



**GEOLOGIC-HAZARD STUDY
PROPOSED HANNOY RESIDENCE
3563 PINEVIEW COURT
EDEN, UTAH**

PREPARED FOR:

**BIG CANYON HOMES, INC.
1925 SW HOYTSTVILLE ROAD
WANSHIP, UTAH 84017**

ATTENTION: PAUL BERMAN

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PURPOSE AND SCOPE OF INVESTIGATION

This report presents the results of a geologic-hazard study for the proposed Hannoy residence to be constructed at 3563 Pineview Court in Eden, Utah. A geotechnical study is being prepared under Project No. 1160176B along with this report to provide geotechnical related recommendations.

This study was conducted to evaluate geologic hazards that may affect the proposed development of the lot. The hazards evaluated are surface fault rupture, landslide, tectonic subsidence, rockfall, debris flow and liquefaction. The study included a review of geologic literature, aerial photographs and Lidar data, site reconnaissance, subsurface exploration and geologic analysis. This report has been prepared to summarize the data obtained during the study and to present our conclusions.

PROPOSED CONSTRUCTION

A single-family residence is planned for the site. The building will be a single-story structure with a basement. Grading for the site will be relatively minor with most rockeries planned to be 5 feet or less in height. The tallest rockery is planned for the northeast corner of the site along the driveway where a two-tier rockery is planned to be up to approximately 10 feet in height.

SITE DESCRIPTION

At the time of our field study, there were no permanent structures or pavement on the site. The site consists of an undeveloped residential lot. It appears that some fill has been placed along the north edge of the site. This fill is approximately 4 feet thick at the boring location.

The ground surface at the site slopes gently down toward the south and southwest with slopes of approximately 6 horizontal to 1 vertical and flatter throughout most of the proposed building area and slopes on the order of 3 horizontal to 1 vertical and flatter south of the proposed building area.

Vegetation at the site consists of grass and brush.

There is a residential house west of the site and Pineveiw Court to the north. There are undeveloped lots to the south and east.

OFFICE METHODS OF INVESTIGATION

Geologic conditions at the site were evaluated by a review of geologic literature, aerial photographs and Lidar data. Aerial photographs used during the investigation were downloaded from the Utah Geological Survey website. They have photograph numbers of ELK-2-205 and 206 and a photograph date of June 25, 1963. The Lidar data has a date of 2011 and was obtained from the Open Topography website.

A. Geologic Literature Review

The site is located in Ogden Valley, which is a northwest trending valley within the Wasatch Mountains of north/central Utah. The valley is filled with an accumulation of lacustrine, alluvial and colluvial sediments from deposition during the past 15 million years (Sorensen and Crittenden, 1979). The surface deposits across the site consist of Quaternary-age colluvium consisting of clayey gravel with cobbles and boulders. These sediments are underlain by bedrock consisting of Tertiary-age pyroclastics of the Norwood Tuff.

Ogden Valley is a down-dropped structure with the Ogden Valley Northeast margin fault along the northeast side of the valley and the Ogden Valley Southwest margin

fault and the Ogden Valley North Fork fault along the southwest side of the valley. These faults are oriented in a general northwest/southeast direction with the two western faults estimated to have moved in the last 750,000 years and the east fault having evidence of movement in the last 2.6 million years. The faults are considered normal faults with dip direction down to the northeast on the two west fault systems and down to the southwest for the Ogden Valley Northeast margin fault. The faults are considered relatively old structures and do not represent a significant surface-fault-rupture hazard for development within the Ogden Valley area. Tectonic subsidence associated with fault movement would similarly not be a significant hazard at this site.

The Utah Fault and Fold database shows the Ogden Valley North Fork fault located along the north fork of the Ogden River approximately 1.9 miles to the southwest and the Ogden Valley Northeast margin fault located on the hillside to the northeast, approximately 1.1 miles from the site. No active faults are mapped through or near the site. The closest active fault to the site based on the Utah Geological Survey database is the Wasatch fault located approximately 6.7 miles to the west.

The geologic map by Sorensen and Crittenden (1979) shows the site to be underlain by colluvium and slope wash of Holocene age.

Mapping by Coogan and King (2001) shows the area underlain by alluvium and colluvium of Quaternary age and states that this unit locally includes mass-movement deposits. The map shows a fault with sense of movement down to the southwest approximately 1,500 feet northeast of the site.

The Elliott and Harty (2010) landslide map shows the site and surrounding area as landslide deposits.

The King and others (2014) geologic map, which is a map in progress and currently has no legend, shows the site mapped as "Qmso? (QTg?)" with a note stating "like Tcg" (see Figure 1). This mapping would suggest that the site is underlain by potential older landslide or gravel deposits. Gravel deposits were encountered in the boring drilled and test pits excavated at the site. The map shows a fault approximately 1,700 feet to the northeast of the site and several lineations in the area with the closest located approximately 700 feet to the west. The map shows a queried back-tilt feature about 800 feet to the southeast. The lineations can be attributed to differential weathering of the underlying bedrock in the area. The back-tilt features are dubious in nature.

B. Aerial Photograph and Lidar Review

The geologic literature indicates that there are landslide deposits in the area of the site. Review of aerial photographs and Lidar data finds evidence of potential geomorphology consistent with landslide deposits in the area but no evidence of landslide geomorphology at the site. Based on the mapped landslide deposits for the site and vicinity, a slope stability evaluation was made for the site. The results of the study are reported in the geotechnical report and find slope stability not to be a significant hazard for the proposed development.

Based on the topography of the site and surrounding area, rockfall and debris flow are not potential geologic hazards at the site. The site is protected from potential debris-flow sources on the steep mountain slopes approximately ½ mile to the northeast by a ridge just to the north of the site, which would effectively divert debris flows away from the site.

C. Seismicity

The property is located in the Intermountain Seismic Zone, which consists of an area of relatively high historical seismic activity. The most intense seismic ground shaking at the site is expected to originate from the Wasatch fault zone. The Wasatch fault

zone is considered capable of producing earthquakes on the order of 7 to 7.5 magnitude and can result in significant seismic ground shaking at the site. The US Geological Survey data indicate that a peak ground acceleration of 0.35g can be expected to have a 2 percent probability of being exceeded in a 50-year time period at this site (IBC, 2012).

FIELD METHODS OF INVESTIGATION

Two test pits and a boring were used to determine subsurface conditions at the site. Test Pits TP-1 and TP-2 were extended to depths of approximately 26 and 21 feet, respectively. Clayey gravel with sand, cobbles and boulders up to approximately 3 feet in size was encountered the full depths of the test pits and the lower 5 feet of the boring, where practical auger refusal was met. The gravel is primarily matrix to clast-supported and represents colluvial deposits. No evidence of faults or landslide slip planes were found in the test pits. Logs for the upper 15 feet of the test pits are presented on Figure 3. Photographs of the upper 15 feet of the test pits are presented in the appendix.

Liquefaction is not a hazard at this site because of the type of sediments encountered and the expected depth to groundwater.

CONCLUSIONS

Seismic ground shaking is considered the only significant geologic hazard at the site. This hazard will be mitigated through structural design. It is our professional opinion that landslide, debris flow, rockfall, surface fault rupture, tectonic subsidence and liquefaction are not significant hazards at the site.

LIMITATIONS

The analysis and report findings are based on published geologic maps and reports, aerial photographs and Lidar data of the site, the test pits excavated and boring drilled at the approximate locations indicated on Figure 2 and our interpretation of geologic conditions at the site. Our conclusions are based on currently accepted geologic interpretation of this information. The geologic logs of the excavations presented in this report depict geologic conditions only along the specific corridors and to the depths excavated. The logs do not necessarily reflect geologic conditions at other locations or at greater depths. No attempt has been made to predict earthquake ground motions or to determine the potential magnitude for earthquakes associated with faults in the area.

The test pits were backfilled without significant compaction. The backfill in the test pits should be removed and properly compacted where it will support settlement-sensitive structures, slabs or pavement.

APPLIED GEOTECHNICAL ENGINEERING CONSULTANTS, INC.


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REFERENCES

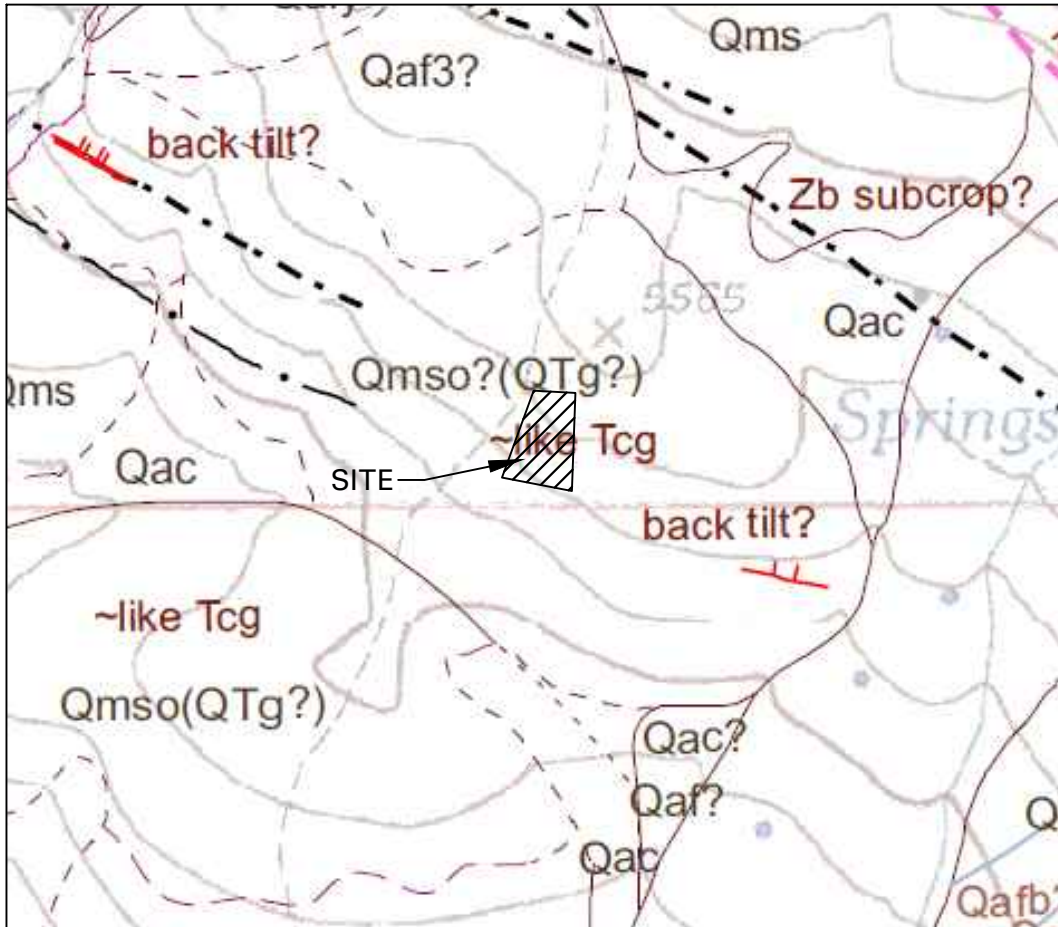
Coogan, J.C. and King, J.K., 2000; Progress report geologic map of the Ogden 30' X 60' quadrangle, Utah and Wyoming, Utah Geological Survey Open-file Map 380.

Elliott, A.H. and Harty, K.M., 2010; Landslide maps of Utah, Ogden 30' X 60' quadrangle, Utah Geological Survey Map 246DM, Plate 6.

King, J.K., McDonald, G.N. and Coogan, J.C., 2014; Progress report geologic map of the Huntsville quadrangle, Weber and Cache Counties, Utah, Utah Geological Survey map in progress.

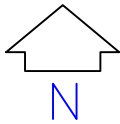
Sorensen, M.L. and Crittenden, M.D., Jr., 1979; Geologic map of the Huntsville quadrangle, Weber and Cache Counties, Utah, US Geological Survey Map GQ-1503.

Utah fault and fold database accessed on March 18, 2016 at geology.utah.gov/resources/data-databases/qfaults/.



Approximate Scale 1" = 600'

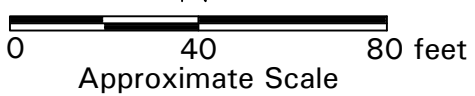
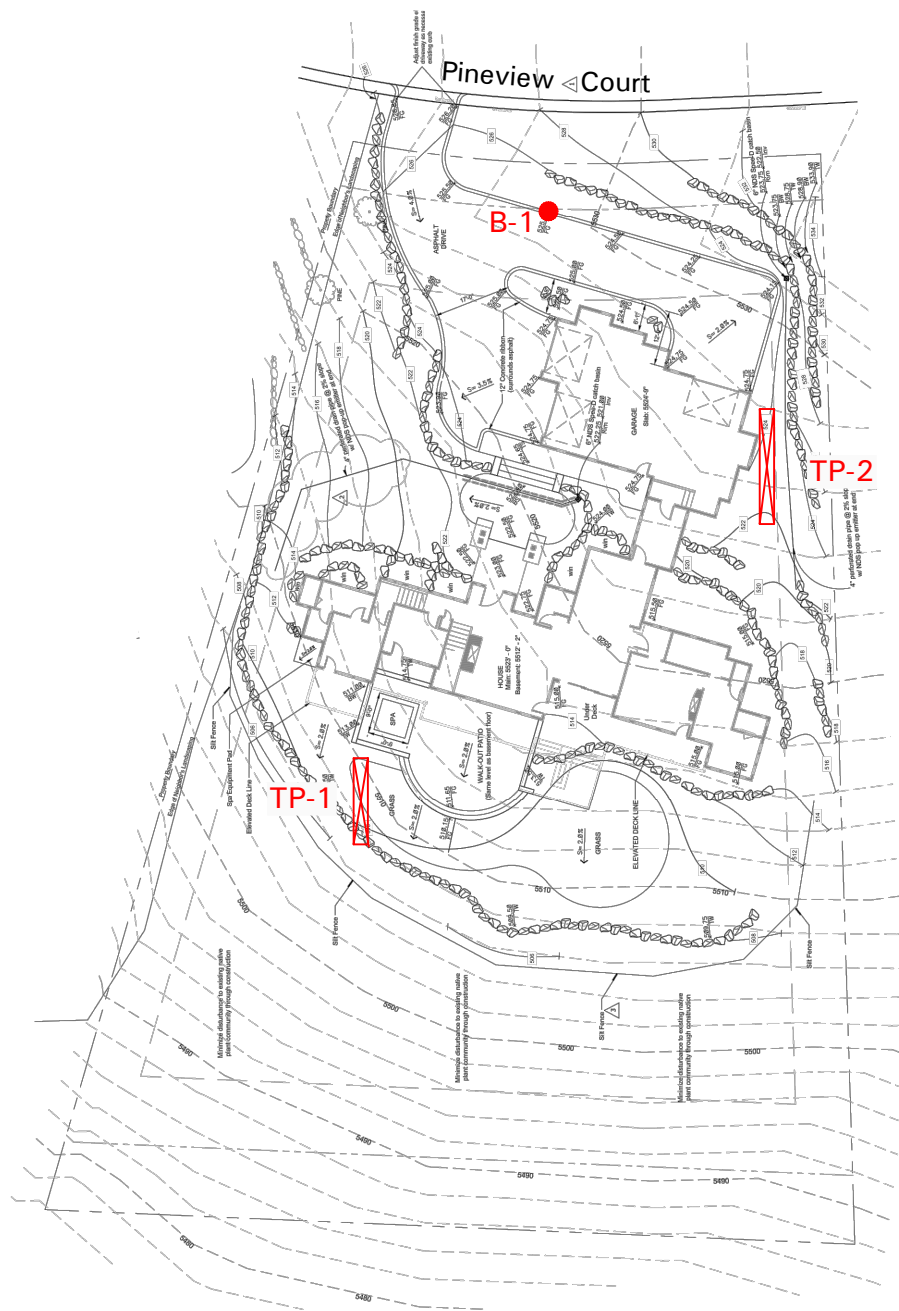
From King and others (2014)



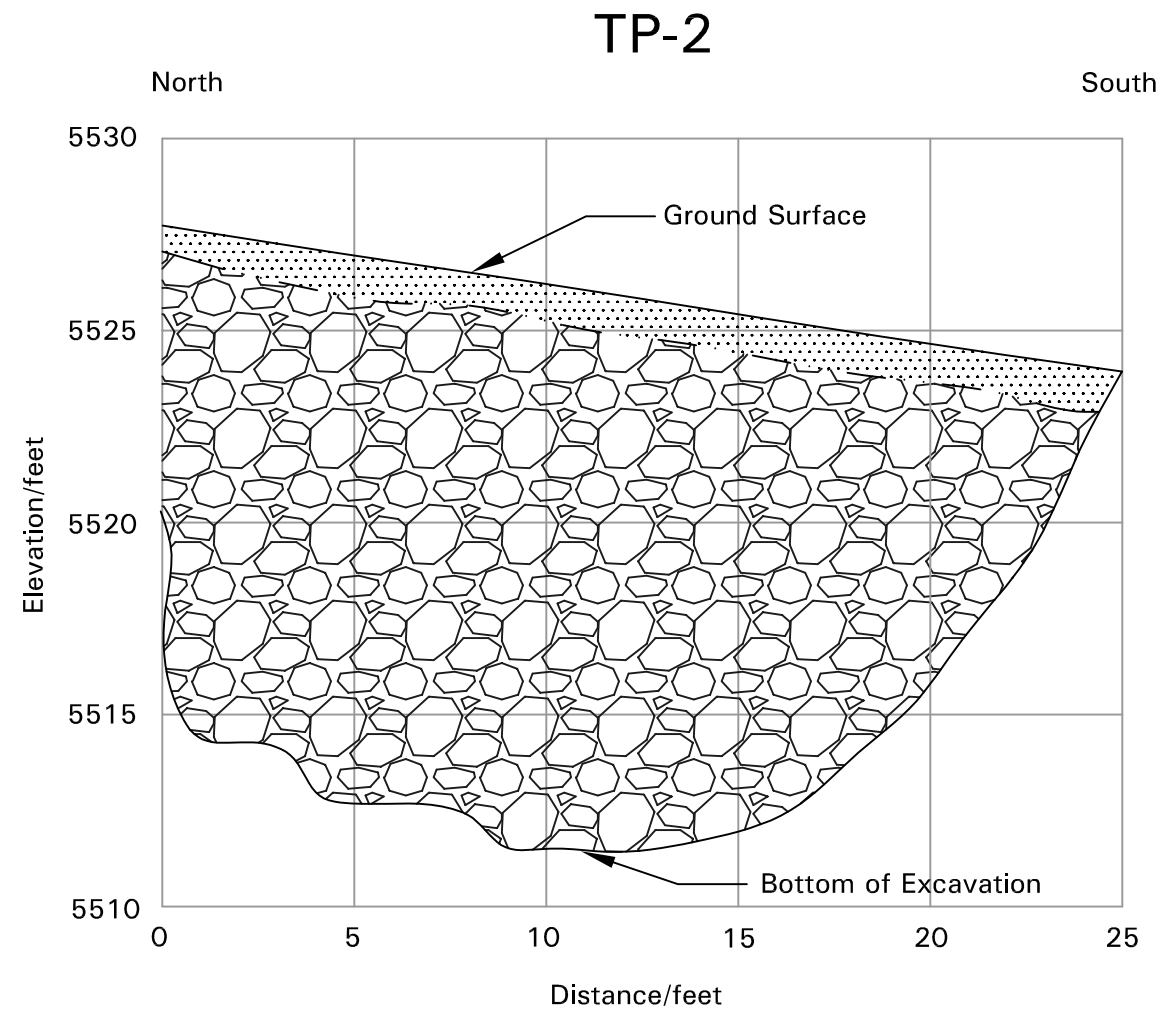
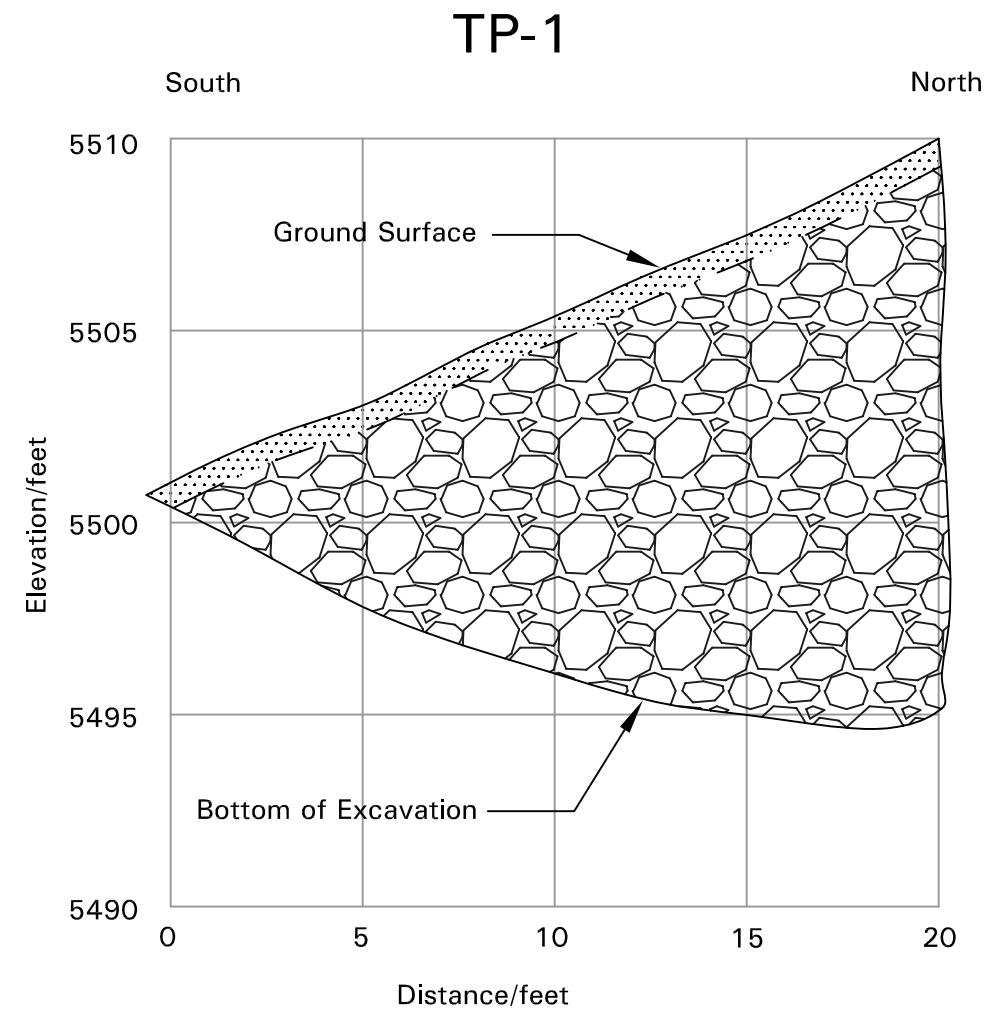
DESCRIPTION OF GEOLOGIC UNITS AND SYMBOLS

- Qac - Quaternary Alluvium and Colluvium
- Qaf - Quaternary Alluvial-fan deposit
- Qms - Quaternary Landslide deposits
- Qmso (QTg) - Quaternary Older Landslide deposits (gravel deposits)
- |---|--- Lineation
- contact between units, dashed where approximate

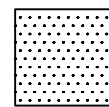
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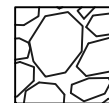
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LEGEND:



Topsoil; clayey gravel with sand, cobbles, occasional boulders up to approximately 3 feet in size, very moist, dark brown, roots, organics.



Clayey Gravel with Sand (GC); cobbles, occasional boulders up to approximately 3 feet in size, dense to very dense, moist to very moist, brown, iron oxide staining. (Colluvium)



Test Pit TP-1



Test Pit TP-1



Test Pit TP-2



Test Pit TP-2