Surface Rupture Information Needed for Bridge Design

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May 20, 2009

Surface Fault Displacement Hazard Workshop

PEER

Information needed:

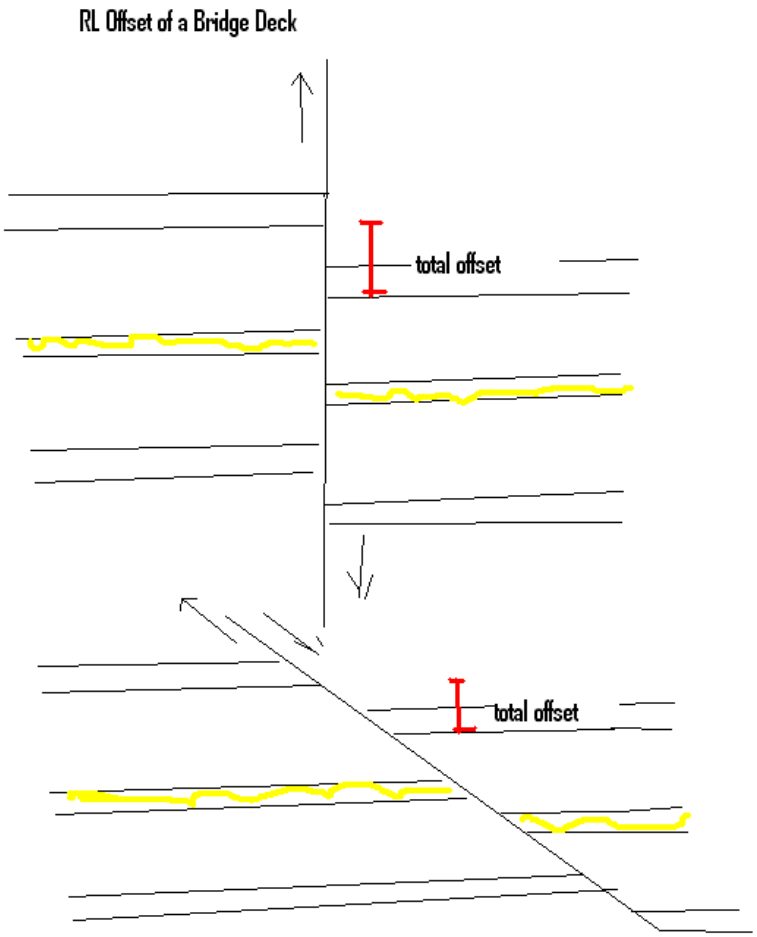
- Fault location
- Fault width/setback
- Geometry/sense of displacement
- Expected amount of displacement
- Will the displacement be distributed across several strands or occur on a principal fault?

Caltrans currently uses:

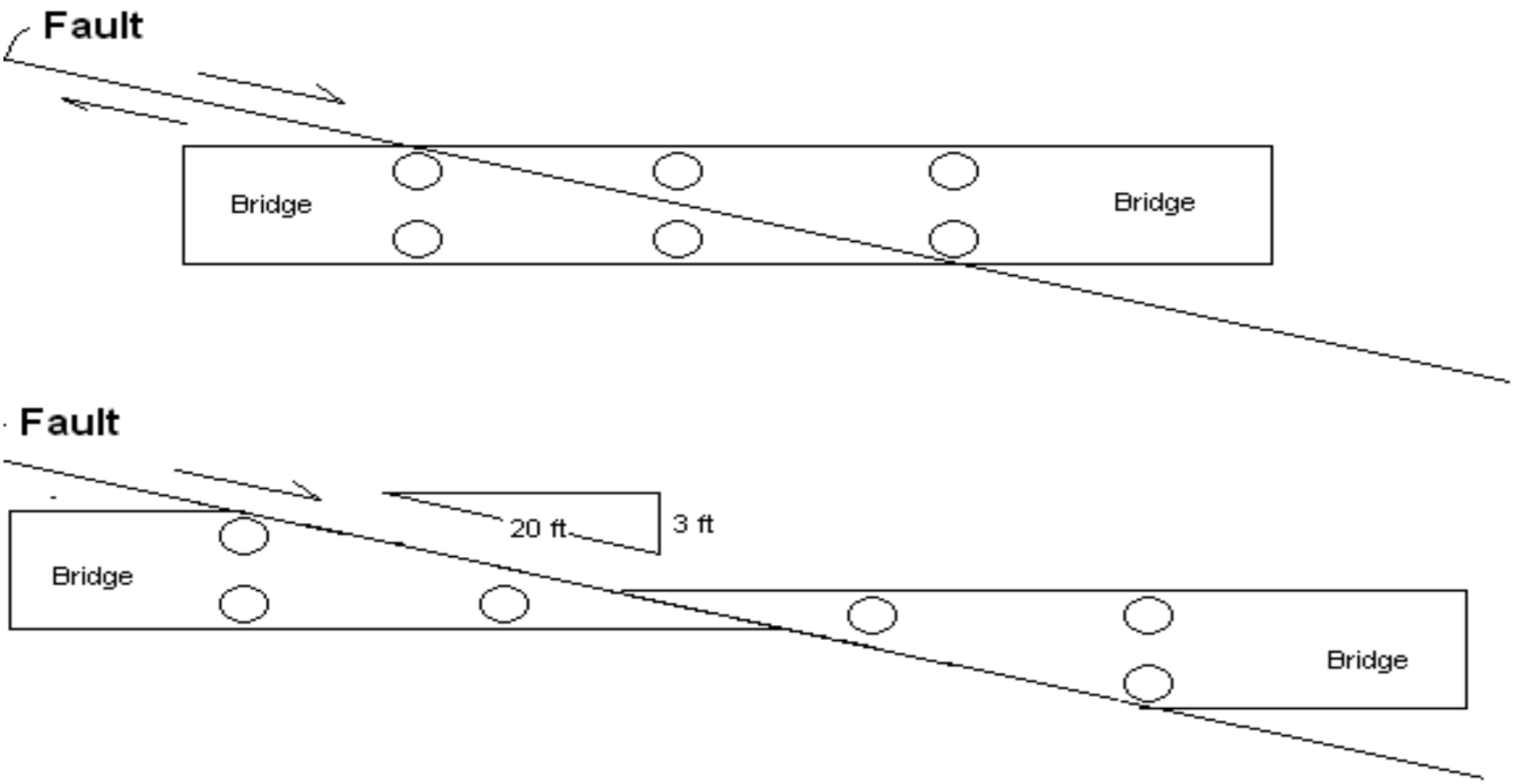
Late-Quaternary age faults (includes faults not in EFZs)

– sometimes the engineer accepts the expected displacement without further work because the original design can accommodate it.

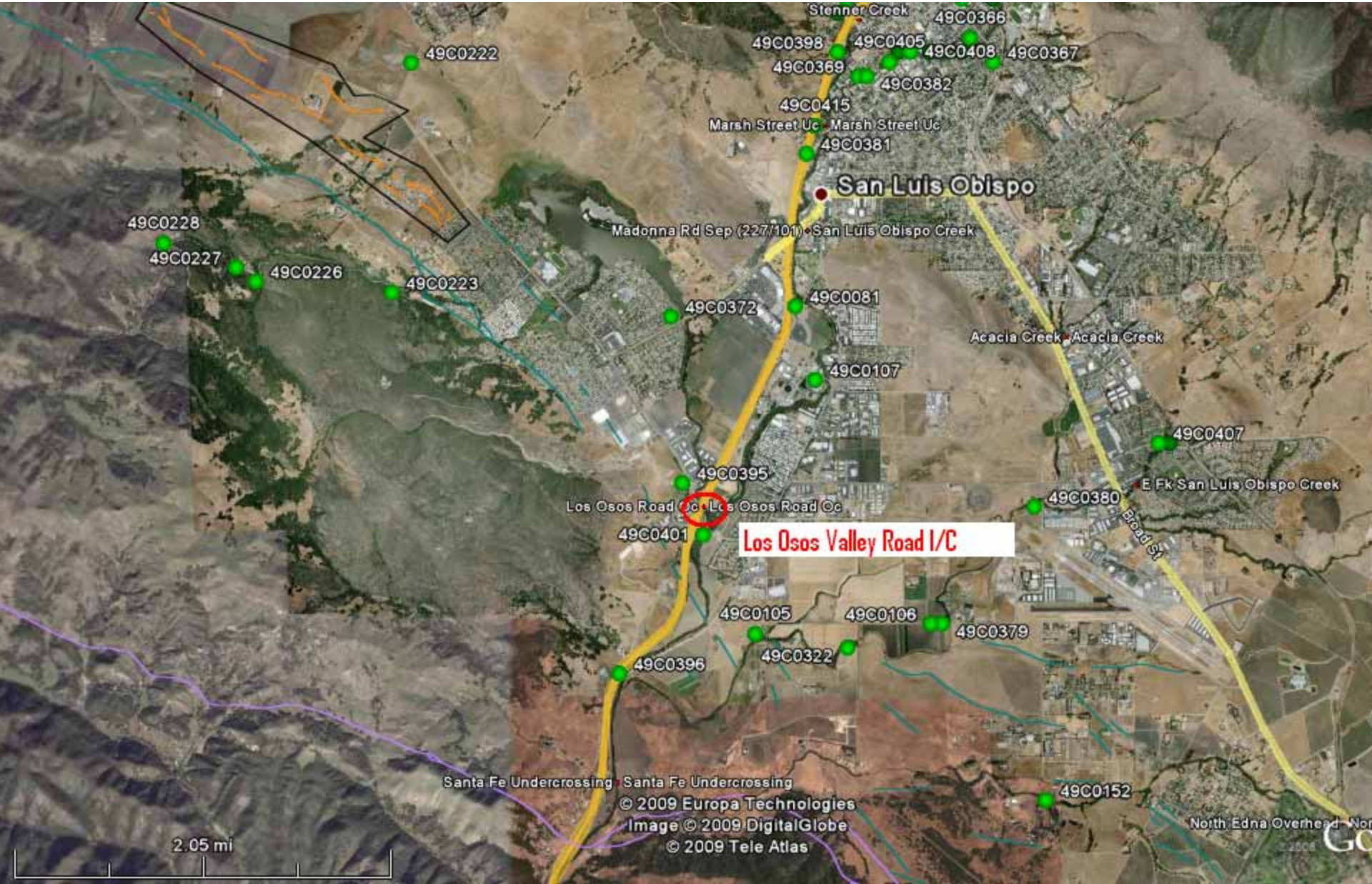
Angle-corrected offset?



Angle-corrected offset?



Example: Los Osos Valley Rd I/C



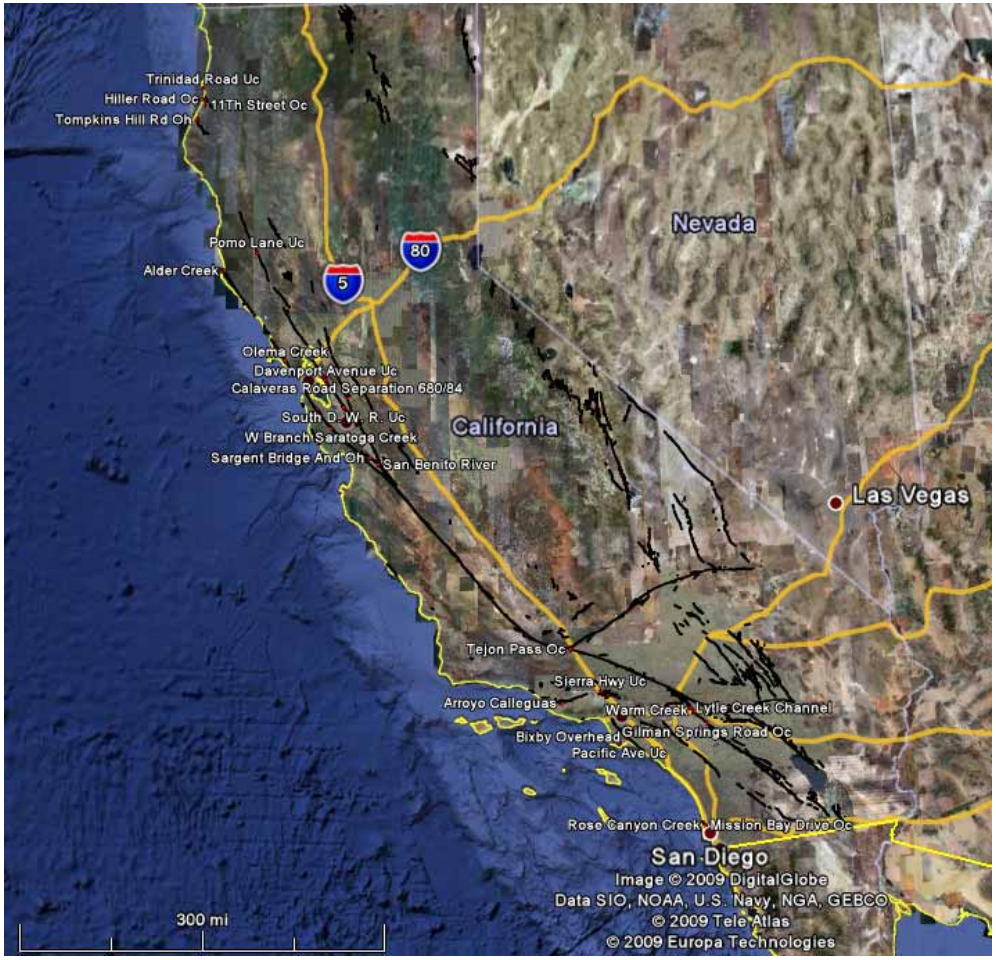
Example: Los Osos Valley Rd I/C

- No fault mapped but minor fault evidence
- Estimate “conservative” offset
- Run that number by the engineer – too big?
- Look closer at potential fault location/ geometry; if there were a fault there would it be a splay/in a step/at the end of a fault where the offset might not be as large?
- What further work if any would help in decision-making?

Current study of fault rupture at Caltrans bridges:

- Caltrans files – foundation reports, LOTBs, some fault studies (most are in CGS files)
- Maintenance records for unusual damage on creeping faults
- Air photos – Caltrans has historic air photos along highways
- Consultant work – e.g. 12/80/680, San Bernardino area

Bridges within 100 ft of EF-zoned fault (for starters)

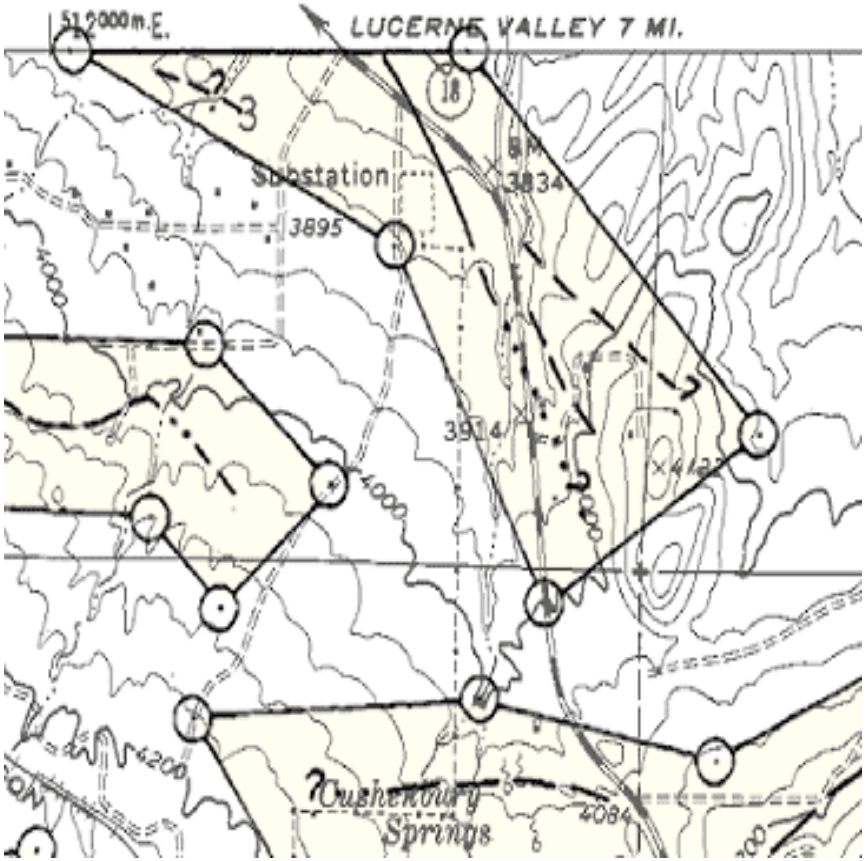


San Benito River Bridge – San Andreas Fault

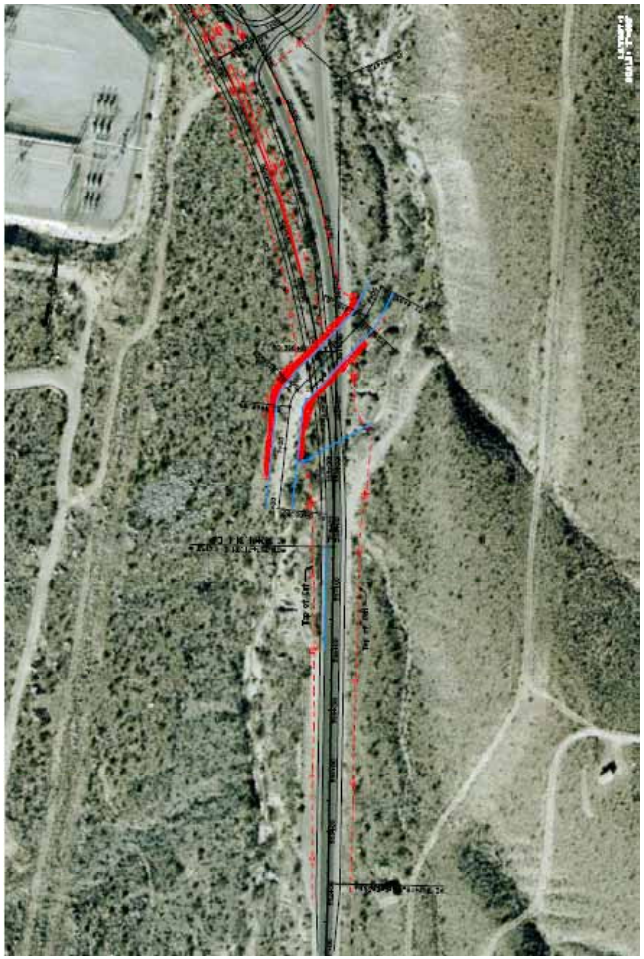
Sargent Bridge and Overhead – Sargent fault

Sargent Bridge and Overhead – Sargent fault

Cushenbury Creek Bridge – Helendale fault



Cushenbury Creek Bridge – Helendale fault



Summary

- We need:
  - Specific information about faults near bridges, including location, width, geometry, and displacement
  - Suggestions about estimating displacement
  - Suggestions about if and how to apply angle corrections
  - Suggestions about setback/soil or rock differences?
  - Suggestions about using PFDHA approach to surface rupture displacement in space and time?

- We have:
  - Geologic information of varying quality on bridge sites
  - Scientific and large-scale equipment, right-of-ways, and potential funding (if we can justify it as work at a bridge)