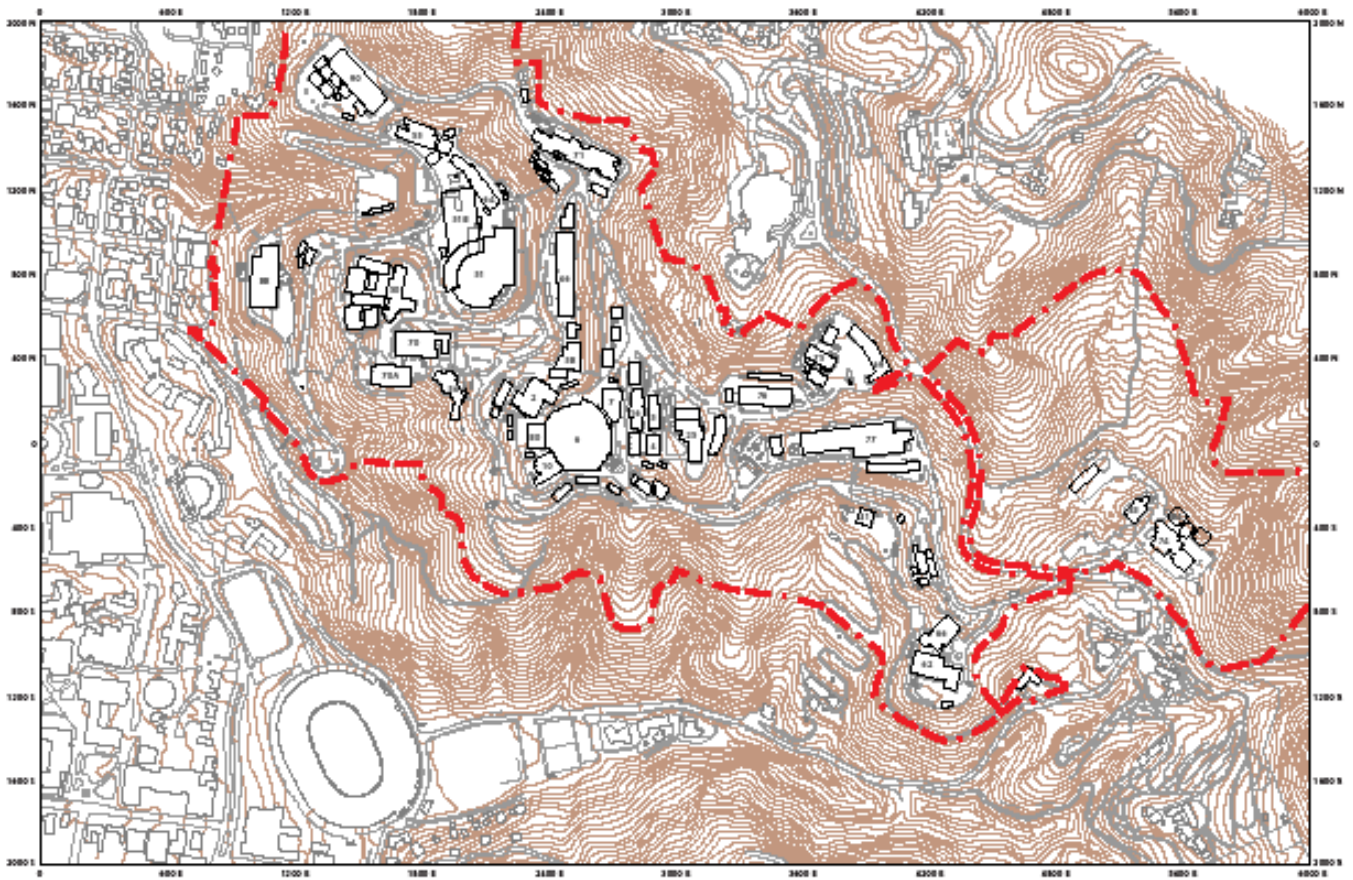
An Introduction to the Geology and Engineering Geology of Lawrence Berkeley National Laboratory

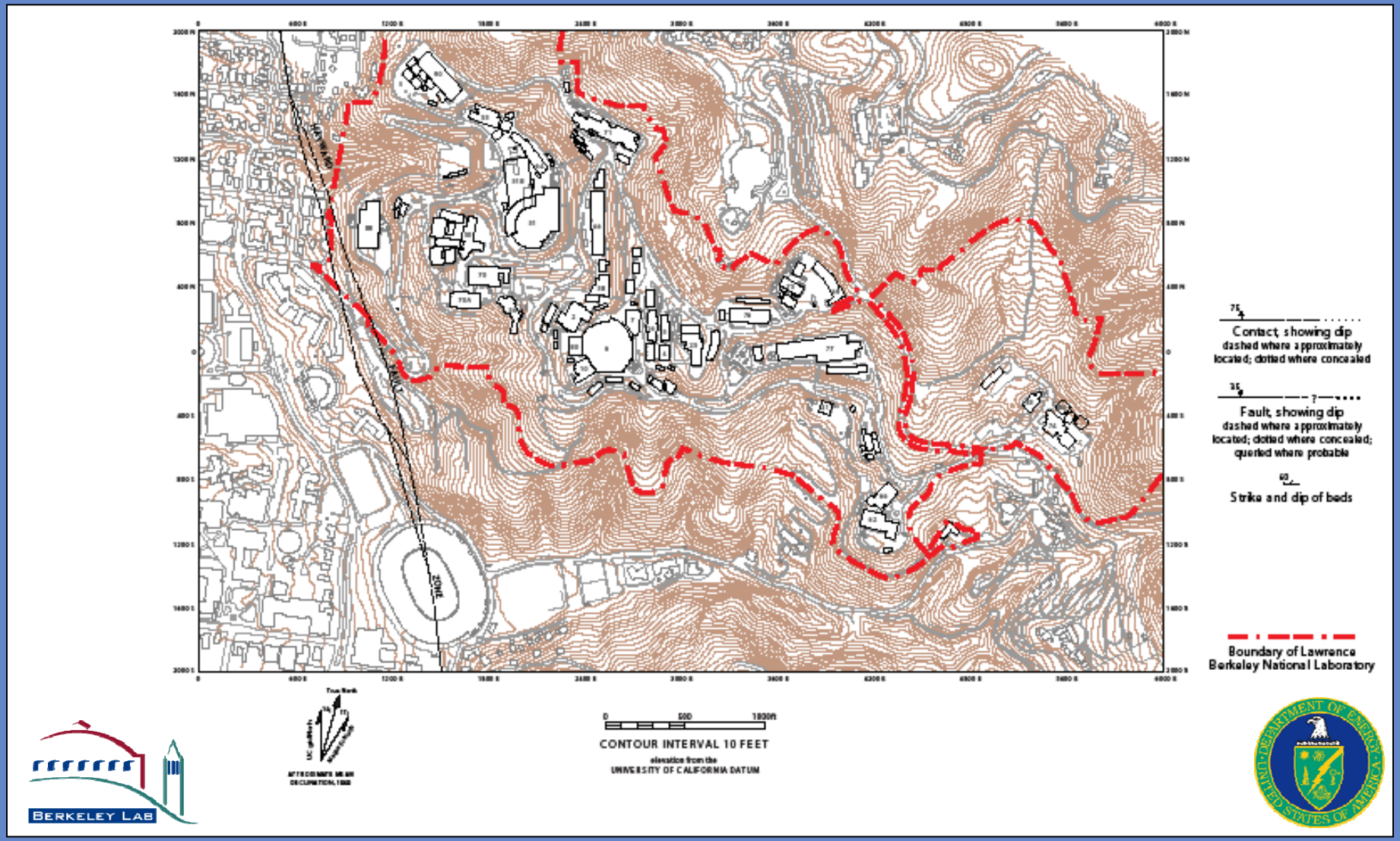
Preston Jordan

Earth Sciences Division
Lawrence Berkeley National Laboratory

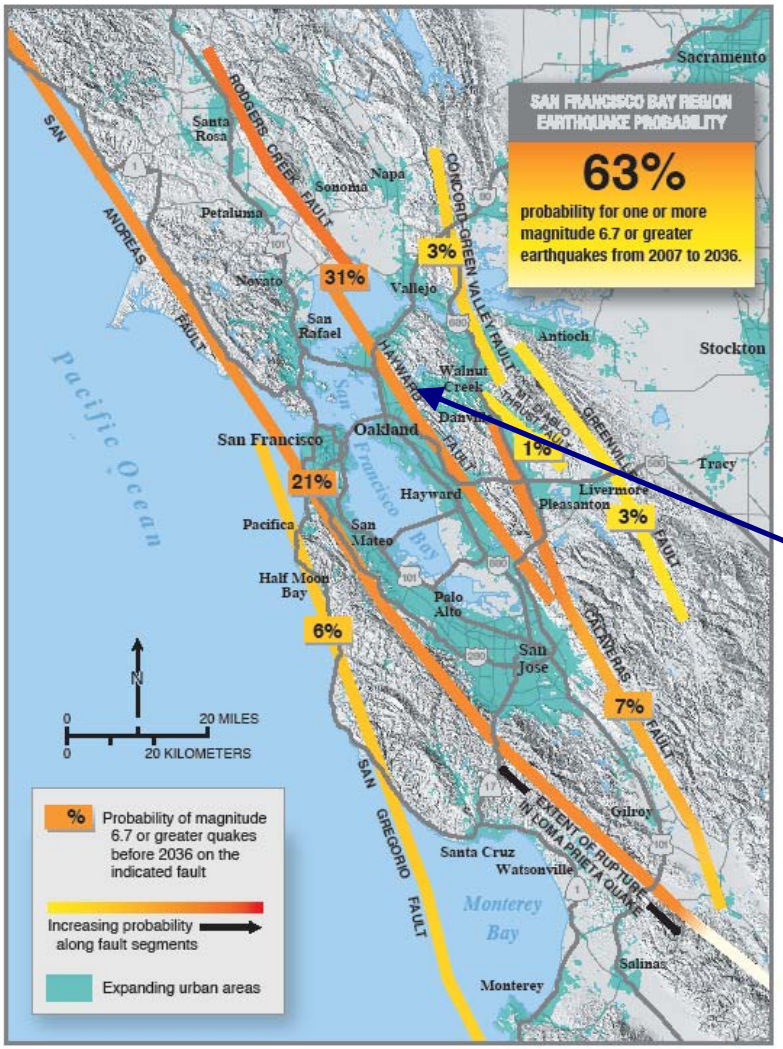
LBNL


Contact, showing dip
dashed where approximately
located; dotted where concealed
Fault, showing dip
dashed where approximately
located; dotted where concealed;
queried where probable
Strike and dip of beds
Boundary of Lawrence
Berkeley National Laboratory
CONTOUR INTERVAL 10 FEET
elevation from the
UNIVERSITY OF CALIFORNIA DATUM
BERKELEY LAB

Hayward Fault (Active)



Hayward Fault Earthquake Probability



≥M6.7 probability estimate for 2007-2036

63% for the Bay Area
31% for the Hayward/Rodgers Creek Faults

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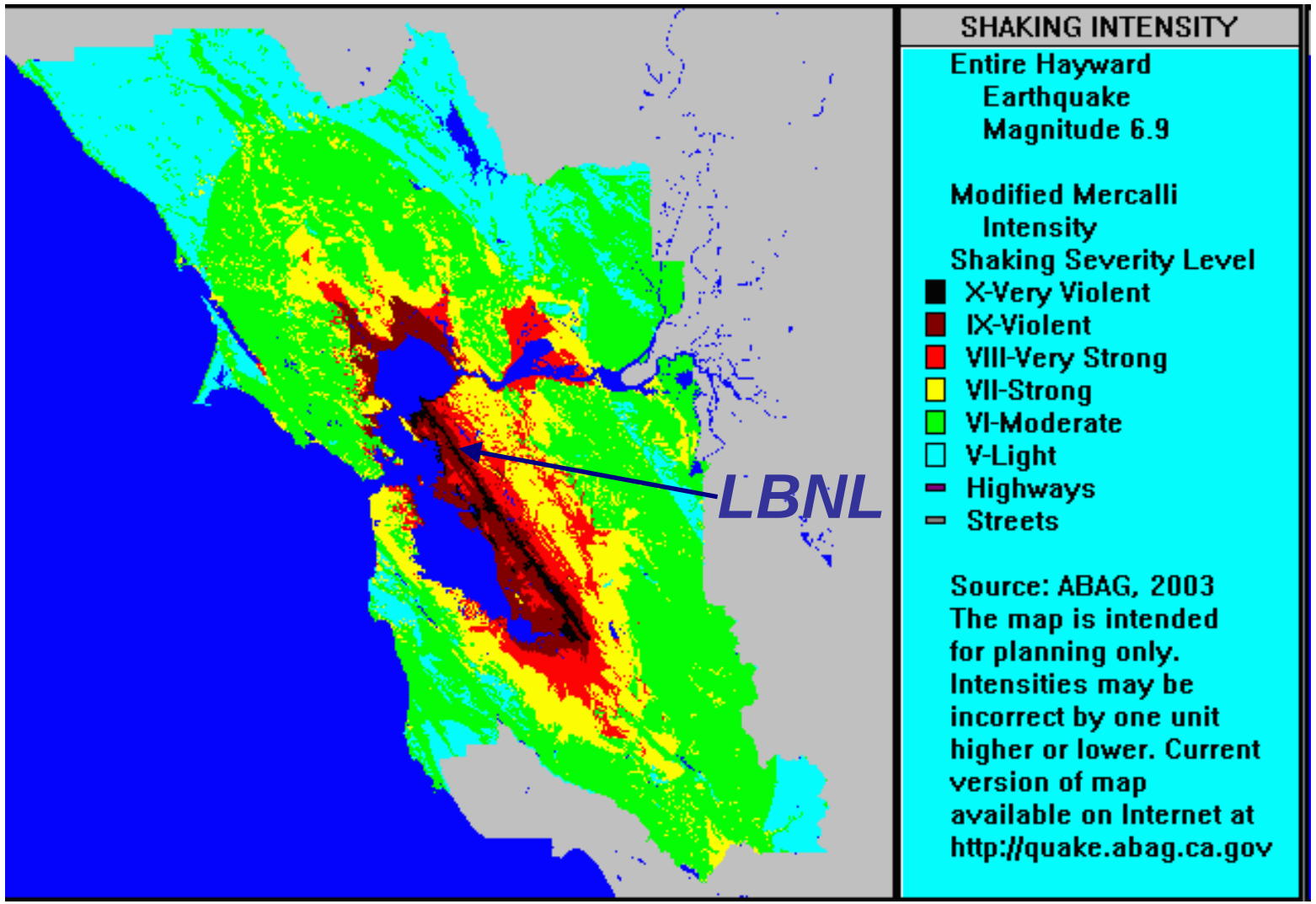
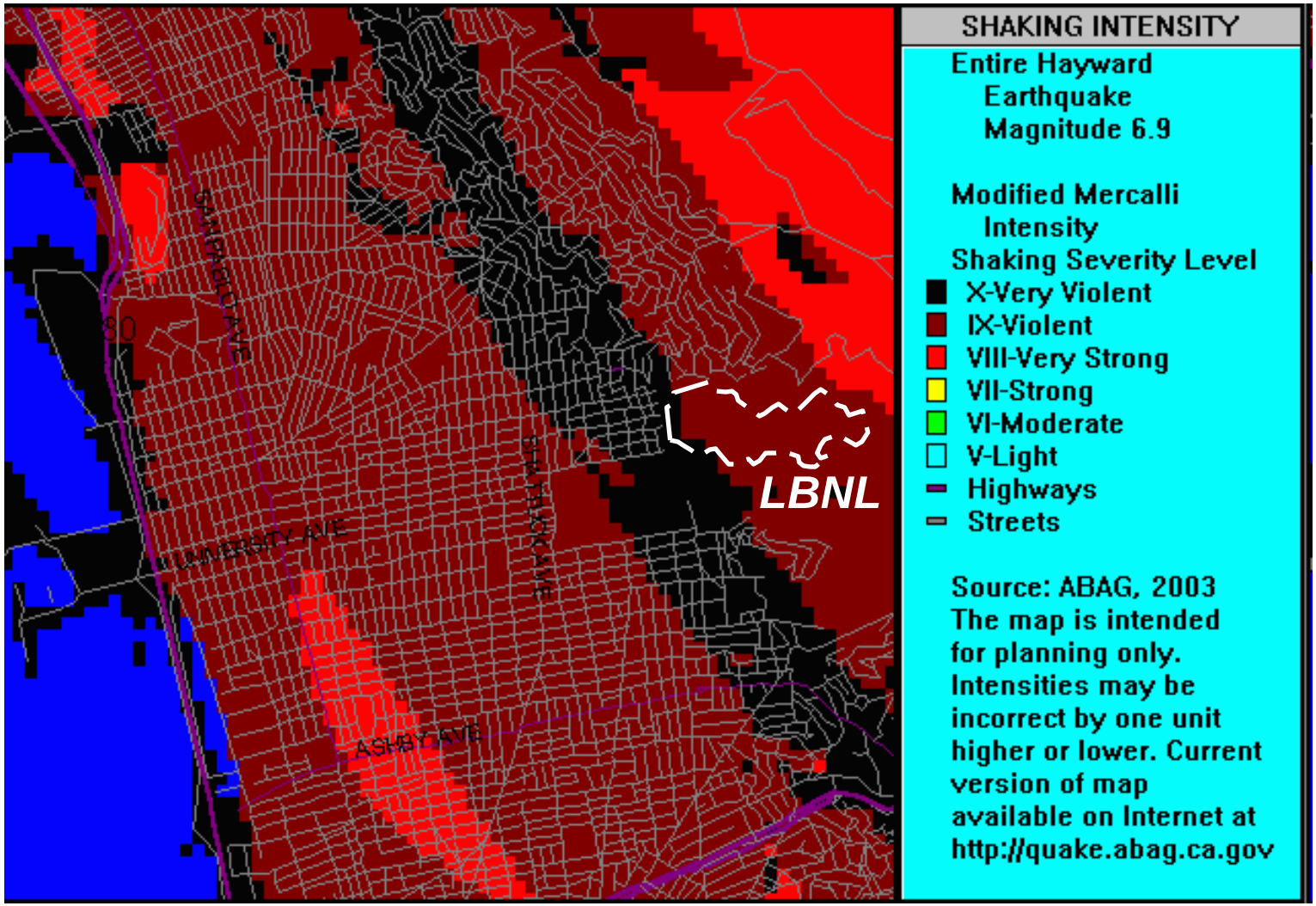
Working Group on California Earthquake Probabilities, 2008. The uniform California earthquake forecast, version 2 (UCERF 2). USGS OFR 2007-1437.

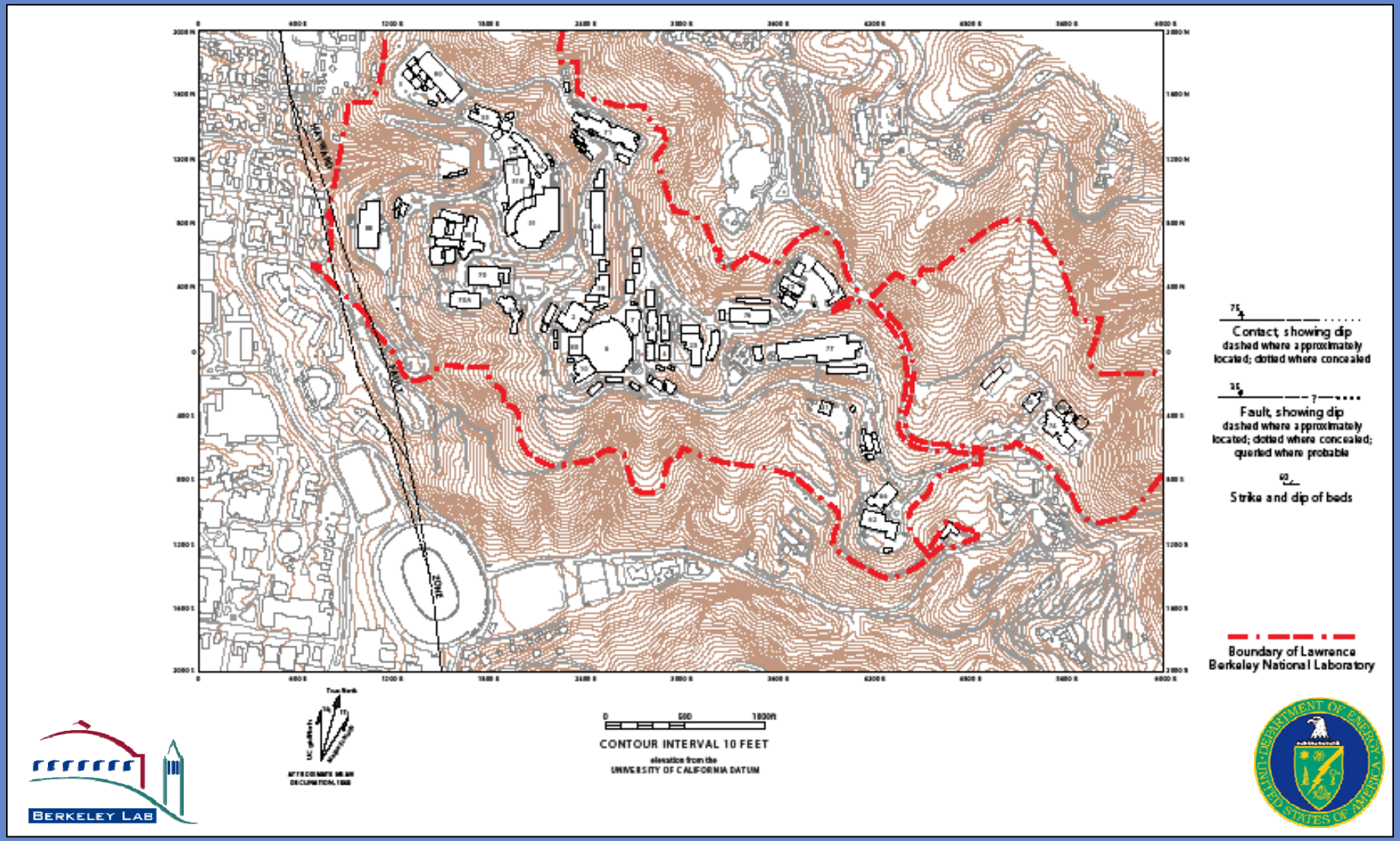
Hayward Fault Earthquake Shaking



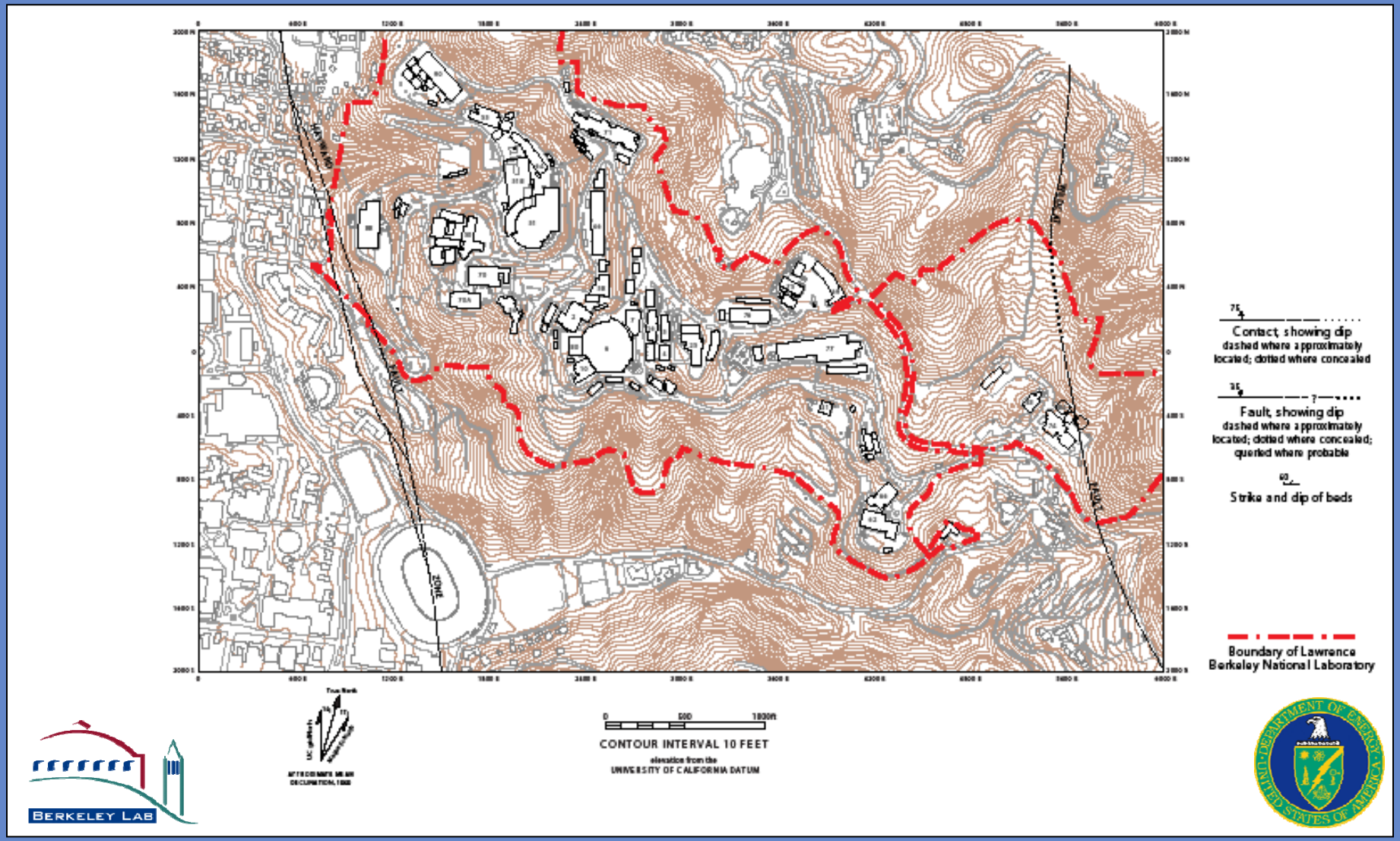
Hayward Fault Earthquake Shaking



Hayward Fault (Active)



Wildcat Fault



Wildcat Fault (Inactive)

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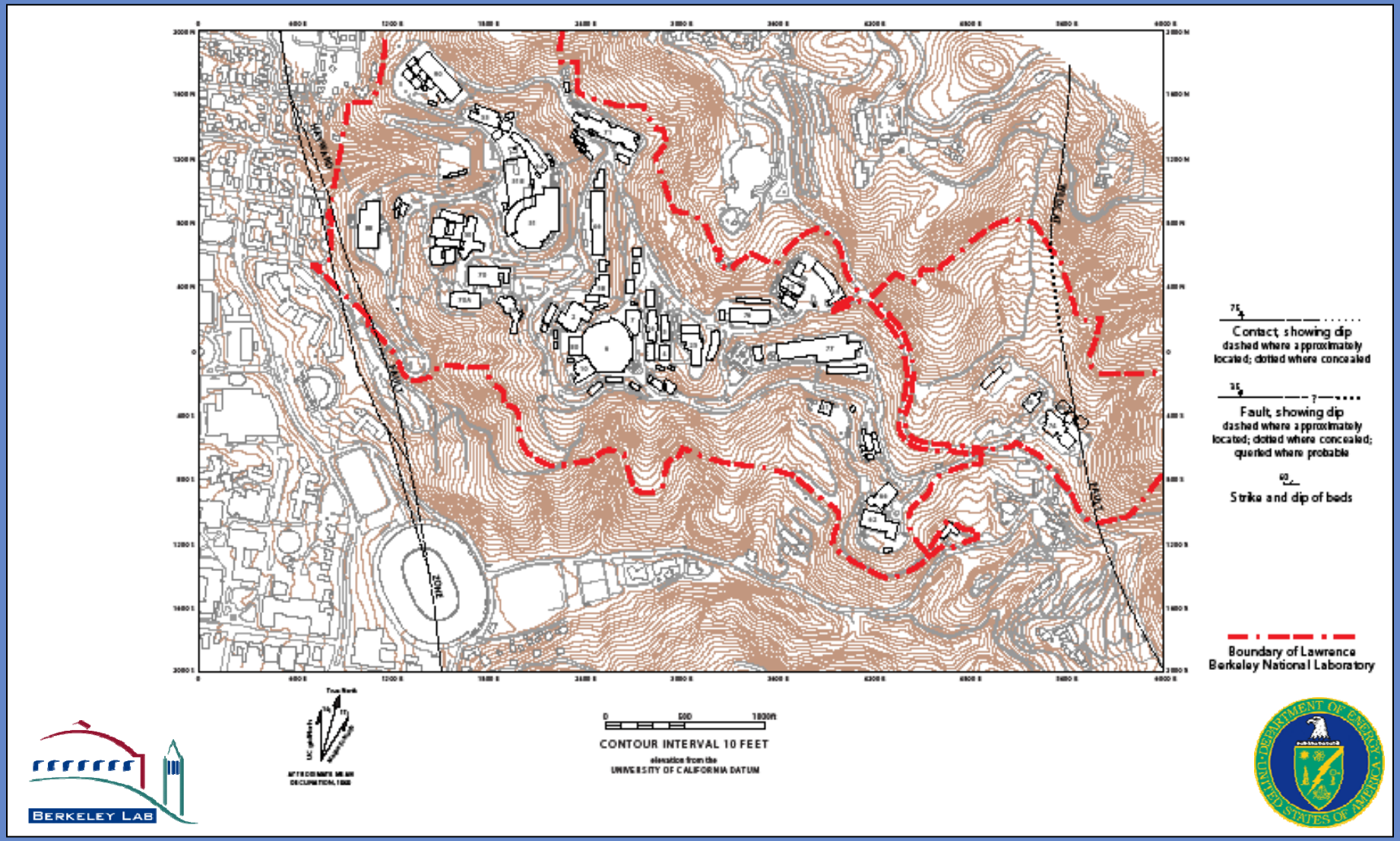
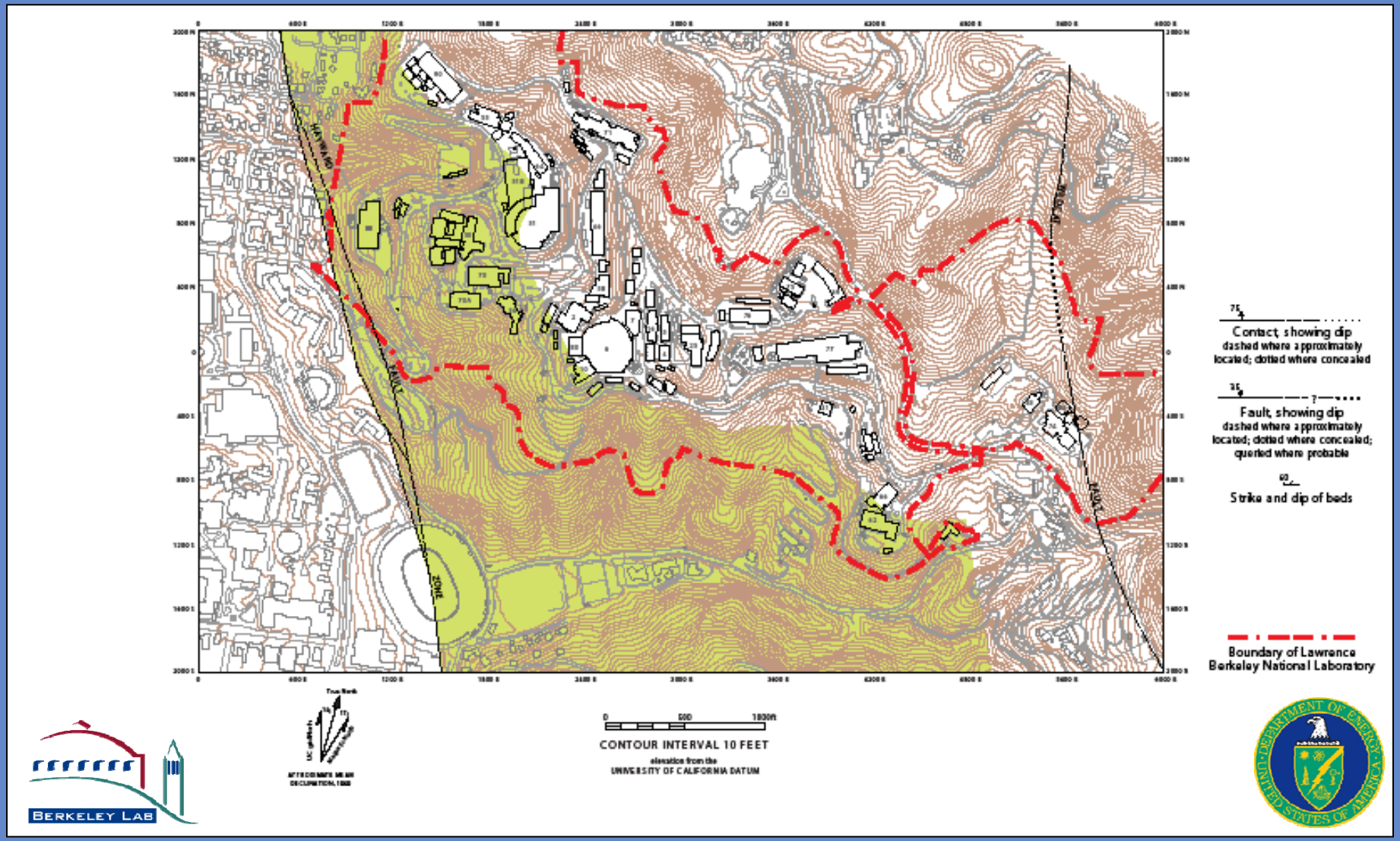
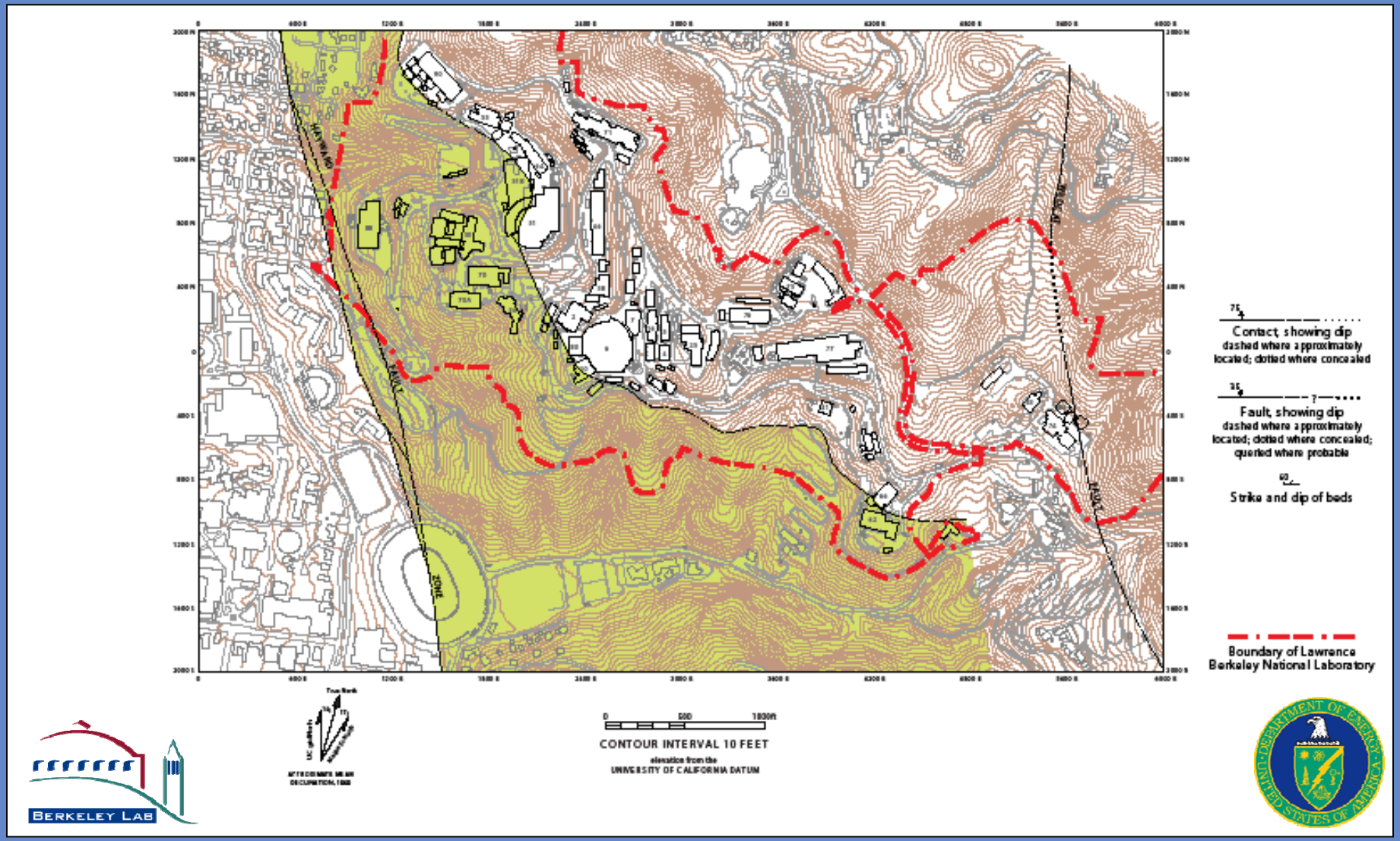


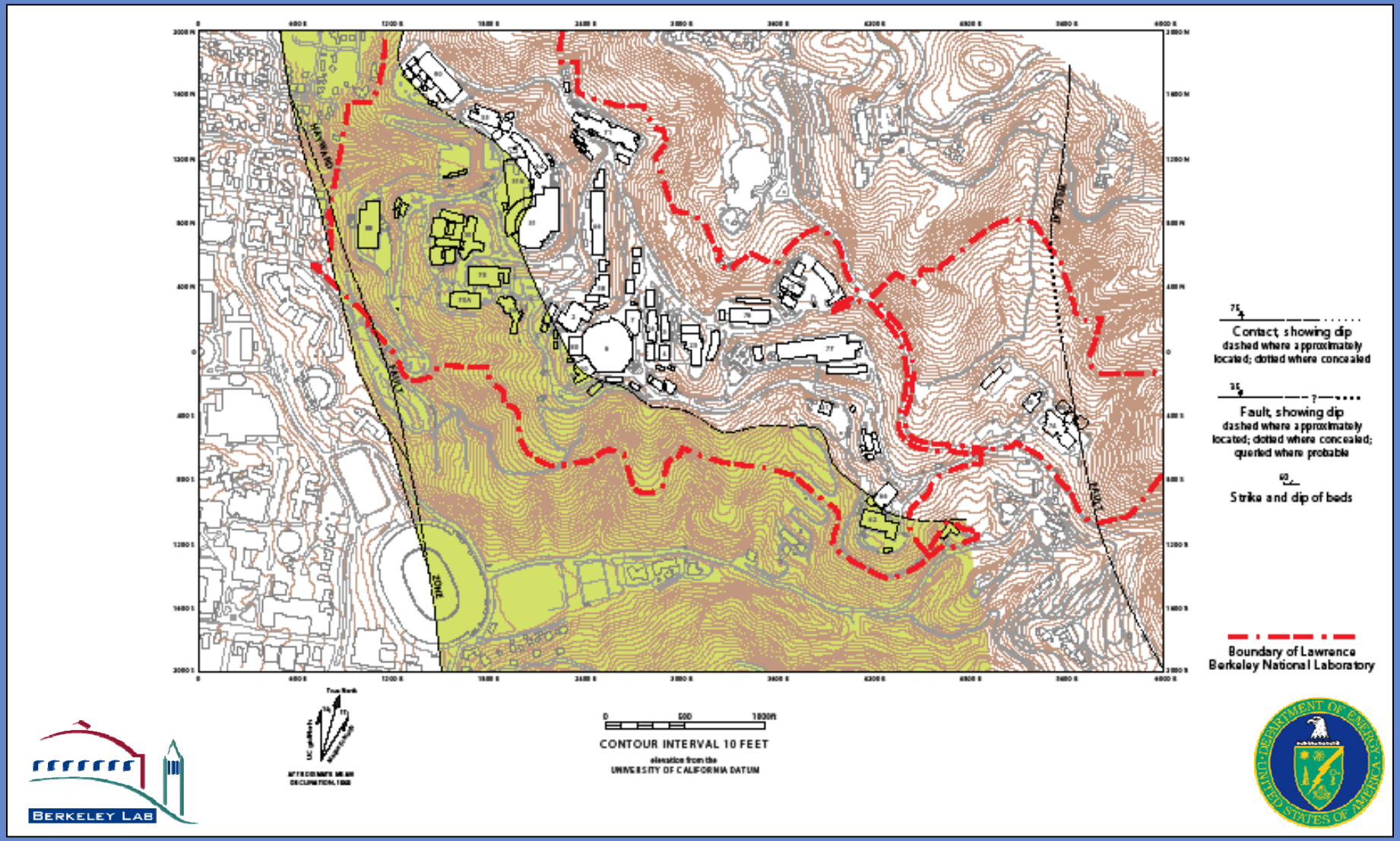
Great Valley Group



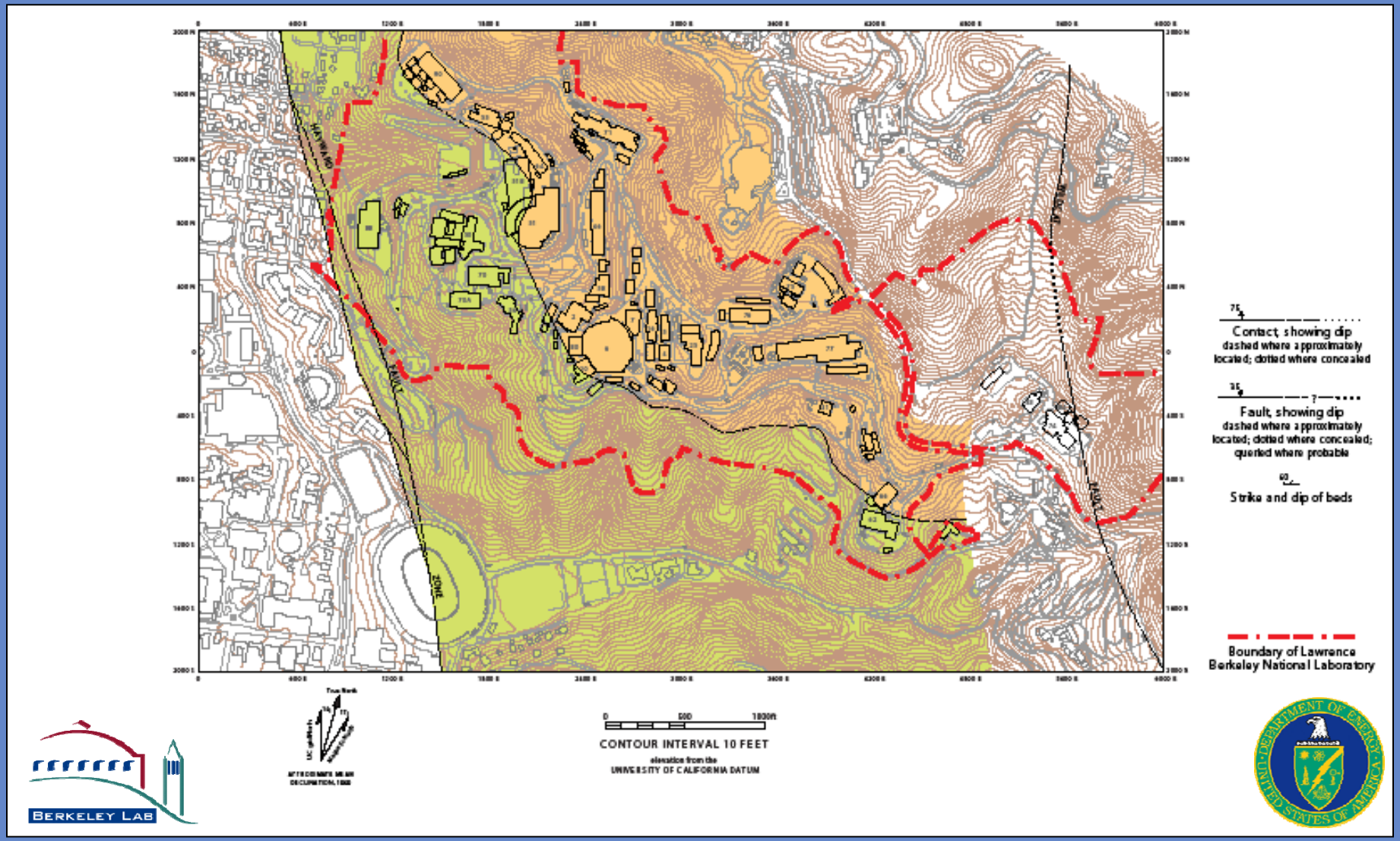
Unnamed Fault



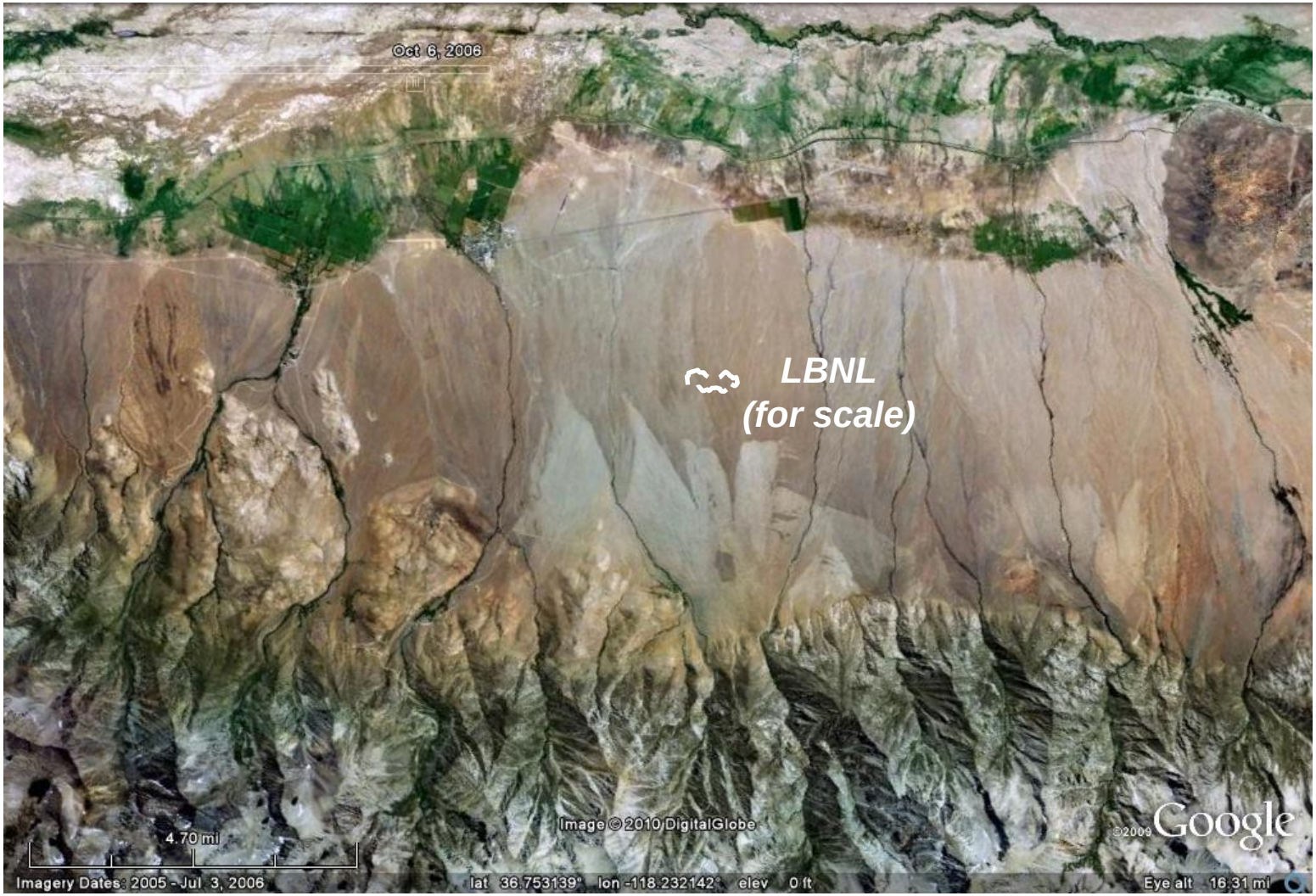
Unnamed Fault (Inactive)



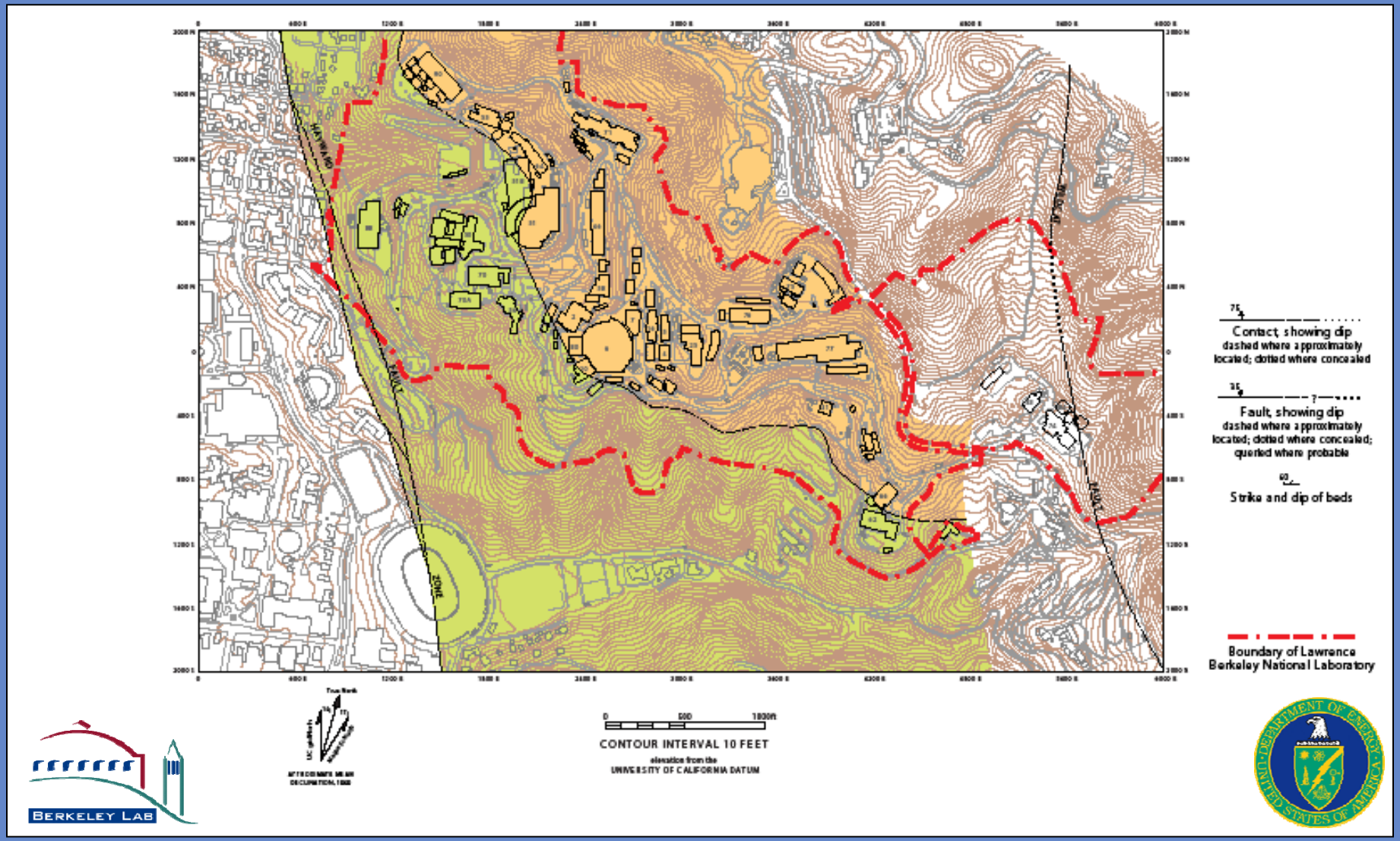
Orinda Formation



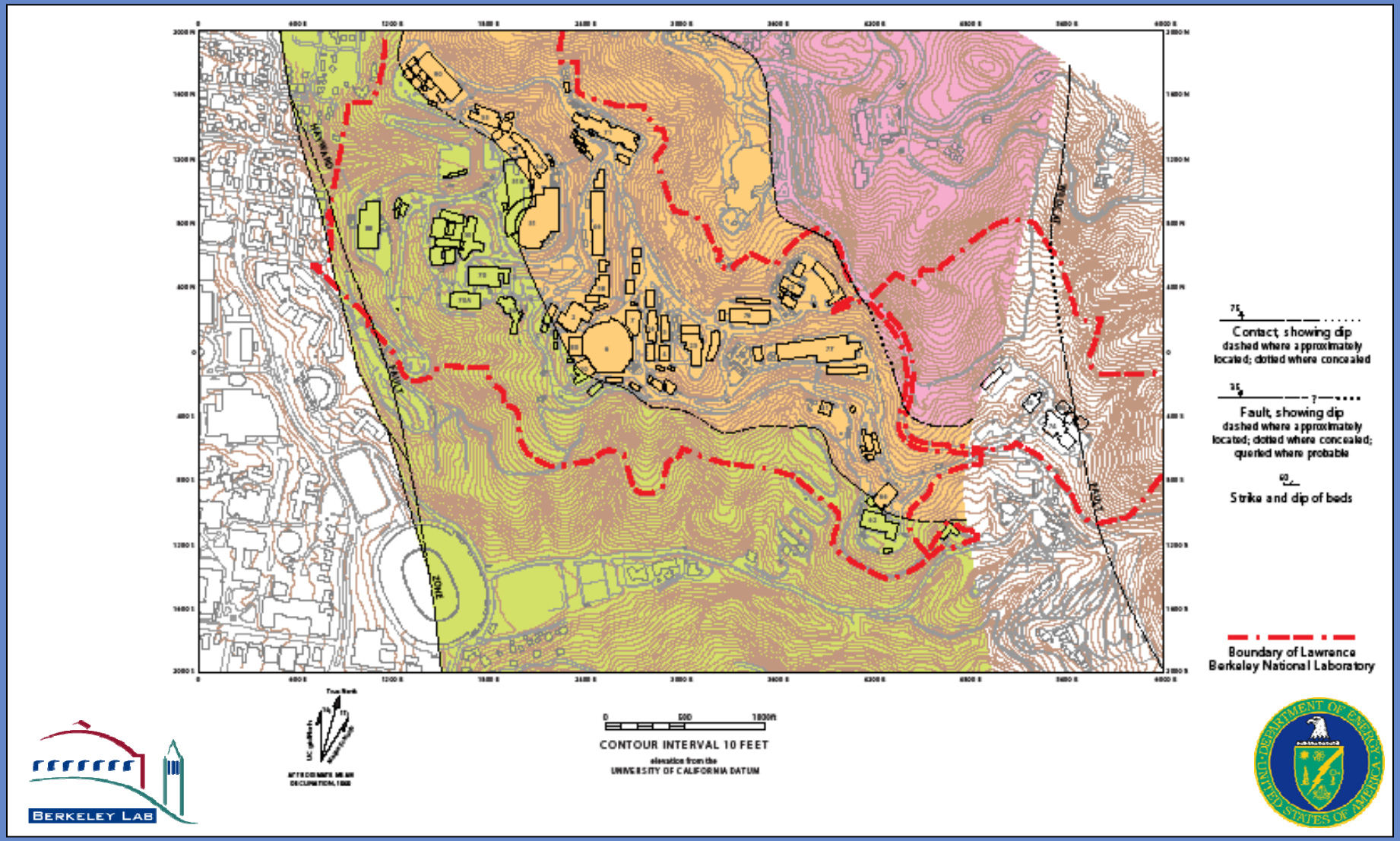
Orinda Formation Analog (Southern Owens Valley)



Orinda Formation



Moraga Formation



Moraga Formation Analog (Big Pine Volcanic Field In Southern Owens Valley)

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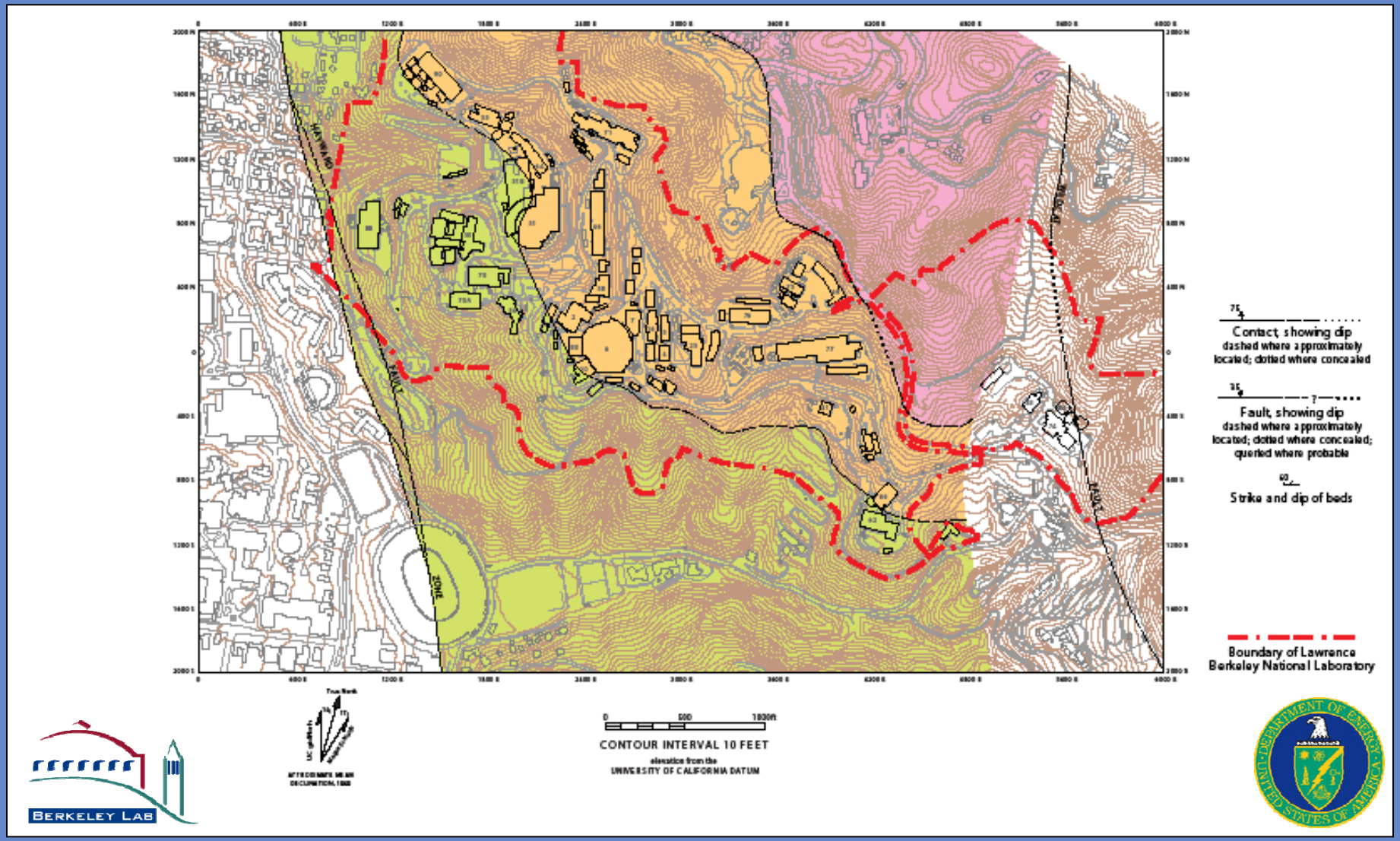
Moraga and Orinda Formation Tilted

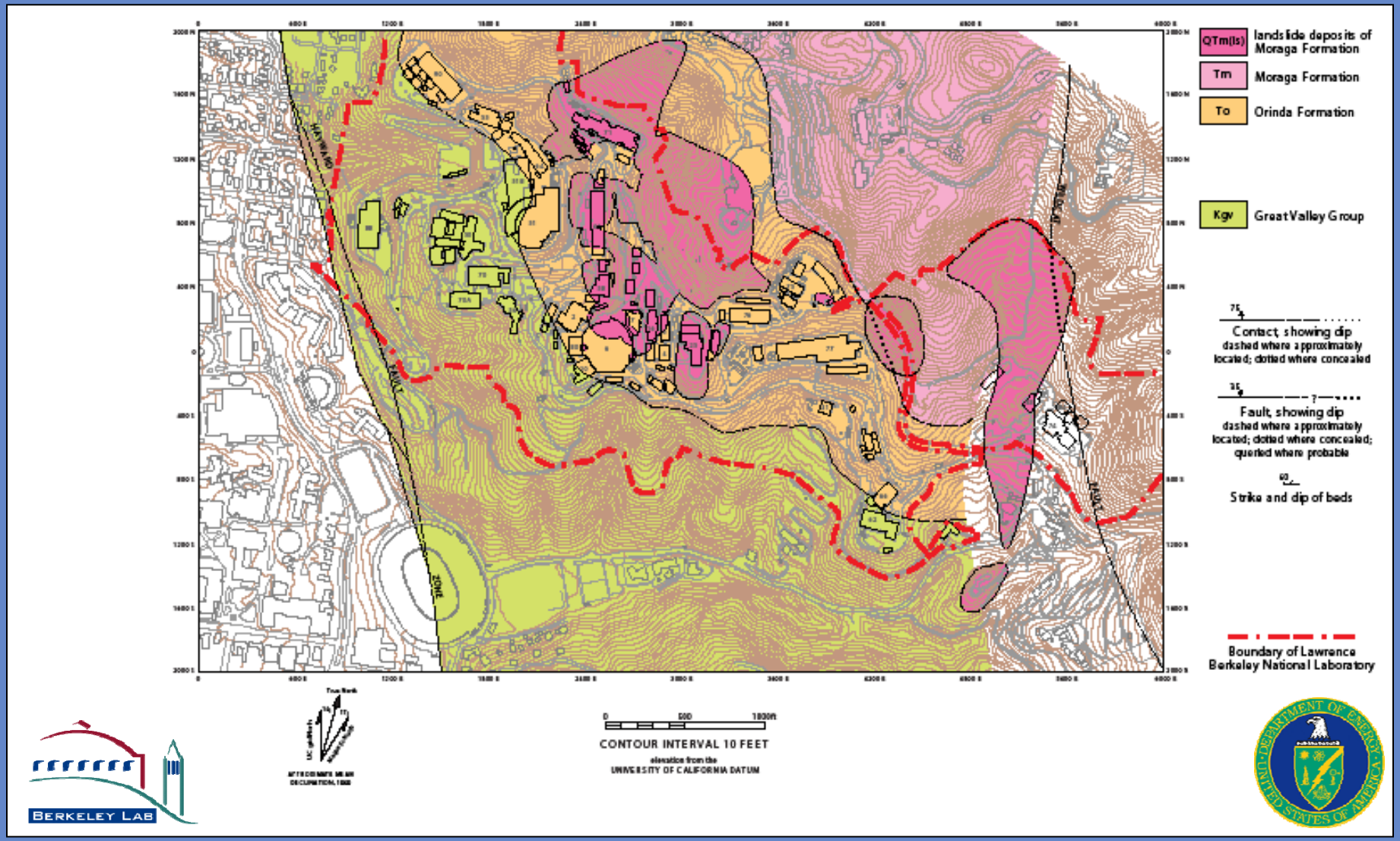
Southern road cut exposure of eastern approach to the Caldecott tunnels on Highway 24

From Steven Dutch via http://www.uwsp.edu/geo/projects/geoweb/participants/dutch/Vtrips/CA24.HTM

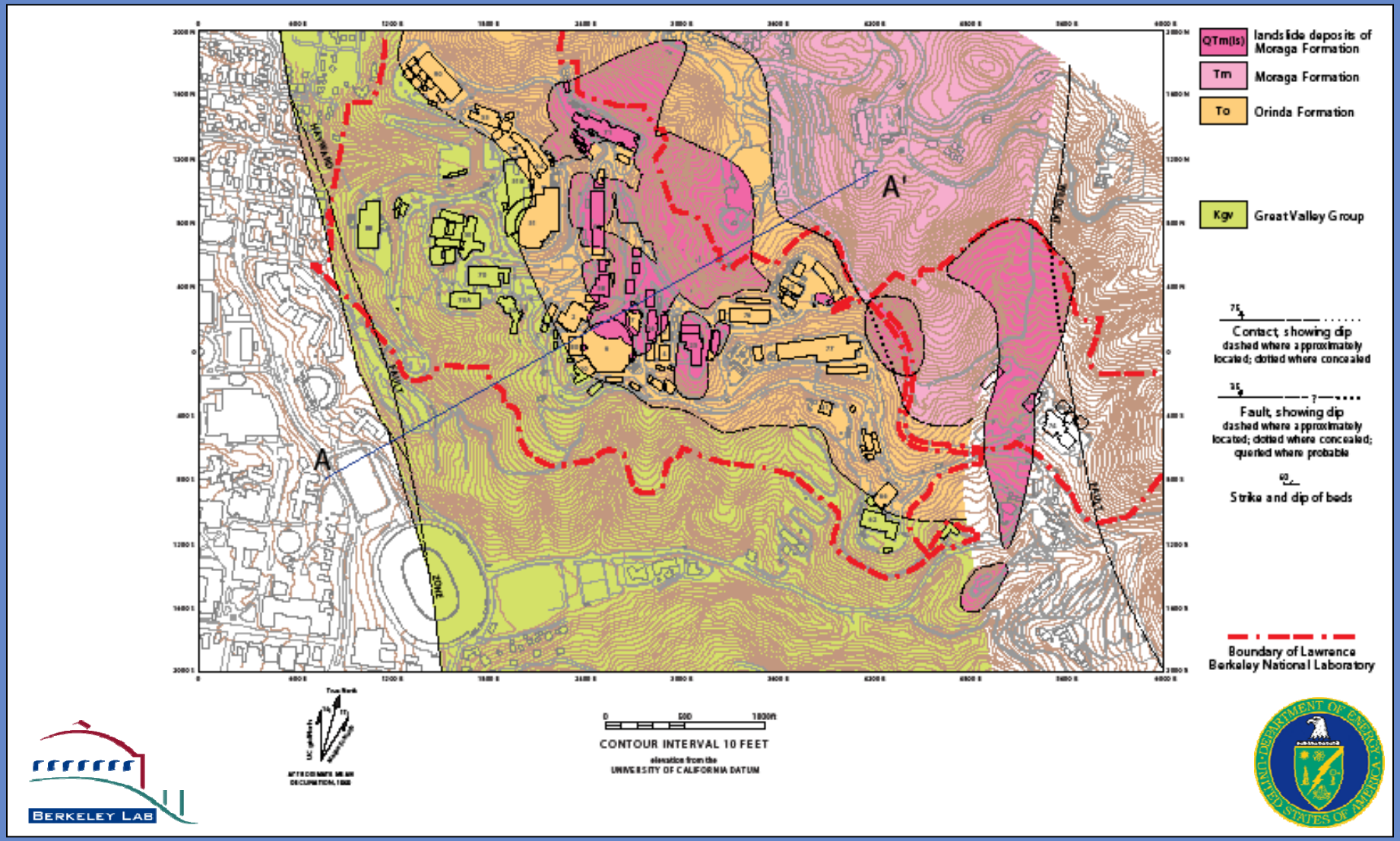
Moraga Formation



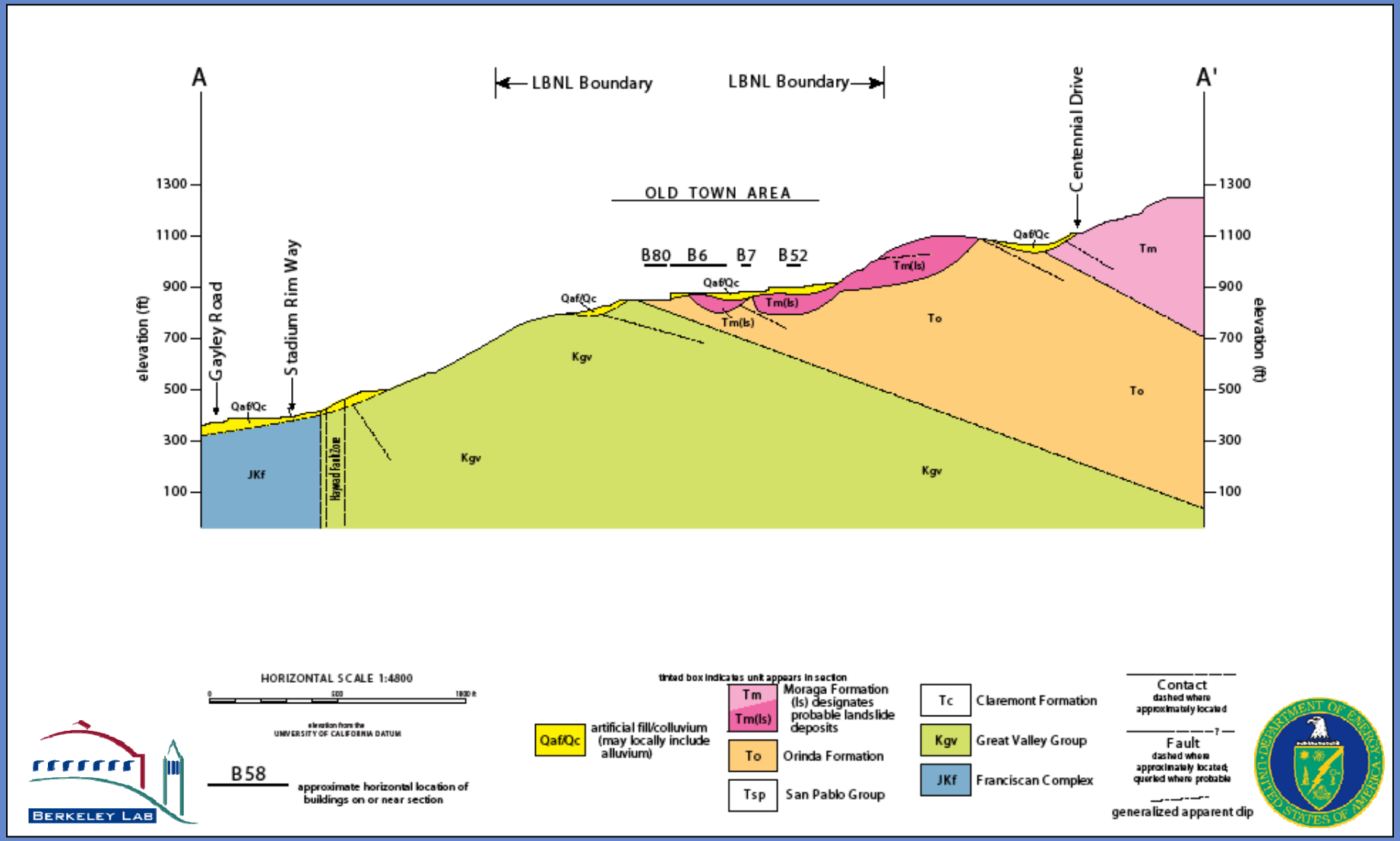
Surficial Masses of Moraga Volcanics



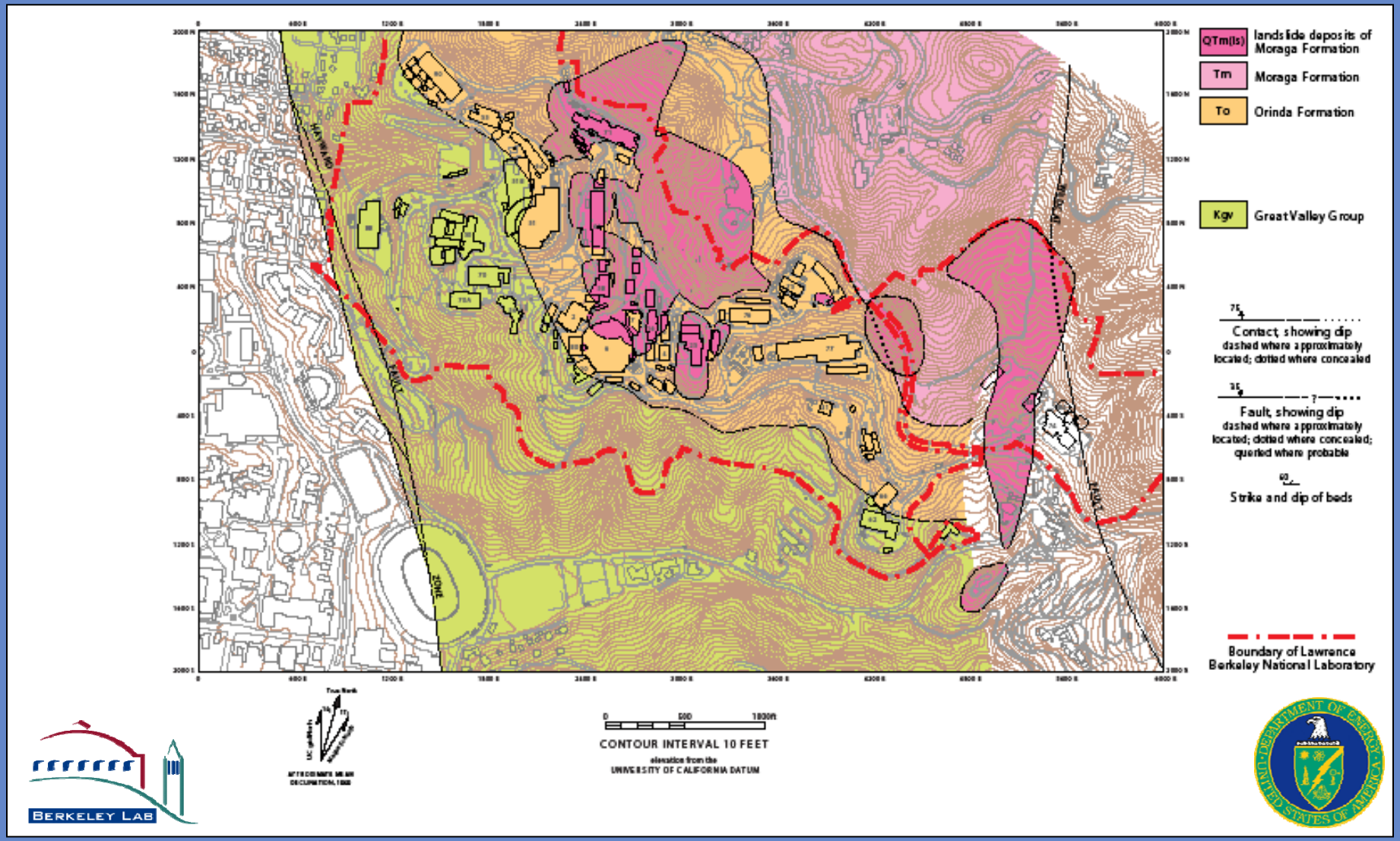
Lab-Wide Geologic Section



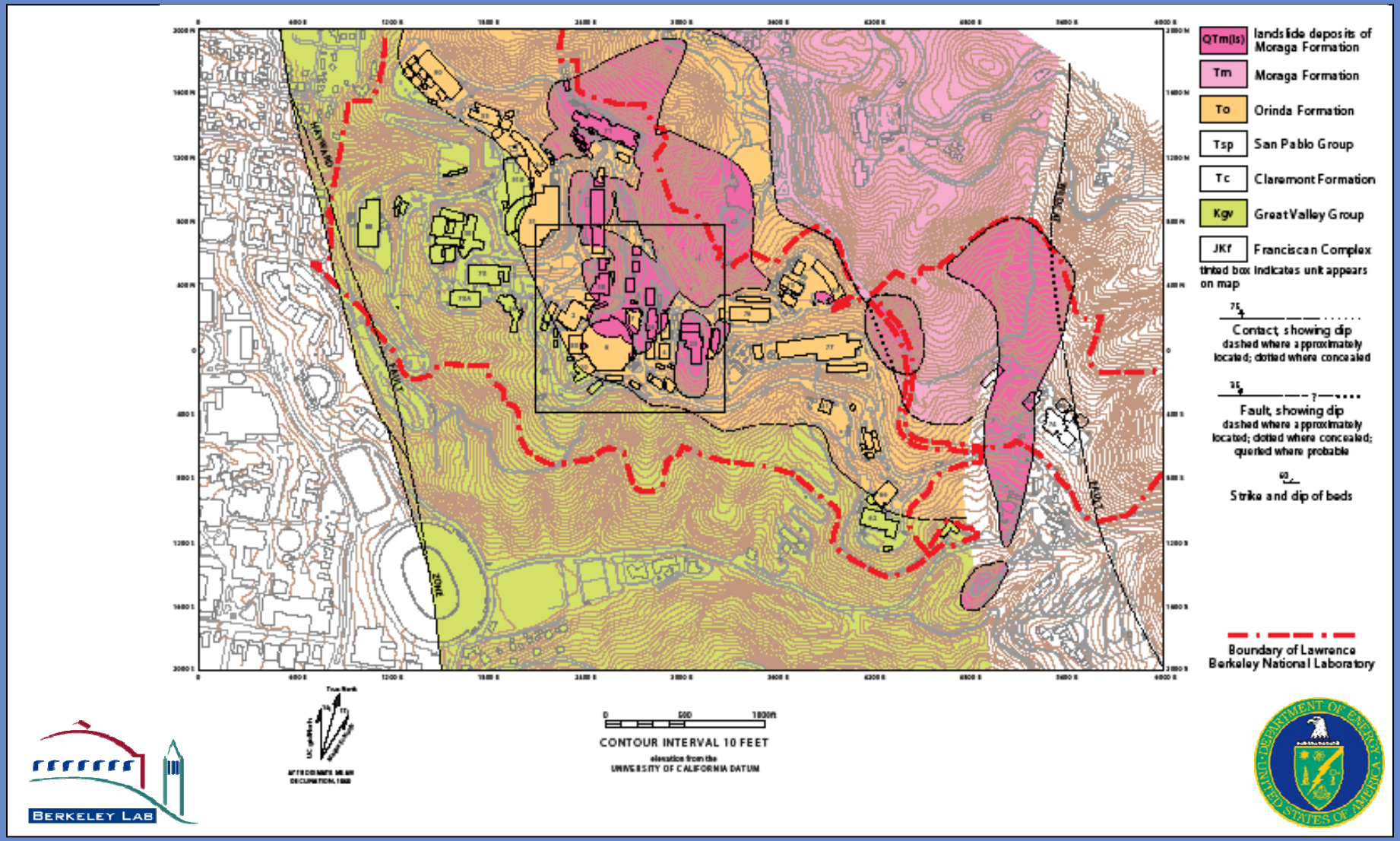
Lab-Wide Geologic Section



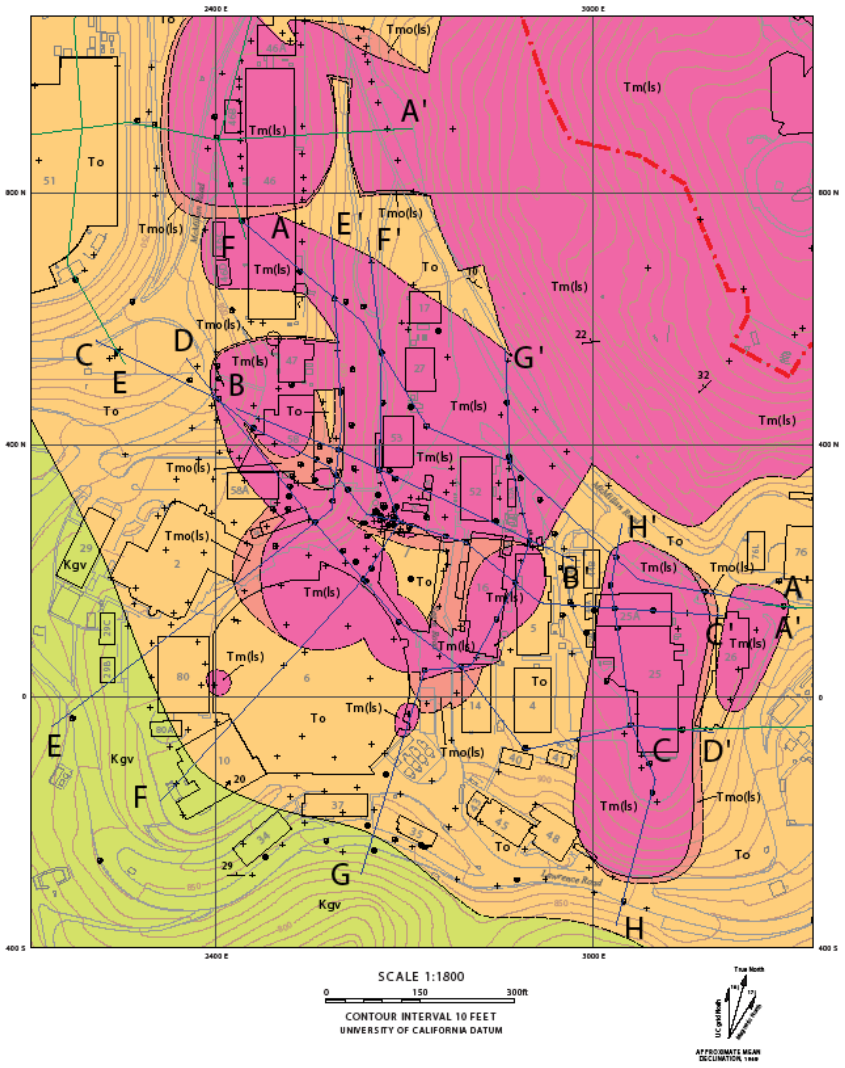
Where's The Data?



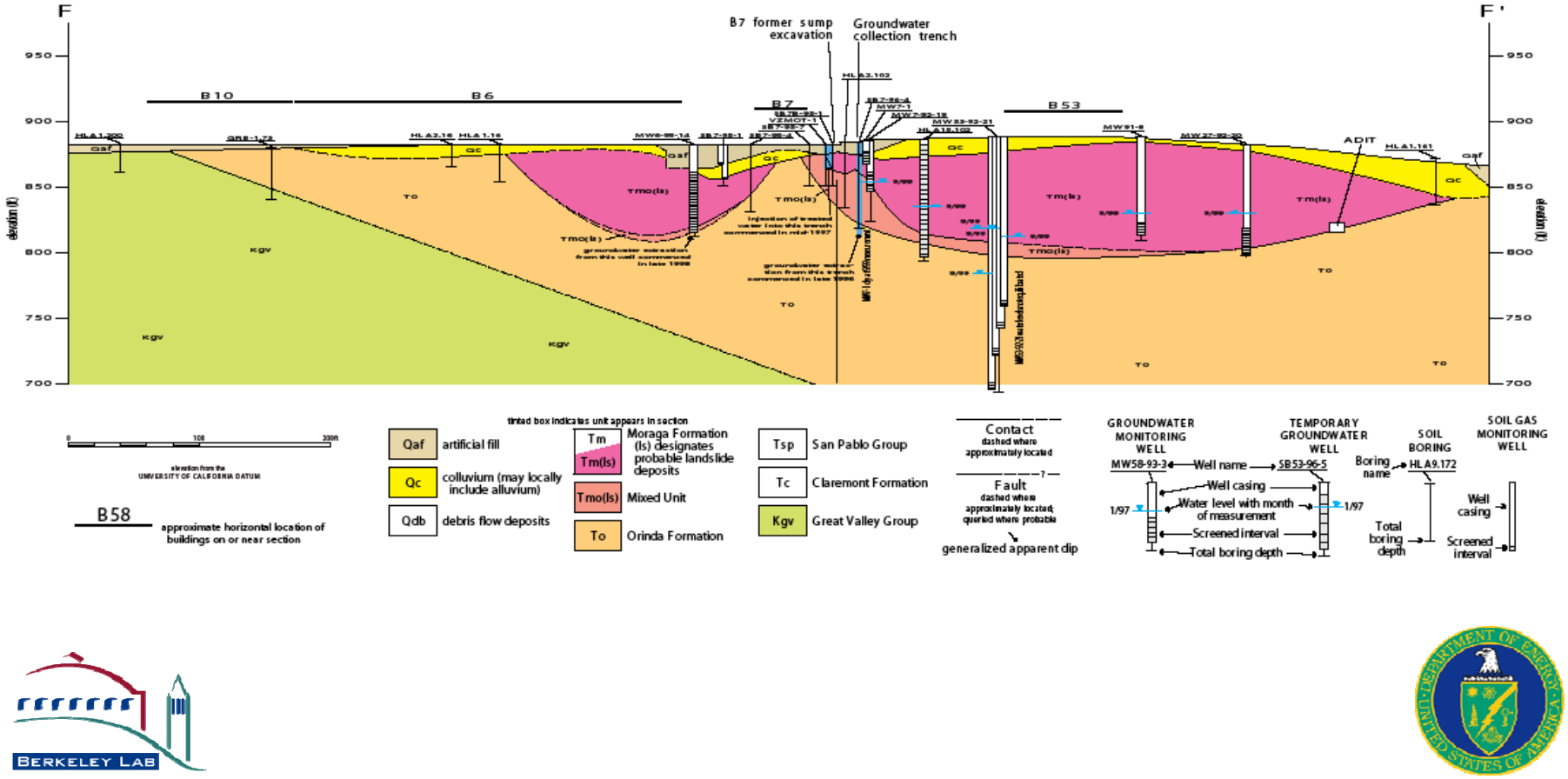
Old Town Area



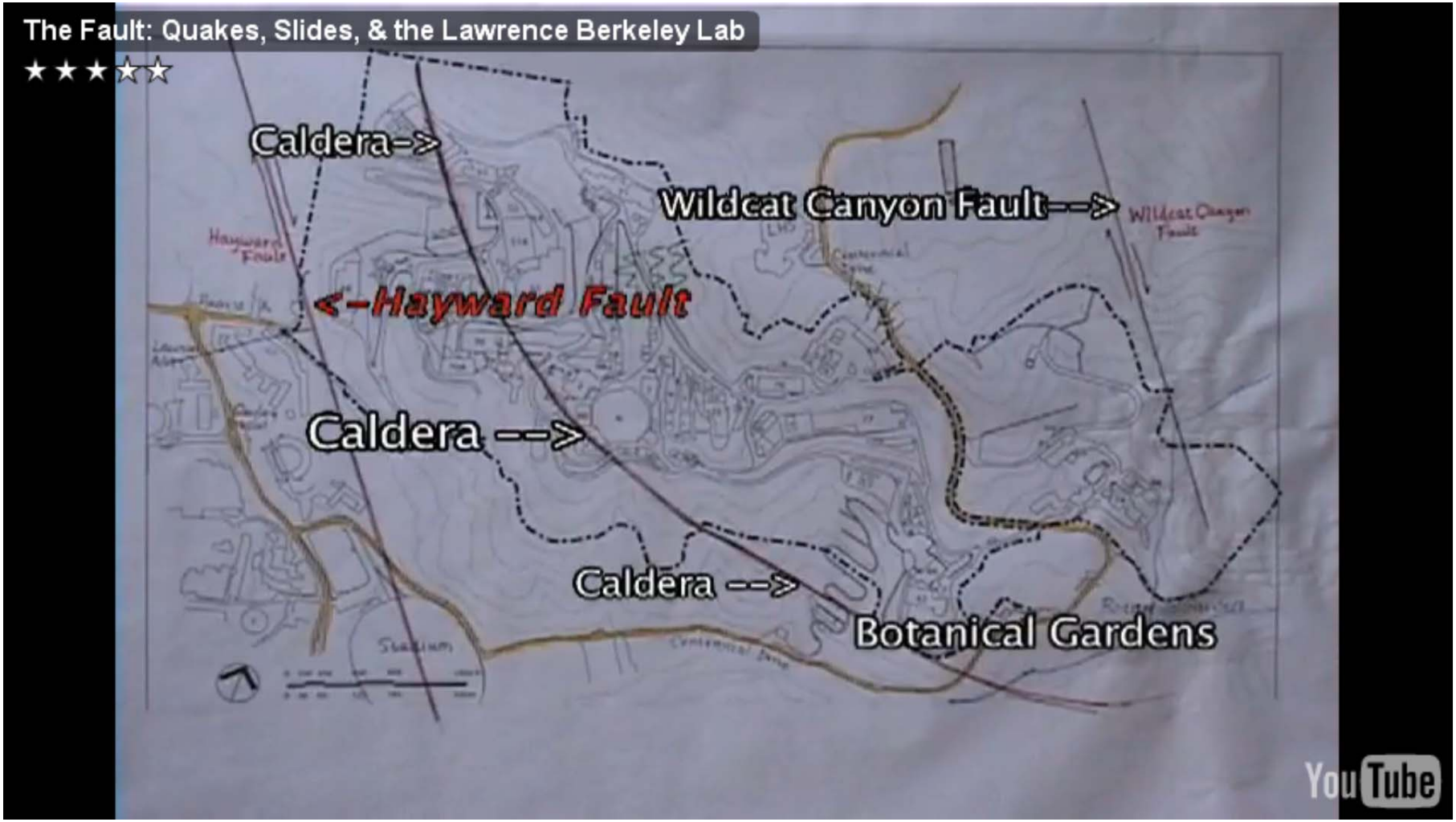
Old Town Area



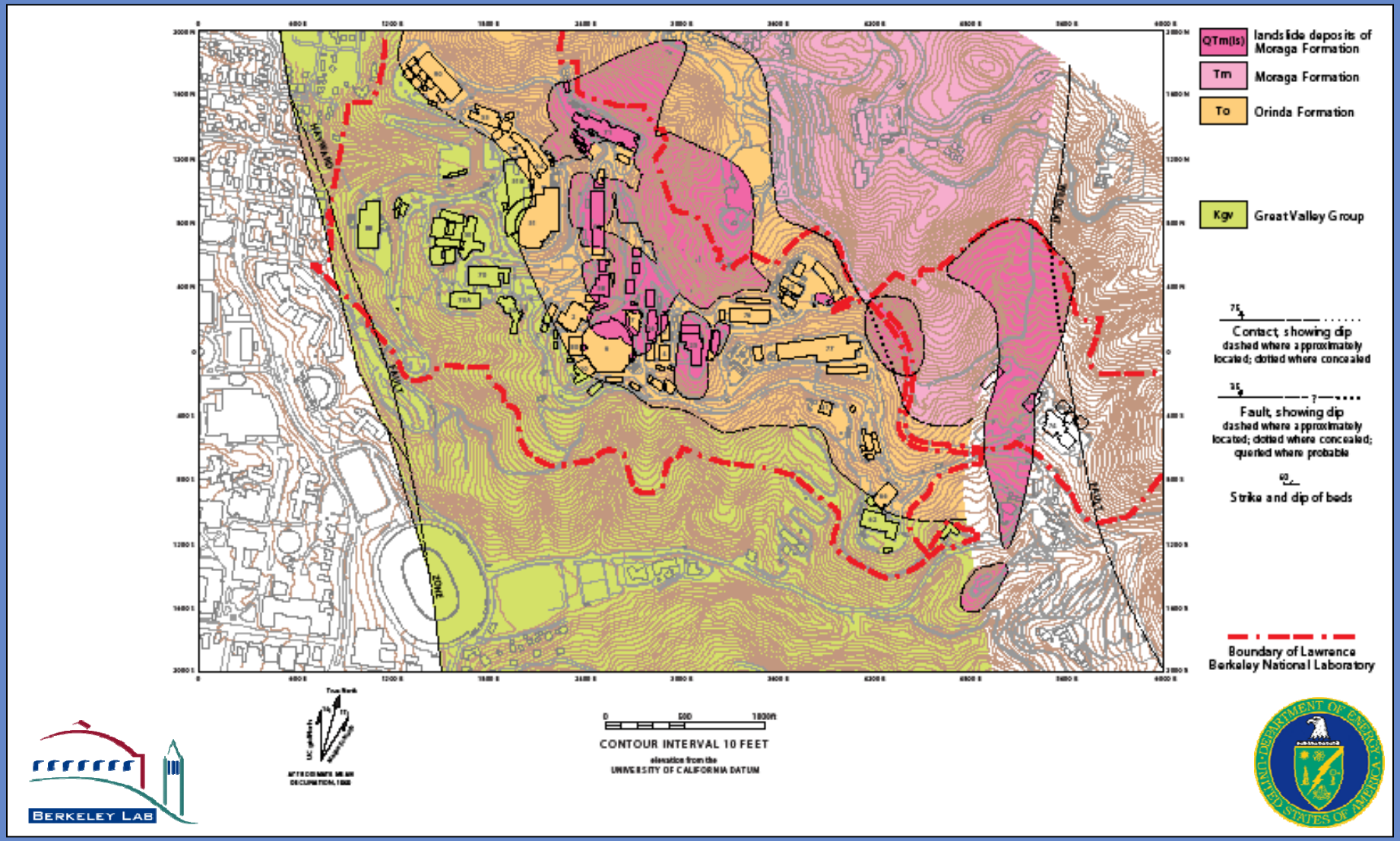
Old Town Area



Caldera Hypothesis Map



LBNL Bedrock Geology



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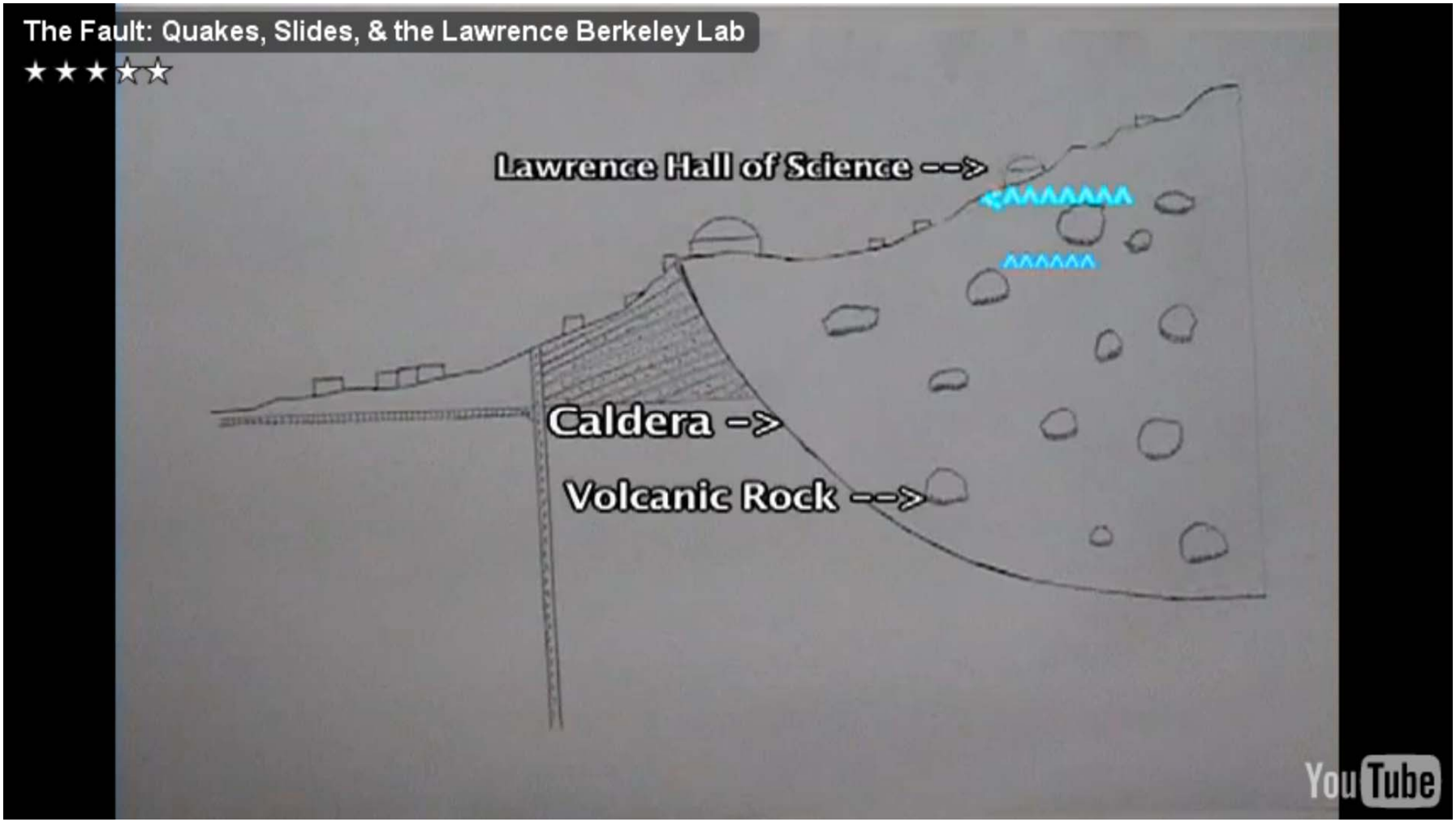

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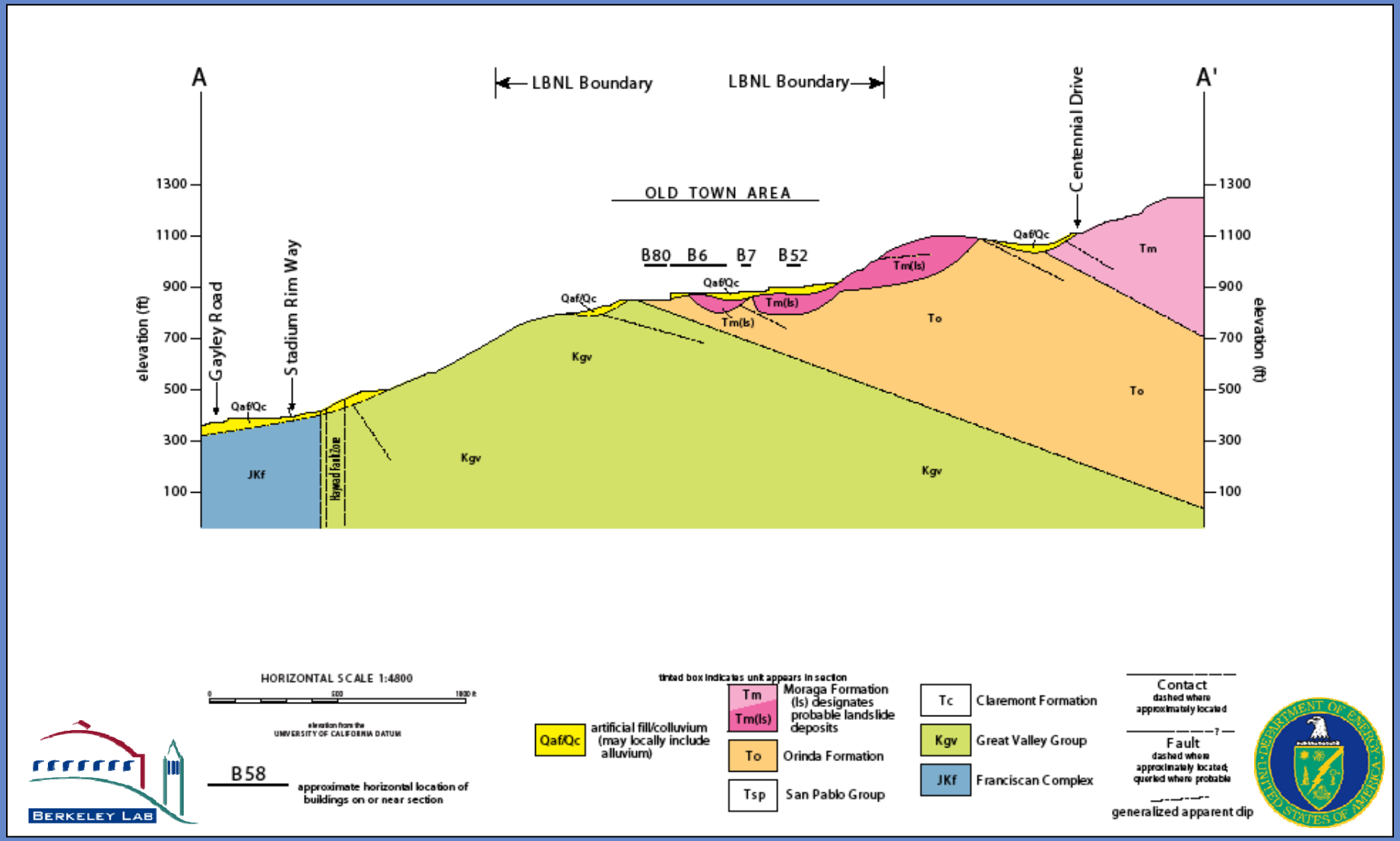

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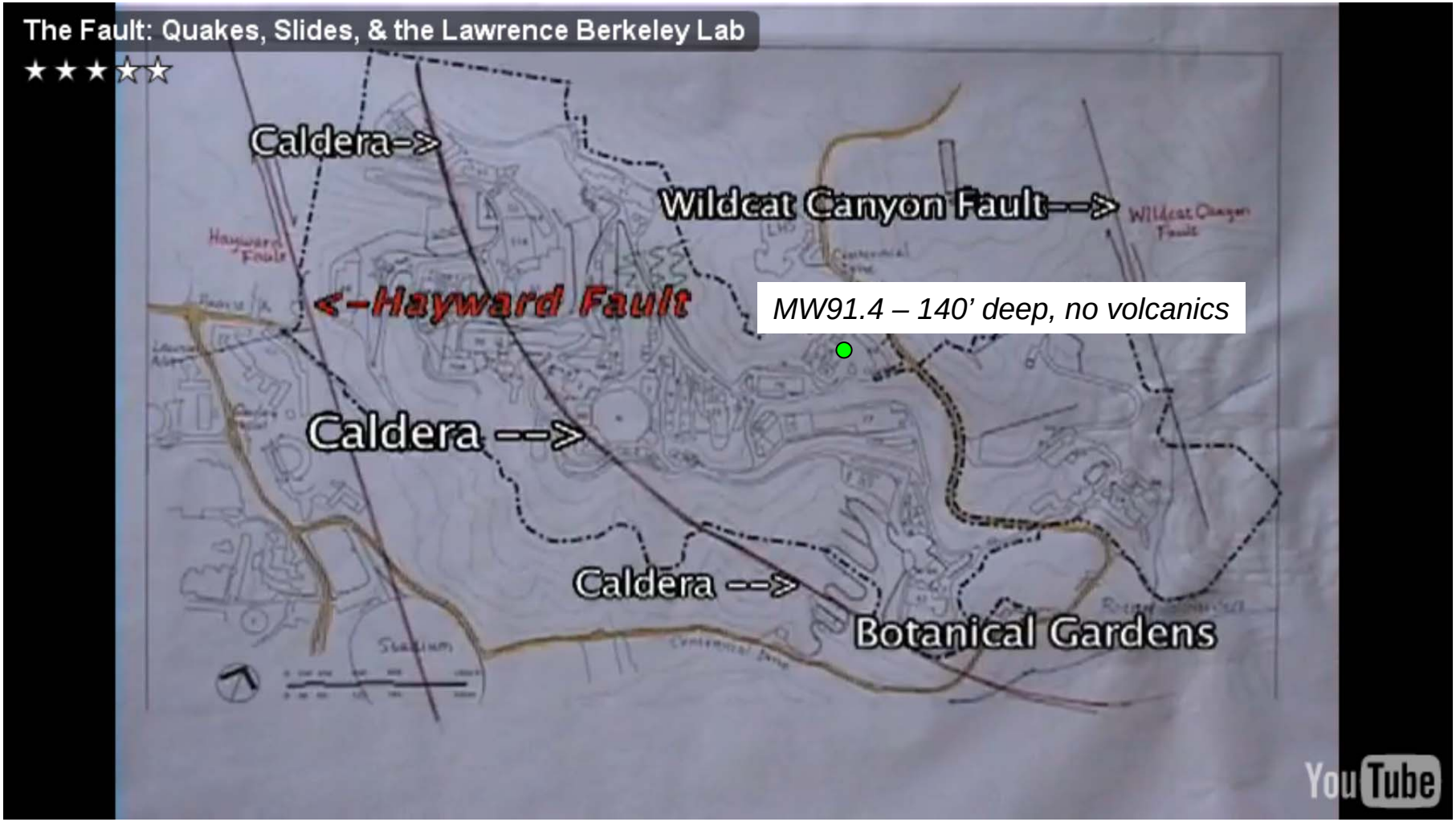

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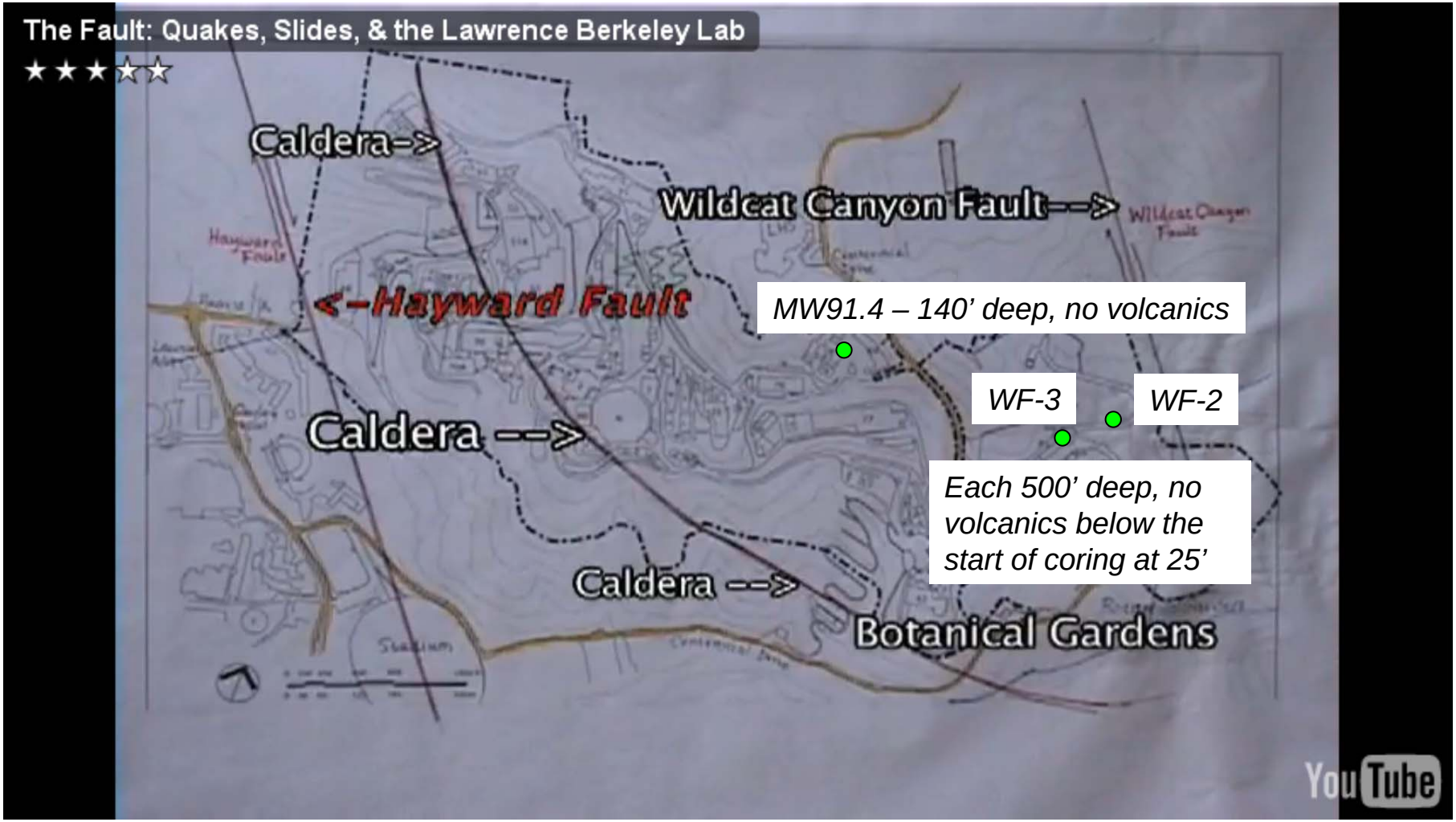

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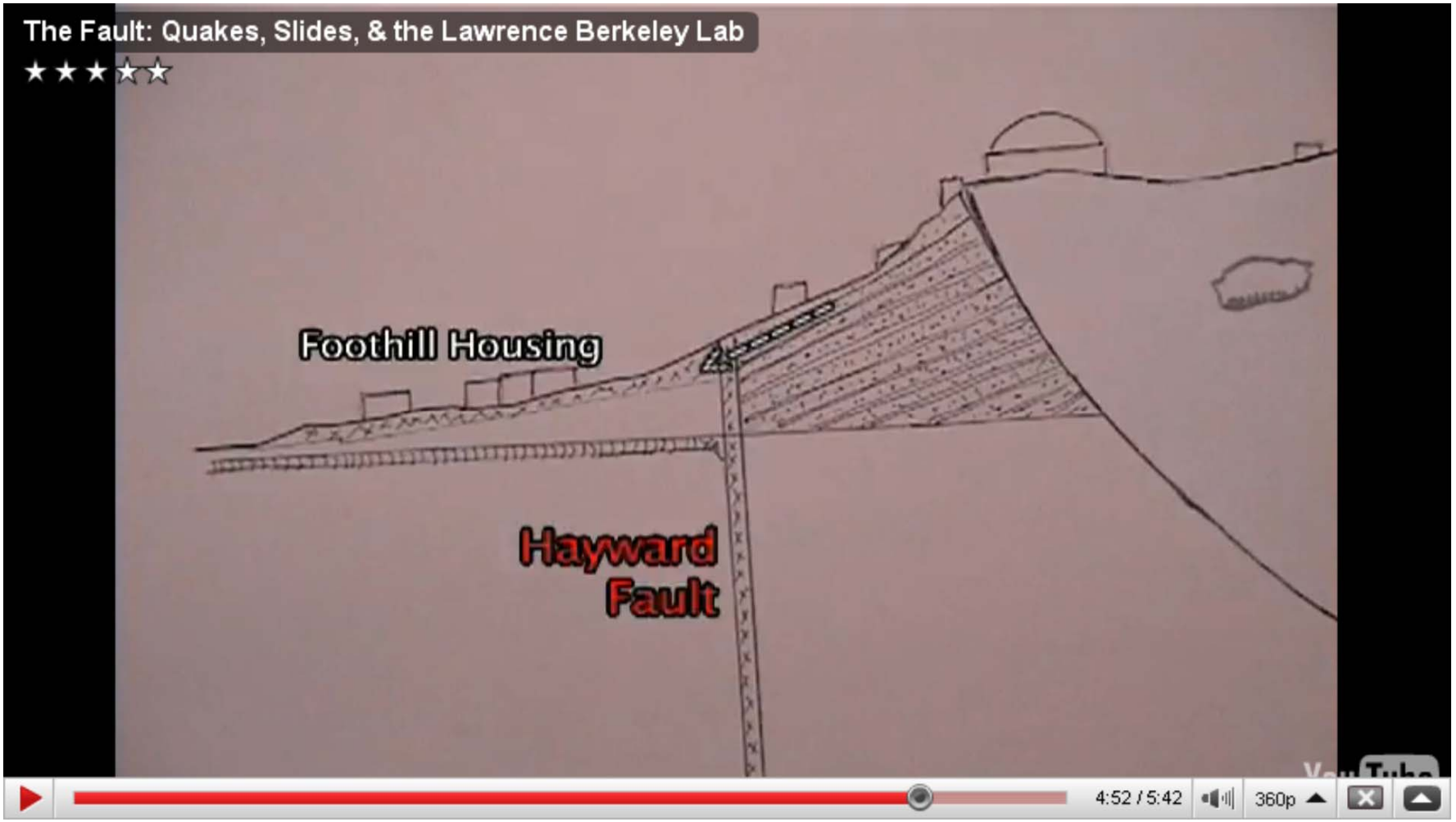

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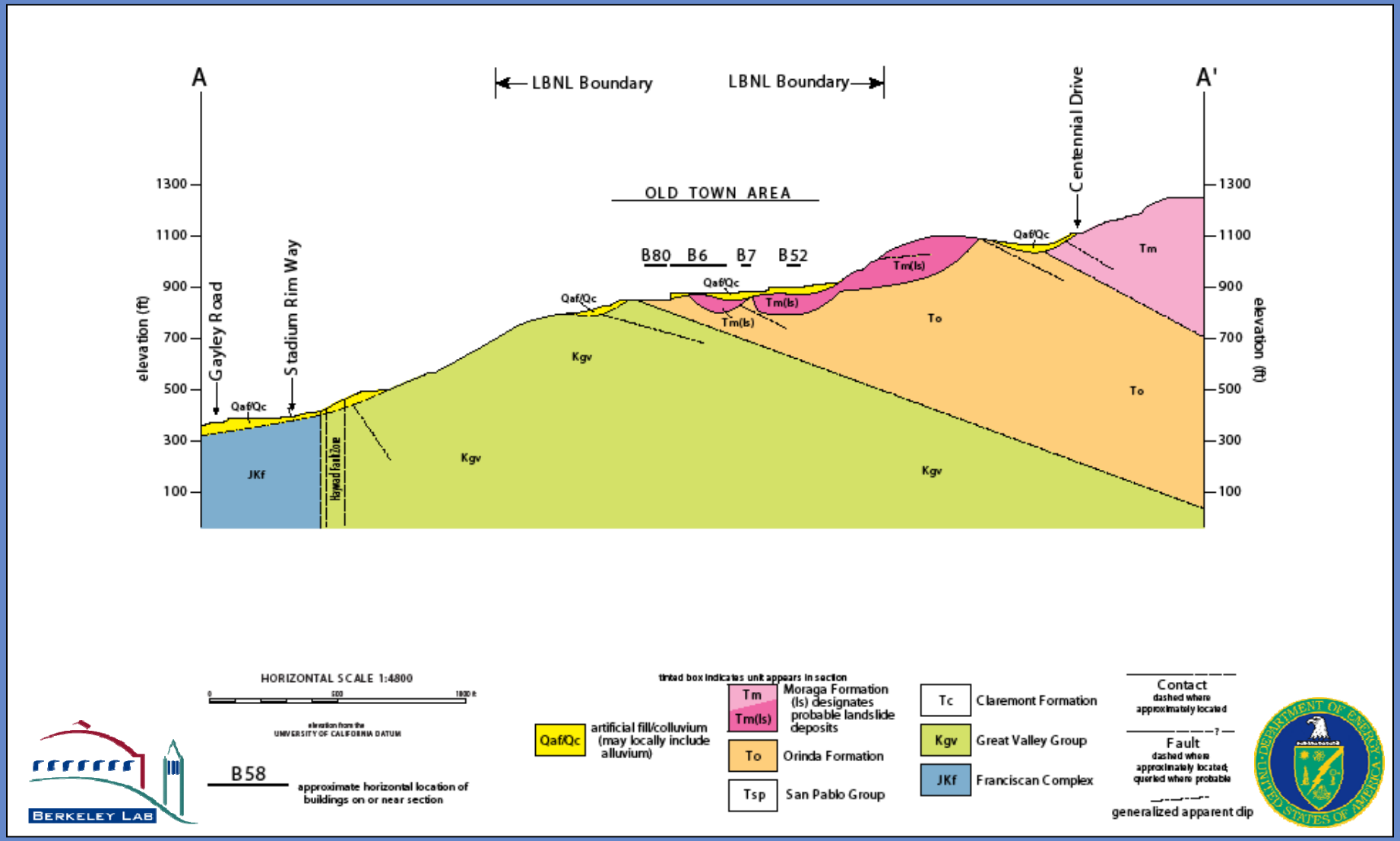

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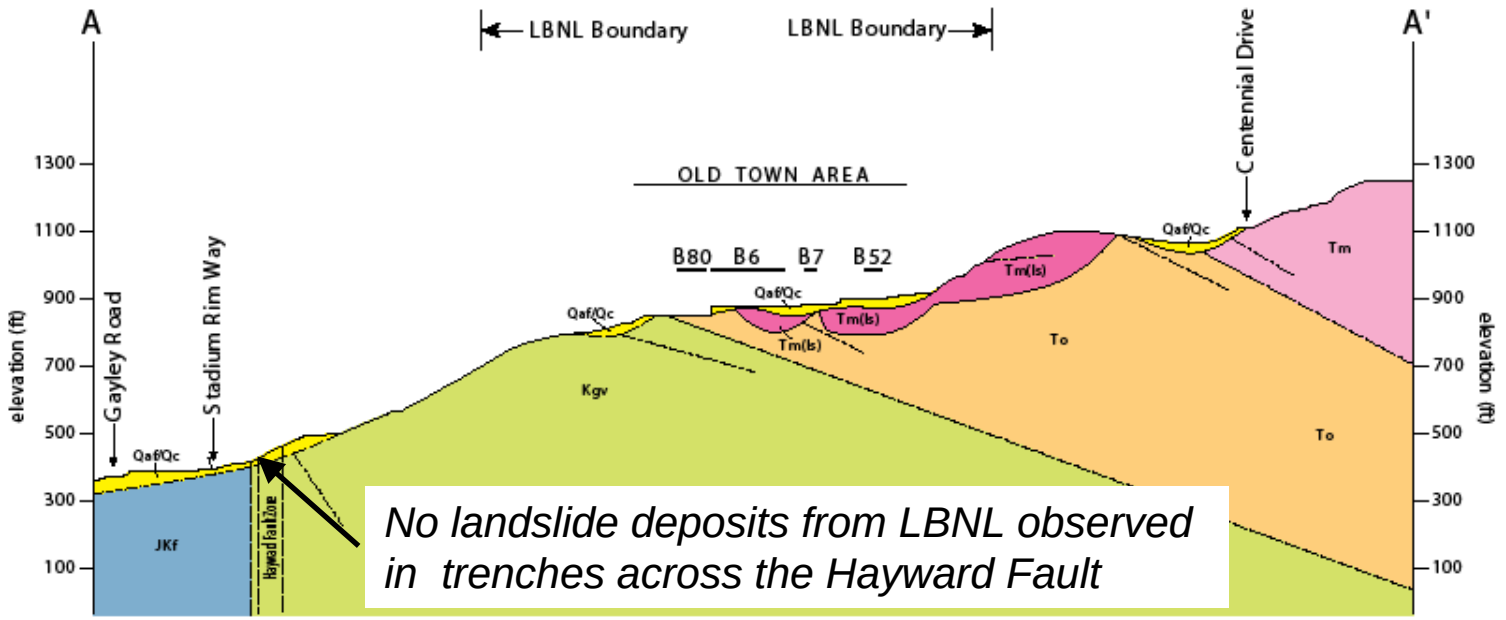
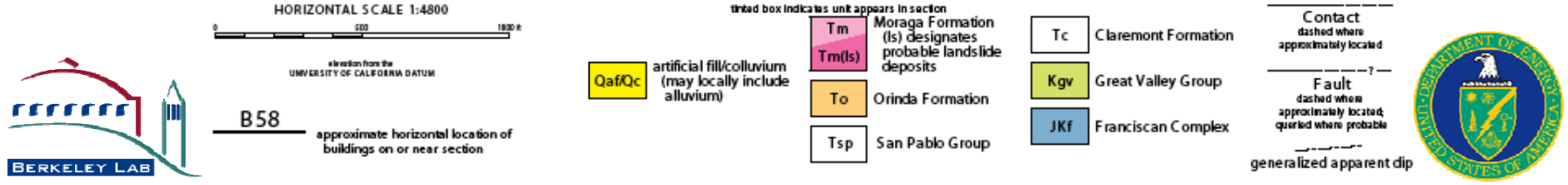
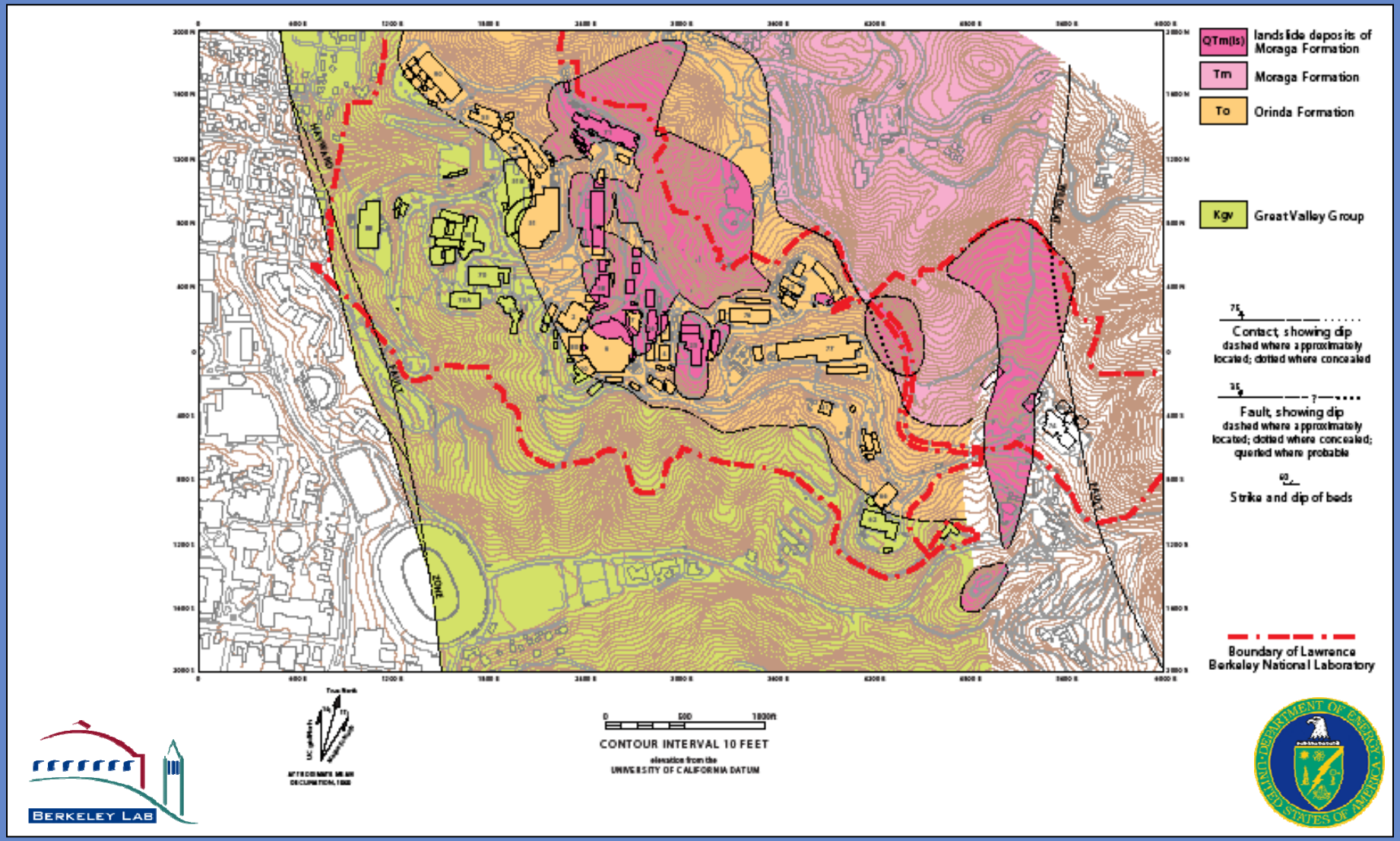
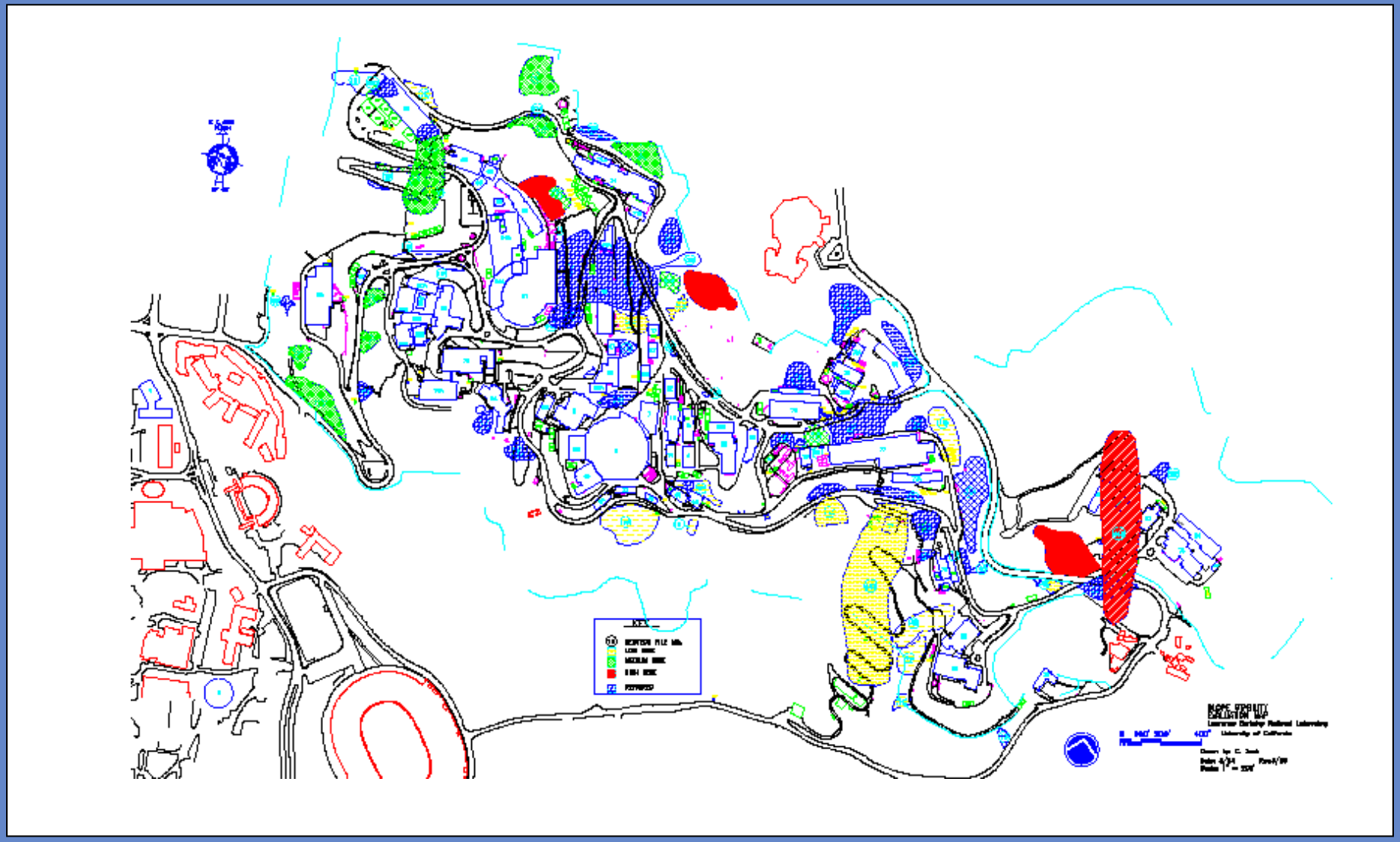




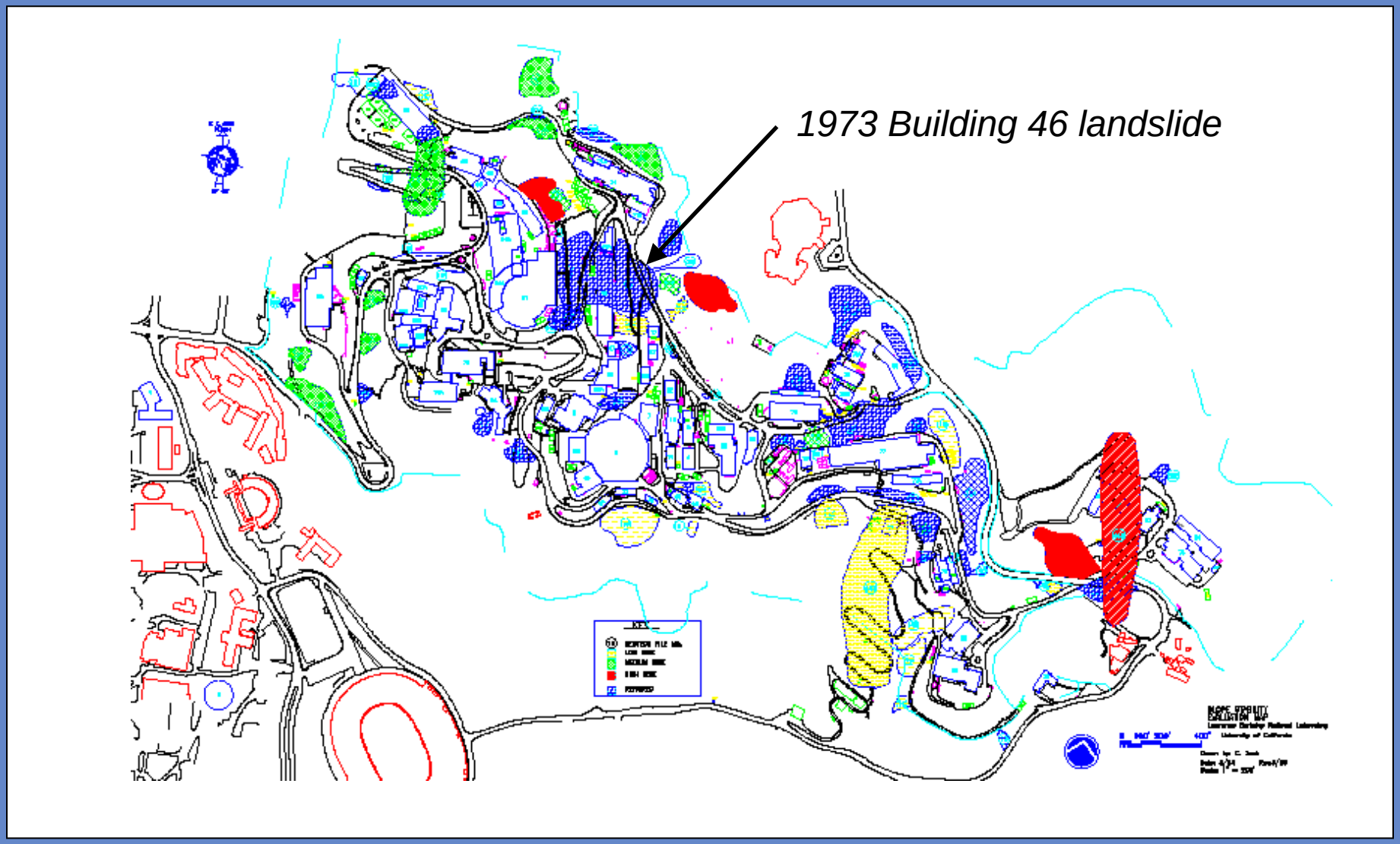
Surficial Volcanic Masses as Landslide Deposits



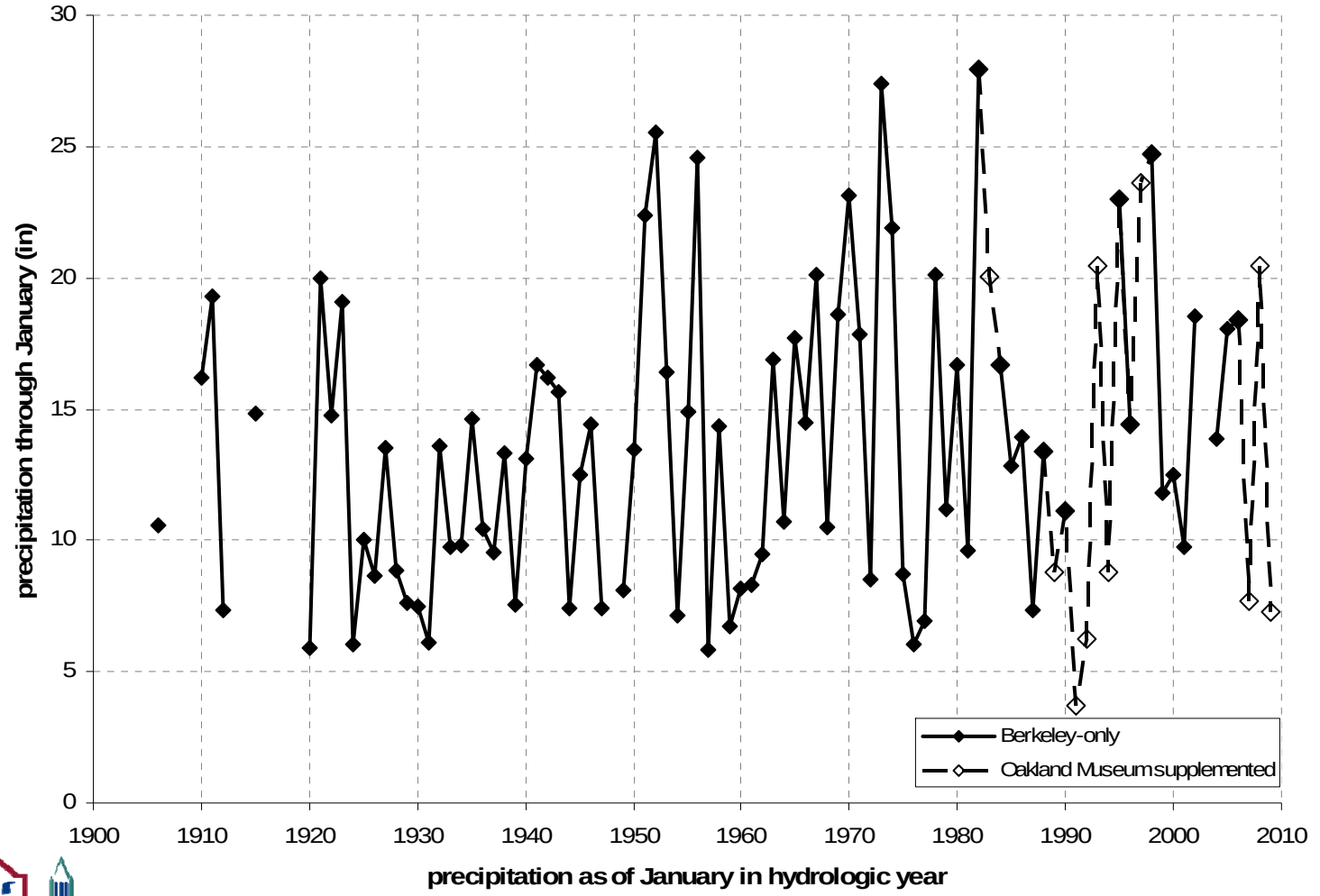
LBNL Landslide Map



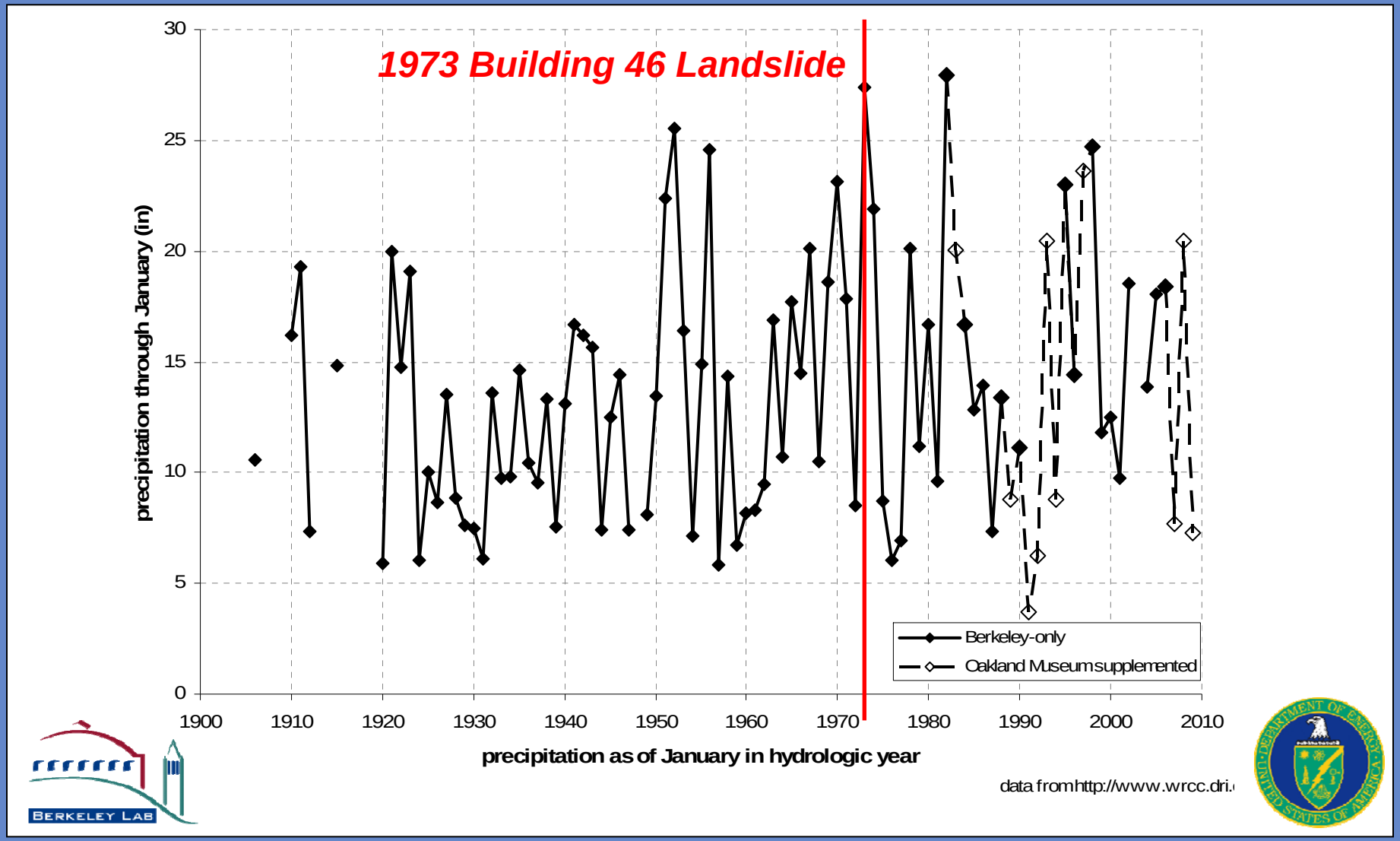
LBNL Landslide Map



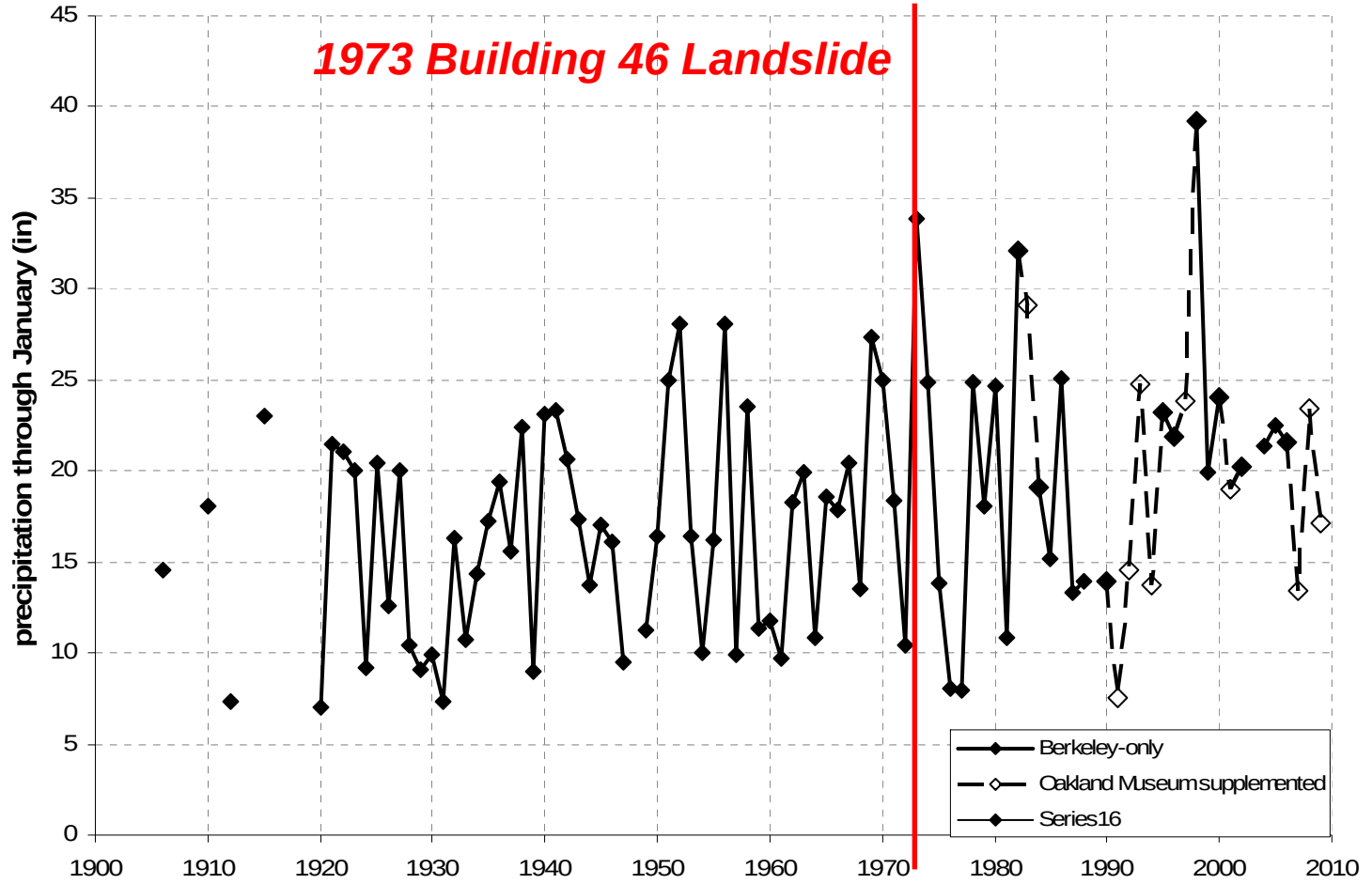
Precipitation Through January



Precipitation Through January

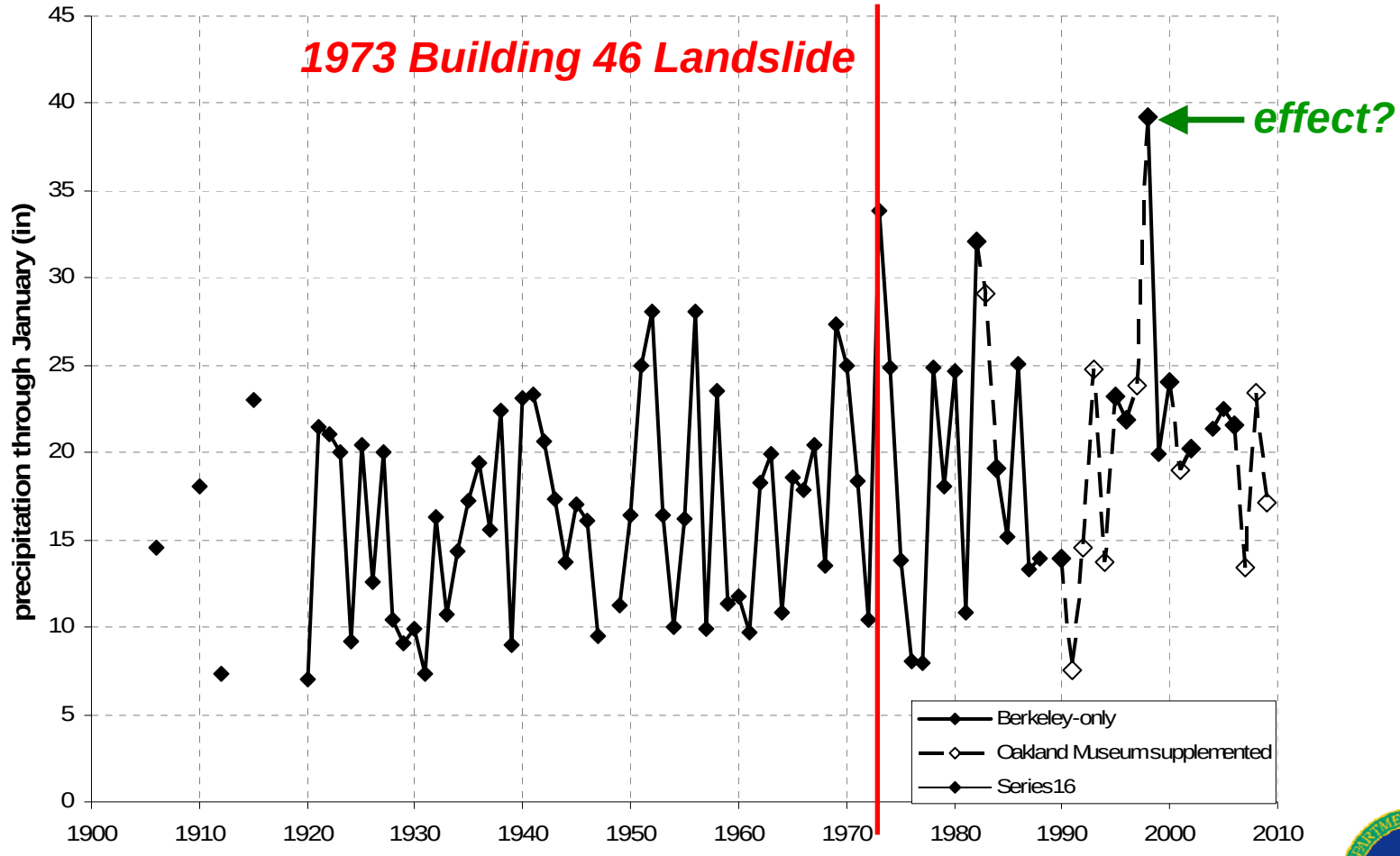


Precipitation Through February



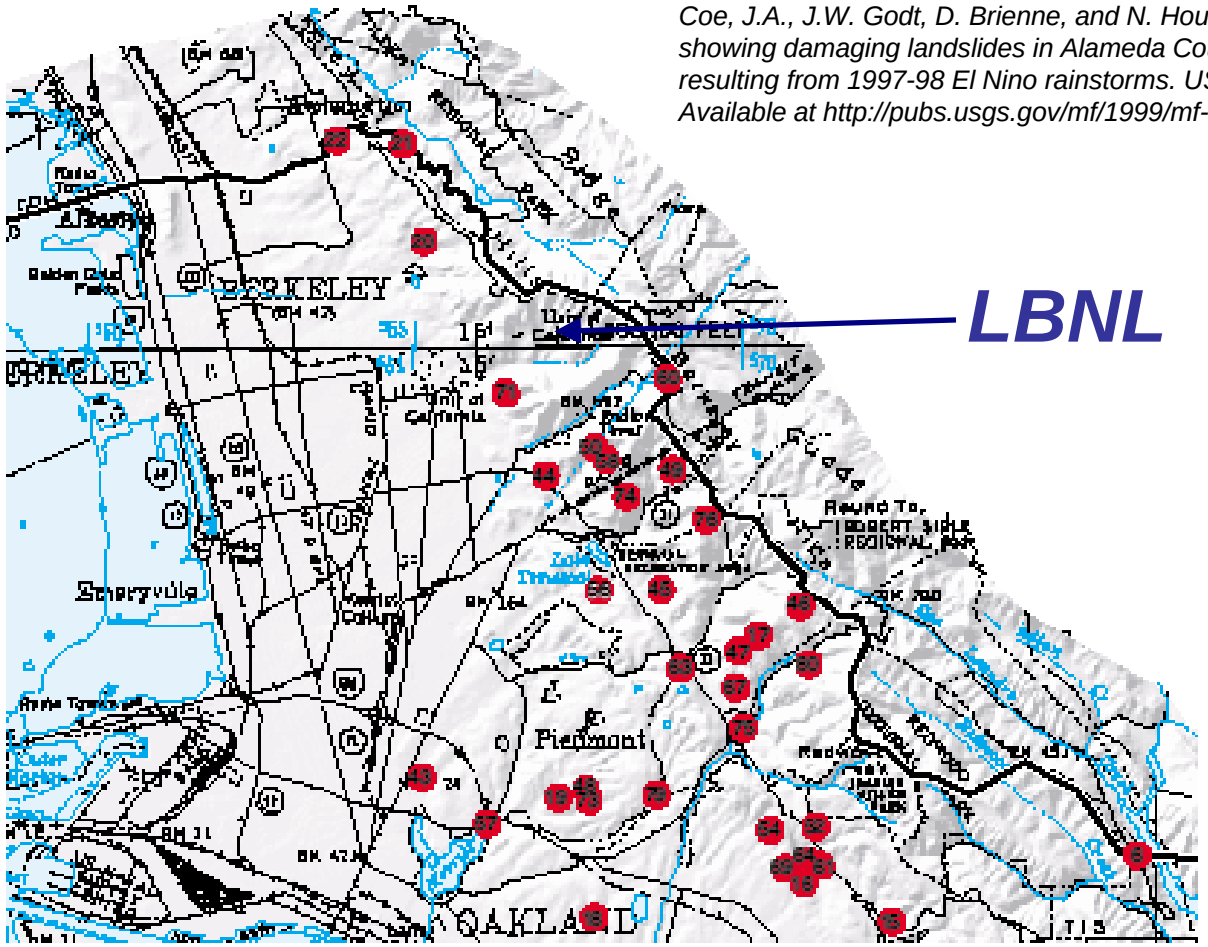
data from http://www.wrcc.dri.

Precipitation Through February



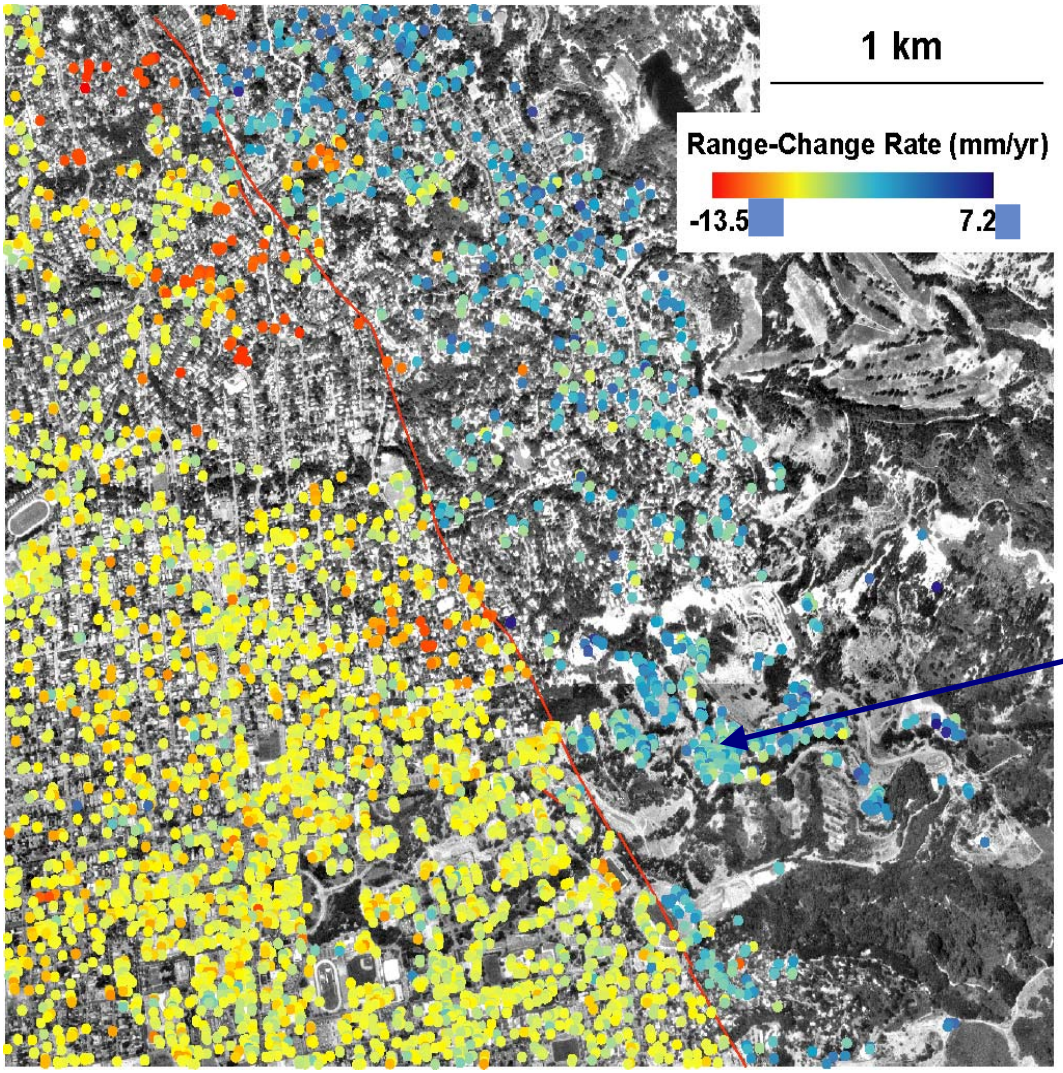
data from http://www.wrcc.dri.

1997-98 Landslides



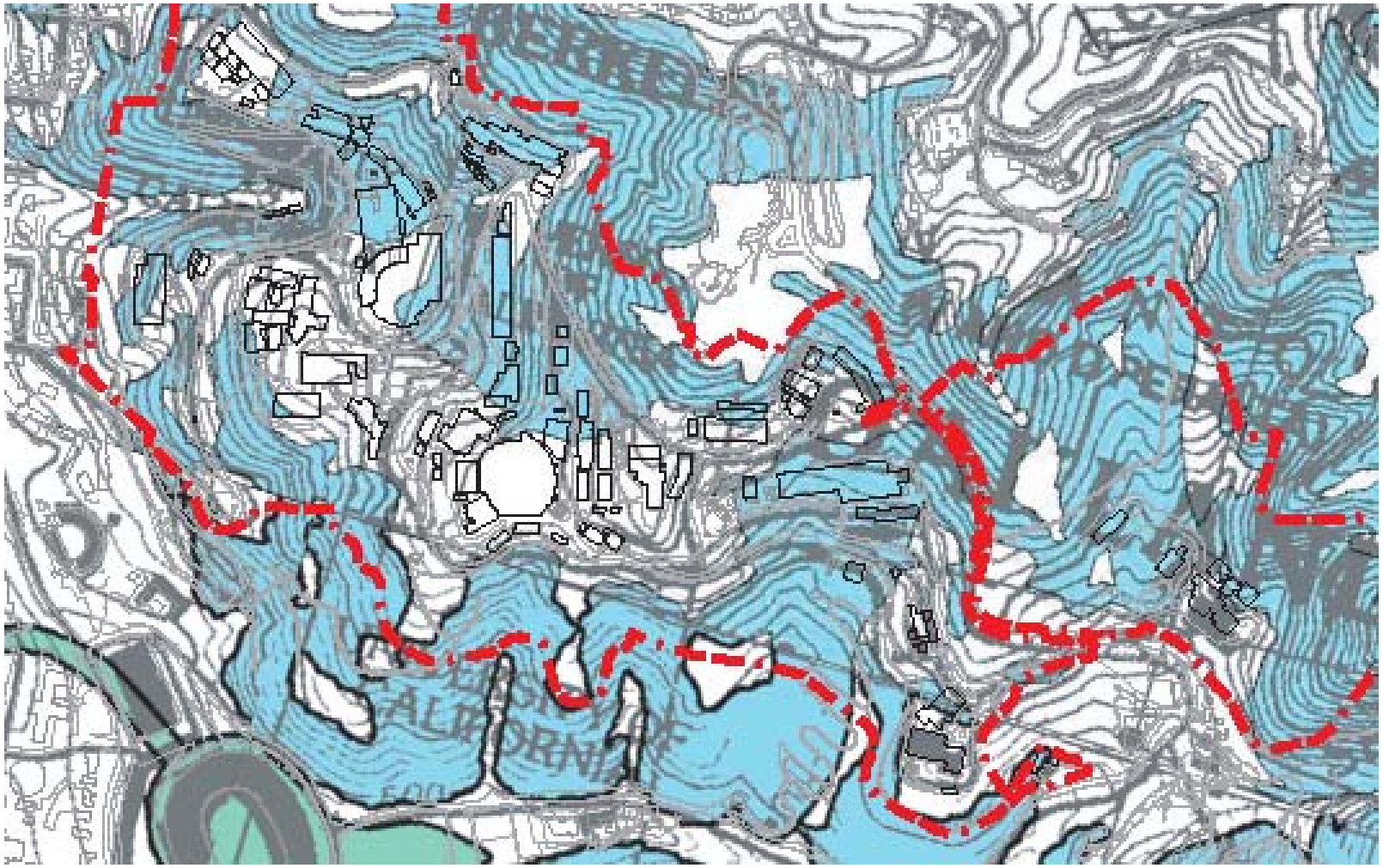
Coe, J.A., J.W. Godt, D. Brienne, and N. Houdre, 1999. Map showing damaging landslides in Alameda County, California, resulting from 1997-98 El Nino rainstorms. USGS MF-2325-B. Available at http://pubs.usgs.gov/mf/1999/mf-2325-b/mf2325b.pdf.

1992-2000 InSAR

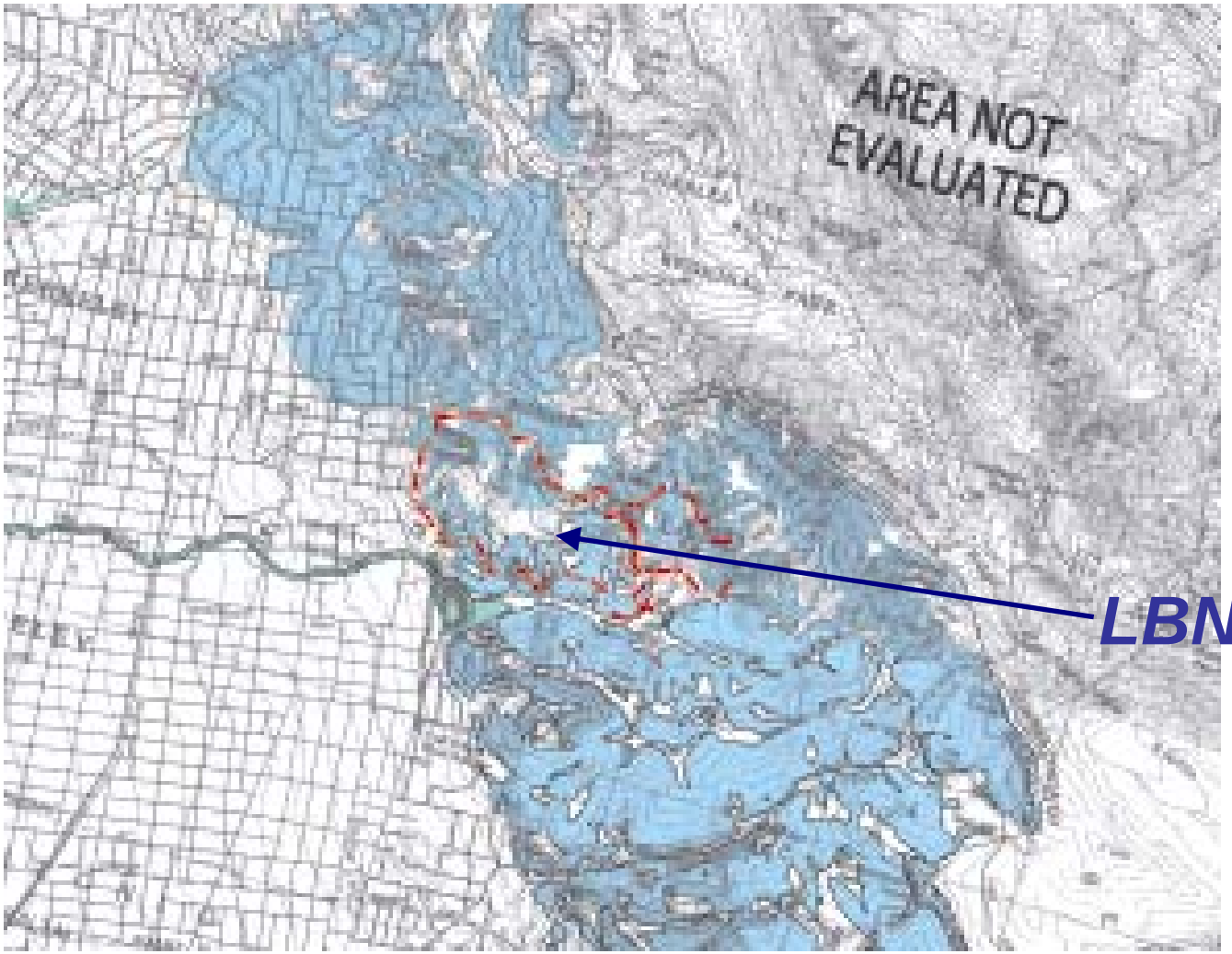


Courtesy of Roland Burgmann, UCB Professor of Earth and Planetary Science

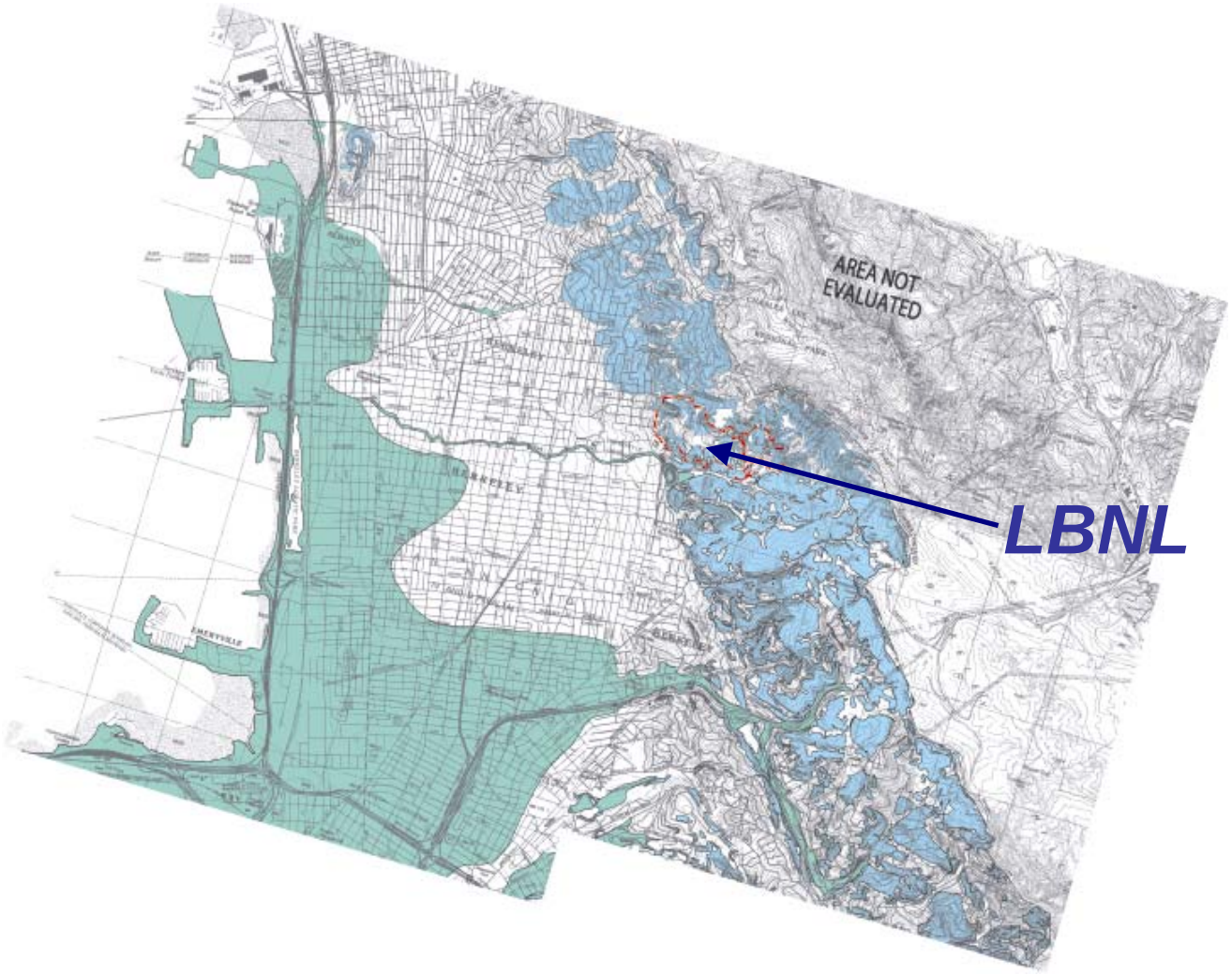
Earthquake-Induced Landslide Study Zones



Earthquake-Induced Landslide Study Zones



Earthquake-Induced Landslide Study Zones



In Conclusion

- There is no evidence of a caldera at LBNL
- The topography of LBNL suggests the volcanic rocks are stronger and more resistant to erosion that the other geologic units
- There is no evidence of a past landslide on the western slope of LBNL impacting the area below
- Slope stability is a concern at LBNL, as it is throughout the Berkeley Hills
- The LBNL site is on average more stable than the surrounding hills due to the initial site characteristics and the completed slope stability projects
- LBNL will continue to evaluate and improve slope stability