AGEC
Applied GeoTech

May 8, 2019
Revised June 27, 2019

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Subject: Fault Study
Moccasin Flats Subdivision
4300 South 1100 West
Hurricane, Utah
Project No. 2190127

Gentlemen:

Applied Geotechnical Engineering Consultants, Inc. was requested to perform a fault study for the proposed Moccasin Flats Subdivision located at 4300 South 1100 West in Hurricane, Utah (See Figure 1).

PURPOSE AND SCOPE OF INVESTIGATION

The study was conducted to determine if there is evidence of faults extending through the western portion of the proposed subdivision.

The study includes a review of geologic literature, aerial photographs and lidar data covering the site and vicinity. A site reconnaissance was performed and eight trenches logged to obtain information on geologic conditions at the site. The approximate locations of the trenches are shown on Figure 2.

GEOLOGIC SETTING

A. Regional Geology

Hurricane is located in the transition zone between the Colorado Plateau and Basin and Range physiographic provinces. The site is located on alluvial fans formed along the base of the steep slopes of the Hurricane Cliffs.

The site is located in the St. George Basin, situated between the Hurricane Fault and the Gunlock-Grand Wash Fault to the west. The St. George Basin is bounded by the Pine Valley Mountains to the north, the Hurricane Cliffs to the east, the Beaver Dam Mountains to the west and the Mount Tromble area to the south. Within the basin are numerous mesas, buttes and pediment surfaces that formed as fluvial systems incised the strata along the western margin of the Colorado Plateau.

B. Tectonic Setting

The St. George Basin lies at the southern end of the Intermountain Seismic Belt, a zone of pronounced earthquake activity extending from northwestern Montana to northern Arizona. In Utah, the zone of seismicity generally follows the north-south trending Hurricane and Wasatch fault zones. The St. George Basin is a fault block within the fault system that forms the western edge of the Colorado Plateau. It has been downdropped 6,000 to 8,000 feet along the Hurricane Fault on the east (Hamblin, 1970). The Hurricane Fault is made up of six segments of high-angle, west-dipping normal faults extending from south of the Grand Canyon to Cedar City (Utah Geological Survey, 2019). The site is located along the Anderson Junction section of the Hurricane fault zone.

Historical earthquakes have not exceeded magnitude 6.5 in southwest Utah, but geologic studies indicate faults in the region could produce earthquakes of magnitude 7 (Lund and others 2007). The largest magnitude historical earthquake occurred in 1902 with an estimated magnitude 6.3 and an epicenter near the Pine Valley Mountains. The most recent large-magnitude earthquake occurred September 2, 1992 with the epicenter about 6 miles east of St. George. Ground shaking was felt in St. George and caused damage as far as 95 miles from the epicenter (Olig, 1995).

In Utah, three fault activity classes have been adopted to define fault activity:

- **Holocene fault** - a fault with evidence of ground rupture in the past 10,000 years.
- **Late Quaternary fault** - a fault with evidence of ground rupture in the past 130,000 years.
- **Quaternary fault** - a fault with evidence of ground rupture in the past 2.6 million years.

Lund and others (2007) indicate the Anderson Junction segment of the Hurricane Fault is considered a Holocene fault with latest surface rupture occurring in the last 5,000 to 10,000 years.

C. Site Geology

Surface deposits across the site are mapped as consisting of alluvial-fan deposits (Qafy), which are moderately to poorly-sorted, clay- to boulder-sized sediments at the base of the Hurricane Cliffs (Hayden, 2004). The geology of the site and vicinity is shown on Figure 1.

SITE DESCRIPTION AND CONDITIONS

At the time of our field study, the property consisted of a fenced, livestock-grazing area with a shed in the west-central portion of the site.

Vegetation at the site consists of grass and brush.

The ground surface in the western portion of the property slopes gently to moderately down toward the west. The steep Hurricane Cliffs are in the eastern portion of the property.

There are houses to the north and west of the site and undeveloped land to the south and east. The west edge of the property is bordered by 1100 West Street, a two-lane, asphalt-paved road.

OFFICE METHODS OF INVESTIGATION

Geologic conditions at the site were evaluated by a review of the geologic map by Hayden (2004), by review of low-sun-angle aerial photographs (Bowman and others, 2011, Photographs 810941 PM 10-6, 7 and 8 dated October 25, 1981) and review of 2011 lidar data available at the Utah AGRC website.

The general geology of the area and the locations of mapped potentially active faults in the area are presented on Figure 1, which is based on mapping by Hayden (2004). Note that the Hurricane Fault is shown as a dotted line indicating that the fault is concealed. Our review of the aerial photographs and lidar data finds no evidence of a fault extending into the portion of the property trenched.

FIELD METHODS OF INVESTIGATION

A. Surface

Geologic mapping performed by Christenson and Deen (1983) and Hayden (2004) was reviewed and a site reconnaissance was performed to evaluate the surface geology at the site and vicinity. Generally, the site consists of alluvial-fan deposits with no evidence of fault offset in Quaternary sediments. Geologic conditions were found to be generally consistent with mapping presented by Hayden (2004).

B. Subsurface

Subsurface investigation for surface-fault-rupture hazard was performed by logging eight trenches oriented in an approximate perpendicular direction to the mapped fault trend at the approximate locations shown on Figure 2.

The soil encountered in the trenches consists of Quaternary-aged, alluvial-fan deposits with the soil ranging in composition from silty sand with gravel to silty gravel with sand. Layers and lenses of sand and gravel encountered in the trenches dip gently down to the west and roughly parallel the ground surface. These sand and gravel lenses are not continuous across the length of the trenches. There was no evidence that the lenses and layers encountered in the trenches are offset by faulting.

No evidence of active faults was identified within the exploratory trenches.

CONCLUSIONS

Based on a review of geologic literature, aerial photographs and lidar data, and field observations, there is no evidence that active faults extend into the western portion of the property investigated with the trenches. Thus, the area evaluated with trenches as indicated on Figure 2 is considered suitable for residential development from a fault-rupture-hazard standpoint.

LIMITATIONS

The analysis and report findings are based on review of aerial photographs, geologic literature and lidar data, site reconnaissance and investigation of the subsurface conditions at the approximate trench locations shown on Figure 2. Our conclusions are based on currently accepted geologic interpretation of this information.

APPLIED GEOTECHNICAL ENGINEERING CONSULTANTS, INC.

Douglas R. Hawkes, P.E., P.G.

Reviewed by JEN, P.E.

DRH/rs
Enclosures

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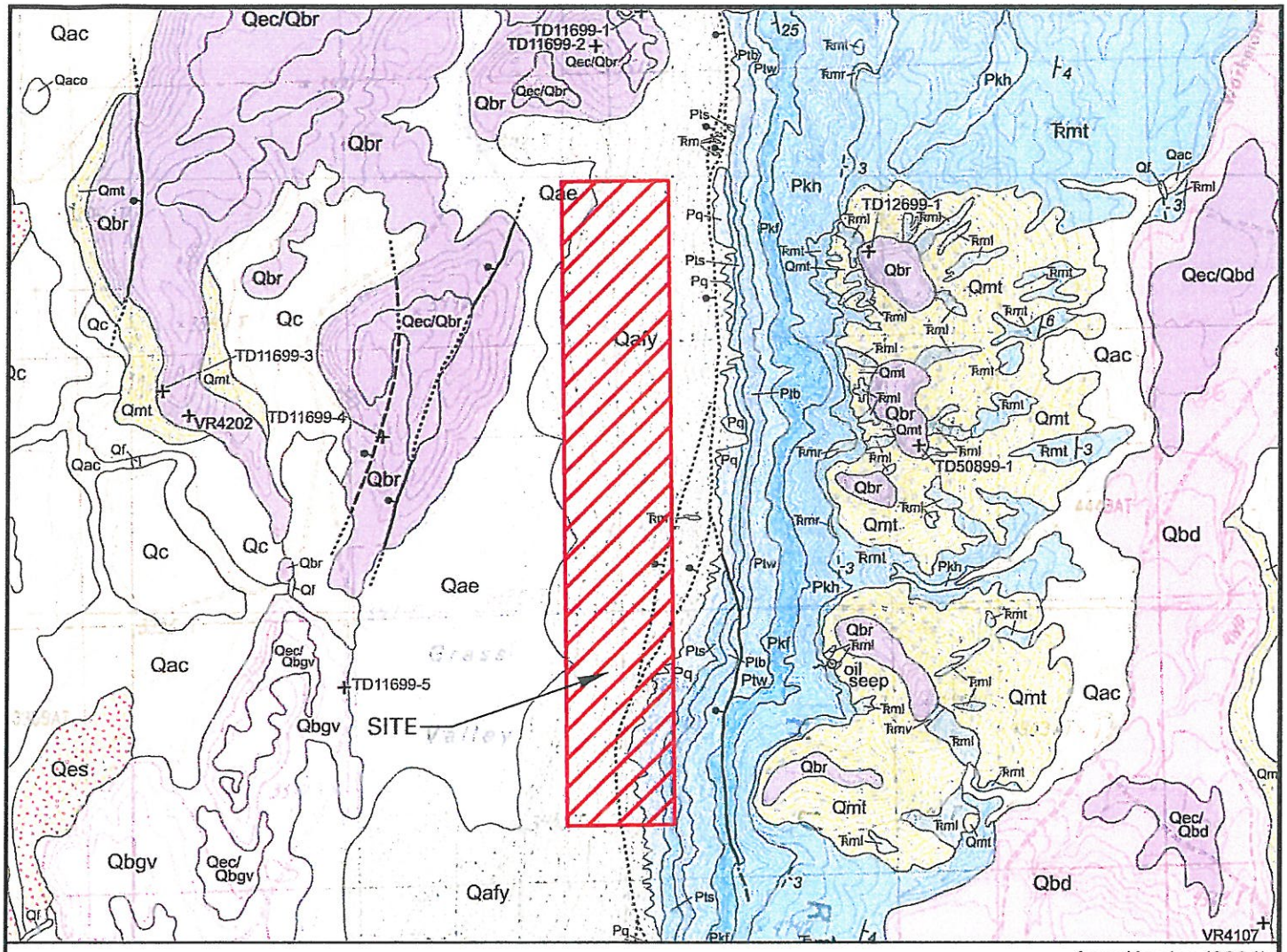
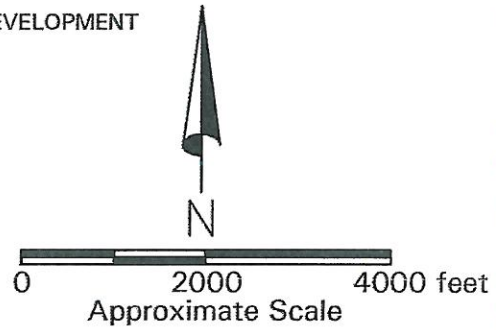


from Hayden (2004)

EXPLANATION OF SYMBOLS AND GEOLOGIC UNITS IN AREA OF PROPOSED DEVELOPMENT

Qae	-	Mix of alluvial-fan and eolian deposits (Holocene to Pleistocene).
Qafy	-	Alluvial-fan deposits (Holocene to Pleistocene).
Trm	-	Moenkopi Formation (Triassic).
Pkh	-	Harrisburg Member of the Kaibab Formation (Permian).
Pkf	-	Fossil Mountain Member of the Kaibab Formation (Permian).
Ptw	-	Woods Ranch Member of the Toroweap Formation (Permian).
Ptb	-	Brady Canyon Member of the Toroweap Formation(Permian).
Pts	-	Seligman Member of the Toroweap Formation (Permian).
Pq	-	Queantoweap Sandstone (Permian).
———		Geologic contact between units.
		Normal fault, bar and ball on down thrown side, dashed where approximate, dotted where concealed.



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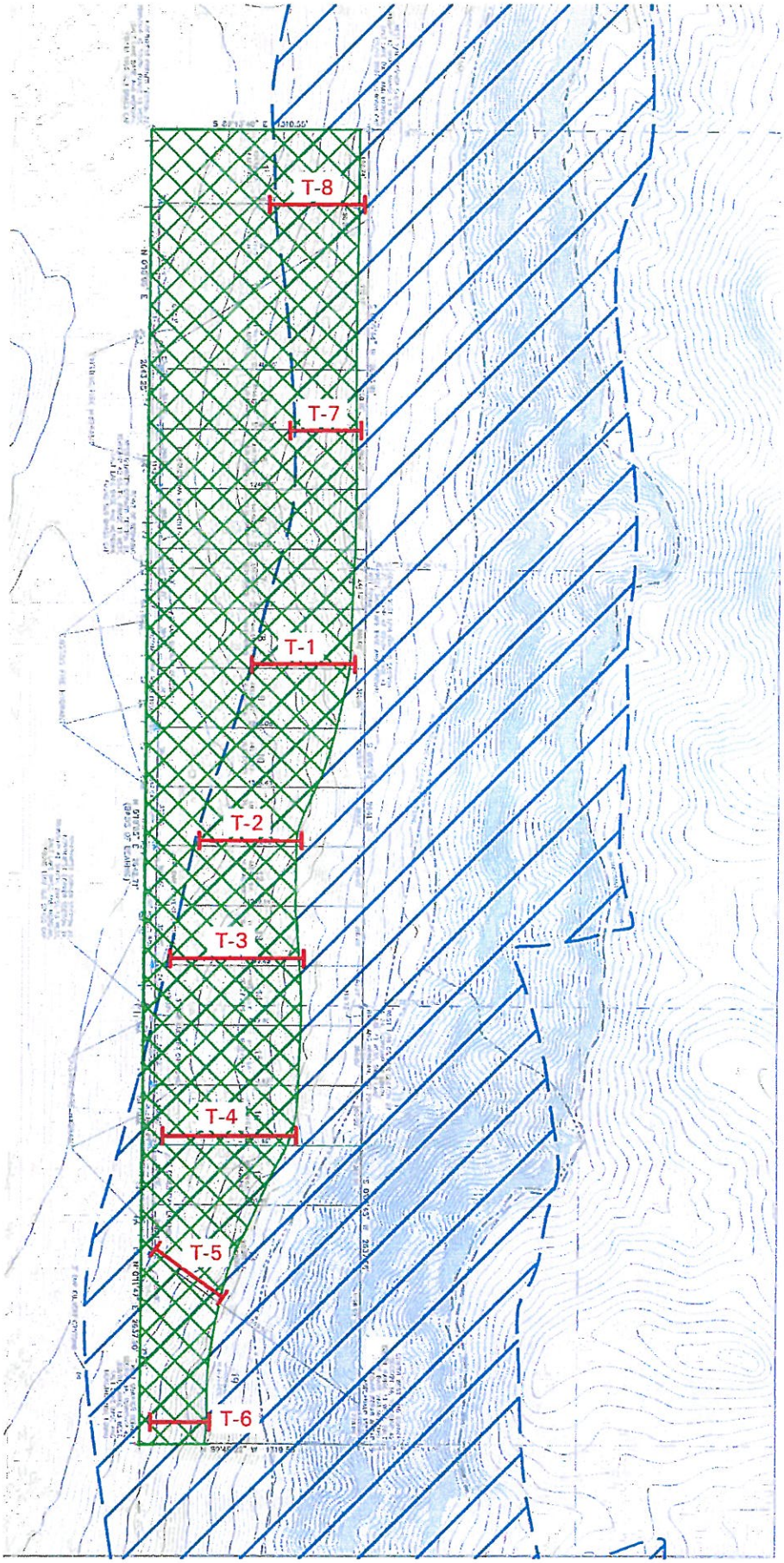
2190127	AGEC	Geologic Map	Figure 1



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2190127	AGEC	Fault Trench Locations	Figure 2