Surface Rupture Information Needed for Bridge Design

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Information needed:

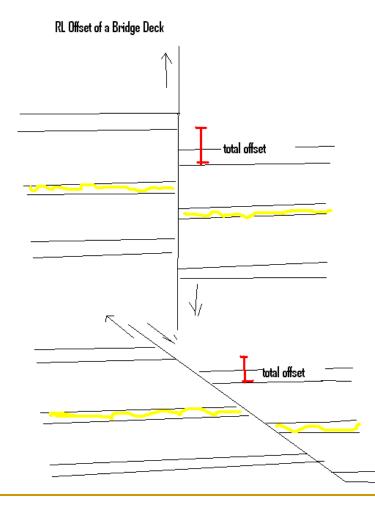
- Fault location
- Fault width/setback
- Geometry/sense of displacement
- Expected amount of displacement
- Will the displacement be distributed across several strands or occur on a principal fault?

Caltrans currently uses:

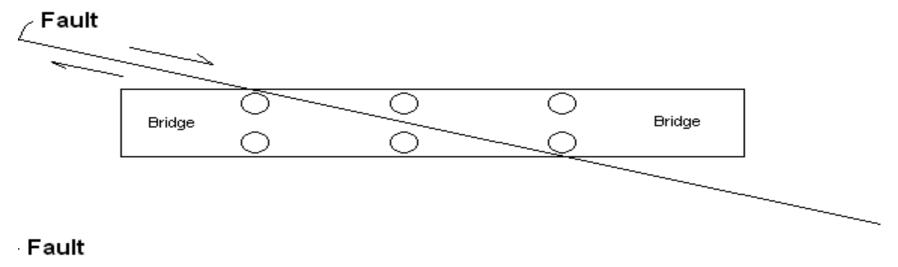
Late-Quaternary age faults (includes faults not in EFZs)

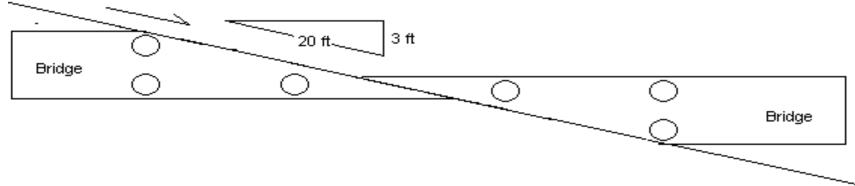
 sometimes the engineer accepts the expected displacement without further work because the original design can accommodate it.

Angle-corrected offset?



Angle-corrected offset?





Example: Los Osos Valley Rd I/C

49C0228

49C0227

49C0226

4900223

Constant of the

4900222

Stenner Creek 49C0366 49C0398 49C0405 49C0369 49C0369 49C0382

49C0415 Marsh Street Uc - Marsh Street Uc - 49C0381

San Luis Obispo

Madonna Rd Sep (227/101)+San Luis Obispo Creek

4900372

4900395

4900105

490032

Los Osos Road Colles Osos Road Oc

4900081

Acacia Greek Acacia Greek

4900107

Los Osos Valley Road I/C

4900106

4900379

200 ----

4900407

49C0380 E Fk San Luis Obispo Creek

Santa Fe Undercrossing © 2009 Europa Technologies Image © 2009 DigitalGlobe © 2009 Tele Atlas

4900401

4900396

4900152

North Edna Overhead

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?

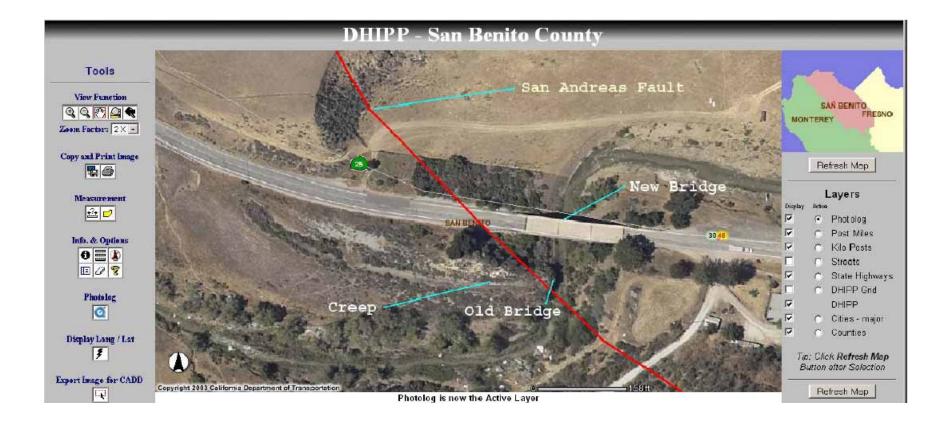
Current study of fault rupture at Caltrans bridges:

- 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

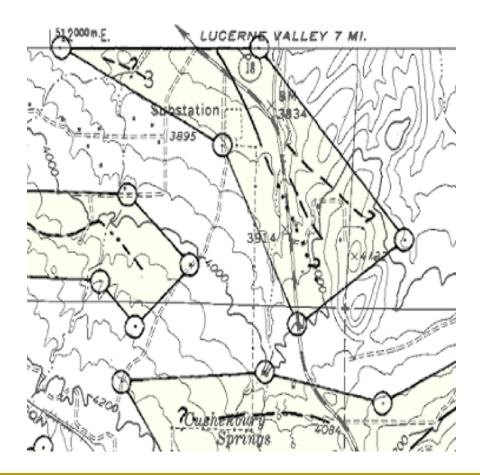


Sargent Bridge and Overhead – Sargent fault

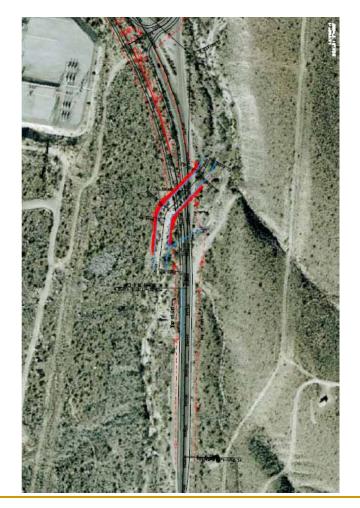


Offset in left bridge barrier at second hings in Span 4.

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)