CHANDLER KOEHN CONSULTING

December 5, 2016

Reference No.: 2016042

Guillon Inc.
Development & Construction
Attn.: Steve Honeycutt
2550 Lakewest Drive, Suite 50
Chico CA 95928
Sent via email to: steve@guilloninc.com

Subject: Geotechnical Feasibility Study for the Proposed Development at 165 Lovers Lane, Ukiah, California - AP 170-030-06 and 170-040-05

References: See page 5.

Dear Mr. Honeycutt:

In accordance with your request, I have prepared a Geotechnical feasibility study for the subject site. The purpose of my investigation was to determine if the proposed project is feasible from a Geotechnical standpoint. My scope of work consisted of the following tasks:

- Review and research of available geotechnical reports and geologic maps for the subject site.
- Visual site review.
- Engineering analysis.
- Preparation of this report describing anticipated site soil conditions and preliminary Geotechnical/Geologic hazards.

Please note this report is limited to my opinions and recommendations regarding the geotechnical engineering aspects of your proposed project.

Project Description

It is my understanding that the proposed project includes an approximately 23 acre residential subdivision. Proposed subdivision includes 121 lots for single family residences. Proposed lot layout and streets are shown on the attached Tentative Subdivision Map, Figure 1 which was provided by you.

Site Conditions

Subject site is located at 165 Lovers Lane approximately 2 miles north of downtown Ukiah, California as shown on the attached Site Location Map, Figure 2. Site is further located within the upper western margin of Ukiah Valley approximately 1 mile west of the Russian River. Closest river coarse is Ackerman Creek located approximately 2,000 feet north of the project site. Site slopes gently to the southeast at 2 to 5%.

Site is surrounded by vineyard to the west, a private road and Orr Springs Road to the north, State Highway 101 to the east, and a residential subdivision to the south. The site is currently planted with vineyards and is zoned for agriculture use.

The project area occupies a surface underlain by stream terrace deposits referred to as valley fill. Valley fill is divided into three units in the Ukiah Valley. Valley fill units include recent alluvium, terrace deposits (younger and older based on elevation), and basin deposits. Terrace deposits are commonly described as partially to loosely cemented layers of gravel, sand, silt, and clay. The thickness of the terrace deposits underlying the project

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area are probably 10 to 20 feet thick. Published literature and geologic maps of the region indicate native site soils are Pleistocene aged younger continental terrace deposits underlain by Paleocene aged Continental basin deposits (USGS, 1986). Stream terrace and basin deposits are derived from weathered Franciscan Complex bedrock sources (DMG, 1960). Valley infill sediments at the site overlie bedrock associated with the Cretaceous to Tertiary age Coastal belt of the Franciscan Complex, specifically the Coastal terrane (USGS, 1986).

The USDA soil websurvey identifies the soils in the northern and eastern project vicinity as Pinole loam (2 to 8% slopes), Yokayo sandy loam in the center portion, and Russian loam in the southern portion (USDA, 2013). Risk of corrosion for concrete is identified as low and risk of uncoated steel corrosion as moderate to high (USDA, 2013).

Seismic Hazards and Parameters

The site is located 1.1 miles west of the Maacama Fault AP zone and there are no known active faults that cross the site based on official fault maps (State of California Special Studies Zones, Ukiah, 1982). The Maacama fault zone is a roughly N30W trending, right lateral strike-slip fault within the San Andreas fault system. Fault rupture hazard is considered low since research has shown that the Maacama Fault is confined to a limited zone with little or no splaying.

In northern California, transform plate motion at the western edge of the North American continental plate is distributed across a broad zone that includes the main San Andreas fault as well as a series of inboard strike-slip faults. The most significant of these inboard plate boundary fault systems includes the Hayward fault through the eastern San Francisco Bay area; the Rodgers Creek fault through Sonoma County; and the Maacama fault, the northern continuation of the system, through Mendocino County. As such, Hayward fault slip is transferred to the Rodgers Creek fault (across a right fault step beneath San Pablo Bay), which is subsequently transferred to the Maacama fault (across another right fault step).

A Seismic Site Class of D has been selected for the subject site based on nearby site studies and geologic maps. Based on the site class and the latitude/longitude, design spectral response acceleration parameters were determined with the aide of the United States Geological Survey (USGS) seismic design software version 3.1.0 last updated on July 11, 2013. Preliminary spectral response acceleration parameters are presented below in Table I for planning purposes.

TABLE I

*SEISMIC DESIGN CRITERIA **

Design Spectral Response Acceleration Parameters	156 Lovers Lane
Latitude	39.1747° N
Longitude	123.2134° W
Building Code Reference	2010 ASCE 7 with March 2013 errata
Occupancy Category	II

Site Class	D
S_S	2.32 g
S_1	0.95 g
F_a	1.0
F_v	1.5
S_{MS}	2.32 g
S_{M1}	1.43 g
S_{DS}	1.54 g
S_{D1}	0.95 g
PGA_M	0.89
Seismic Design Category	E

Tsunami waves are not considered a hazard at the site due its location from the coast. Lake Mendocino is the only large body of water near the subject site. Mendocino County General Plan Seismic Safety Element (MCGP, 1991) states there is a reasonable margin of safety in terms of potential seiche damage for Ukiah Valley.

The location of the proposed subdivision is on relatively flat ground and therefore site slope instability is not a concern.

A preliminary screening for liquefaction was performed for the site based on available geologic maps and Special Publication 117A. Liquefaction is described as the sudden loss of soil shear strength due to a rapid increase of soil pore water pressures caused by cyclic loading from a seismic event. In simple terms, a liquefied soil behaves similarly to a viscous fluid during, and in the immediate aftermath, of a seismic event. Note not all seismic events will trigger liquefaction. In order for liquefaction to occur, the following are needed:

- granular soils (sand, silty sand, sandy silt, and some gravels); and
- a high groundwater table; and
- a low density of the granular soils usually associated with young geologic age (recent deposits).

Qualitatively, all three of these requirements were not identified for the site. Geologic materials most susceptible to liquefaction are geologically recent (or late Holocene age) sand- and silt-rich deposits, located adjacent to rivers, bays, or ocean shorelines. Native site soils are identified as Pleistocene age Terrace Deposits. Liquefaction potential for site soils during rare very strong earthquake events is considered low.

Lateral spreading and lurching are considered low risks due to the relatively flat nature of the site and due to the discontinuous nature of the valley deposits. Also published accounts of earth movement during the 1906 San Francisco great earthquake in Ukiah did not

indicate liquefaction movements (Reference 3); note however, reports of liquefaction movement were reported in Healdsburg and near Fort Bragg.

Conclusions & Discussion
Based on the results of my investigation, it is my opinion that the proposed project is feasible from a Geotechnical standpoint; provided my recommendations are followed and that noted conditions and risks are acknowledged.

Additional geotechnical investigative work with subsurface exploration would be necessary to provide grading recommendations and foundation design criteria.

Limitations:
The findings, discussions, and opinions contained in this report are based on site conditions that we observed at the time of our reconnaissance visit, and on our experience with similar projects in similar geotechnical environments. Our services were performed using the degree of care and skill ordinarily exercised, under similar circumstances, by reputable Soils Engineers and Geologists practicing in this or similar localities. No other warranty, express or implied, is made as to the conclusions and professional advice included in this report.

I hope this report presents the information that is needed at this time. If you have any questions, please feel free to contact me at (707) 972-2897.

Sincerely,

Chandler H. Koehn

REGISTERED PROFESSIONAL ENGINEER
CHANDLER H. KOEHN
GE 2895
Expires 6/30/17
GEOTECHNICAL
STATE OF CALIFORNIA

Chandler H. Koehn, P.E., G.E.
Geotechnical Engineer

Attachments: Tentative Subdivision Map, Figure 1
Site Location Map, Figure 2

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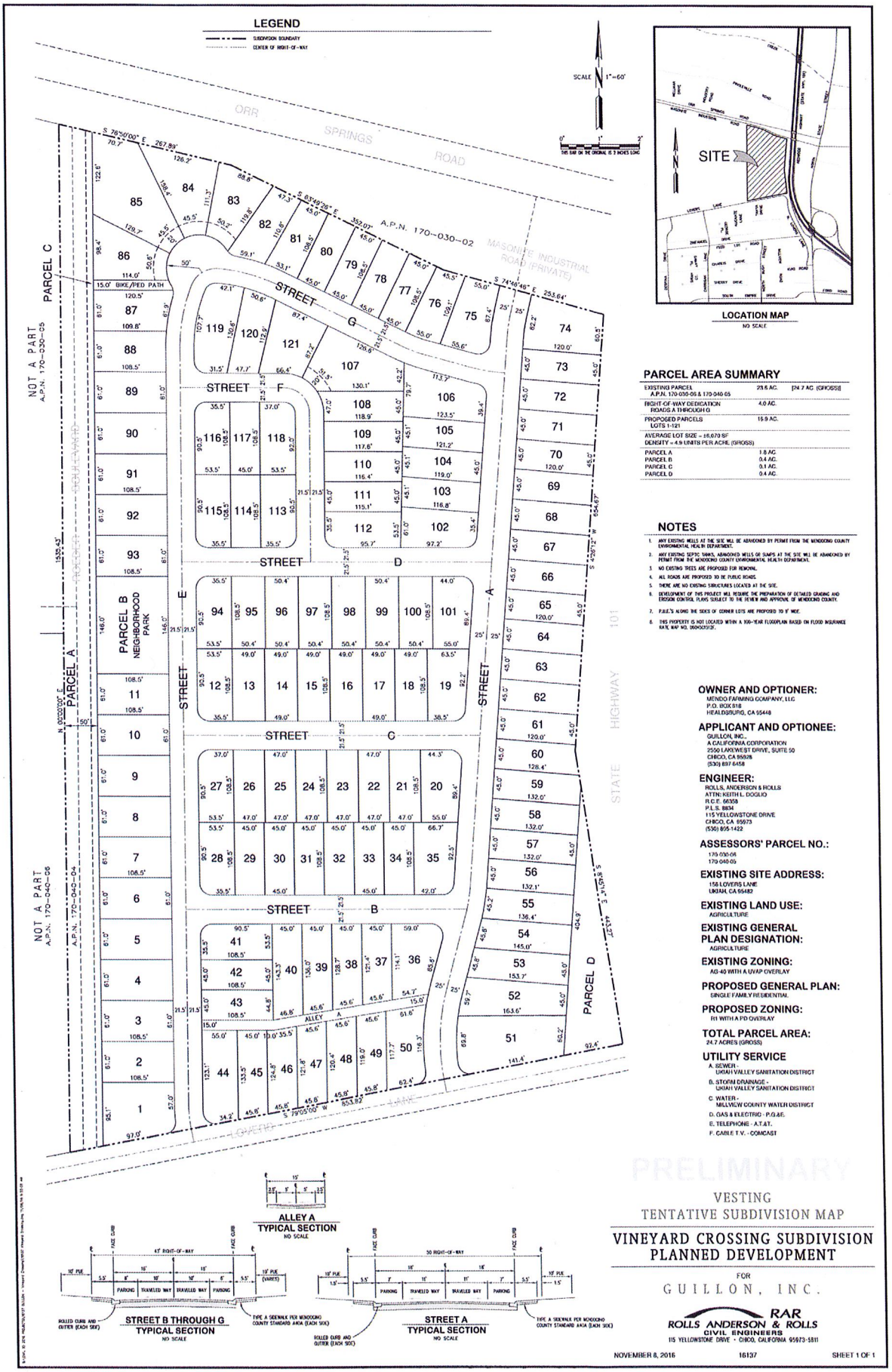
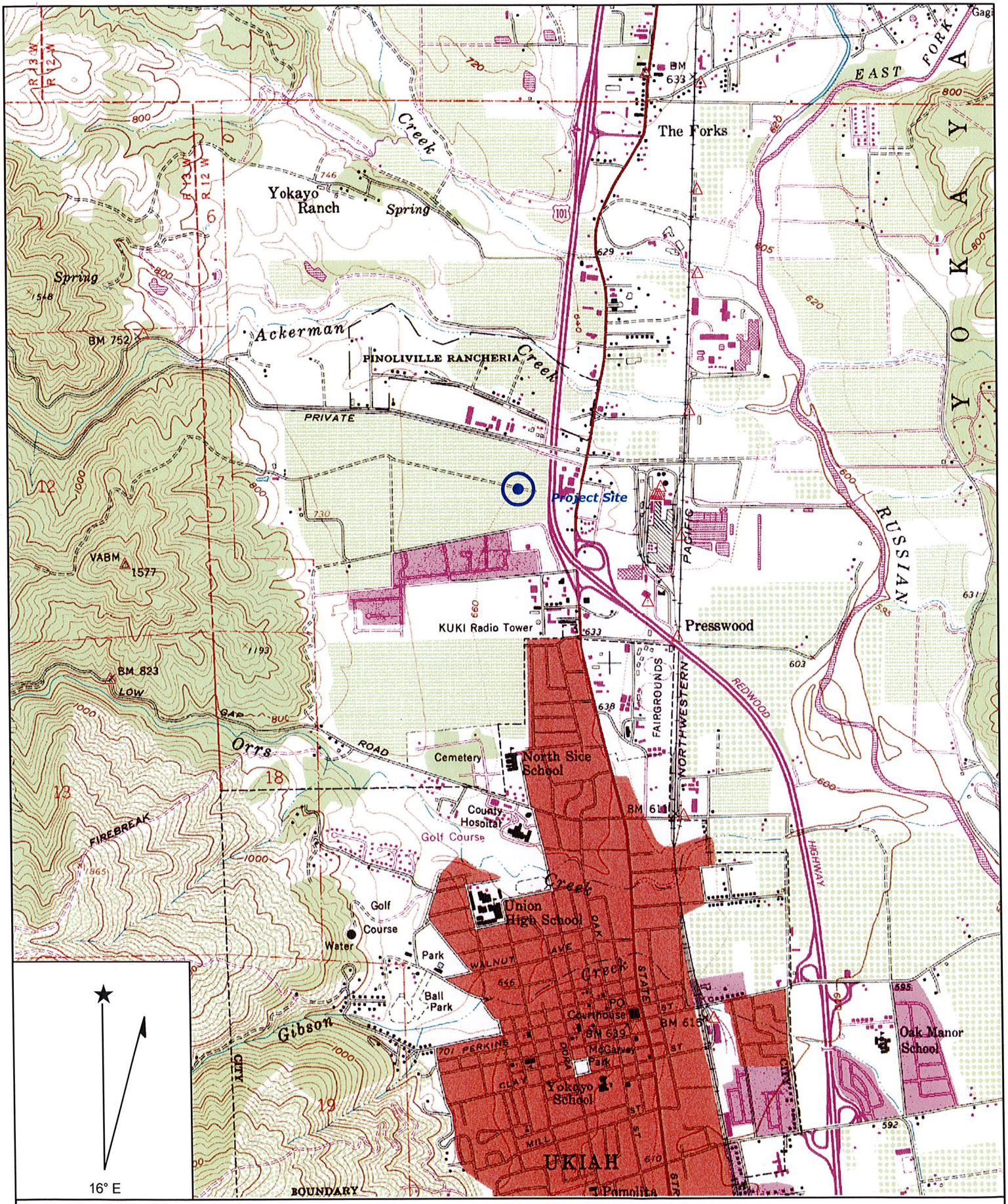
References

1. 2013 California Building Code, California Code of Regulations Title 24, Part 2, Volume 2 of 2, based on 2012 International Building Code, by California Building Standards Commission.
2. USGS National Earthquake Information center Website (2016).
3. Lawson, Andrew C. and others. (1908). *Report of the State Earthquake Investigation Commission*. Washington, DC: Carnegie Institute of Washington, (Reprinted 1969).
4. Digital Images of Official Maps of Alquist-Priolo Earthquake Fault Zones of California, northern and Eastern, by Division of Mines and Geology (DMG) staff, DMG CD 2000-005.
5. Mendocino County Generally Plan, (1991), Seismic Safety Element of the Mendocino County General Plan. Website http://www.co.mendocino.ca.us/planning/GenPlan/Siesmic/Contents.htm. MCGP.
6. Geologic Map of California, Ukiah Sheet, CDNR, State of California Department of Natural Resources, Division of Mines, 1992.
7. U.S. Department of Agriculture, January 1991, Soil Survey of Mendocino County, Eastern Part, and Trinity County, Southwestern Part, NR:USDA.
8. U.S. Navy (1986). Design Manuals 7.01 and 7.02, Soil Mechanics, Alexandria: Naval Facilities Engineering Command (NAVFAC).
9. 2010 California Geologic Map, California Geological Survey (CGS), 2010.
10. Natural Resources Conservation Service, USDA, (2013). Web Soil Survey at http//: websoilsurvey.nrcs.usda.gov/app/homepage.htm.
11. Special Publication 117A Guidelines for Evaluating and Mitigation Seismic Hazards in California, CGS, 2008.
12. Department of the Interior United States Geological Survey. Miscellaneous Field Studies Map MF-1217, Recent breaks along Maacama Fault Zone, Laytonville to Hopland, Calif., by Pampeyan and Others, dated 1981.
13. Holocene Activity of the Maacama Fault, Mendocino County, California. PhD. Dissertation at Stanford University by Upp, dated June 1982.
14. Ground-Water Resources in Mendocino County, CA, US Geological Survey – Report 85-4258, by C.D. Farrar, dated July 1986.
15. My, "Geotechnical Investigation, Proposed Industrial Building, Ford Road, Ukiah, California – AP 170-200-14," dated May 29, 2012.
16. My, "Geotechnical Investigation, Hospital Building Addition, Ukiah Valley Medical Center, 275 Hospital Drive, Ukiah, California," dated December 2, 2013.
17. My, "Geotechnical Investigation for a Proposed Commercial Building at 2700 North State Street, Ukiah, California," dated April 7, 2014.



Reference No. 2016042

Figure 1



Name: UKIAH
Date: 12/5/2016
Scale: 1 inch equals 2000 feet

Location: 039° 10' 10.24" N 123° 12' 52.46" W
Caption: Site Location Map
Reference No. 2016042
Figure 1

Markers

Name: Project Site

Short Name: PrjctS

Coordinates: 039° 10' 28.88" N, 123° 12' 48.15" W