

October 14, 2015

Ms. Dana Shuler, P.E.
Weber County Engineering Division
2380 Washington Blvd., Suite 240
Ogden, UT 84401

Subject: Geologic Review
Lot 13, Summit Eden Ridge Nests Subdivision
7914 East Heartwood Drive, Unit 13
Eden, Utah
SA Project No: 15-160

Report: IGES Letter – Response to Review Comments – Geology, Geotechnical Investigation, The Ridge Nests Development, Powder Mountain Resort, Weber and Cache Counties, Utah (IGES Project No. 01628-008), dated September 23, 2014; prepared for Summit, LLC, 3632 North Wolf Creek Drive, Eden, Utah 84310.

Geologic Submittal Status: INCOMPLETE SUBMITTAL

Dear Ms. Shuler,

At your request, Simon Associates (SA) reviewed the above referenced September 23, 2015, IGES letter. The September 23, 2015, IGES letter was submitted in response to the following SA review letter:

Geologic Review, Lot 13, Ridge Crest Subdivision, 7914 East Heartwood Drive, Eden, Utah (SA Project No: 15-160), dated August 18, 2015, prepared for Dana Shuler, P.E., Weber County Engineering Division, 2380 Washington Blvd., Suite 240, Ogden, UT 84401.

The August 18, 2015, SA letter was submitted in response to the following IGES report:

Geotechnical Investigation, The Ridge Nests Development, Powder Mountain Resort, Weber and Cache Counties, Utah (IGES Project No. 01628-008), dated

September 16, 2014: prepared for Summit, LLC, 3632 North Wolf Creek Drive, Eden, Utah 84310.

This letter constitutes the fifth geologic response to IGES documents for the subject project. A chronology of prior SA responses follow:

1. SA Geologic Review, Lot 13, Ridge Crest Subdivision, 7914 East Heartwood Drive, Eden, Utah (SA Project No: 15-160), dated August 28, 2015: prepared for Dana Shuler, P.E., Weber County Engineering Division, 2380 Washington Blvd., Suite 240, Ogden, UT 84401. Submitted in response to:

IGES Letter - Preliminary Response to Geologic Review Comments, The Ridge Nests Development, Powder Mountain Resort, Weber County, Utah (IGES Project No. 01628-005 L11), dated August 19, 2015: prepared for Summit, LLC, 3632 North Wolf Creek Drive, Eden, Utah 84310.

2. SA Letter - Request for Professional Qualifications (SA Project No: 15-160), dated September 3, 2015: prepared for Dana Shuler, P.E., Weber County Engineering Division, 2380 Washington Blvd., Suite 240, Ogden, UT 84401. Submitted in response to:

IGES Letter - Response to Review Comments – Geology, Geotechnical Investigation, The Ridge Nests Development, Powder Mountain Resort, Weber and Cache Counties, Utah (IGES Project No. 01628-008), dated September 1, 2015.

3. SA Letter - Geologic Review Response, Review of Professional Qualifications – Peter Doumit (IGES), Lot 13, Ridge Crest Subdivision, 7914 East Heartwood Drive, Eden, Utah (SA Project No: 15-160), dated September 7, 2015: prepared for Dana Shuler, P.E., Weber County Engineering Division, 2380 Washington Blvd., Suite 240, Ogden, UT 84401. Submitted in response to:

IGES Letter - Response to Review Comments, Geology, Geotechnical Investigation, The Ridge Nests Development, Powder Mountain Resort, Weber and Cache Counties, Utah (IGES Project No. 01628-008), dated September 1, 2015.

The purpose of SA's review is to evaluate whether or not the IGES documents adequately addresses geologic conditions at the site, consistent with concerns for public health,

safety, and welfare; reasonable professional standards-of-care, and; the Weber County Hillside Development Review Procedures and Standards.

SA Comments

August 18, 2015, SA Letter Recommendations to Weber County

The August 18, 2015, SA letter recommended Weber County not consider the September 16, 2014, IGES report complete from a geologic perspective and recommended Weber County request IGES address the following:

1. In accordance with the recommendations provided in the Western Geologic (2012) report, SA recommends Weber County request IGES perform a slope stability analysis as stipulated in the Geologic Hazard Study for the development (Western Geologic, 2012), since the slope at the building envelope is greater than 20%.
2. Figure A-2, Geotechnical Map, of the September 16, 2014 IGES report depicts "... the relative locations of the various geologic units ..." described in the September 16, 2014, IGES report. SA recommends Weber County request IGES:
 - a. Include, for a reasonable distance, geologic units of adjacent properties.
 - b. Evaluate whether any potential off-site geologic hazards may impact the subject property; the evaluation should preferably be completed under the direction of an engineering geologist.
3. An IGES engineering geologist observe all excavations for the proposed structure to substantiate the findings contained in the September 16, 2014, IGES report and August 28, 2012, Western Geologic report.

SA Recommendations

1. *IGES' response to Item 1 of the August 18, 2015, SA letter:* Slope stability analyses were provided in September 23, 2015, IGES response letter. SA will defer to the Weber County Consulting Geotechnical Engineer regarding the adequacy of the IGES slope stability analysis from a geotechnical engineering perspective.

Geologic conditions at the property were adequately provided in "Response to Comment No. 2" of the September 23, 2015, IGES letter. However, IGES noted bedding near the subject site was oriented (strike) about N24°W and dip (inclination from the horizontal) at 25°NE. The bedrock was found to have blocky jointing, with the two major joint sets being orthogonal to one another. One joint set was parallel to the bedding, and the other was perpendicular to the bedding (presumably about N66°E), dipping steeply to the southwest.

The properties of bedding¹, joints², and fractures³ influence the stability of rock slopes. The September 23, 2015, IGES response letter did not describe the properties of the bedding and/or jointing for incorporation into the slope stability analyses, e.g., properties such as, strike and dip, degree of fracturing (generally controlled by the number of joints in a given direction), persistence of jointing, spacing of jointing, roughness of joint surface, open and/or closed joints, joint coatings and infillings, etc.

Should the Weber County Consulting Geotechnical Engineer consider the properties of bedding, joints and/or fractures pertinent in regards to slope stability analyses presented in the September 23, 2015, IGES response letter, SA recommends Weber County request documentation of the bedding, joint, and/or fracture properties, and incorporation of the geologic data in the slope stability analyses.

2. IGES' response to Item 2b of the September 23, 2015, SA letter:

IGES documented two faults in the subdivision and IGES considered the faults inactive due to following:

- a. The fault extends up to, but not through, the overlying soil profile.

¹ Bedding plane: A planar or nearly planar bedding surface that visibly separates each successive layer of stratified rock (of the same or different lithology) from the preceding or following layer; a plane of deposition (AGI Glossary of Geology, 2011).

² Joint: A planar fracture, crack, or parting in a rock, without shear displacement; the surface is usually decorated with a plumose structure (AGI, 2011).

³ Fracture: A general term for any surface within a material across which there is no cohesion, e.g., crack. Fracture include cracks, joints, and faults. (AGI, 2011).

- b. Abundant vegetation is present above the fault trace, and is not offset or disturbed in any way.
- c. The topographic surface has a consistent slope across the fault trace, and there is no evident associated fault scarp.
- d. The bedrock is Cambrian in age, and has likely undergone much deformation since deposition, including faulting. The fact that the footwall block shows such drastic deformation not seen elsewhere on the property suggests that the displacement happened in the ancient geologic past, and subsequent geomorphic processes have returned the bedrock block back to stable topographic conditions across the fault trace.

SA recommends Weber County request IGES provide definitions for "inactive" fault, "drastic deformation," and "ancient geologic past". Without definitions, applicability of the above factors to determine timing of surface-fault-rupture are difficult to evaluate. However, regardless of the definitions, SA considers several of the factors not to be applicable in regards to timing of surface-fault-rupture. For instance:

- a. "The fault extends up to, but not through, the overlying soil profile." Without the age of the overlying soil profile, the statement is unsubstantiated.
- b. "Abundant vegetation is present above the fault trace, and is not offset or disturbed in any way." Without an age of the vegetation, the statement is unsubstantiated.
- c. "The fact that the footwall block shows such drastic deformation not seen elsewhere on the property suggests that the displacement happened in the ancient geologic past, and subsequent geomorphic processes have returned the bedrock block back to stable topographic conditions across the fault trace."

In regards to determining timing of surface-fault-rupture, SA is not aware of any paleoseismic studies correlating:

- i. "...drastic deformation" to displacement occurring in the "ancient geologic past."
- ii. The use of "... subsequent geomorphic processes ... [returning] bedrock blocks back to stable topographic conditions across a fault trace."

Additionally, SA recommends Weber County suggest IGES consider the following, long established standard of practice, methods for evaluating the potential for surface-fault-rupture along the documented faults:

- a. Review of aerial photographs and surface observations to identify any fault-related geomorphic features indicative of past surface faulting at or near the property (e.g., fault scarps, vegetation lineaments, gullies, vegetation/soil contrasts, aligned springs and seeps, sag ponds, aligned or disrupted drainages, faceted spurs, grabens, and/or displaced landforms such as terraces, shorelines, geologic units, etc.).
- b. The USGS Quaternary Fault and Fold Database of the United States. (<http://earthquake.usgs.gov/hazards/qfaults>).

Closure

Comments and recommendations in this review are based on data presented in the referenced Consultant's report. SA accordingly provides no warranty that the data in the Consultant's report or any other referenced reports are correct or accurate. SA has not performed an independent site evaluation. Comments and recommendations presented herein are provided to aid Weber County in reducing risks from geologic hazards and to protect public health, safety, and welfare. There is no other warranty, either express or implied.

All services performed by SA for this review were provided for the exclusive use and benefit of Weber County; no other person or entity may or is entitled to use or rely upon any of the information or reports generated by SA as a result of this review.


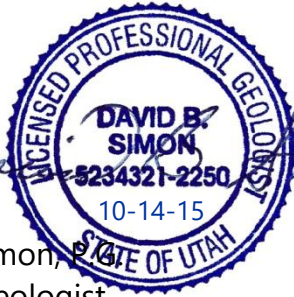
Geologic Review
Lot 13, Ridge Nest Subdivision
7914 East Heartwood Drive, Unit 13, Eden, Utah

SA Project No. 15-160
October 14, 2015
Page 7 of 7

Should you have any questions, please feel free to contact the undersigned. The opportunity to be of service to Weber County is appreciated.

Very truly yours,

SA

David B. Simon,
Principal Geologist

DBS/AOT

Dist.: 1/addressee