California
Department of
Conservation
California Geological Survey

Careers in Geology:

Engineering Geology (and more!) at the California Geological Survey

Tim Dawson
timothy.dawson@conservation.ca.gov

Professional Background

1989 – 1994: University of Oregon, B.S. (1994). Field Assistant, San Andreas fault paleoseismic projects.

1995 - 1997: Geologist, Yucca Mountain Project (USGS)

1997 – 2000: San Diego State University, M.S. (2000)

2000 – 2004: Geologist, USGS Earthquake Hazards Team, Menlo Park

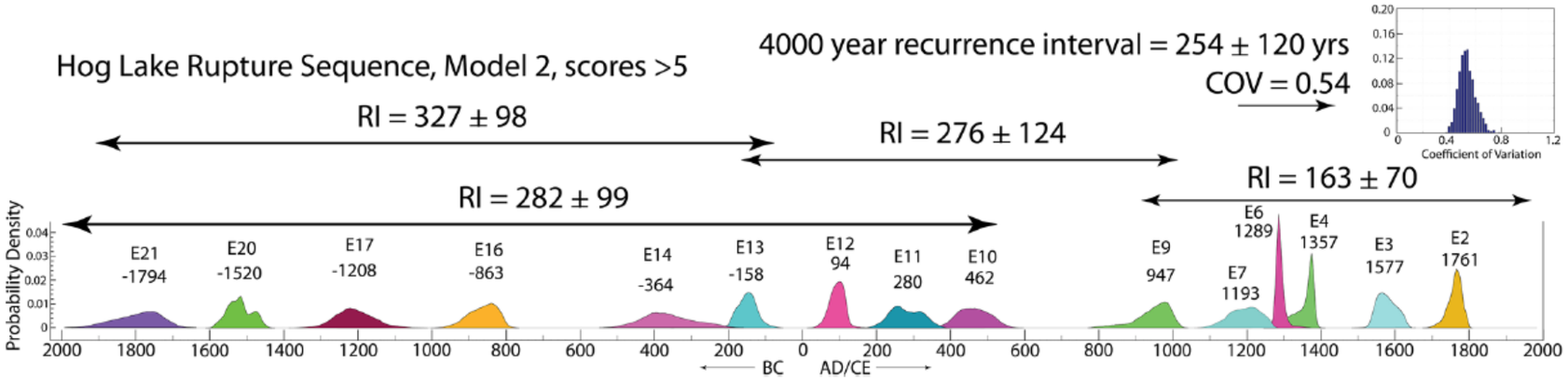
2004 – 2007: Consulting Geologist (ECI, URS, Independent)

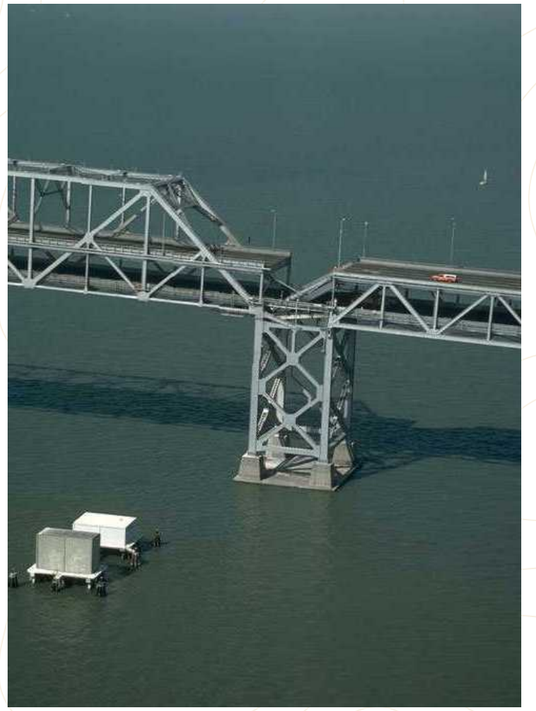
2007 – 2014: Engineering Geologist, California Geological Survey

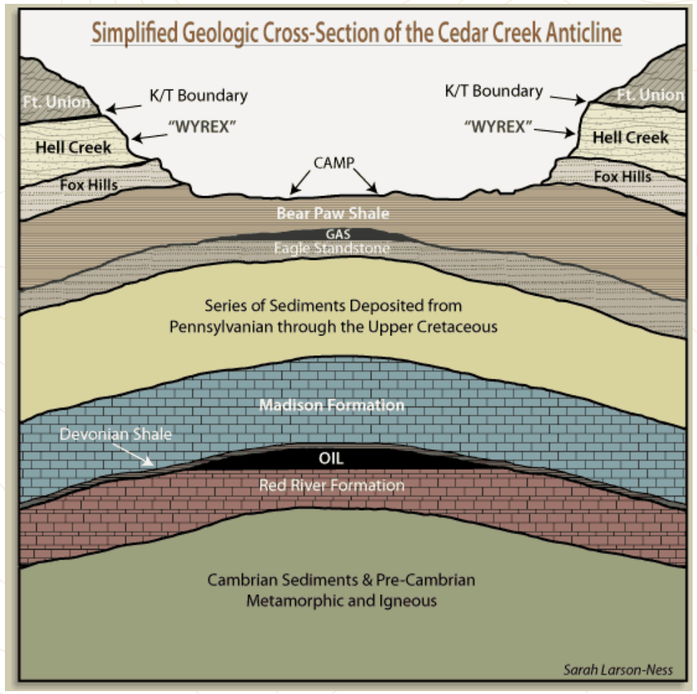
2014 - present: Senior Engineering Geologist, California Geological Survey

Why a Career in Geology?

Intersection of basic research and applied science



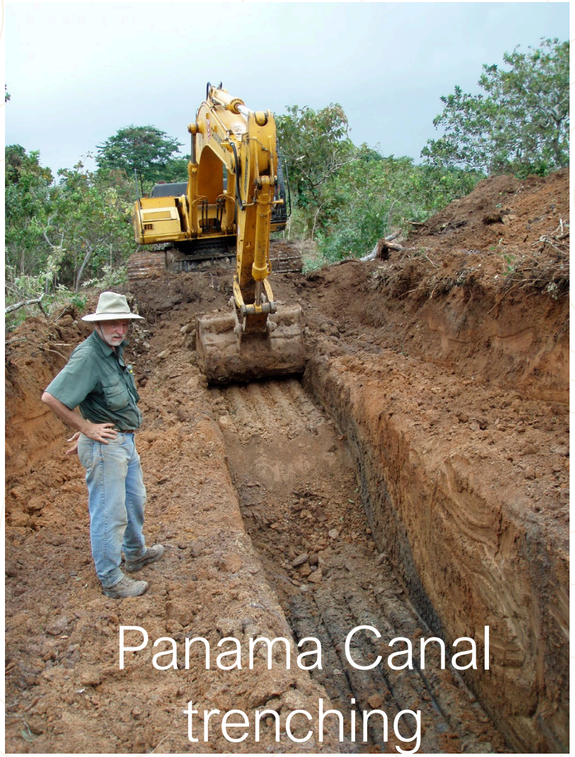




Why a Career in Geology?

Interesting places


Denali fault rupture, Alaska


Panama Canal trenching


New Zealand


Mt Yasur volcano – Vanuatu

State of California Departments that Employ Earth Scientists

Caltrans

Department of Conservation (including CGS, CalGEM, Mine Reclamation)

California Energy Commission

State Water Resources Control Board

Toxic Substances Control

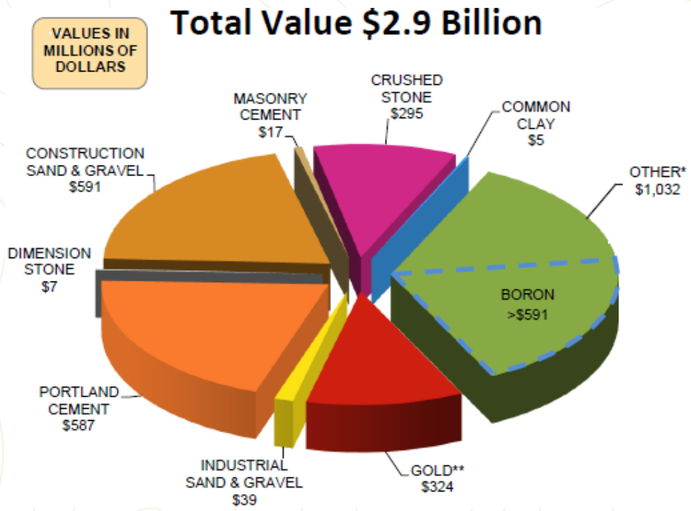
Department of Water Resources

Parks & Recreation

Dept of Fish and Game

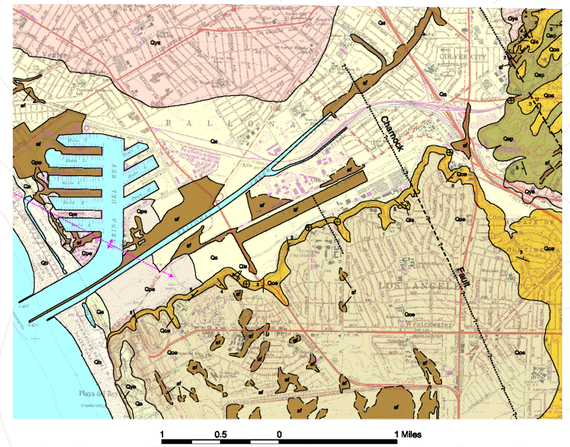
California Geological Survey Overview

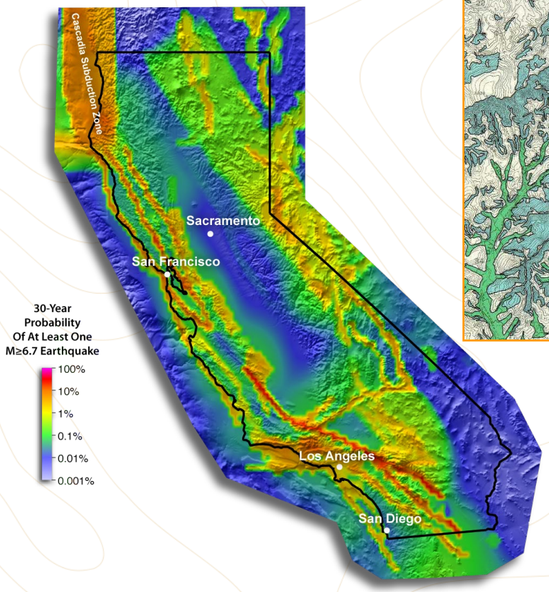
The mission of CGS is to provide scientific products and services about the state's geology, seismology and mineral resources including their related hazards, that affect the health, safety, and business interests of the people of California

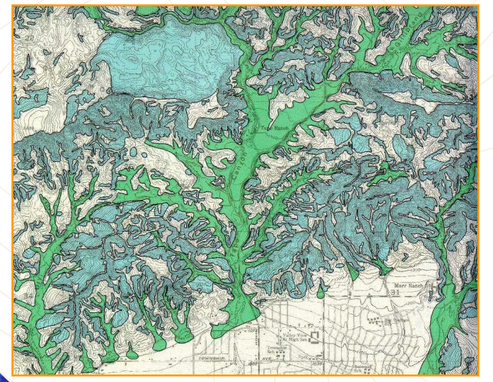


California
Department of Conservation

California Geological Survey







California Geological Survey Overview

Staff Overview

- Engineering Geologists: ~60
- Engineers (Civil): 4
- Technical Staff (GIS, Instrument techs): ~30
- Administrative Support: ~20

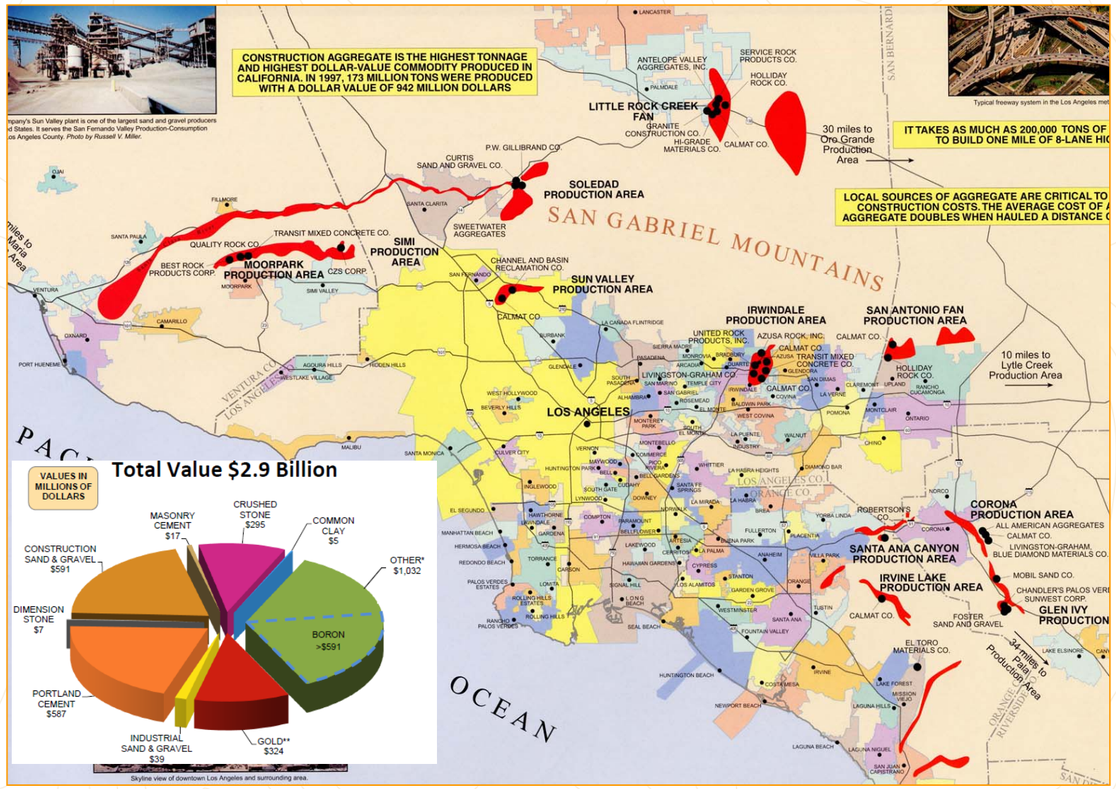
Office Locations

Typical Experience and Education at CGS

Mix of backgrounds:

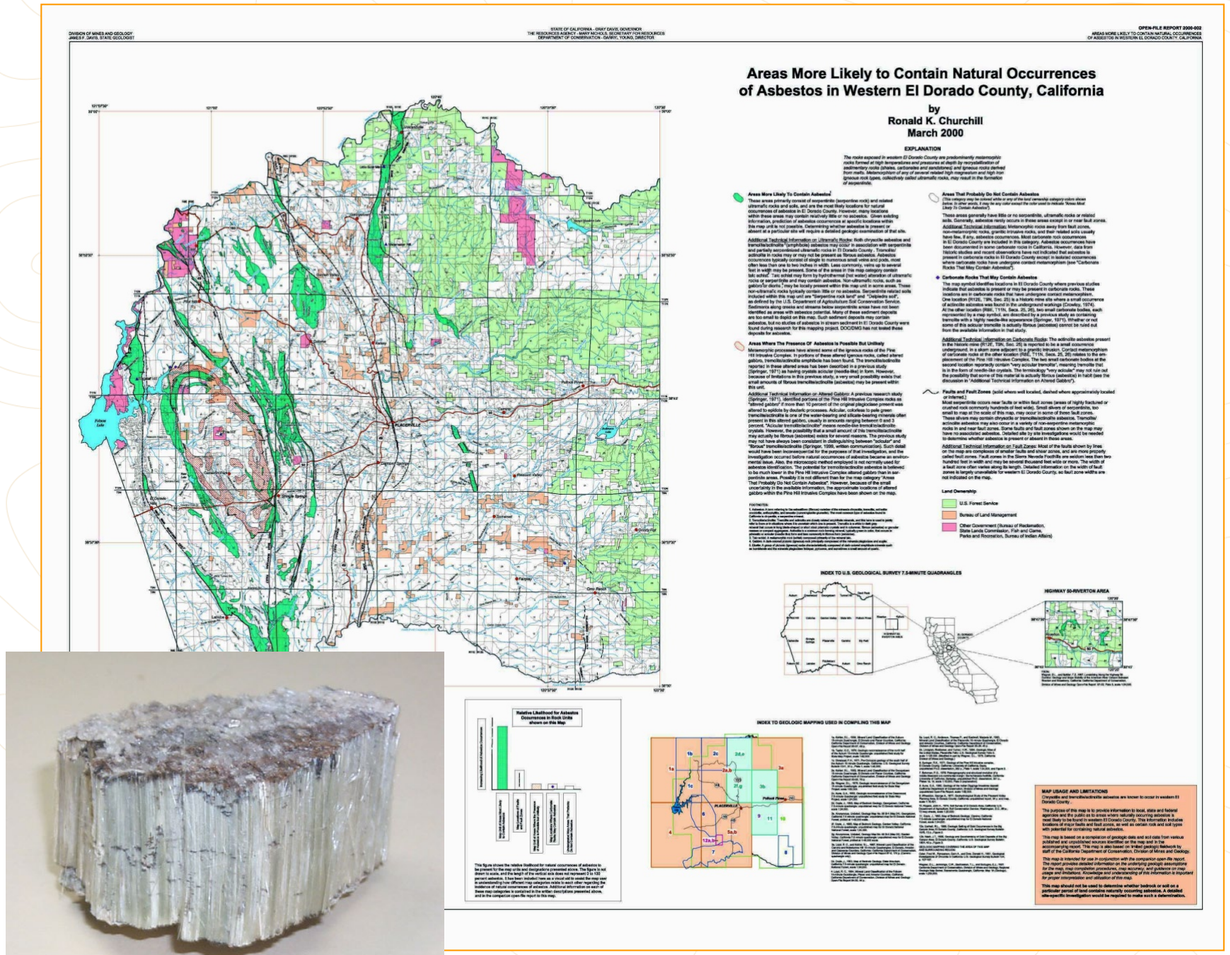
- Degrees: Bachelors, Masters, and PhDs
- Many have previous experience as consulting geologists or at other State agencies
- Career geologists at CGS (“20 to life”)
- Professional licensure (P.G.) required for upper pay scales and preferred for hiring.
- Other registrations desirable: C.E.G., C.H.G.

CGS Programs:
Mineral Resources and Hazards

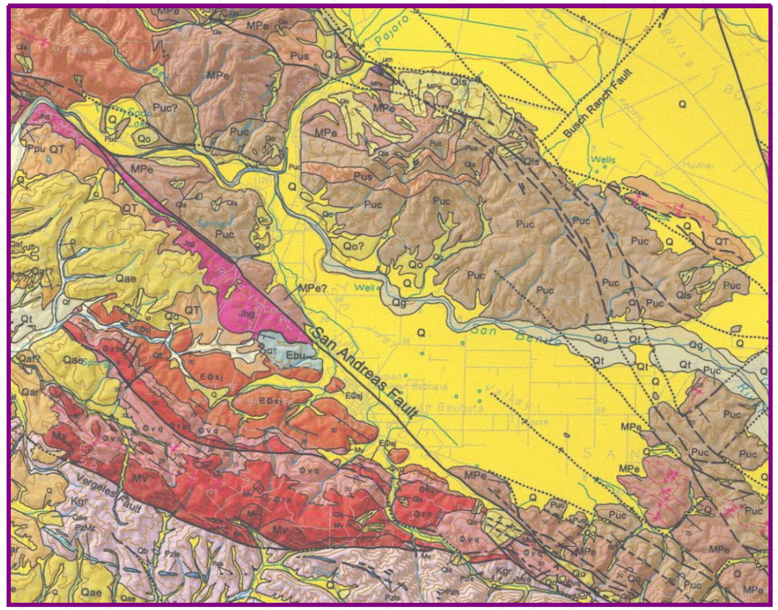


Aggregate (sand and gravel) resources

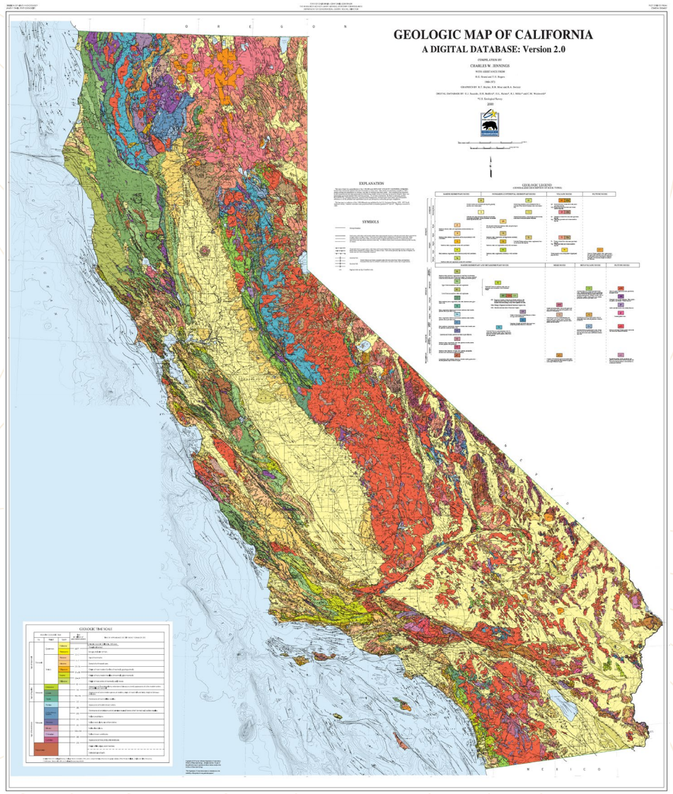
Mineral Hazards (Asbestos, radon)



CGS Programs:
Geologic Mapping

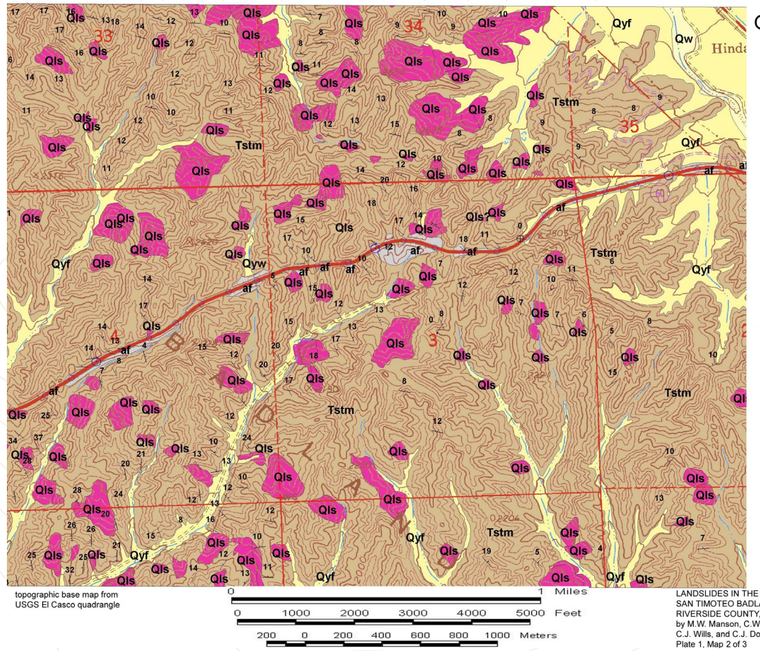


Regional Geologic Mapping
StateMap funded projects



Regional Compilations

Landslide mapping and inventories



CGS Programs:
Forest and Watershed Geology

Provide technical information, advice, and hazard maps

- Landslides, erosion, sedimentation
- Land-use decisions
- Activities that affect water quality & fish habitat
- Timber Harvest Plan reviews

CGS Programs: Seismic Hazards

- Surface fault rupture (Alquist-Priolo (AP) Earthquake Fault Zoning Act)
- Liquefaction (Seismic Hazards Mapping Act)
- Earthquake-induced landslides (Seismic Hazards Mapping Act)
- Tsunamis (Seismic Hazards Mapping Act)

CGS Seismic Hazards Program Products: Earthquake Zones of Required Investigation Maps

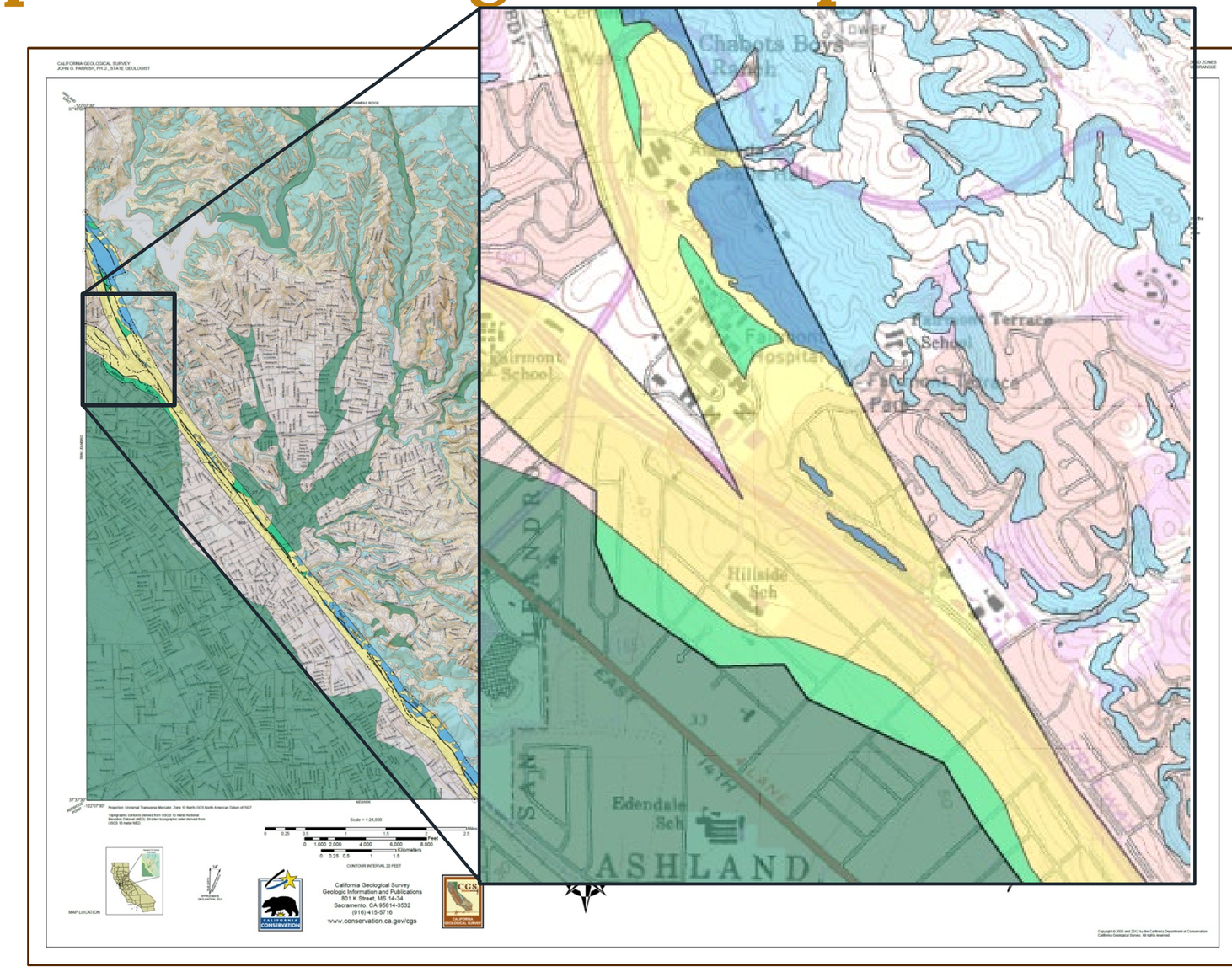
California Department of Conservation
California Geological Survey

Regulatory Earthquake Zones of Required Investigation for earthquake ground deformation.

Includes:
Earthquake Fault Zones (A-P Zones)
Seismic Hazards Zones (liquefaction and earthquake-induced landslides), Tsunami Inundation Zones

Developments must conduct fault investigations within these zones prior to development.

If a hazard is identified at the site-specific level, it must be mitigated.



CGS Programs:
Seismic Hazards

Technical Review of Critical Facilities for Regulatory Agencies

- School Site Review (DSA)
- Hospital Site Review (OSHPD)
- Critical Facilities (CPUC)

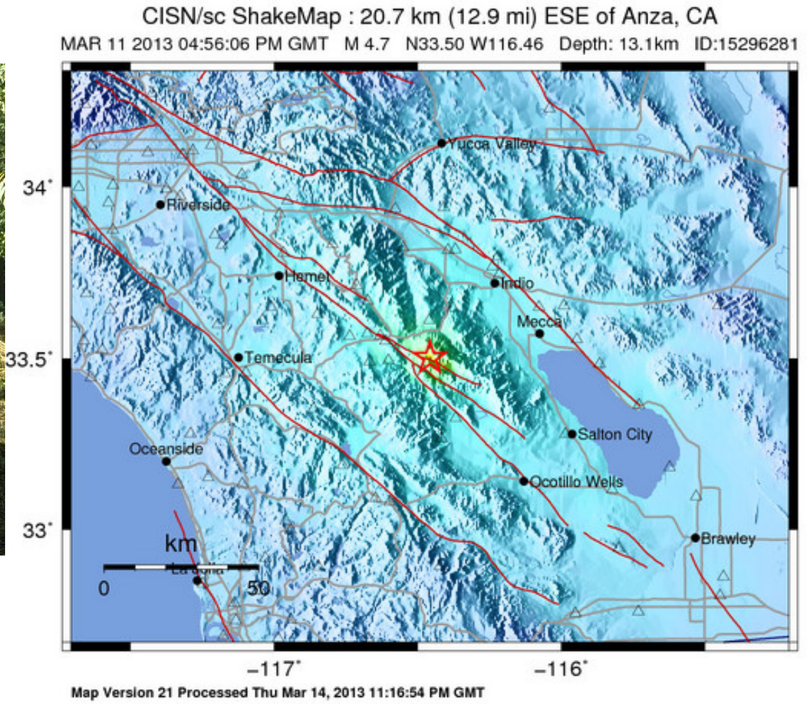
CGS Programs:
Strong Motion Instrumentation Program (CSMIP)

Program designed to provide data on strong ground motion in earthquakes, including response of structures to strong shaking

Goals:

- Measurement of earthquake shaking in a wide variety of structures that can be used to improve structural engineering design.

- Rapid measurement of strong ground motion during earthquakes and dissemination of that information to emergency managers.



PERCEIVED SHAKING	Not felt	Weak	Light	Moderate	Strong	Very strong	Severe	Violent	Extreme
POTENTIAL DAMAGE	none	none	none	Very light	Light	Moderate	Mod./Heavy	Heavy	Very Heavy
PEAK ACC.(%g)	<0.05	0.3	2.8	6.2	12	22	40	75	>139
PEAK VEL.(cm/s)	*<0.02*	*0.1*	*1.4*	*4.7*	*9.6*	*20*	*41*	*86*	*>178*
INSTRUMENTAL INTENSITY	I	II–III	IV	V	VI	VII	VIII	IX	X+

Scale based upon Worden et al. (2011)

Post-Event Response: Earthquakes, Tsunamis, and Wildfire Disaster Preparedness

California Department of Conservation

Earthquakes: Documentation of surface fault rupture, liquefaction, landslides.

Tsunamis: Documentation of tsunami runup, coastal and harbor effects.

Watershed Emergency Response Teams (WERT) helps communities prepare after wildfire by rapidly documenting and communicating post-fire risks to life and property posed by debris flow, flood, and rock fall hazards

Getting a Job at the State of California

California Department of Conservation

Engineering Geologist Position Description

- Knowledge of: Stratigraphic, structural, historical, and economic geology as related to civil engineering projects; geological processes and survey techniques, equipment, and procedures; fundamental principles of mineralogy, petrography, soil mechanics, and hydrogeology; photogeology, geological mapping and drafting, and the application of geology to engineering problems; grouting methods, techniques, and equipment; geological literature; and subsurface exploration and sampling procedures.

- Ability to: Conduct geological and geophysical exploration investigations; conduct independent technical research work; make, record, and evaluate observations on geological engineering problems; make accurate tests, observations, and measurements; analyze situations accurately and take effective action; and prepare and analyze technical reports.

Getting a Job at the State of California

California Department of Conservation

Steps in the State Hiring Process:

1. Search for job postings at calcareers.ca.gov “Engineering Geologist”.

2. Take the Engineering Geologist State Service Training and Experience Exam/Questionnaire. Passing score (or higher places) you on an eligibility list.

3. Apply for position. If qualified, the agency will call you in for an interview.

Career Advice

The market for earth science careers is highly competitive so…

- Get as much practical experience as possible.
- Engineering geologists tackle a range of issues and a diverse skill-set is always desirable to a potential employer.
- Get licensed (or start the process)

    ASBOG Exam – Standardized test

    1. Fundamentals of Geology – GIT
    2. Practice of Geology
    3. California Specific Examination

Career Advice (cont'd)

- Take the Engineering Geologist Exam for State Service

- Consider other State agencies in addition to CGS (DWR, Caltrans, etc)
    - Lateral transfers within State-service is common (although people tend to stay in CGS)

California
Department of Conservation

THANK YOU

Questions?

Tim Dawson
Timothy.Dawson@conservation.ca.gov