steep. The slope to the east did not have large boulders at the surface to generate rockfall but did contain a massive granitic outcrop that appeared to be intact. The subject property is not considered to be prone to rockfall.

Debris Flows and Debris Fans

Terrain features consistent in the formation of debris flows and debris fans are not present in the vicinity of the property.

Seismicity

The Pikes Peak Regional Building Code, 2017 Edition, indicates maximum considered earthquake spectral response accelerations of 0.185g for a short period (S_s) and 0.059g for a 1-second period (S_1). Specific recommendations should be provided by the Geotechnical Engineer of Record during the design phase of the project.

Surface Drainage and Erosion

The permeability of the decomposed granite (sands and gravel) at the site is generally considered to be high. Surface runoff could also be rapid and the potential for rapid erosion of unvegetated slopes could be high. Long-term slopes should not be steeper than 3:1 (horizontal:vertical) in both cut and fill areas. Revegetation of any disturbed areas should be performed as soon as possible with revegetation/erosion mats placed as required. Excavation cuts and soil disturbance should be kept to a minimum. Proper surface drainage, as recommended in a geotechnical engineering report, should be provided and maintained by the Homeowner.

Radioactivity/Radon Gas

Based upon a Map of Radon Zones by the Colorado Department of Public Health and Environment (CDPHE) (Ref. 11), two zones of radon potential are indicated in Colorado, Zone 1 - High Radon Potential (probable indoor radon average >4 pCi/L) and Zone 2 -Moderate Radon Potential (probable indoor radon average 2-4 pCi/L). El Paso County is located within Zone 1.

Potential radon hazards are best mitigated at the building design and construction phases. Providing increased ventilation of basements, crawlspaces, creating slightly positive pressures within structures, and sealing of joints and cracks in the foundations and below-grade walls can help mitigate radon hazards.

CLOSING

This report has been prepared for the exclusive purpose of providing geologic hazards information and recommendations for development described in this report. RMG should be retained to review the final construction documents prior to construction to verify our findings, conclusions and recommendations have been appropriately implemented.

This report has been prepared for the exclusive use by the Client for application as an aid in the design and construction of the proposed development in accordance with generally accepted geotechnical and geological engineering practices. The analyses and recommendations in this report are based in part upon data obtained from site observations and the information presented in referenced reports. The nature and extent of variations may not become evident until construction. If variations then become evident, RMG should be retained to review the recommendations presented in this report considering the varied condition, and either verify or modify them in writing.

Our professional services were performed using that degree of care and skill ordinarily exercised, under similar circumstances, by geotechnical engineers practicing in this or similar localities. RMG does not warrant the work of regulatory agencies or other third parties supplying information which may have been used during the preparation of this report. No warranty, express or implied, is made by the preparation of this report. Third parties reviewing this report should draw their own conclusions regarding site conditions and specific construction techniques to be used on this project.

The scope of services for this project does not include, either specifically or by implication, environmental assessment of the site or identification of contaminated or hazardous materials or conditions. Development of recommendations for the mitigation of environmentally related conditions, including but not limited to biological or toxicological issues, are beyond the scope of this report. If the Client desires investigation into the potential for such contamination or conditions, other studies should be undertaken.

If we can be of further assistance in discussing the contents of this report or analysis of the proposed development, from a geotechnical engineering point-of-view, please feel free to contact us.

Cordially,

RMG – Rocky Mountain Group



Kelli Zigler
Project Geologist

Reviewed by,

RMG – Rocky Mountain Group

Geoff Webster, P.E.
Sr. Geotechnical Project Engineer

