POST EARTHQUAKE INVESTIGATION TEAM (PEQIT) MANUAL

MARCH 2013

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APPENDIX A: Caltrans Safety Manual Excerpts

APPENDIX B: California Earthquake Related Information

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INTRODUCTION

The Post Earthquake Investigation Team (PEQIT) gathers information about the performance of bridges and other highway structures after a large earthquake. This information is used to evaluate Caltrans' current design and retrofit procedures. Because highway damage is removed or repaired very quickly after an earthquake, the PEQIT must be single-minded in their pursuit of data. Although there are constant demands from professors, reporters, engineers, and residents after an earthquake, the PEQIT cannot allow itself to be sidetracked. A successful post-earthquake investigation depends on preparation, organization, coordination, communication, and cooperation. It depends on a commitment on the part of all members, but it also depends heavily on safety. The highway is a particularly dangerous place after an earthquake and the PEQIT must remember that no piece of information is worth endangering one's life.

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PEQIT ROSTER (UPDATED FEBRUARY 28, 2013)

PEQIT/EEAR HOTLINE 916-227-8804				
Office Chief:	Tom Ostrom	Office No. 916-227-4119	Cell No. 916-803-4975	Home No. 916-939-7440
Coordinator:	Mark Yashinsky (*)	Office No. 916-227-8719	Cell No. 916-335-2685	Pager No. 916-948-1851
Assistant:	Bob Tanaka	Office No. 916-227-8784	Cell No. 916-606-6929	

Name	Office	Office No.	Home/Other No.	Cell No.
1. Fadel Alameddine (L, C)	EEAR	916-227-8512		
2. Don Lee (L, C)	EEAR	916-227-8191		
3. Steve Mitchell (L, C)	EEAR	916-227-8083		
4. Jaro Simek (*, L, C)	EEAR	916-227-8095		
5. Richard Heninger (L,C)	EEAR	916-227-8735		
6. Jim Gutierrez (L, C)	EEAR	916-227-8519 707-654-1229		
7. Rod Simmons	Design Sacramento	916-227-8168		
8. David Alvarez (C)	Design Sacramento	916-227-8511		
9. Traci Menard (L, C)	Design Sacramento	916-227-8763		
10. Marc Friedheim (C)	Design Sacramento	916-227-8480		
11. Mary Beall (C)	Design Sacramento	916-227-8888		
12. Matt Schott (C)	Design Sacramento	916-227-8609		
13. David Romero (C)	Design Sacramento	916-227-8890		
14. Ron Bromenschenkel	EEAR	916-227-8151		
15. Sharon Yen	Design Sacramento	916-227-5209		
16. Paul Chung	Design South	909-595-4743		
17. Bin Shen	SC Stockton	760-937-3236		
18. Frank Wei	Design South	909-598-1872		
19. Dawit Worku	Design South	909-595-4506		
20. John Peterson	Design West	925-286-6857		
21. Muthanna Omran	Design West	510-286-5798		
22. Robert Zezoff (L, C)	Local Assistance	916-227-9881		
23. Scott Straub	Local Assistance	916-227-3146		
24. Yusuf Saleh (*)	OSFP Management	916-227-0971		
25. Steve Ng (*)	Hydraulics	916-227-8018		
26. Sharid Amiri	Geo Services South	949-724-2599		
27. K Douglas Cook	Geo Services North	916-227-4514		
28. Martha Merriam (L, C)	Geo Services North	916-227-7135		
29. Mike Keever (L, C)	Design West	916-227-8806		
30. Amir Rahbari	EEAR	916-227-8810		

(L) – Laptop **(C) – Digital Camera and/or Other Suitable Device** **(*) – CalEMA Badge**

Note: Home and Cell phone numbers, Emergency Form Information, etc., are not published. At the time of normal operation they are available only to the Office Chief, PEQIT Coordinator, and his Assistant. However, we ask that in the time of emergency you post your Home and Cell phone numbers on your Office answering system. This way each team member can reach all other PEQIT workers when necessary.

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POST EARTHQUAKE INVESTIGATION PROCEDURE

1. PEQIT coordinator is notified of large earthquake and contacts EEAR Chief.

Caltrans' Highway Communication Center (CHCC) will telephone the Chief of the Office of Earthquake Engineering (EEAR) or the PEQIT coordinator, usually within half an hour after an earthquake with a magnitude greater than 5.5 occurs. The CHCC will report the magnitude and time of the event and the geographical location. Alternatively, the coordinator may receive notification of a large earthquake on the CGS Strong Motion Instrumentation Program (SMIP) pager, the California Integrated Seismic Network (CISN) Computer, or from a ShakeCast email. After receiving notification, the coordinator should contact the EEAR Chief to discuss what further action is necessary.

Earthquakes with magnitude less than 5.0 can be ignored and earthquakes with magnitude less than 6.0 don't usually require an investigation. However, magnitude isn't always a good parameter for determining bridge damage. There was almost no bridge damage during the October 16, 1999 M7.1 Hector Mine Earthquake while a bridge almost collapsed during the July 29, 2008 M5.4 Chino Hills Earthquake.

2. Coordinator determines geographical area to be investigated.

It's difficult to precisely determine in what area bridges will be damaged during a given earthquake. During the 1989 Loma Prieta Earthquake most of the bridge damage occurred sixty miles away. During the 1994 Northridge Earthquake, two bridges were damaged on the Santa Monica Freeway, many miles from the epicenter. However, Shakemap and ShakeCast are good tools for a preliminary determination of the area of heavy shaking after an earthquake, and their predictions will improve in the hours and days after the earthquake occurs.

The coordinator can download the appropriate Shakemap file showing the intensity of ground shaking from http://pasadena.wr.usgs.gov/latest/shakingmaps.html and overlay it in ArcMap or in Google Earth to determine the area to be investigated following large earthquakes (see page 12 for instructions on creating a list of bridges using ArcMap).

ShakeCast sends out an email with ground shaking maps and a list of potentially damaged bridges based on the intensity of ground shaking and on an estimate of bridge vulnerabilities.

The Log of Bridges on State Highways (http://www.dot.ca.gov/hq/structur/strmaint/brlog2.htm) lists all bridges by post mile for every route in California. Once the area to be investigated is determined, the coordinator can use the 'Log' to create a list of bridges in the impacted area.

Local bridges are difficult to locate. The coordinator has a set of county maps with local bridges identified on them. PEQIT investigators assigned to investigate the performance of local agency bridges should copy relevant county maps.

Caltrans is beginning to design a variety of highway structures (tunnels, retaining walls, etc) for earthquakes. Members of PEQIT should familiarize themselves with these design procedures and note their performance after earthquakes.

3. Coordinator uses the PEQIT roster to contact sufficient engineers for the investigation.

The goal in selecting engineers is to obtain a mixture of experienced and new earthquake investigators so that everyone can gain experience without jeopardizing safety, efficiency, or the quality of the final report.

4. Coordinator obtains information for PEQIT.

There is a great deal of information that can help the team conduct a thorough, productive investigation. This information may include lists of routes and bridges in the area of strong shaking, maps of roads, areas of weak soils, and as-built plans of affected bridges. The coordinator will attempt to obtain relevant damage and road closure information for use by the PEQIT.

5. Coordinator makes arrangements for transportation and lodging of PEQIT.

Vehicles may be obtained from the Engineering Service Center, Translab, Headquarters, and many other sources. Please read the chapter on 'Resources' for more information.

6. Coordinator assembles, packs, and writes a list of equipment for PEQIT.

Cellular phones are a useful way of providing breaking information between PEQIT members, between the team leader and the coordinator, with district engineers, maintenance engineers etc. The coordinator has cellular phones for use by the PEQIT. The Coordinator also has pagers and a portable Caltrans radio. Immediately after the Northridge earthquake, the cellular telephone system was unable to handle the huge demand placed on it. However, the PEQIT Leader should still be able to keep in contact by tuning the portable Caltrans radio to the appropriate district. Instructions for using the radio are included, and PEQIT candidates should practice using the radio before an earthquake occurs.

Other equipment such as hard hats, orange vests, cameras, etc. are also available. The PEQIT members must sign out all equipment and are responsible for its safe return to the coordinator. Since the amount of equipment available is limited, during very large earthquakes the PEQIT members may have to use some of their own supplies. The equipment section provides a list of what is available for the PEQIT.

7. Members pack and assemble at the Division of Engineering Services (DES).

When engineers are notified by the coordinator, they should immediately pack all personal items that are needed for an investigation. This may include suitable outdoor clothing for several days away from home, cameras, water, food, and anything else that will allow the investigator to survive in harsh conditions, possibly without lifelines during the investigation. The members should keep a checklist of necessary items, including any prescription drugs, and be able to assemble these items quickly. They should assemble in Room 212 of Farmers Market Plaza I (FMPI) at 1801 30th Street or in the coordinator's cubicle on the 2nd floor of FMPI.

8. Meeting between Coordinator and PEQIT.

Once the PEQIT has assembled at the EEAR, the coordinator will provide the team with whatever information, equipment, and material are available. The coordinator will attempt to obtain special identification to enter restricted areas. The coordinator will designate a team leader for each PEQIT. A daily communication schedule will be arranged between the team leader and coordinator and between the team leader and team members. The PEQIT will divide into groups of 2 or 3 for the investigation. Preliminary assignment of routes will be given for each PEQIT group.

9. PEQIT obtains vehicles, loads vehicles and leaves for area of damage.

Occasionally, a special route will be assigned to avoid damaged roads. In areas of heavy damage the CHP may meet and chaperone the PEQIT to the site. In especially remote areas, special cargo planes may be used to transport the PEQIT and their equipment into the area. One team should leave ASAP to begin recording damage and taking photos before demolition activities have removed seriously-damaged bridges. Contact SC (Structure Construction) for demolition locations and to possibly take photos of activities before PEQIT arrives at site.

10. Coordinator communicates daily with all those involved in the earthquake.

It is the coordinator's job to provide support for the PEQIT. Thus, the coordinator tries to keep abreast of all facts by talking to and attending meetings with Structures Maintenance, Translab, Office of Emergency Services (OES), California Geological Survey (CGS), etc. If the PEQIT has questions or needs help, it's the coordinator's job to find a solution. The coordinator should call the California Highway Communication Center (CHCC) and the District Director to let them know the daily location of the PEQIT.

11. PEQIT has tailgate safety meeting before going into the field.

Every morning before going out into the field, a tailgate safety meeting must be held. The team leader should remind the investigators of potential hazards and safety procedures.

12. PEQIT performs investigation while maintaining contact with coordinator.

Early each day the team leader calls the coordinator to discuss aspects of the investigation. The coordinator's cellular phone, pager, and home phone number are provided in the PEQIT Roster. After talking with the coordinator, the leader meets with the members and gives each of them the day's assignment. This assignment may be to investigate an area, a route, or a specific bridge. The team should not delay the investigation if contact with the coordinator is not successful. However, in that case the leader should attempt to establish contact at a later time. A description of what should be recorded during an investigation is provided in this manual. Because damaged structures block transportation routes, they will be removed as quickly as possible, and the investigation should continue from dawn to dusk. The PEQIT should obtain newspapers everyday for information and as a possible source of photographs. If construction or maintenance personnel were able to take photos before damaged bridges were removed, the PEQIT should interview the person and get their phone number as an additional source of photos. At the end of the day, the PEQIT will meet with the leader and discuss the results of the investigation. The PEQIT members should then organize their day's notes and write down everything significant that was observed that day. The team leader should call the coordinator to review the events of the day and plan for the next day's investigation. The extent of the investigation shall be determined by the PEQIT coordinator in consultation with the EEAR Chief.

13. Coordinator posts daily updates on the Internet

As bridge performance becomes known, the coordinator will write summaries and ftp them to the EEAR Website (http://www.dot.ca.gov/hq/esc/earthquake_engineering/indexNEW.php). If the PEQIT has access to digital cameras, laptop computers, and modems, they should email photos, drawings, and documents to the coordinator for posting at the end of each day's investigation.

14. PEQIT returns to DES and provides digital or hard copies of all photos with labels describing important features.

A digital copy (compact disk, memory card, etc.) or all photographs should be made. All photos should be labeled as thoroughly as possible with the bridge name, number, bridge member, and a brief description of important features. The master set of photos should include where the photo should be placed in the report.

15. PEQIT provides a completed report (hard copy and digital files) to coordinator and returns to normal duties.

The Coordinator will provide the PEQIT with the scope and direction of the report as directed by the EEAR Chief. The contents of a typical PEQIT report are provided in this manual. All team members are expected to participate in this process and complete their assignment before returning to normal duties.

16. Coordinator edits report and prepares a draft copy for review.

Coordinator edits the report for grammar and content. Coordinator adds sections on seismology, geology, geotechnical issues, performance of other highway structures (with help from other Caltrans Offices) as appropriate. Coordinator adds an introduction, recommendations, and a conclusion to the report.

17. Coordinator sends draft PEQIT Report to the General Earthquake Committee for review and to the Executive Earthquake Committee for approval.

Coordinator will send the draft PEQIT Report to the General and Executive Earthquake Committee Managers who will distribute the report to committee members and schedule a meeting to review, discuss, recommend changes and/or approval of the PEQIT Report. This should be done ASAP as discussed in the Charter for the Caltrans' Executive and General Earthquake Committees.

The Executive Earthquake Committee will decide how many copies of the report to print, who should be sent a copy, whether a report with color photographs should be printed, etc.

18. Coordinator publishes and distributes hard copies and Internet version of the PEQIT Report.

The final draft should be converted to a PDF file and checked for errors before sending to reprographics and posting on the EEAR website. The final report should replace the daily summaries that were previously posted on the Internet.

After publication, the Coordinator provides copies as directed by the Executive Earthquake Committee. Copies may be provided to the DES, SD and EEAR chiefs, to the Seismic Advisory Board (SAB), to Technical Publications, the Technical Resource Center, the HQ Library, etc. The coordinator gives the "original" and any remaining copies to the DES publications unit for general distribution. Normally, the copies remaining after the general distribution are sent to the Document Center by the DES publications unit for sale to the public.

Coordinator's Checklist

✓	Coordinator's Checklist
	Monitor earthquake reports and estimate extent of highway/bridge damage.
	Call a sufficient number of engineers from the roster and select a team leader.
	Round up and write down equipment to be used by PEQIT
	Call Structures Maintenance to coordinate lodging and transportation.
	Call airlines, rental agencies, garages, etc. to arrange transport into area of damage.
	Continue monitoring reports to determine areas of damage.
	Obtain maps, bridge logs, and bridge plans for investigators.
	Meet with team to plan investigation and arrange communication.
	PEQIT goes into area of investigation.
	Obtain information and communicate daily with PEQIT.
	Provides update for the EEAR Website.
	PEQIT returns from investigation.
	Organize the writing of the PEQIT report.
	Edit the PEQIT report.
	Send report for review by GEQC and EEQC.
	Make relevant changes to PEQIT report and sends report to reprographics.
	Provide summary of report for the EEAR Website.
	Distribute published report.

PEQIT Leader Checklist

✓	PEQIT Leader Checklist
	It is impossible to set up an exact procedure which will take care of every situation. The guidelines given here are based on past experience and should be modified to suit the situation.
	Tune to local media (Radio, TV, Cable TV, etc.)
	Help assemble investigation team as quickly as possible after the event and help to gather necessary equipment and information for the investigation.
	Transport investigation team to the earthquake site as fast as possible in order to obtain undisturbed data with the least possible delay. If necessary, two members with a camera should leave immediately.
	Alert District and Bridge Maintenance forces to take as many photos as possible before disturbing or removing any damaged structures.
	Notify Deputy District Director that a Structures team is in the area for gathering technical information. (See "RESOURCES")
	Notify the District Communications Dispatcher when you enter or leave the District. (See "RESOURCES")
	Provide the PEQIT Coordinator with your motel name, location, and phone number.
	Gain as much information as possible about damaged bridges, related transportation structures, and earthquake hazards in the region.
	In areas of serious bridge damage, it is sometimes helpful to make a cursory investigation of adjacent building damage, or search for signs of ground surface distress. Sometimes these sources can help establish the primary direction of the ground motion or other factors.
	Get names and addresses of persons who may have taken photos before you got there. Buy local newspapers -- we may want to buy some of their photos.
	Report results of the investigation in a timely and usable manner. A brief summary of the damage may be required within one week of the investigation. A final report should be ready for final typing and publication within one month for most investigations.

OBSERVE - NOTE - PHOTOGRAPH

- Views of structures in elevation and foreshortened views to show general condition.
- Obtain residual displacement of columns and bents. Use plumb bob, level, etc.
- Measure and photograph structure cracks. Determine if due to bending, shear, compression, etc.
- Abutments, piers, wingwalls, retaining walls, etc. Check for signs of movement; alignment, plumb, cracking.
- Take samples of rebar at failures. (At bond and tension failures. Samples should be about 3 feet long. Take one sample from where it failed and another where it probably wasn't stressed beyond yield. Label and note location where obtained. Maintenance people or Resident Engineers on nearby jobs may be able to get assistance for cutting the bars.)
- Indications of movements at hinges, joints, railing, curbs. Some bridges have scribes at rail joints. If so, check amount of movement.
- Damaged utilities in, on or near the bridge. Signs of electrical shorting. Disconnected power lines.
- Distress, cracking or movement -- signs, electroliers, barriers, etc.
- Exposed piles.
- Connection of widenings to original structures.
- Scrape marks, dents, holes, indicating parts of structures sliding or hitting each other.
- Direction of leaning or falling.
- Deformed or displaced bearings.
- Condition of equalizing bolts, restrainers, shear keys.
- Broken welds, rivets or bolts.
- Warping or tearing of steel.
- Condition of structures, equipment and facilities in vicinity of bridges -- record location and compass heading or direction the camera is facing.
- Comments from eyewitnesses.

Miscellaneous Comments

It is likely that a heavily damaged area will be well guarded to keep out sightseers, unauthorized persons, looters, etc. Caltrans Photo ID's, business cards with title, hard hats with Caltrans Labels, state autos or private autos with magnetic door seals should facilitate entry into the area.

The object of these investigations is to get as much accurate information as possible before the evidence is destroyed. Getting to the site as quickly as possible is of prime importance. Tape (or digital) recorders can document comments quicker than writing. Transcribing the tapes (or memory cards) and editing your notes can be done at a later date. Don't skimp on taking notes.

Immediate attention should be given to structures over railroads and heavily traveled highways or critical routes since damaged structures blocking these facilities are likely to be removed as quickly as possible in order to restore normal traffic or remove a hazard to traffic underneath. Little information can be obtained from those structures after removal or demolition operations.

Don't avoid taking a picture because you'll be back later to get a better one. Take it anyway. The cost and time involved in taking pictures is negligible compared to all other expenses. They are the most accurate records that can be obtained and the cost is very minor. Don't trust your memory. Identification is very important.

Use the tape/digital recorder or a photo log to describe each picture as it is taken -- which bridge, exact location, direction, etc. The first couple pictures at each new location should have some distinguishing detail to identify the location. When necessary, include a person, pencil, ruler, hard hat or other common object to relate area of view, size of detail location, etc. Take photos of critical details from several angles. When exposures or details are critical take three pictures -- "correct" exposure, one stop under and one stop over.

Positive recording that there is no damage may be as important as recording damage. Take photos and note in the recorder that columns are not cracked, abutments not affected, hinges did not show signs of abnormal movements, wing-walls not cracked or settled, approach fills didn't settle, horizontal and vertical alignment appears to be normal, etc. Keep in mind that "no damage" evidence as well as "damage" evidence may eventually be used in court. Photograph the entire bridge and any pertinent geological features near it.

Special attention should be given to structures if injuries or fatalities are involved.

It is better to use more tape/memory than necessary and edit later than to find out that you didn't use enough. For digital cameras, create separate folders for each bridge or write in a notebook the photo numbers for each bridge with a brief description about the photo.

The team leader should make certain that there aren't any gaps in the photo coverage because each person is assuming that someone else is doing it. Your one and only purpose for being on this team is to get as much accurate information as possible concerning the damage in the shortest feasible time. Don't allow yourselves to be unnecessarily sidetracked by outside engineers, professors, reporters, citizens, or anyone else attempting to get information, opinions, evaluations, etc. However, cooperation with the bridge maintenance engineers can be mutually beneficial.

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WRITING A PEQIT REPORT

Binding and Cover should use District Color

District 1: White
District 2: Ivory
District 3: Gray
District 4: Orange
District 5: Brown
District 6: Light Blue
District 7: Dark Green
District 8: Red
District 9: Dark Blue
District 10: Light Green
District 11: Yellow
District 12: Goldenrod

Contents

Title Page

Acknowledgments

The PEQIT report depends on the efforts of many people. Those individuals who went out of their way to make the investigation and report a success should be acknowledged in this section.

Table of Contents

Seismological Data

Only the most essential data should be included in this section. This would include the magnitude, the rupture location and direction, the type of fault, whether the rupture broke the surface, strong motion record information, and comments with reference to Caltrans seismic hazard map.

Geological Data

A general description of the geology, soil characteristics, and fault system in the area of bridge damage. Any unusual conditions should be recorded.

Geographical Data

The topography, location of bays, lakes, and rivers, and other geographical conditions that have a bearing on the performance of bridges for the earthquake.

Summary

This section should typify the performance of bridges and highway structures due to this earthquake. The damage severity should be documented in terms of local and global categories.

- Collapse
- Major Damage
- Moderate Damage
- Minor Damage
- No Damage

Performance of Retrofits

Performance of Post-1980 Bridges

Performance of Post 1990 Bridges

Performance of other Highway Structures

Design Recommendations

Conclusions

Appendices

Sample Post-Earthquake Evaluation Form

POST EARTHQUAKE BRIDGE EVALUATION FORM Sheet Number_____

Inspector's Name _____ Affiliation_____ Date _____ Time _____

Earthquake Name_____ Country_____ Region_____

DESCRIPTION OF BRIDGE	DESCRIPTION OF DAMAGE
Bridge Name_____ Br. # _____ Route #___ Location_____ Bridge Bearing _____ Length _____ Number of Spans __Simple Spans ☐ Continuous ☐ Hinges yes ☐ no ☐ locations in spans_____ River Xing ☐ RR Xing ☐ Interchange ☐ Other ___	**Overall Rating** No Damage ☐ Minor Damage ☐ Moderate Damage ☐ Major Damage ☐ Collapse ☐
Suspension ☐ Cable Stay ☐ Steel Truss ☐ Steel Arch ☐ Steel Box Girder ☐ Steel I Girder ☐ Concrete Box Girder ☐ Concrete T Girder ☐ Concrete Slab ☐ Precast Girder ☐ Concrete Arch ☐ Timber Arch ☐ Timber Truss ☐ Timber Girder ☐ Bascule ☐ Lift ☐ Swing ☐ Other _____	Dropped Spans yes ☐ no ☐ spans_____ Span Movement _____ Girder Damage _____ Other Superstructure Damage _____ _____ Indications of soil movement _____ _____

BEARING TYPES _____		Damage	Location	Description
Roller	Plane Sliding	Restrainer Hinge Joint	_____ _____ ___	_____ _____ _____
Rocker	Curved Sliding	Bearings Shear Key Abutment	_____ _____ ___	_____ _____ _____
Knuckle	Disc	Bent Bent Cap	_____ _____	_____ _____
Leaf	Elastomeric	Column	_____ _____	_____ _____
Link	Isolation/Damping	Footing	_____ _____ ___	_____ _____ _____

	Roll #	Frame #	Photo Log
Abutments Seat Type ☐ Diaphragm ☐ Other _____ **Piers** Concrete Walls ☐ Single Col. ☐ Multicol. ☐ Steel Tower ☐ Single Col. ☐ Multicol. ☐ Other _____ **Foundations** spread ☐ pile ☐ pileshaft ☐ caisson ☐ other ____	_____ _____ _____ _____ __	_____ _____ _____ _____ _	_____ _____ _____ _____ _____
Retrofit yes ☐ no ☐ Shear Keys ☐ Catcher Blocks ☐ Restrainers ☐ Abutments _____ Bents _____ Other___ _____	_____ _____ _____	_____ __ _____ _____	_____ _____ _____ _____

Additional Comments _____
_____
_____

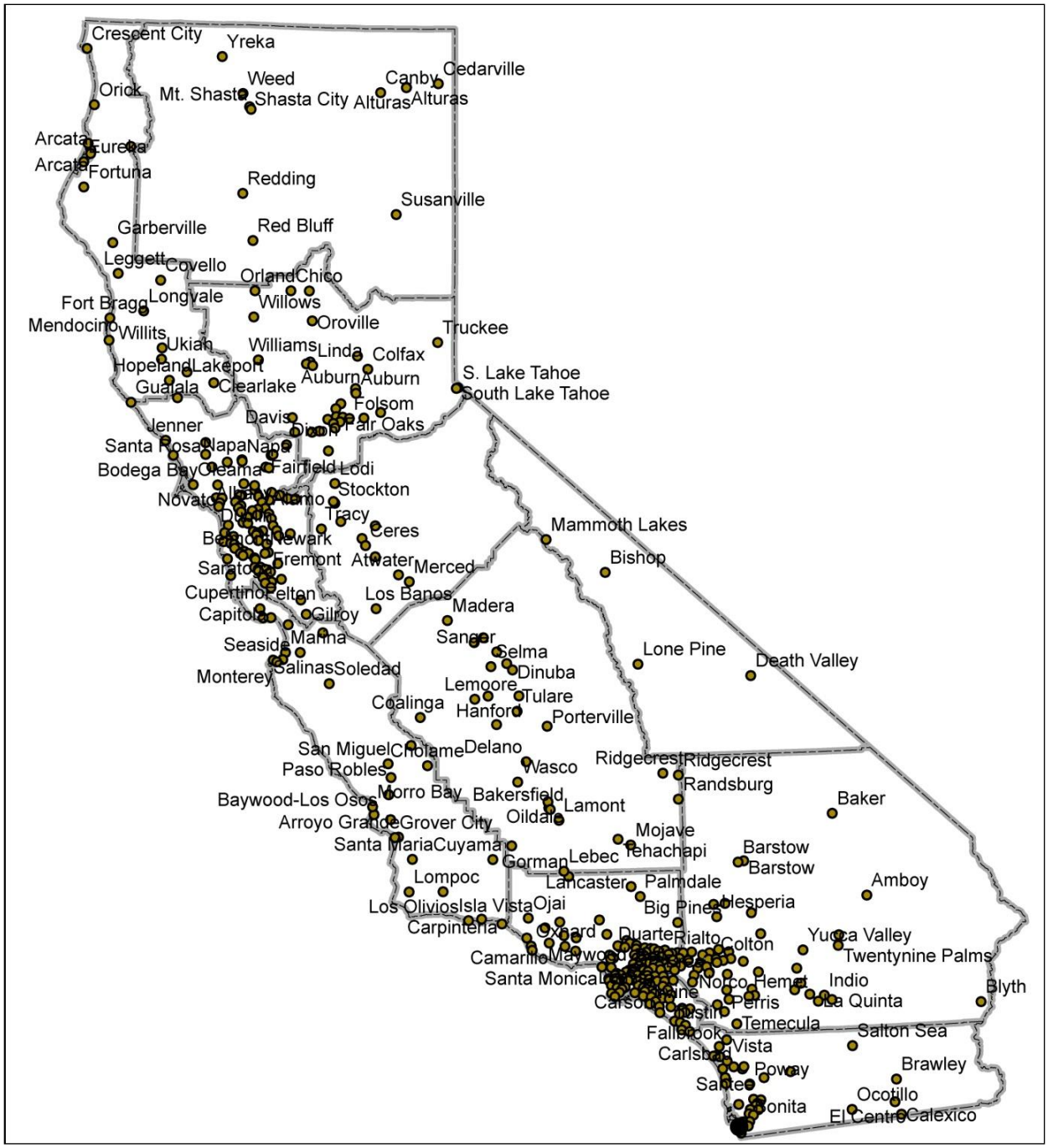
SKETCH DAMAGE

IDENTIFYING LOCATION OF DAMAGE

Map Showing Caltrans Counties and Districts

COUNTY		COUNTY		COUNTY	NUMBERS		
ALAMEDA	33-00	ORANGE	55-00	1-00	D.N.	30-00	CAL.
ALPINE	31-00	PLACER	19-00	2-00	SIS.	31-00	ALP.
AMADOR	26-00	PLUMAS	9-00	3-00	MOD.	32-00	TUO.
BUTTE	12-00	RIVERSIDE	56-00	4-00	HUM.	33-00	ALA.
CALAVERAS	30-00	SACRAMENTO	24-00	5-00	TRI	34-00	S.F.
COLUSA	15-00	SAN BENITO	43-00	6-00	SHA.	35-00	S.M.
CONTRA COSTA	28-00	SAN BERNARDINO	54-00	7-00	LAS.	36-00	S.CR.
DEL NORTE	1-00	SAN DIEGO	57-00	8-00	TEH.	37-00	S.CL.
EL DORADO	25-00	SAN FRANCISCO	34-00	9-00	PLU.	38-00	STA.
FRESNO	42-00	SAN JOAQUIN	29-00	10-00	MEN.	39-00	MER.
GLENN	11-00	SAN LUIS OBISPO	49-00	11-00	GLE.	40-00	MPA.
HUMBOLDT	4-00	SAN MATEO	35-00	12-00	BUT.	41-00	MAD.
IMPERIAL	58-00	SANTA BARBARA	51-00	13-00	SIE.	42-00	FRE.
INYO	48-00	SANTA CLARA	37-00	14-00	LAK.	43-00	S.BT.
KERN	50-00	SANTA CRUZ	36-00	15-00	COL.	44-00	MON.
KINGS	45-00	SHASTA	6-00	16-00	YUB.	45-00	KIN.
LAKE	14-00	SIERRA	13-00	17-00	NEV.	46-00	TUL.
LASSEN	7-00	SISKIYOU	2-00	18-00	SUT.	47-00	MNO.
LOS ANGELES	53-00	SOLANO	23-00	19-00	PLA.	48-00	INY.
MADERA	41-00	SONOMA	20-00	20-00	SON.	49-00	S.L.O.
MARIN	27-00	STANISLAUS	38-00	21-00	NAP.	50-00	KER.
MARIPOSA	40-00	SUTTER	18-00	22-00	YOL.	51-00	S.B.
MENDOCINO	10-00	TEHAMA	8-00	23-00	SOL.	52-00	VEN.
MERCED	39-00	TRINITY	5-00	24-00	SAC	53-00	L.A.
MODOC	3-00	TULARE	46-00	25-00	E.D	54-00	S.BD.
MONO	47-00	TUOLUMNE	32-00	26-00	AMA	55-00	ORA.
MONTEREY	44-00	VENTURA	52-00	27-00	MRN	56-00	RIV.
NAPA	21-00	YOLO	22-00	28-00	C.C	57-00	S.D.
NEVADA	17-00	YUBA	16-00	29-00	S.J	58-00	IMP.

Map Showing Caltrans Cities and Districts



RESOURCES

CALTRANS' EMERGENCY PLANNING SECTION

In the event of a disaster involving highways, Caltrans' Emergency Planning Section will coordinate all of Caltrans' operations with the California Highway Patrol, the Office of Emergency Services, the National Guard, the Bureau of Aeronautics, and other Federal, State and Local agencies. Although the PEQIT is primarily interested in studying how Caltrans design criteria is reflected in bridge performance during the incident (in contrast with the emergency operations of other agencies) our team may be able to obtain assistance in transportation, communications and information gathering through Caltrans' Office of Management Planning. The current chief is Herbie Lissade at 916-417-6994 (cell phone 916-417-6994). If he is unavailable contact the Homeland Security Chief, Denny Fong, at 916-654-1564 (cell phone 916-654-4684) or the Chief of Maintenance Emergency Services Branch, David Frame, at 916-654-6723 (cell phone 916-616-8987).
The existence and location of our team should be made known by contacting the Caltrans Highway Communications Center at 916-653-3442.

BOOKKEEPING

Time Sheets

Your Unit:	4-digit number
E-FIS Project:	000 000 1016
Phase:	N
Reporting Code:	6TCAEQ
Sub-Object:	095

Travel Authorizations and Expense Claims

Team members are expected to handle their own financial arrangements. Reimbursement is made by submitting a Travel Expense Claim (TEC) with appropriate receipts. Refer to the current Caltrans' Travel and Expense Guide for more information.

GETTING THERE

Information on state travel is on Caltrans Intranet at: http://www.dot.ca.gov/hq/asc/travel/. For general assistance, contact the Travel Information Line at 916-227-9061 between 9:00 a.m. and 12:00 p.m. or 1:00 p.m. and 3:00 p.m. If an answer to a specific question cannot be found in the Travel Guide or answered by the Travel Information Line, contact the Travel Policy Section at 916-227-9330.

Autos

1. State cars are available from the State Garage at 1416 Tenth Street in Sacramento. Their hours are Monday to Friday, from 7:00 a.m. to 7:00 p.m. (returns are 6:00 a.m. to 9:00 p.m.). To get a car, the following steps are required:
    a) Set up an account on line at www.ofa.dgs.ca.gov.
    b) You will need an email address, driver's license number with expiration date and a DGS card number.
    c) Contact the State Garage at 916-657-2327.
    d) Only one car per driver. If you need more than one car, another driver has to reserve it.
2. Employees must use the CalTravelStore located on the Internet at http://www.caltravelstore.net/, to make rental car reservations in "Concur" the state's travel reservation on-line booking tool.
3. All Farmer's Market Plaza Fleet Vehicles are obtained by calling either Todd Harris 916-227-1940 or Cindy Newell 916-227-1940.
4. Personal Autos. State cars should be used, if possible, to facilitate entry into restricted areas. Use the 12" x 12" magnetic Caltrans door signs on private or rental cars. Do not drive autos while magnetic signs are

attached (they blow off). The Coordinator has one sign and more can be obtained from the Translab or from your supply clerk.

5. If available, a District car equipped with a District radio (and an AM/FM radio) is preferred (see District radio channels on Page 16 and District phone numbers on Page 19).

Air Travel

Caltrans employees who travel on state business must use the travel service provider, CalTravelStore located on the Internet at http://www.caltravelstore.net/ to obtain airline tickets and rental car reservations. The CalTravelStore website offers access to the on-line booking tool Concur. The CalTravelStore will assist employees with changes to reservations ONLY. Assistance for setting up a Concur account is available from the Division of Accounting - Travel Policy Section at 916-227-8652 or 916-227-9330. Concur is used for all Southwest Airlines flights and all other airline reservations including state contracted city pairs and all rental car reservations.

For further travel related information refer to Caltrans' Travel and Expense Guide. Included in the guide are Travel Information & Policies such as TIP 12-002 for airline reservations and TIP 13-002 for rental car reservations.

Trip Essentials

Equipment

The following is a list of equipment for a post-earthquake investigation. Some of it is provided by PEQIT Coordinator, but much of it needs to be brought by the team member. Some items are further described in sections that follow the list.

PERSONAL ITEMS	
Essential Items	Suggested Items
Personal identification/Driver's license	Food/water
Official identification badge	Canteen/water purification tablets
Cash/credit cards (small bills and change)	Safety goggles/dust mask
Backpack	Safety vest
Eyeglasses/safety glasses (including extras)	Gloves
Prescription medication	Knee pads
Hard hat/ whistle	Sleeping bag
Boots/sturdy shoes	First aid kit
Rugged clothing/rain gear	Sunscreen lotion
Personal hygiene supplies	
Transportation to and from damage area	

PEQIT FIELD EQUIPMENT	
Essential Items	Suggested Items
Hard hat, green vest	Coveralls
Caltrans magnetic vehicle sign	Pick, rock hammer, hack saw, bolt cutters
Communication equipment	Bridge Plans (As-Builts)
Camera and memory cards	Maps
Flashlight, tape measure, plumb bob	Aerial Photos of the site (not always available)
Laptop computer to record observations (one per team)	Radio
Binoculars (one per team)	Tape recorder
Caltrans access keys and replacement locks (one per team)	Walkie-talkies
Log of Bridges on State Highways (one per team)	AAA maps
Power converters (one per team)	

Personal and Vehicle Identification

Each team member should carry a Caltrans Emergency Pass if they are available. These were provided by OSC after Loma Prieta and by the Director of Engineering Services after Northridge. Caltrans Employee ID may be used to obtain access to damaged structures. Caltrans magnetic vehicle sign should be attached to auto doors unless autos with permanent signs are used. Remember not to attempt driving with magnetic signs as they will blow off. Areas of damage are likely to be guarded by police or CHP. Some form of identification is necessary to be admitted into these areas. The Office of Emergency Services provides photo ID's for engineers taking the 1/2 day seminar. However, OES workers are issued special colored passes that change for every event.

Personal Items

Clothing

Each person is responsible for furnishing their own hard hat, boots or shoes with heavy soles, and suitable clothing. Nail-proof inserts are recommended for shoes. Take raingear during the rainy season. Bring cold weather gear for earthquakes in the mountains or near a bay or ocean.

Water

Potable water may be difficult to obtain. Consider buying one or more plastic folding type containers or canvas water bags. Large, rigid plastic type containers may be available near the destination in some cases. Individual members should consider bringing their own filled canteens or water bottles.

Food

Consider taking granola bars, dried fruit, and bottled water. If restaurants and grocery stores are severely damaged or cannot operate due to lack of water and power, obtain canned and dehydrated foods and canned juices before you enter the area.

PEQIT Equipment Available to Teams

The following equipment is available to PEQIT team members on the second floor of Farmers Market Plaza I. Some of it is in white bags in Room 218 while other smaller items are in cabinets located by column 5I.

Quantity	Description	Model No.	Location
1	Cellular Phone with Charger, etc.	Samsung (916-826-6609)	Cabinet
3	Motorola Pagers	A05MVB5861AA	Cabinet
2	ICOM Two Way Radios	IC-F4-4	Cabinet
2	Garmin Walkie-Talkies / GPS Receivers	Rino 120	Cabinet
1	Motorola Portable Radio	MTS2000	Cabinet
3	Digital Cameras, Memory, and Batteries	Sony, Cannon, Panasonic	Cabinet
1	Camera Multi-Card Reader		Cabinet
1	Microcassette Recorder and Tapes	Sony	Cabinet
2	Laptop Computers	IBM ThinkPad, HP ProBook	Cabinet
2	Binoculars		Cabinet
1	100' Tape Measure		Cabinet
1	Replacement Locks & Bag of Caltrans Keys	12B130	Cabinet
1	Caltrans magnetic vehicle signs		Cabinet
-	AAA Maps		Cabinet
-	Log of Bridges on State Highways		Cabinet
4	Canvas Tote Bags with: Hacksaw and Replacement Blade Hard Hat, Green Vest, and Coveralls Flashlight, Pick, Plumb Bob, Tape Measure, etc.		Room 218
1	Bolt Cutters		Room 218
3	Power Converters	Jensen 160W, Jensen 320W	Cabinet

Cameras

Currently, the PEQIT Coordinator has three digital cameras and memory cards. Members of the PEQIT should either bring their own cameras or practice taking pictures with the PEQIT cameras, particularly for taking pictures in shadow when there is bright background light. This is too often the case when photographing under bridges. Some cameras have a 2X setting to compensate for bright backgrounds. Usually focusing on the dark area will set the aperture and shutter speed for the area of darkness. Familiarity with the camera is essential for clear pictures. Bring lots of memory cards. It is not unusual to shoot over two hundred photos a day. Make sure you have sufficient memory cards (and the right kind of memory card) to meet your needs. Take photos at high resolution so we can blow up details of importance.

Digital photos must either be downloaded to a computer with the appropriate camera software or to a computer with the appropriate card reader.

Digital cameras come with lithium batteries, chargers, AC adapters, connection cables, and manuals. Investigators should not take the digital cameras unless they are familiar with their operation. The use of laptops with modems and digital cameras will allow the PEQIT to send the coordinator photos from the field, which can then be put on the Internet to update the public.

It is essential that investigators take the time to identify each photo as it is taken. Identify each photo by its file name in your notes. Investigators are encouraged to study the labeling system used after the Northridge earthquake. These are available from the coordinator.

Communication Equipment

Cellular Phones

The PEQIT Coordinator has one cellular phone (916-826-6609). It should work well in most areas of California. If you are not transmitting, try moving a few hundred yards away and try again. These phones have chargers that should be taken if you anticipate being gone for several days. If you have trouble with a phone, contact Kim Ross at 916-227-8989.

Pagers

The PEQIT Coordinator has four MobileComm pagers. These pagers will display the caller's phone number, or they can be used to receive an email message. Simply type the address http://www.mobilecomm.com/message/ on the Internet address bar and type the phone number and your message on the Arch Wireless screen that appears. The same message will appear on the pager. For more information, on pagers or cell phones contact Kim Ross at 916-227-8989.

Pager No.	PIN
916-602-0092	
916-602-0055	
916-602-0106	

Two-Way Radios

We have a pair of 'walkie-talkies' that can be strapped to the investigators clothing for hands-free operation. These can be used for rope climbing or when traffic noise makes conversation impossible. The main unit is hung from a belt and the microphone clipped to a shirt collar. We also have a newer pair of 'walkie-talkies' that are smaller but don't provide hands-free operation.

Caltrans Radio

The PEQIT Coordinator has a MTS 2000 portable radio. This radio can be used to contact District Dispatchers and Caltrans' vehicles equipped with radios. The radio can be used to monitor District communication for information on bridge damage and to establish contact when other communication facilities are damaged. The radio comes with an operating instruction manual and a charger. The radio should be set to the correct District and Channel using the selector knob. Then the switch on the side is pushed to begin communications. The radio can be set to monitor conversations in the area or on a direct setting to speak with another radio operator. The following Settings are for Caltrans repeater stations in California.

- TURN RADIO ON WITH THE VOLUME CONTROL KNOB
- 16 POSITION ROTARY KNOB SELECTS DISTRICT 1, POSITION 1, ETC.
- TO CHANGE CHANNELS:
  1. PRESS (>)
  2. PRESS BUTTON (1) UNDER MENU DISPLAY 'CHAN'
  3. PRESS (>) OR (<) TO SELECT A DESIRED CHANNEL OR CHANNEL NUMBER ON THE KEY PAD.
  4. PRESS (HOME)
- TO SELECT DIRECT OR REPEATER MODE OF OPERATION:
  1. PRESS (>)
  2. PRESS BUTTON (2) UNDER MENU DISPLAY 'DIR'
  3. PRESS BUTTON (1) FOR 'DIRECT' OR BUTTON (3) FOR 'REPEATER'
  4. '→' IN THE DISPLAY INDICATES DIRECT
- TO TURN SCAN 'ON' OR 'OFF':
  1. PRESS (>)
  2. PRESS BUTTON (3) UNDER MENU DISPLAY 'SCAN'
  3. PRESS BUTTON (1) UNDER MENU DISPLAY 'ON' OR PRESS (3) UNDER MENU DISPLAY 'OFF'
  4. DISPLAY 'Z' INDICATES RADIO IS SCANNING
  5. NOTE: CH. 1 IN EACH DISTRICT LIST IS A FIXED SCAN LIST
- TO VIEW A SCAN LIST:
  1. PRESS (>) TWO TIMES
  2. PRESS BUTTON (1) UNDER MENU DISPLAY 'VIEW'
  3. PRESS BUTTON (1) UNDER MENU DISPLAY 'SCAN'
  4. 'Z ☐'INDICATES RADIO IS IN THE SCAN LIST VIEW MODE
  5. PRESS (>) OR (<) TO VIEW THE CHANNELS THAT ARE CURRENTLY IN THE SCAN LIST
  6. PRESS (HOME) TO EXIT VIEW MODE
- TO EDIT A SCAN LIST:
  1. PRESS (>) TWO TIMES
  2. PRESS (2) UNDER MENU DISPLAY 'PROG'
  3. PRESS (1) UNDER MENU DISPLAY 'SCAN'
  4. FLASHING '☐' INDICATES RADIO IS N THE SCAN LIST EDIT MODE
  5. PRESS (<) OR (>) TO ADD OR DELETE THE CHANNEL FROM THE SCAN LIST
  6. PRESS THE BLUE/GREEN BUTTON ON THE LEFT SIDE OF THE RADIO TO ADD OR DELETE THE CHANNEL FROM THE SCAN LIST
  7. 'Z' INDICATES THE CHANNEL IS IN THE SCAN LIST
  8. SCAN LIST CAN INCLUDE UP TO TEN CHANNELS
  9. PRESS 'HOME' TO EXIT EDIT MODE
  10. DISTRICT CHANNELS FOR CALTRANS RADIO

DIST	CH. NO. & NAME	DIST	CH. NO. & NAME	DIST	CH. NO. & NAME	DIST	CH. NO. & NAME
1	1-01 C/C SCAN *	2	1-02 C/C SCAN*	5	1-05 C/C SCAN'	6	1-06 C/C SCAN'
1	2-SR 199W	2	2-DORRIS	5	2-FREEMONT PK	6	2-MADERA
1	3-CRESCENT CITY	2	3-SEIAD	5	3-MONTEREY	6	3-COURSEGOLD
1	4-KLAMATH	2	4-GAZELLE	5	4-CARMEL	6	4-HUNTINGTON I-AK
1	5-ORLEANS	2	5-EAGLE LAKE	5	5-LITTLE RIVER	6	5-AUBERRY
1	8-SR 299 W	2	8-MC CLOUD	5	6-KING CITY	8	6-5R 180
1	7-EUREKA	2	1-BUCK HORN	5	7-SAN SIMEON	6	7-VISALIA
1	8-SCOTIA	2	8-HAYFORK	5	8-CAMBRIA	6	8-SR 178
1	9-GARBERVILLE	2	9-PLATINA	5	9-SAN LUIS	6	9-SR 58
1	10-LONGVALE	2	10-RED BLUFF	5	10-SAN LUIS MS	6	1 0-MARICOPA
1	11-UKIAH NORTH	2	11-COLBY	5	11-SANTA MARIA	6	1 1-BAKERSFIELD
1	12-NAVARRO	2.	12-ST JOHNS	5	12-SANTA BARBARA	6	I 2-FRESNO
1	13-BOONVILLE			5	13=SANTA BARB MS	6	1~ONST GI
1	14-UKIAH SOUTH			5	14-BIG BASIN	6	14-CONST G2
1	15-CLEAR LAKE			7	1-C/C SCAN'	8	1-C/C SCAN'
3	1-03 C/C SCAN'	4	1-04 C/C SCAN'	7	2-GRAPEVINE	8	2-INDIO
3	2-115 NORTH	4	2-SANTA ROSA	7	3-GORMAN	8	3-CABAZON
3	3-OROVILLE	4	3-BERRYESA	7	4-PALM DALE	8	4-BOX SPRINGS
3	4-CHICO	4	4-NAPA	7	5-I 5/SR 14	8	S-JOHNSTONE

DIST	CH. NO. & NAME	DIST	CH. NO. & NAME	DIST	CH. NO. & NAME	DIST	CH. NO. & NAME
3	5-CHICO NORTH	4	5-FAIRFIELD	7	6-BURBANK	8	6-CAJON PASS
3	6-WOODLAND	4	8-SAN RAFEL	7	7-SAN DIMAS	8	7-VICTORVILLE
3	7-SACTO LOCAL	4	7-OAKLAND	7	8-POMONA	8	8-BARSTOW
3	8-SOUTH SACTO	4	8-WALNUT CRK	7	9-TORRANCE	8	9-TEMECULA
3	9-PLACERVILLE	4	9-PLEASONTON	7	I 0-WEST LAKE	8	10-BIG BEAR
3	1 ~STOCKTON	4	1~ALTAMONT PS	7	11-SANTA PAULA		
3	11 -KYBURZ	4	1 1-BENICIA TOW	7	12-VENTURA		
3	12-ECHO/ SLTAHOE	4	12-NILES CANYON	7	13-OJAI	10	1-C/C SCAN'
3	13-AUB/MARYSV L	4	13-SAN FRANCISC	7	14-MALIBU	10	2-CABBAGE PATCH
3	14-NEV CITY/I 80	4	14-HALFMOON BAY	9	1-C/C SCAN'	10	3-TELEGRAPH
3	1 5-BAXTER	4	15-HWY 92135	9	2-TOPAZ	10	4-PEDDLER HILL
3	I 6-WHIT/KINGVALE	4	16-LA HONDA	9	3-HOT SPRINGS	10	5-MT BUWON
3	I 7-KINGVALE/TRKE	4	17-PIGEON PT	9	4-MONO LAKE	10	6-MT OSO
3	I 8-TRUCKEE	4	18-SAN JOSE	9	~REST VIEW	10	7-LEVIAThON
3	19-BOCA/RENO	4	19-HECKER PASS	9	6-BISHOP	10	8-MT ZION
3	2~TRKI//TAHOE CITY	4	2~PACHECO PASS	9	7-LONE PINE		
3	21-TAHOE			9	8-RIDGE CREST		
3	22-NEV CITY			9	9-MOJAVE	12	1-C/C SCAN*
3	23-CAL IDA			9	10-TEHACHAPI	12	2-SANTA ANA COM
3	24-DOWNIEVILLE			9	11-LITTLE CREEK	12	3-ORANGE
3	25-SIERRA CITY			11	1-C/C SCAN*	12	4-BREA
3	26-YUBA PASS			11	2-ESCONDIDO	12	5-SAN JUAN
3	27-SIERRAVILLE			11	3-METRO	12	6-REGION 2
3	28-RED BLUFF			11	4-EL CAJON	12	7-YORBA LINDA
3	29-PU LGA			11	5-EL CENTRO	12	8-WESTMINSTER

* CHANNELS LABELED [C/C SCAN] ARE CAR TO CAR CHANNELS WITH FIXED SCAN LISTS. SCAN FEATURE MUST BE ACTIVATED VIA THE MENU.

Tape Recorders

Currently, the PEQIT Coordinator has one microcassette recorder. It comes with 10 blank tapes and a supply of AA batteries. PEQIT members should either become familiar with using the tape recorder or bring a stenographer's pad to take their notes.

Bridges Plans

The following steps can be used to obtain bridge plans in the field:

Step 1: From Caltrans computer: Activate: VPN Client.
From non-Caltrans computer: Go to website: https://sslvpn.dot.ca.gov/.
"Caltrans Secure Internet Portal" should appear.
Enter your Username (S-number) and Password.
Step 2: Select: Onramp
Step 3: Click on menu item: Internal Programs/Divisions/Districts
Step 4: Select: Project Delivery - Engineering Services
Step 5: Click on the BIRIS link.

The software will prompt the user for any needed plug-ins (such as Jinitiator and Acrobat).

Call IT support at 916-654-4216 or send an email to: [Caltrans_it_servicedesk@dot.ca.gov] if you have any questions or if you are having difficulty accessing BIRIS.

Maps

The best maps for locating state bridges are the California State Highway Maps that have post-miles corresponding to the bridge logs. The best maps for locating local bridges are the county township and range maps that show every street and local bridge. The Coordinator has a complete set of these county maps under his desk. The PEQIT Coordinator also has a complete set of AAA maps for the state of California.

The PEQIT Coordinator also has ARC-VIEW GIS software installed for locating faults and creating lists of bridges for investigation. Most mapping software (such as "Delorme Street Atlas") can take a text file of Caltrans bridge latitude and longitudes and overlay it onto a map of California. The investigator can then zoom in on the area to locate state and local bridges.

Google Earth can be downloaded to a laptop and provides detailed views of state highways and local roads. The statewide bridge inventory can be downloaded as a kml file from: http://10.160.173.171/data/google/bridges.kml.

Aerial Photographs

Aerial photos of disasters that cause vehicle damage or loss of life on state highways are usually taken by aerial photography firms under contract to Caltrans within 24 hours of the event. To obtain aerial photos, call 'Photogammetry' under Contacts or check at the following website: http://www.dot.ca.gov/hq/esc/photogrammetry/contacts.html.

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MAKING CONTACT

Contact the Coordinator when you arrive at your location (i.e., at the airport or at the incident site) for an update on the damage. The team leader will notify the District Director that a Structures team will be in his/her district to gather technical information. Give names of team members and name of motel - if known. If you have a Caltrans radio, notify the District Communications dispatcher when you enter or leave the District (use the District Headquarters as the call number; i.e., "San Francisco," "Marysville," etc.). The PEQIT can use the following call number for its use: 59-"(last name of team leader)." District offices can relay messages to and from Sacramento via radios on Caltrans frequencies. Caltrans and the CHP monitor each other's frequencies.

DEPUTY DISTRICT DIRECTORS FOR MAINTENANCE (UPDATED FEBRUARY 28, 2013)

District	Name	Office No.	Cell No.	District Dispatcher/ Traffic Management
D01	Mark Suchanek	707-445-6393	707-498-0536	707-441-5747
D02	Ed Lamkin	530-225-3545	530-949-7059	530-225-3273
D03	Steve Kirkpatrick	530-741-4318	530-218-2672	916-859-7900
D04	Nader Eshgipour	510-286-5893	925-250-5587	510-286-6359
D05	Steve Price	805-549-3281	805-748-8421	805-549-3212
D06	John Liu	559-488-4144	559-696-0249	559-488-4152
D07	Dan Freeman	213-897-8150	213-792-8144	323-259-1922
D08	Steve Pusey	909-383-6320	909-553-8273	909-383-2594
D09	Craig Holste	760-872-0670	760-937-7826	760-872-0718 (no real dispatcher)
D10	Dennis Agar	209-948-7883	209-351-4961	209-948-7556
D11	Mike McManus	619-688-6980	619-318-3633	858-467-3090
D12	James Pinheiro	949-724-2659	949-279-5452	949-936-3400

STRUCTURES MAINTENANCE AND INVESTIGATIONS BRIDGE ENGINEERS (UPDATED JANUARY 31, 2012)

Name	Office No.	Cell No.	Email	Assignment	Supervisor	Office
Clayton K. Tom	213-897-4868		clayton_tom@dot.ca.gov	Bridge Maint. Design	Tony Brake	Investigations - South
Edward Li	213-897-2036		edward_li@dot.ca.gov	Bridge Maint. Design	Tony Brake	Investigations - South
Gerald Joo	213-897-0046		gerald_joo@dot.ca.gov	Bridge Maint. Design	Tony Brake	Investigations - South
James Holloway	213-897-2352		james_holloway@dot.ca.gov	-	Tony Brake	Investigations - South
Kenneth Q. Vo	213-897-1457		kenneth_vo@dot.ca.gov	Bridge Ratings	Bing Wu	Investigations - South
Mazin Ibrahim	213-897-2925		mazin_ibrahim@dot.ca.gov	Bridge Maint. Design	Tony Brake	Investigations - South
Tom T. Dang	213-897-0380		tom_dang@dot.ca.gov	Bridge Maint. Design	Tony Brake	Investigations - South
Vinh L. Dang	213-897-0868		vinh_dang@dot.ca.gov	Bridge Maint. Design	Tony Brake	Investigations - South
Bill N. Zanetich	510-286-5392	510-910-5224	bill_zanetich@dot.ca.gov	Sr. - Toll Inspection - 99T	Kenneth R. Brown	Investigations - Toll
Christopher T. Lee	510-286-4951	510-520-8848	christopher_t_lee@dot.ca.gov	Toll Bridge Design	Kenneth R. Brown	Investigations - Toll
Lina G. Ellis	510-622-8855	530-219-4965	lina_g_ellis@dot.ca.gov	Toll Bridge Design	Kenneth R. Brown	Investigations - Toll

Name	Office No.	Cell No.	Email	Assignment	Supervisor	Office
Ahsanullah Kushkaki	510-286-4944		ahsanullah_kushkaki@dot.ca.gov	Bridge Maint. Design	Kenneth R. Brown	Investigations - Toll
Bert Ballesteros	510-286-5967		bert_ballesteros@dot.ca.gov	Toll Bridge Design	Kenneth R. Brown	Investigations - Toll
Michael Bahrami	510-286-4967		michael_bahrami@dot.ca.gov	Toll Bridge Design	Kenneth R. Brown	Investigations - Toll
Muqin Yu	510-286-0628		muqin_yu@dot.ca.gov	Toll Bridge Design	Kenneth R. Brown	Investigations - Toll
Reynaldo J. Castro	510-286-0886		reynaldo_castro@dot.ca.gov	Toll Bridge Design	Kenneth R. Brown	Investigations - Toll
Thuc Tran			thuc_tran@dot.ca.gov	Toll Bridge Design	Kenneth R. Brown	Investigations - Toll
Hongyuan Su	510-286-4849			Toll Bridge Design	Kenneth R. Brown	Investigations - Toll
W. John Baker	916-227-8623	916-798-7175	w_john_baker@dot.ca.gov	ABME - 05B	Richard C. Dills	Investigations - North
Gary Claggett	916-227-8624	916-798-7176	gary_claggett@dot.ca.gov	ABME - 06A	Richard C. Dills	Investigations - North
Andy N. Dang	916-227-8639	916-798-7180	andy_dang@dot.ca.gov	ABME - 06B	Richard C. Dills	Investigations - North
Diana M. Ventura	916-227-9558	916-798-7181	diana_ventura@dot.ca.gov	ABME - 06C	Richard C. Dills	Investigations - North
Cory Cowden	916-227-7317	916-225-5525	cory_cowden@dot.ca.gov	Rover	Richard C. Dills	Investigations - North
Nick Semander	916-227-9479	916)947-5990	nick_semander@dot.ca.gov	Rover	Richard C. Dills	Investigations - North
Patrick Piacentini	916-227-8436		patrick_piacentini@dot.ca.gov	ABME - 04C	John Gillis	Investigations - North
Armin G. Groess	916-227-8650	916-947-8055	armin_groess@dot.ca.gov	ABME - 04E	John Gillis	Investigations - North
Ronnie H. Le	916-227-6831	916-798-7190	ronnie_le@dot.ca.gov	ABME - 04F	John Gillis	Investigations - North
Bari Nekaien	916-227-9560	916-769-7324	bari_nekaien@dot.ca.gov	ABME - 04I	John Gillis	Investigations - North
Simon Zhang	916-227-9538	916-798-7188	zhigang_zhang@dot.ca.gov	ABME - 04J	John Gillis	Investigations - North
Joyce E. Copelan	916-227-6832	916-798-7192	joyce_copelan@dot.ca.gov	Rover -	John Gillis	Investigations - North
Tim Sandoval	916-227-8204	916-798-7151	tim_sandoval@dot.ca.gov	ABME - 01A	Michael W. Johnson	Investigations - North
Erik J. Halsted	916-227-8121	916-798-7152	erik_halsted@dot.ca.gov	ABME - 01B	Michael W. Johnson	Investigations - North
Timothy Bakken	213-897-0972	213-435-9598	timothy_l_bakken@dot.ca.gov	ABME - 08A	Jeffrey Johnson	Investigations - South
Terence Cheung	213-897-0883	213-361-0712	terence_cheung@dot.ca.gov	ABME - 08B	Jeffrey Johnson	Investigations - South
Summer A. Silveira	916-227-8384	916-798-7184	summer_silveira@dot.ca.gov	ABME - 10A	Michael W. Johnson	Investigations - North
Mike Nguyen	916-227-0410	916-798-7155	mike_nguyen@dot.ca.gov	ABME - 10B	Michael W. Johnson	Investigations - North
Warren L. Peterson	916-227-8649	916-747-9637	warren_peterson@dot.ca.gov	ABME - 10C	Michael W. Johnson	Investigations - North
Xing Fang	213-897-2019	213-479-8845	xing_fang@dot.ca.gov	ABME Coronado Bay Br. - 11A	Jeffrey Johnson	Investigations - South
Andy S. Hsu	213-897-2017	213-479-8285	andy_s_hsu@dot.ca.gov	ABME - 11B	Jeffrey Johnson	Investigations - South
Ben Phan	213-897-2023	213-479-5444	ben_phan@dot.ca.gov	ABME - 12A	Jeffrey Johnson	Investigations - South

Name	Office No.	Cell No.	Email	Assignment	Supervisor	Office
Huy Vu	213-897-2031	916)990-6990	huy_vu@dot.ca.gov	Rover	Jeffrey Johnson	Investigations - South
Rohit Nand	916-227-9542	916-717-3215	rohit_nand@dot.ca.gov	Rover	Michael W. Johnson	Investigations - North
Mentol Sun	916-227-6830	916-420-0803	mentol_sun@dot.ca.gov	Rover - 04A	Richard P. Jorgensen	Investigations - North
Colman Cronin	916-227-4064	916-947-5990	colman_cronin@dot.ca.gov	Bridge Rating	Andrew Corker	
Andrew W. Corker	916-227-4063	916-798-7167	andrew_corker@dot.ca.gov	ABME - 04D	Anthony Gugino	
Thanh Le	916-227-8097	916-798-7165	thanh_le@dot.ca.gov	ABME - 04G	Richard P. Jorgensen	Investigations - North
Beau Trinh	916-227-9770	916-715-2459	beau_trinh@dot.ca.gov	Rover - 04H	Richard P. Jorgensen	Investigations - North
Ariel Reyes	916-227-8656	916-947-9916	ariel_reyes@dot.ca.gov	Dist. 4	John Gillis	Investigations - North
Ryan Odell	916-227-4535	916)862-2443	ryan_odell@dot.ca.gov	Rover	Richard P. Jorgensen	Investigations - North
Jason E. Edwards	916-227-8637	916-798-7157	jason_edwards@dot.ca.gov	ABME - 02B	Erol C. Kaslan	Investigations - North
Anthony Fernandes	916-227-8645	916-798-7159	anthony_fernandes@dot.ca.gov	ABME - 03A	Erol C. Kaslan	Investigations - North
Daniel Zuhlke	916-227-8210	916-798-7160	daniel_zuhlke@dot.ca.gov	ABME - 03B	Erol C. Kaslan	Investigations - North
Catherine A. Tarala	916-227-8246	916-803-2743	catherine_a_tarala@dot.ca.gov	ABME - 03C	Erol C. Kaslan	Investigations - North
Matthew O'Leary	916-227-8638	916-261-5810	matthew_oleary@dot.ca.gov	ABME	Erol C. Kaslan	Investigations - North
Shawn Hart	916-227-9490	916-761-4391	shawn_hart@dot.ca.gov	Rover	Erol C. Kaslan	Investigations - North
Tony Brake	213-897-0916		tony_brake@dot.ca.gov	Bridge Maint. Design	Ching Chao	Investigations - South
Gedion Werrede	213-897-2018	213-440-4687	gedion_werrede@dot.ca.gov	Dist. 6, 8, 9, Local & Permits	Ching Chao	Investigations - South
Bing X. Wu	213-897-0874	213-479-0649	bing_wu@dot.ca.gov	Dist. 7	Ching Chao	Investigations - South
Ruddy O. Pascua	213-897-2014	213-479-5486	ruddy_o_pascua@dot.ca.gov	Signs & Walls Senior	Ching Chao	Investigations - South
Jeffrey Johnson	213-897-0869	213-479-8161	jeffrey_johnson@dot.ca.gov	Dist. 8, 11, 12	Ching Chao	Investigations - South
Chau Le	213-897-0183	213-369-2476	chau_le@dot.ca.gov	Signs & Walls	Ruddy O. Pascua	Investigations - South
Stevenson Lim	213-897-0153	213-435-4583	stevenson_lim@dot.ca.gov	Signs & Walls - Los Angeles	Ruddy O. Pascua	Investigations - South
Duoc T. Nguyen	213-897-0129	213-435-9601		Signs & Walls - Los Angeles	Ruddy O. Pascua	Investigations - South
Thanh Minh Nguyen	510-286-8815	510-685-2360	thanh_M_nguyen@dot.ca.gov	Signs & Walls	Ruddy O. Pascua	Investigations - South
Marco Chao	510-286-5980	510-685-3197	marco_chao@dot.ca.gov	Signs & Walls - Oakland	Ruddy O. Pascua	Investigations - South
Mehran Sajjadi	213-897-2508		mehran_sajjadi@dot.ca.gov	-	Tony Brake	Investigations - South
Gregory Haylock	213-897-0927	213-598-0421	greg_haylock@dot.ca.gov	ABME - 08D	Gedion Werrede	Investigations - South
George T. Zorapapel	213-897-0871	213-440-1183	george_zorapapel@dot.ca.gov	ABME - 08E	Gedion Werrede	Investigations - South
Mikhael T. Zaarour	213-897-0884	213-440-4100	mikhael_t_zaarour@dot.ca.gov	ABME - 11C	Gedion Werrede	Investigations - South

Name	Office No.	Cell No.	Email	Assignment	Supervisor	Office
Ashraf Shenouda	213-897-0872	213-479-4728	ashraf_shenouda@dot.ca.gov	ABME - 12B	Gedion Werrede	Investigations - South
Mort Zolfaghari	213-897-0876	213-440-1300	mort_zolfaghari@dot.ca.gov	Rover and CMS	Gedion Werrede	Investigations - South
Utin Nwe	213-897-0847		utin_nwe@dot.ca.gov	Permit & Airspace Review	Gedion Werrede	Investigations - South
Kevin D. Henderson	213-897-0877	626)372-0032	kevin_henderson@dot.ca.gov	As-Builts	Gedion Werrede	Investigations - South
Michael W. Johnson	916-227-8383	916-798-6480	michael_w_johnson@dot.ca.gov	Branch Chief - Dist. 1, 10 & County Str.	Pete J. Whitfield	Investigations - North
Mary L. Warrick	916-227-8642		mary_warrick@dot.ca.gov	Senior Specialist	Pete J. Whitfield	Investigations - North
Jonathan Leong	916-227-8097	916-704-3650	jonathan_leong@dot.ca.gov	Load Rating Specialist	Rick Jorgensen	Investigations - North
Richard P. Jorgensen	916-227-8229	916-835-1163	rick_jorgensen@dot.ca.gov	Branch Chief - Dist. 4 & C	Pete J. Whitfield	Investigations - North
John Gillis	916-227-8774	916-798-7182	john_gillis@dot.ca.gov	Branch Chief - Dist. 4 & C	Pete J. Whitfield	Investigations - North
Erol C. Kaslan	916-227-8205	916-799-5057	erol_kaslan@dot.ca.gov	Branch Chief - Dist. 2, 3 & County Str.	Pete J. Whitfield	Investigations - North
Richard C. Dills	916-227-9483	916-799-7999	richard_dills@dot.ca.gov	Branch Chief - Dist. 5, 6 & County Str.	Pete J. Whitfield	Investigations - North
Renee Au	213-897-0870	213-248-3912	renee_au@dot.ca.gov	ABME - 07B	Bing X. Wu	Investigations - South
Matthew M. Monajemi	213-897-2006	213-479-8124	matthew_m_monajemi@dot.ca.gov	ABME - 07C	Bing X. Wu	Investigations - South
Edwin Mah	213-897-0662	213-479-8174	edwin_mah@dot.ca.gov	ABME - 07D - 07E	Bing X. Wu	Investigations - South
Thac Q. Dau	213-897-0819	213-479-6125	thac_dau@dot.ca.gov	ABME - 07E	Bing X. Wu	Investigations - South
Nelson N. Vo	213-897-0875	213-479-8025	nelson_n_vo@dot.ca.gov	Rover	Bing X. Wu	Investigations - South
David Muwanes	213-897-4997	760-792-9876	david_muwanes@dot.ca.gov	-	Bing X. Wu	Investigations - South
Mary S. Schulz	213-897-2004		mary_schulz@dot.ca.gov	Office Support	Bing X. Wu	Investigations - South
Kenneth Q. Vo	213-897-2725		kenneth_vo@dot.ca.gov	Rover	Bing X. Wu	Investigations - South
Allan K. Lee	510-286-6443	510-508-3903	allan_k_lee@dot.ca.gov	ABME Richmond Toll Bridge	Bill N. Zanetich	Investigations - Toll
Robert D. Hugel	510-286-5942	510-520-8845	robert_hugel@dot.ca.gov	ABME SFOBB	Bill N. Zanetich	Investigations - Toll
Chris Elbo	510-286-1053	510-520-8851	christopher_elbo@dot.ca.gov	ABME Benecia Mart Carquinez TB	Bill N. Zanetich	Investigations - Toll
Mike Dajnowicz	510-286-6188	510-520-8853	maciej_dajnowicz@dot.ca.gov	Toll Bridges	Bill N. Zanetich	Investigations - Toll
Edward Thometz	510-622-8854	510-529-1743	ed_thometz@dot.ca.gov	ABME Carquinez Toll Bridge	Bill N. Zanetich	Investigations - Toll
Seong-Hyeok Song	510-286-4460		seong-hyeok_song@dot.ca.gov	-	Bill N. Zanetich	Investigations - Toll

STRUCTURE CONSTRUCTION MANAGERS AND SUPERVISORS LIST (UPDATED FEBRUARY 28, 2013)

Due to frequent changes in personnel assignments in Structure Construction, senior bridge engineers are intentionally not listed below. Please contact Marty Cook at 916-227-8827 (marty.cook@dot.ca.gov) or Cheryl Poulin at 916-227-8309 (cheryl.poulin@dot.ca.gov) for up to date personnel information.

Structure Construction PEQIT HOTLINE 916-227-7777					
Deputy Division Chief:	Rob Stott	Office No. 916-227-8845		Cell No. 916-240-3798	
Name	Office No.	Cell No.	Email	District	Office Address
Harvey, Steve	530-533-4164	530-218-8963	steve.harvey@dot.ca.gov	District 1,2 & 3N	1031 Butte Street Redding, CA 96049
Wilder, Dennis	619-688-6981	619-607-9062	dennis.wilder@dot.ca.gov	District 11	4050 Taylor Street San Diego, CA 92110
De Santos, Gerardo "Jerry"	909-829-3343	951-840-8227	g.de.santos@dot.ca.gov	District 8 & 9	13970 Victoria Street Fontana, CA 92336
Kirzhner, Guennady "Henry"	213-897-1681	818-262-8913	henry.kirzhner@dot.ca.gov	District 7W	100 S. Main Street, 3rd Fl. Los Angeles, CA 90012
Bocchicchio, Ken	949-724-2059	949-279-8474	ken.bocchicchio@dot.ca.gov	District 7E & 12	3347 Michelson Drive, Ste.100 Irvine, CA 92612-8894
Crain, Robert	408-254-5839	408-591-5121	robert.crain@dot.ca.gov	District 4NE	1007 Knox Avenue San Jose, CA 95122
Luena, Roberto	415-703-3288	408-591-5123	roberto.luena@dot.ca.gov	District 4SW	295 San Bruno Avenue San Francisco, CA 94103
Salinas, Rick	559-243-3548	559-260-4508	rick.salinas@dot.ca.gov	District 5, 6 & 10S	3240 N Millbrook Ave Fresno, CA 93726
Altman, Steve	916-212-8585	916-212-8585	steve.altman@dot.ca.gov	District 3S & 10N	2777 Del Monte Street West Sacramento, CA 95691
Babcock, John	916-227-8871	916-205-8871	john.babcock@dot.ca.gov	Headquarters	1801 30th Street, Rm. 209 Sacramento, CA 95816
Morrow, Rick	510-286-0501	510-774-6283	rick.morrow@dot.ca.gov	District 4 Toll & District 7 GDDB	333 Burma Road Oakland, CA 94607
Hamaguchi, Jon	916-227-8257	916-996-8772	jon_hamaguchi@dot.ca.gov	District 7-405 Design Build	30th Street, MS 9-2/11H Sacramento, CA 95816-7006

RAILROAD COMPANY EMERGENCY PHONE NUMBERS (UPDATED JANUARY 31, 2012)

If you discover railroad damage, immediately call 911 to prevent a derailment. Then you may call the railroad dispatcher at one of the numbers listed below.

- The two major freight railroad companies in California are the Union Pacific and the Burlington Northern and Santa Fe Railway Company. Their emergency hotlines are shown below.
    - The Union Pacific Railroad Company (UPRR) 1-888-877-7267 (Emergency - Railroad Police) & Emergency Crossing Hotline # 1-800-848-8715
    - The Burlington Northern and Santa Fe Railway Company (BNSF) Emergency Number is 1-800-832-5452 followed by prompts.
- The Southern California Regional Rail Authority (SCRRA) also known as Metrolink operates and runs commuter train system for the six transportation authority in Southern California. Their listed 24-hr Number is 1-888-446-9721.
- The Metropolitan Transit Development Board (MTDB) also known as San Diego Trolley, Inc. Their 24/7 emergency number is 619-595-4961.
- Caltrain in the Bay Area, 24-hr 877-723-7245 and the Dispatch # for Amtrak is 800-872-4600.

RR	Title	Last Name	First Name	Office No.	Cell No.
ABL	Supt.	Copple	Phil	510-832-8464	
ABL	General Manager	Pattison	Phil	510-832-8464	925-286-7008
AL	RR Supervisor	Simpson	Greg	530-258-4417	530-258-9229
AL	After Hours			530-258-2111	
ARZC	Supt.	Cecil	Tanya	602-669-6662	
CCT	Superintendent	Copple	Phil	209-466-6927	
CCT	General Manager	Garrison	Cindy	209-466-6927	
CCT	Track	Martinez	Jerry		209-479-3252
CNFR	Mech Supervisor	Deem	Robert	707-642-1826	707-333-3081
CNFR	General Manager	Jones	Bob	707-638-1315	916-717-1727
CNFR	Chief Dispatcher	Jones	Blake		707-557-2868
CNFR	Mgr Train Operator	Kerruish	Jon	707-638-1313	707-333-3078
CNFR	Sr. Roadmaster	Nevins	John		530-330-1301
CNFR	Mgr Train Operator	Purdy	Doug	530-668-9490	530-330-1303
CORP	Chief Trans Officer	Carter	Gerald	541-957-2504	541-915-0796
CORP	General Manager	Lovelady	Dan	541-953-2512	541-912-7437
CORP	Dispatcher	Nugent	Shannon	541-957-2503	
CORP	Chief Mech Officer	Reeves	Ron	541-957-2509	541-953-4994
CORP	Roadmaster	Underwood	Jim	541-957-2506	541-968-4178
CZRY	MGR	Scheueman	Geoffrey	619-938-1943	
FWRY	RR Owner	Wilkinson	Dave	805-524-2546	
FWRY	RR Line Manager	Wyatt	Dale		
IRTV	General Manager	Servin	AF	951-685-9551	
LAJ	General Manager	Edwards	Bill	323-277-2004	
LCR	RR Supervisor	Gray	Barry	541-947-2444	541-219-0097
LCR	RR Director	Simms	Ray	541-947-6003	
MCR	Mech Officer	Brunello	Albert	530-964-2141	
MCR	Roadmaster	Harris	Jeff	530-964-2141	
MCR	Passenger OPS			800-733-2141	
OTR	Superintendent	Copple	Phil	209-466-6927	
OTR	Track	Copple	Bryan	510-832-8464	
OTR	General Manager	Pattison	Joe	510-832-8464	925-286-7008
OTR	Mechanical	Wise	Howard	510-832-8464	
PHL	Chief Engineer	Giannoble	Bob	310-984-5780	
PHL	Gen Supt	Stolzman	Mike	310-984-5770	
PHL	Supt Trans	Tomren	Russell	310-984-5765	

RR	Title	Last Name	First Name	Office No.	Cell No.
PHL	Trans Manager	Magana	Howard	310-830-0753	
PHL	Trans RFE	Prince	Merve	310-984-5769	
PHL	Trainmaster	Peters	Greg	310-984-5775	
PHL	Trainmaster	Dixon	Greg	310-984-5781	
PHL	Trainmaster	Moore	Steve	310-984-5771	
QRR	Gen Supt	Breaux	John	530-283-2820	
QRR	Director of Trans	Rogers	George	530-378-8252	
SDIV	MGR	Jaspersen	Peter	619-239-3262	
SJVR	Chief Trans Officer	Barksdale	Keith	661-323-4157	661-201-9566
SJVR	Dispatcher	Garza	Norma	559-592-1857	
SJVR	Chief Mech Officer	Goins	Paul	559-592-1857	
SJVR	Asst. General Manager	Hardy	Jackie	559-592-1857	707-479-6603
SJVR	Roadmaster	Kelsey	Craig	559-592-1857	559-469-2625
SJVR	General Manager	Littlefield	Chuck	559-592-1857	561-213-8917
SMV	General Manager	Jennings	Dave	805-922-7941	
SMV	President	Parry	Michael	805-922-7941	
ST&E	President	Carney	Gregory	209-466-7001	
VCRR	Mech Foreman	Contreras	Mario	619-690-0945	619-571-1875
VCRR	Chief Trans Officer	Jesperson	Pete	619-239-3262	619-572-6771
VCRR	Roadmaster	Rhoads	Curtis	805-240-7743	805-331-8161
VCRR	General Manager	Verity	Douglas	805-488-7467	619-572-6777
WFS	General Manager	Engleka	Merle	559-949-8576	559-740-9781

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SAFETY

The PEQIT needs to be cognizant of safety while in the field. It is both the team leader's and the team members' responsibilities to ensure the safety of the PEQIT throughout the investigation. The team leader should hold a tailgate safety meeting at the start and at the end of each day. At the start of the day, all possible hazards that the PEQIT might encounter should be discussed and methods to prevent injury must be formulated. At the end of the day, the hazards that were encountered and whether the PEQIT can improve their response needs to be discussed.

On the following pages are forms and procedures to protect worker safety in the field. These include information:

1. Information on the Emergency Notification System for Caltrans Employees
2. See Appendix A of this document for "Office and Field Safety" *(Chapter 5 from Caltrans Safety Manual)* and "Earthquake Preparedness" *(Chapter 20 from Caltrans Safety Manual)*
3. Code of Safe Work Practices
4. STD 270: Vehicle Accident Report
5. PM –S- 0110: Safety Meeting Report
6. Instructions for State Employees before they drive a car on state business
7. Approved Medical Care Facilities listed by District

The following bulleted items are directed to help the PEQIT perform their investigation safely. Be aware of the possibility of hazardous materials after an earthquake and do not approach such locations. Keep your eyes open for overturned, placarded trucks and people or animals lying unconscious along the road. The PEQIT should make use of the resources offered by the District and by the Office of Maintenance in order to conduct a safe, incident-free inspection.

- **PEQIT members should take confined space training.** Do not attempt to enter the cells of box girder bridges or other confined spaces unless you are trained to do so. Seek assistance from OSMI to get information about damage in confined spaces.
- To get a lane closure, contact District Maintenance Region Manager.
- Consider adding air horn for lookout to use when monitoring traffic, unstable structure, or unstable earth.
- District Maintenance Equipment Manager can rent lights or other needed equipment.
- Contact the District Maintenance Hazardous Materials Officer regarding spills in or under a bridge.
- Contact Maintenance Permits Office to find out about utility easements within affected bridges.

Although the PEQIT's first priority is to collect perishable data, if you are the first person to find a severely damaged bridge, roadway, railway, or utility, you must immediately notify the responsible party to prevent possible injury or death.

Immediately call **911** if you discover a dangerous situation while inspecting bridges.

Another useful phone number is the California Highway Information Network (CHIN) at 800-427-77623 or 916-445-2895.

Other important phone numbers like the District Dispatcher and the emergency phone numbers for railroads are listed under 'Making Contact' in the previous chapter.

CODE OF SAFE WORK PRACTICES - FIELD TRIPS & PREPARING FOR A FIELD TRIP

Physical and Environmental Hazards

TYPICAL FIELD TRIP HAZARDS:

1. Adverse weather conditions
2. Slippery roadways
3. Moving vehicular or equipment traffic/traffic congestion
4. Hazardous parking areas
5. Noise
6. Impaired drivers
7. Footing on uneven terrain
8. Poor visibility
9. Contact with flying particles
10. Bending, stooping and lifting objects

Safe Work Practices

TYPICAL PRECAUTIONS TO AVOID INJURY:

1. Review Safety Manual for fieldwork safety items
2. Wear appropriate footwear, hard hat, safety glasses, and warning garments
3. Wear appropriate personal clothing
4. Perform pre-operation inspection on vehicle
5. Bend, stoop, and lift properly
6. Obey traffic laws
7. Be alert for other motorists
8. Stop and/or park vehicle in safe place
9. Exit vehicle properly, away from traffic
10. Avoid backing vehicle if possible
11. Use physical protection from traffic where practicable such as (a vehicle, guardrail, K-rail, etc.)
12. Work facing traffic and/or use lookout
13. Wear hearing protection as required.

SAMPLE VEHICLE ACCIDENT REPORT

STATE OF CALIFORNIA
VEHICLE ACCIDENT REPORT
STD. 270 (REV. 04/2002)

ACCIDENT PREVIOUSLY REPORTED TO ORIM? (If yes, give date)
☐ YES ☐ NO _____

THIS REPORT MUST BE MAILED WITHIN 48 HOURS AFTER ACCIDENT(ACCIDENTS INVOLVING INJURY SHOULD BE FIRST CALLED OR FAXEDTO ORIM AT (916) 376-5300 - CALNET 480-5300 - FAX (916) 376-5277.
**** CONFIDENTIAL INFORMATION ****
DO NOT RELEASE TO OTHER PARTIES WITHOUT CONSENT OF THE OFFICE OF RISK AND INSURANCE MANAGEMENT

DISTRIBUTION:
ORIGINAL -
District or Headquarters
Office of Safety and Health

Page of

STATE DRIVER

NAME		AGE	EMPLOYING DEPARTMENT **CALTRANS -**	AGENCY BILLING CODE
DRIVER'S LICENSE NO.	ACCIDENT DATE	TIME	OFFICE ADDRESS	AGENCY DOCUMENT NO. **District/Cost Center**
WAS VEHICLE BEING USED ON OFFICIAL STATE BUSINESS? (If NO, attach explanation)	☐ YES ☐ NO			
APPROXIMATE DATE DRIVER LAST COMPLETED STATE DEFENSIVE DRIVER TRAINING Month/Year	☐ NOT TAKEN		JOB TITLE	BUSINESS TELEPHONE

STATE VEHICLE

VEHICLE LICENSE NUMBER	VEHICLE YEAR, MAKE, MODEL	**VEHICLE OWNER** ☐ DEPT OWNED ☐ DGS POOL ☐ RENTAL ☐ EMPLOYEE OWNED	EQUIPMENT ID NO.
BRIEFLY DESCRIBE DAMAGES TO STATE VEHICLE	ESTIMATED REPAIR COST	IF DEPARTMENT OWNED OR RENTAL, ENTER OWNER'S NAME	

ACCIDENT DETAILS *(See Reverse for Diagram and Description)*

ACCIDENT LOCATION *(Address/Area)*	ROAD CONDITIONS	
	WEATHER CONDITIONS	
(City/State)	TRAFFIC CONDITIONS	
(County)	HOW FAST WERE YOU DRIVING	EST. SPEED OF OTHER CAR
POLICE REPORT MADE ☐ YES ☐ NO	NAME AND ADDRESS OF INVESTIGATING AGENCY	
AGENCY ☐ CHP ☐ OTHER	NCIC#	BADGE #

OTHER VEHICLE

DRIVER'S NAME	AGE/DOB	VEHICLE LICENSE NO.	VEHICLE YEAR, MAKE, MODEL	NO. OF PASSENGERS
DRIVER'S LICENSE NO.	HOME TELEPHONE	WORK TELEPHONE	REGISTERED OWNER	
DRIVER'S ADDRESS *(Street, City, State, Zip Code)*			OWNER'S ADDRESS	HOME TELEPHONE / WORK TELEPHONE
BRIEFLY DESCRIBE DAMAGES TO OTHER VEHICLE OR PROPERTY			NAME AND ADDRESS OF OTHER PARTY'S INSURANCE COMPANY	

INJURED

NAME	AGE	ADDRESS	HOSPITAL
NAME	AGE	ADDRESS	HOSPITAL

WITNESS

NAME	TELEPHONE	ADDRESS
NAME	TELEPHONE	ADDRESS

VEHICLE PASSENGERS

STATE	NAME	ADDRESS
STATE	NAME	ADDRESS
OTHER	NAME	ADDRESS
OTHER	NAME	ADDRESS

ADA Notice For individuals with sensory disabilities, this document is available in alternate formats. For information call (916) 654-6410 or TDD (916) 654-3880 or write Records and Forms Management, 1120 N Street, MS-89, Sacramento, CA 95814.

(CONTINUED ON REVERSE)

SAMPLE SAFETY MEETING REPORT

STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

SAFETY MEETING REPORT

PM-S-0110 (REV. 10/1999)

ACTION AND DISTRIBUTION:

- ☐ 1. First-line supervisor conducts meeting, completes, and signs form.
- ☐ 2. First-line supervisor retains and posts one copy.
- ☐ 3. First-line supervisor sends original to second-line supervisor for review.
- ☐ 4. Second-line supervisor reviews, signs original, and returns to first-line supervisor to file.
- ☐ 5. Additional routing to:

Note: See Chapter 2, Safety Meetings, in the Caltrans Safety Manual for details.

MEETING DATE	OFFICE/CREW/PROJECT NAME	COST CENTER/PROJECT NUMBER

ATTENDANCE-SIGNATURE OF EMPLOYEES (Add additional sheets if required)

SAFETY TOPICS DISCUSSED

SAFETY SUGGESTIONS/COMMENTS

FIRST AND/OR SECOND-LINE SUPERVISOR'S COMMENTS

FIRST-LINE SUPERVISOR SIGNATURE	DATE	SECOND-LINE SUPERVISOR SIGNATURE	DATE

SUGGESTED TOPICS FOR DISCUSSION

☐ Safe work habits	☐ Maintenance, Chapter 8	☐ Respirator safety	☐ Warning garments
☐ Safe work conditions	☐ Traffic control/flagging	☐ Confined spaces	☐ Body protection
☐ Codes of Safe Operating/Work Practice	☐ Slip/trip/fall hazards	☐ Hard hats	☐ Foot protection
☐ First aid treatment	☐ Protective vehicles	☐ Safety glasses	

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Before an Employee Drives a Vehicle on State Business

Ok, You Had A Motor Vehicle Accident, So Now What Happens????

You are the State driver and it is immediately following the accident:

At the accident scene, keep safety in mind at all times, provide what help you are trained for to any injured, do not admit fault or make any promises that the State will pay for any damages. Using the STD. 269 Accident Identification card that should be in the glove compartment of all state vehicles, write down as much information as you can about the accident and other party. Complete and tear off the perforated part and give it to the other driver so they know who you are and how to contact our insurance carrier, the Office of Risk and Insurance Management.

Complete the latest revision of the VEHICLE ACCIDENT REPORT (STD. 270) immediately upon return to your office. If there were injuries to non-State parties or the other party suffered significant property damage, the supervisor must fax an advance copy to the Office of Risk & Insurance Management (ORIM) at 916-376-5277 or telephone the accident report to ORIM within 48 hours at 916-376-5300.

1. Complete all sections of STD. 270
2. Enter the Equipment ID number of state vehicle as appropriate
3. Enter District and Cost Center numbers (Agency Doc. No.).
4. Give details as to be understood by someone who was not a witness
5. Make a simple diagram of the accident scene
6. Obtain an inspection and estimate of damage from Division of Equipment
7. Sign completed form and give to your supervisor

Be sure your supervisor reviews the STD. 270 and signs it before faxing an advance copy to ORIM (916) 376-5277 and the Caltrans Safety Office.

SUPERVISORS TAKE NOTICE!

The requirement for prompt reporting of all damage to state equipment cannot be overstated!

Train your employees!

PEQIT Tailgate Safety Meeting Form

Name of Incident		Date Prepared	
Location		Start Date	
Specific Location Description		Finish Date	

Personnel

Position	By signing below, I agree that I have been briefed and understand the contents of this post incident inspection form.	Contact	Training	Emergency Contact Name/Phone
Prepared by	Name: Sign:	Ph: Cell: Email:		
Safety Supervisor	Name: Sign:	Ph: Cell: Email:		
PEQIT Member Name	Name: Sign:	Ph: Cell: Email:		
PEQIT Member Name	Name: Sign:	Ph: Cell: Email:		
PEQIT Member Name	Name: Sign:	Ph: Cell: Email:		
PEQIT Member Name	Name: Sign:	Ph: Cell: Email:		

Emergency Information

EMS Phone		Company Emergency Contact Name & Phone	
EMS Access Life-flight?			
Emergency Gathering Site			
Nearest Hospital Location & Phone			
Communication:	☐ Cell Phone (Check service on site ☐Y ☐N) ☐ Radio (Channel:) ☐ Phone (Note phone number, location, special dialing, other contacts, etc) Additional Notes:		

General Description of Work		
Sequence of Operations	Description of Steps and Tools Required	Hazards and Methods to Mitigate

	Condition	Description of Hazards		Control Measures
☐	Falling	Gravity-induced injury or death	☐ ☐	Always use appropriate fall-protection or rope-access equipment when 6 feet from unprotected edge with a fall potential of 6 feet or more All personnel must be properly trained (certified as required)
☐	Human Error	Rigging Errors	☐ ☐ ☐	Use 2-rope system when working line is primary means of support Use independent anchorages Always do 4-point check: Ropes (including anchors), Hardware, Harness, Helmet
☐	Communication Difficulty	Loud ambient noise (traffic, machinery, running water, wind, etc.) Malfunctioning or dropped radios Conditions change	☐ ☐ ☐ ☐	Agree upon and use standardized communication signals Check communication system Designate alternate communication system in case conditions change or technical difficulties arise Review hand signals (as appropriate)
☐	Sharp, hot or abrasive	Rope or anchor damage and/or failure Abrasions or cuts to hands Melted rope Burns sustained by operator	☐ ☐ ☐	Use proper edge protection and padding Use re-direct or intermediate anchors as needed Wear gloves and proper clothing
☐	Machinery	Inadvertent operation of machinery Injury sustained from machinery Hazardous condition created (e.g. release of water)	☐ ☐ ☐	Get appropriate clearances Follow lock-out/tag-out procedure Confirm lock-out/tag-out
☐	Injury from Tools	Hazards depend on tools used Damage to rope-access or fall-protection system	☐ ☐	Follow all manufacturers instructions and keep all protective guards in place Separate suspension rope may be required for tools greater than 10 kg
☐	Dropped Tools or Materials	Possible injury to personnel and public Loss of important tools for work or egress Damage to structures or equipment	☐ ☐ ☐ ☐	Clearly mark and barricade Hazard Zone Helmets or hard hats must be worn in Hazard Zone Keep a clean and orderly worksite All tools and devices must be tethered or secured Avoid working or standing below other workers
☐	Rock fall or loose detritus	Possible injury to personnel and public Damage to structures or equipment Severed ropes	☐ ☐ ☐	Careful scaling or clearing of slope may be needed prior to beginning work Loose materials or rock may need to be secured (either temporarily or permanently) Manage ropes carefully to avoid dislodging loose materials
☐	Water (working around/over moving/standing water)	Wet surfaces can be slippery Potential for Drowning Trapped in current while tied off (drowning hazard)	☐ ☐ ☐ ☐	Stop work if conditions become dangerous Rescue boat shall be readily available if working directly over water, especially if descent is a viable method of egress. Fall protection or rope access equipment should not allow worker to fall into water (especially moving water) Personal flotation devices not required if proper fall protection in place
☐	Weather-Rain/Snow/Ice	Insulating qualities of wet clothing decreases Possible hypothermia (dangerously low body temperature) Loss of dexterity in extremities Wet or icy surfaces can be slippery Decreased friction on descent and rope-grab devices Danger of stray current around improperly insulated and grounded electrical equipment Decreased visibility Frozen Ropes	☐ ☐ ☐ ☐ ☐ ☐	Stop work if conditions become dangerous Wear proper footwear and clothing Waterproof rain gear should be available Be aware of slippery conditions Electrical equipment must be adequately grounded and equipped with GFCI's. Hand warmers should be available in case of emergency

	Condition	Description of Hazards		Control Measures
☐	Sun/Heat	Possible dehydration, heat exhaustion or heat stroke Burns from tools, equipment, and structural steel Adhesives and first-aid supplies may be degraded by heat	☐ ☐ ☐ ☐	Stop work if conditions become dangerous Ample water and/or electrolytes must be on hand for workers Schedule proper breaks and work in morning or evening to avoid peak temperatures Wear gloves and proper clothing to protect hands from hot surfaces
☐	Cold/Freezing Temperatures	Possible hypothermia, frostbite, loss of dexterity in extremities Decrease in efficiency, adhesives and first-aid supplies may not function properly due to cold, water for drinking and work may be frozen; slippery surfaces	☐ ☐ ☐	Stop work if conditions become dangerous Wear proper footwear and clothing, including gloves and hat Warm liquids should be available to workers
☐	**Wind**	Possible increased cooling or hypothermia risk, increased dehydration risk in dry humidity Decrease in efficiency, hindrance to communications between team members Danger of unsecured equipment or material being blown into the access zone Difficulty communicating	☐ ☐ ☐ ☐	Stop work if conditions become dangerous Wear proper footwear and clothing, including gloves and hat Secure loose materials at work site Be wary of wind developing slack in ropes where they may be blown in to areas making retrieval difficult
☐	Lightning	Possible electrocution due to lightning strike, loss of consciousness or life Rope-access equipment may provide a pathway to the operative for electrical strikes	☐	Stop work when lightning threatens
☐	Dimly lit or night work	Sharp or protruding objects (metal, nails, bolts, etc.) may not be visible to moving operatives, drowsiness of employees	☐ ☐	Provide adequate lighting: area lighting and/or head- and hand-lamps Provide spare batteries, light sources, and bulbs
☐	Confined space entry/toxic air	Work areas may contain toxic gases or insufficient oxygen levels for work. Space may have restricted entry/exit making access difficult.	☐ ☐ ☐	Follow confined space procedures Use air monitor- check batteries, recalibrate as needed Toxic rescue plan may be needed
☐	Dust/Chemical Exposure	Difficulty in breathing, possible allergic reaction Possible long-term health hazard Chemical burns to skin, eyes, internal organs	☐ ☐ ☐ ☐	Provide adequate engineering controls Provide PPE where engineering controls not possible or impractical Workers must have MSDS on site for all chemicals used in work Respirators must be the correct type for the exposure and personnel may need medical clearance and be correctly fitted.
☐	High-noise area	Permanent or temporary damage to hearing Communications between team members may be difficult High-noise levels may mask warning buzzers or other alert sounds	☐ ☐ ☐	Hearing protection required, in extremely loud environments (+120 dB), multiple types of protection may be necessary. Agree on hand signals before work starts Workers may be equipped with sound-isolating hearing protection for radios.
☐	Insect or animal bites or stings	Possible injury or incapacitation of personnel depending on severity of bite or venom	☐ ☐	Careful access into areas where spiders, snakes, scorpions, or other creatures may reside. Use of gloves at all times, equip first aid kit with medical supplies appropriate for bites and stings.
☐	Vehicular Traffic	Possible impact or crushing injury	☐ ☐ ☐	Careful demarcation of access and hazard zones, Use flags, signs, flag persons, lighting as needed Provide high-visibility clothing for personnel
☐	Animal/Bird Feces	Possible inhalation of disease carried by feces	☐ ☐	Personnel need to be wary of contact with the droppings. Workers may need to wear protective gloves or respirators.

Post Job Debrief

Incident		Date/Time Completed	
Contributing Team Members			
What went especially well?			
What should we change for next time?			
Safety Concerns, Violations and Near Miss Incidents			

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APPROVED MEDICAL FACILITIES AND PHYSICIANS (UPDATED 2003)

Headquarters

AUBURN

Sutter Occupational Health
3288 Bell Road, Suite 200
(530) 887-0628

CITRUS HEIGHTS

MedClinic Occupational Health Clinic
8421 Auburn Blvd., Suite 120
(Riverside/Auburn Blvd., Exit off I-80)
1201 Alhambra Blvd., Suite 210
(916) 969-1160

ELK GROVE

MedClinic Elk Grove
9354 Elk Grove-Florin Road
(916) 686-5834

Sutter Medical Plaza/Laguna
8170 Laguna Blvd., Suite 210
(916) 683-3252

FAIR OAKS

MedClinic Fair Oaks
8055 Madison Avenue
(at Fair Oaks Blvd.)
(916) 966-2002

FOLSOM

Mercy Hospital of Folsom Occupational Health
1650 Creekside Drive, Suite 3500
(916) 983-7496

Kaiser Occupational Health Center
2155 Iron Point Road
(916) 817-5660
[Case Manager: Kristiana Cooney
(916) 817-5683]

RANCHO CORDOVA

Rancho Cordova Occup. Health Clinic
9755 Lincoln Village Drive
(at Bradshaw Road)
(916) 363-2045

Sutter Health Care Center
1941 Zinfandel Drive
(916) 635-3570

ROCKLIN

MedClinic Rocklin
4804 Granite Drive
(916) 624-5666

ROSEVILLE

Kaiser Occupational Health Clinic
1001 Riverside Avenue
Mott Building, 1st Floor
(916) 784-4100
[Case Manager: Janet Stanger
(916) 784-4410]

Sutter Occupational Health
Two Medical Plaza, Suite 105
(916) 797-4700

MedClinic Occupational Health Clinic
406-1/2 Sunrise Avenue
(916) 536-2525

SACRAMENTO

Kaiser Occupational Health Center
2016 Morse Avenue
(916) 973-5499
[Case Manager: Susan Twining
(916) 973-7760]

MedClinic Occupational Health Clinic
3160 Folsom Blvd. (at Alhambra)
(916) 733-3390

Sutter Health @ Work
1014 N. Market Blvd.
(916) 565-8600

U. S. HealthWorks
1675 Alhambra Blvd., Suite B
(916) 451-4580

U. S. HealthWorks
4700 Northgate Blvd., Suite 100
(916) 929-6161

U. S. HealthWorks
3680 Industrial Blvd., Suite 550-H
West Sacramento
(916) 373-7575

U. S. HealthWorks
6830 Stockton Blvd., Suite 200
(916) 394-2969

Methodist Hospital Emergency Room
7500 Hospital Drive
(916) 423-3000

SOUTH SACRAMENTO

Kaiser Occupational Health Center
6600 Bruceville Road
Building 3, 2nd Floor
(916) 688-2005
[Case Manager: Darlene Schueller
(916) 688-2462]

MedClinic Occupational Health Clinic
8120 Timberlake, Suite 112
(916) 681-6088

District 1

ARCATA

Mad River Community Hospital
3800 Janes Road
(707) 822-3621

Arcata-Mad River Ambulance
(707) 822-4166 emergency only
(707) 822-3353 business calls

BOONVILLE

See UKIAH

Anderson Valley Ambulance
(707) 895-3123
Dial 911

CLEARLAKE

*Redbud Community Hospital_*
18th Avenue & Highway 53
(707) 994-6486
Ambulance
Dial 911

COVELO

See WILLITS

Covelo Fire Dept. & Ambulance
(707) 983-6719

CRESCENT CITY

Redwood Medical Center
1240 Marshall Street
(707) 465-5566

Sutter Coast Hospital
800 E. Washington Blvd.
(707) 464-8511

Del Norte Ambulance Service
(707) 464-9551

EUREKA

General Hospital
2200 Harrison Avenue
(707) 445-5111

St. Joseph Hospital
2700 Dolbeer Street
(707) 445-8121
Emergency Room: 445-5040

City Ambulance of Eureka Inc.
(707) 445-4907

Dr. Salter/Dr. Smuckler
3116 Harrison Avenue
(707) 444-3885

FORT BRAGG

*Mendocino Coast Dist. Hospital_*
700 River Drive
(707) 961-1234

Fort Bragg Ambulance Services
(707) 961-5444

FORTUNA

Fortuna Family Medical Group
874 Main Street
(707) 725-3334

Humboldt Medical Group
3306 Renner Drive
(707) 725-6101

Redwood Memorial Hospital
3300 Renner Drive
(707) 725-3361

GARBERVILLE

So. Humboldt Community Clinic
509 Elm Street
(707) 923-3925

Gerald Phelps Humboldt Com. Hospital
733 Cedar Street
(707) 923-3921

Garberville Ambulance Service
Dial 911

GUALALA

Redwood Coast Medical Service
46900 Ocean Drive
(707) 884-4005

Mendocino Coast Hospital – Fort Bragg

HOOPA

Kamow Medical Center
(530) 625-4261

Hoopa-Willow Creek Ambulance
(530) 625-4180

KELSEYVILLE

Kelsey Creek Medical Clinic
4241 Church Street
(707) 279-8813

LAKEPORT

Duane Bradley/Donald Joyce, M.D.
5375 Lakeshore Blvd.
(707) 263-5679

*Sutter-Lakeside Community Hospital_*
5176 Hill Road
(707) 263-5651

Ambulance
Dial 911

McKINLEYVILLE

See ARCATA

MIDDLETOWN

Middletown Medical Clinic
21337 Bush
(707) 987-3312

Ambulance
Dial 911

ORLEANS

See WILLOW CREEK

Ambulance
Dial 911

POINT ARENA

See FORT BRAGG or GUALALA

REDWAY

Redwoods Rural Health Center
101 Westcoast Road
(707) 923-2783

UKIAH

*Ukiah Valley Medical Center Hospital_*
275 Hospital Drive
(707) 462-3111

Ukiah Ambulance Service
(707) 462-3001
Dial 911

WILLITS

*Frank R. Howard Memorial Hospital_*
Madrone & Manzanita Avenue
(707) 459-6801

Willits Ambulance Service
(707) 459-7088

WILLOW CREEK

Six Rivers Medical Clinic
#8 State Highway 96
(530) 629-3116

Willow Creek Family Medical Group
38883 Highway 299
(530) 629-3111

Hoopa-Willow Creek Ambulance
(916) 625-4180

District 2

ALTURAS

Modoc Medical Center
228 McDowell Street
(530) 233-5131

BIEBER

Big Valley Medical Service
100 N. Market Street
(530) 294-5241

BURNEY

Intermountain Family Practice Group
20641 Commerce Way
(530) 335-5457

CHESTER

Seneca Medical Group
372 Main Street
(530) 258-3191

CHICO

Chico Immediate Care
376 Vallombrosa Avenue
(530) 891-1676

FALL RIVER MILLS

Fall River Health Center
43563 Highway 229 East
(530) 336-6535

HAPPY CAMP

Happy Camp Health Services
38 Park Way Drive
(530) 493-5257

HAYFORK

Dr. Donald Krouse
Highway 3
(530) 628-5517

KLAMATH FALLS, OR

Basin Immediate Care
3150 South 6th Street
(541) 883-2337

Merle West Medical Center
2865 Daggett Avenue
(541) 882-6311

MT. SHASTA

Siskiyou Medical Group
822 Pine Street
(530) 926-5261

PORTOLA

Eastern Pumas Health Care
Appointment Only
480-1st Avenue
(530) 832-4211

QUINCY

Plumas District Hospital
1065 Bucks Lake
(530) 283-2121

RED BLUFF

Lassen Medical Group
2580 Sister Mary Columbia Drive
(530) 527-0414

REDDING

RIOH/Medical Clinics
1710 Churn Creek Road
(530) 226-0310

Everyday Health Care
3270 Churn Creek Road
(530) 222-6886

RENO

Washoe Medical Center
77 Pringle Way
(775) 982-4100

SUSANVILLE

Dr. Hal Meadows
Appointment Only
705 West Street
(530) 257-7251

Lassen Community Hospital
560 Hospital Lane
(530) 257-5325

WEAVERVILLE

Dr. Donald Krouse
252 Main Street
(530) 623-3735

Dr. Edward Dolci
310 Easter Avenue
(530) 623-4471

Dr. Harwood/Dr. Stemple
500 Trinity Lake Blvd.
(530) 623-3600

YREKA

Fairchild Group
475 Bruce Street
(530) 842-3507

District 3

AUBURN/COLFAX

Sierra Doctors Center
275 Grass Valley Highway
(530) 885-0344

Auburn Faith Hospital
11815 Education Street
Highway 49 & Bell Road
(530) 885-7201

CAMERON PARK

Rapidcare
4062 Flying C Road, Suite 41
(530) 676-8234

CHICO

Convenient Care
(Pesticide Exposure Testing)
670 Rio Lindo Avenue, Suite 300
(530) 342-2273

Enloe Hospital
1531 Esplanade
(530) 332-7300

COLFAX

See AUBURN

COLUSA

See MARYSVILLE

DOWNIEVILLE

Frank Lang
Western Sierra Medical Clinic
209 Nevada Street
(530) 289-3298

ELK GROVE

See SACRAMENTO

GRASS VALLEY

Miners Community Clinic
700 Zion Street
(530) 265-7890

Yuba Docs Medical Group
12090 Nevada City Highway
(530) 274-5020

Sierra Nevada Memorial Hospital
155 Glasson Way
(530) 274-6000

LINCOLN

See ROSEVILLE

LOYALTON/SIERRAVILLE

Sierra Family Medical Group
700 West Third Street
(530) 993-1231

Sierra Valley Hospital
700 West Third Street
(530) 993-1225

MARYSVILLE/COLUSA/YUBA CITY

Sutter North Urgent Care
444 Plumas Blvd.
Yuba City
(530) 749-3420

Rideout Memorial Hospital
726 Fourth Streett
Marysville
(530) 749-4300

NEVADA CITY

See GRASS VALLEY

OROVILLE

Premier Health Care
1940 Feather River Blvd., Suite 0
(530) 532-8824

Oroville Hospital
2767 Olive Highway
(530) 533-8500

PARADISE

Feather River Hospital
5974 Pentz Road
(530) 877-9361

PLACERVILLE

Marshall Hospital
Marshall Way
(530) 622-1441

RANCHO CORDOVA

U.C. Medical Group
1100 Olson Drive, Suite 100
(916) 635-4120

U.S. HealthWorks
9261 Folsom Blvd., Suite 200
(916) 364-1733

ROCKLIN

U. S. Health Works
2305 Sunset Blvd.
(916) 632-9606

ROSEVILLE/LINCOLN

Kaiser Occupational Health Center
1001 Riverside Ave., Mott Bldg. 1st Floor
(916) 784-4100
[Case Manager: Janet Stanger
(916) 784-4410]

SACRAMENTO/ELK GROVE

UCD Medical Group
(Pesticide Exposure Testing)
11000 Olson Drive, Suite 100
Rancho Cordova
(916) 635-4120

Sacramento Medical Center
(Poison Center)
2315 Stockton Blvd.
(916) 734-2011

Sutter Occupational Health
Two Medical Plaza, Suite 105
(916) 797-4700
Urgent Care
(916) 797-4750

U. S. HealthWorks
1675 Alhambra Blvd., Suite B
(916) 451-4580

U. S. HealthWorks
4700 Northgate Blvd., Suite 100
(916) 929-6161

Kaiser Occupational Health Center
2016 Morse Avenue
(916) 973-5499
[Case Manager: Susan Twining
(916) 973-7766]

Kaiser Occupational Health Center
6600 Bruceville Road
Building 3, 2nd Floor
(916) 688-2005
[Case Manager: Darlene Schuller
(916) 688-2462]

SIERRAVILLE

See LOYALTON

SOUTH LAKE TAHOE

Tahoe Urgent Care
2130 Lake Tahoe Blvd.
(530) 541-3277

Barton Memorial Hospital
South Avenue & 4th Street
(530) 541-3420

TAHOE CITY

Truckee Tahoe Medical Group
925 N. Lake Blvd., Suite 201
(530) 581-8864

TRUCKEE

Sierra Multi-Specialty Medical Group
10978 Donner Pass Road
(530) 582-1212

Truckee Tahoe Medical Group
10024 Pine Avenue
(530) 587-3887

Tahoe Forest Hospital
10950 Donner Pass Road
(800) 733-9953

WEST SACRAMENTO

See SACRAMENTO

WILLOWS

Glenn Medical Center
1133 W. Sycamore
(530) 934-1800

WOODLAND

Sutter Health
475 Pioneer Avenue, Suite 100
(530) 406-5616

Woodland Clinic Medical Group
1207 Fairchild Court
(530) 668-2660

Woodland Memorial Hospital
1325 Cottonwood
(530) 662-3961

YUBA CITY

Urgent Care
444 Plumas Blvd.
(530) 749-3420

District 4

ANTIOCH

Contra Costa Industrial Medical Clinic
2339 Buchanan Road
(925) 777-9194

Kaiser Occupational Health Center
3400 Delta Fair Blvd., Adobe Bldg.
(925) 779-5434
[Case Manager: Marsha Rees
(925) 372-1113]

BENICIA

Sutter Health @ Work
836 A Southampton Road
(707) 745-4370

CAMPBELL

Gateway Family Medical Center
50 E. Hamilton Avenue, Suite 100
(408) 364-7600

CONCORD

Muir/Diable Occupational Medicine
2231 Galaxy Court
(925) 685-7744

CORTE MADERA

Medical Center of Marin
Marin Urgent Care Center
101 Casa Buena Drive
(415) 924-4525

DAVIS

Sutter Davis Hospital
2000 Sutter Place
(530) 756-6440

Sutter Medical Plaza
2020 Sutter Place, Suite 101
(530) 750-5800

EMERYVILLE

Emeryville Occup. Med. Center (EOMC)
6001 Shellmound Street, Suite 850
(510) 653-5200

FAIRFIELD

North Bay Occupational Health
1860 Pennsylvania Ave., Suite 300A
(707) 429-7701

FOSTER CITY

Mariner Medical Center
1261 E. Hillsdale Blvd., Suite #1
(650) 570-2299

FREMONT

Fremont Urgent Care
3161 Walnut Avenue
(510) 796-1000

Kaiser Occupational Health Center
39400 Paseo Padre Pkwy., Mission Bldg.
(510) 248-3015
[Case Manager: Karen Rickett
(510) 248-3724]

GILROY

Direct Care Medical Clinic
7880 Wren Avenue, Suite C-134
(408) 842-1316

Kaiser Occupational Health Center
7520 Arroyo Circle
(408) 846-2307
[Clinic Manager: Jamie McGuire
(408) 972-6806]

South Valley Family & Occup. Health Ctr.
9460 No Name Uno, Suite 230
(408) 842-1544

GREENBRAE

Sutter Health @ Work
1350 South Eliseo Drive, Suite 250
(415) 925-7888

GUALALA

Redwood Coast Medical Service
46900 Ocean Drive
(707) 884-4005

HAYWARD

Medical Express
22429 Hesperian Blvd.
(510) 782-7111

St. Rose Occupational Health Clinic
27200 Calaroga Avenue
(510) 785-9026
24-Hour Emergency Room
(510) 987-8611

U. S. HealthWorks
26120 Eden Landing Rd., Bldg. B., Ste. 1
(510) 264-3700

HAYWARD/UNION CITY

Kaiser Occupational Health Center
3555 Whipple Road
(510) 675-4807
[Clinic Manager: Connie Perez-English
(510) 675-2255]

HEALDSBURG

James F. Carroll, M.D.
421 March Avenue, Suite D
(707) 433-3321

KENTFIELD

Kentfield Occupational Medicine Center
1125 Sir Francis Drake Blvd., Suite N
(415) 485-3600

MARTINEZ

Kaiser Occupational Health Center
200 Muir Road, Hacienda Bldg., 1st Floor
(925) 313-0301
[Clinic Manager: Marsha Rees
(925) 372-1113]

MILPITAS

Alliance Occupational Medicine
315 South Abbott Avenue
(408) 790-2900

Kaiser Occupational Health Center
700 E. Calaveras Blvd.
(408) 945-5801
[Clinic Manager: Marilyn Howard
(408) 945-6142]

U. S. HealthWorks
1717 South Main Street
(408) 957-5700

NAPA

Work Health
1100 Trancas Street, Suite 300
(707) 257-4084

Kaiser Occupational Health Clinic
3285 Claremont Way, 2nd Floor
(707) 258-4907
[Clinic Manager: Carol Hodges
(707) 651-2953]

Occupational Health
1700 Soscol Avenue, Suite 1
(707) 257-7799

NEWARK

BizMed Occupational Health Clinic
5886 Mowry School Road
(510) 226-8832

OAKLAND

Sutter Health @ Work
Occupational Health Center
5700 Telegraph Avenue
(510) 204-4455

OakCare Occupational Health Center
675 Hegenberger Road, Suite 121
(510) 633-7654

U. S. HealthWorks
7817 Oakport Street #140
(510) 465-0701

Concentra Medical Center
384 Embarcardero West
(510) 465-9565

Kaiser Occupational Health Clinic
235 W. MacArthur Blvd., 3rd Floor
(510) 752-1244
[Clinic Manager: Sandie Weekes
(510) 752-6427]

U. S. HealthWorks
401 Roland Way, Suite 130
(510) 635-9515

PETALUMA

North Bay Corporate Health Services
1436 Professional Drive, Suite 302
(707) 765-1111

El Rose Medical Clinic
24 W. El Rose
(707) 763-9891

Kaiser Occupational Health Clinic
3900 Lakeville Hwy.
(707) 765-3800
[Clinic Manager: Mary Scala
(415) 444-2355]

PLEASANTON

Premier COMP
5635 W. Las Positas Blvd. Suite 401
(925) 520-0055

Kaiser Occupational Health Clinic
7601 Stoneridge Drive.
South Bldg., 1st Floor
(925) 847-5160
[Clinic Manager: Marsha Rees
(925) 372-1113]

POINT REYES

Point Reyes Clinic
3 Sixth Street
(415) 663-8666

REDWOOD CITY

Sequoia Hospital Occup. Health Service
633 Veterans Blvd., Suite A
(650) 364-1565

Kaiser Occupational Health Center
1400 Veterans Blvd., 1st Floor
(650) 299-4785
[Clinic Manager: Kaye Walster
(650) 299-4301]

RICHMOND

Greater Richmond Industrial Med. Clinic
120 Broadway Avenue, Suite 23
(510) 236-7243

Concentra
2970 Hilltop Mall Road, Suite 202/203
(510) 222-8000

Kaiser Occupational Health Center
901 Nevin Avenue
(510) 307-1560
[Clinic Manager: Margaret Solon-Street
(510) 307-2484]

RIO VISTA

Northbay HealthCare Services
690 Main Street
(707) 374-6833

ROHNERT PARK

Sutter Health @ Work
6174 State Farm Drive
(707) 586-4320

SAN FRANCISCO

Concentra Medical Center
728-20th Street
(415) 648-9501

Kaiser Occupational Health Center
601 Van Ness Ave., Suite 2008
Opera Plaza, Mezzanine Level
(415) 674-7000
[Case Manager: Beatrice Ceccato
(415) 674-7002]

CHW Health Center @ Pacific Bell Park
24 Willie Mays Plaza
(415) 972-2249

SAN JOSE

Doctors on Duty
1910-N Capitol Avenue
(408) 942-0333

Samaritan Medical Care Center
554 Blossom Hill Road
(408) 281-2772

U. S. HealthWorks
636 E. Santa Clara Street
(408) 275-9097

U. S. HealthWorks
2011 South Monterey Road
(408) 288-3800

SAN JOSE/SANTA TERESA

Kaiser Occupational Health Center
275 Hospital Parkway, Suite 565
(408) 972-6800
[Clinic Manager: Jamie McGuire
(408) 972-6806]

SAN LEANDRO

Sutter Health @ Work
1555 Doolittle Drive, Suite 180
(510) 351-7833

U. S. Healthworks
15035 East 14th Street
(510) 614-3724

Concentra
2587 Merced Street
(510) 351-3553

SAN MATEO

Mariner Medical Center
1261 E. Hillsdale Blvd.
Foster City
(415) 570-2299

SAN PABLO

EMC Medical Group
2160 Vale Road
(510) 233-0984

SAN RAFAEL

Kaiser Occupational Health Center
99 Montecillo Road
(415) 444-2900
[Clinic Manager: Mary Scala
(415) 444-2355]

SAN RAMON

San Ramon Regional Medical Center
Hospital-Emergency Room
6001 Norris Canyon Road
(510) 275-8280

SANTA CLARA

U. S. HealthWorks
988 Walsh Avenue
(408) 988-6868

Alliance Occupational Medicine
2737 Walsh Avenue
(408) 228-8400

SANTA CLARA/CUPERTINO

Kaiser Occupational Health Center
10050 N. Wolfe Road, Ste. SW1-190
(408) 236-6160
[Clinic Manager: Rosalie Mikelson
(408) 236-6151]

SANTA CRUZ

Santa Cruz Medical Clinic
2025 Soquel Avenue
(408) 423-4111

SANTA ROSA

North Bay Corporate Health Services
95 Montgomery Drive, Suite 110
(707) 576-7300
NEED APPOINTMENT

Work Care
1287 Fulton Road
(707) 543-2441

Kaiser Occupational Health Center
401 Bicentennial Way
(707) 571-3000
[Clinic Manager: Sandra Hanson-Velloo
(707) 571-4847]

Sutter Health @ Work
3327 Channate Road
(707) 576-4932

SOUTH SAN FRANCISCO

Health South
192 Beacon Street
(415) 589-6500

Pacific Occupational Health Clinic
3 So. Linden Avenue
(415) 589-2647

U. S. HealthWorks
884 Dubuque Avenue
(650) 635-0400

SOUTH SAN FRANCISO/SAN BRUNO

Kaiser Occupational Health Center
Bayhill Medical Office
801 Traeger Avenue, 2nd Floor
(650) 742-7110
San Bruno
[Case Manager: Darlene Schuller
(650) 742-7134]

SUNNYVALE

Peninsula Industrial Medical Clinic
1197 East Arques Avenue
(408) 773-9000

U. S. HealthWorks
1195 East Arques Avenue, Suite 1
(408) 773-9000

UNION CITY

Health South
33560 Alvarado-Niles Road
(510) 489-8700

VACAVILLE

Kaiser Occupational Health Center
3700 Vaca Valley Parkway, 1st Flr, South
(707) 453-5515
[Case Manager: Nancy Murchison
(707) 453-5538]

VALLEJO

Kaiser Occupational Health Center
975 Sereno Drive
(707) 651-1370
[Case Manager: Carrie Torres
(707) 651-2951]

WALNUT CREEK

Kaiser Occupational Health Center
1425 S. Main Street
(925) 295-6466
[Clinic Manager: Marsha Rees
(925) 372-1113]

Muir/Diablo Occupational Medical
1981 N. Broadway, Suite 190
(925) 932-7715

WALNUT CREEK/PARK SHADELANDS

Kaiser Occupational Health Center
320 Lemon Lane, Lassen Bldg., 2nd Floor
(925) 906-2060
[Clinic Manager: Marsha Rees
(925) 372-1113]

WATSONVILLE

Watsonville Community Hospital
COMPQUIK Dept.
298 Green Valley Road
(408) 761-5612 or (408) 761-5627

WOODLAND

Sutter Health @ Work
475 Pioneer Avenue, Suite 100
(530) 406-5616

District 5

CARPINTERIA

Santa Barbara Foundation Clinic
4806 Carpinteria Avenue
(805) 566-5000

GOLETA

Sansum/SBMF Immedicenter
101 S. Patterson Avenue
(805) 898-3311

Santa Barbara Medical Foundation Clinic
122 S. Patterson Avenue
(805) 681-1777

GREENFIELD

Urgent Care
634 Walnut Avenue
(831) 674-5066

So. Monterey Medical Group
806 Maple
(831) 674-5593

KING CITY

So. Monterey Medical Group
210 Canal Street
(831) 385-5471

LOMPOC

Santa Barbara Medical Foundation Clinic
1201 Ocean Avenue
(805) 737-8600

Santa Barbara Medical Foundation Clinic
217 West Central Avenue, Suite G
(805) 737-8686

MONTEREY

Doctors on Duty
501 Lighthouse Avenue
(831) 649-0770

Doctors on Duty
2260 North Fremont
(831) 372-6700

Convenient Medical Clinic
14 Ford Road
Carmel Valley
(831) 659-5531

Community Hos. of Monterey Peninsula
23625 W.R. Holman Highway
(831) 624-5311

SALINAS

Doctors on Duty
1212 S. Main Street
(831) 422-7777

Doctors on Duty
1137 N. Main Street
(831) 757-1110

SAN LUIS OBISPO

Med Stop
283 Madonna Road, Suite B
(805) 549-8880

Urgent Care Family Medical Center
47 Santa Rosa Street
(805) 542-9596

SANTA BARBARA

Urgent Care/SBMF
51 Hitchcock Way
(805) 563-6100

SANTA CRUZ

Doctors on Duty
615 Ocean Street
(831) 425-7991

Doctors on Duty
223 Mt. Herman Road
Scotts Valley
(831) 438-7555

Doctors on Duty
1505 Main Street
Watsonville
(831) 722-1444

Dominican Santa Cruz Hospital
1555 Soquel Drive
(831) 462-7700

Santa Cruz Medical Clinic
2025 Soquel Avenue
(831) 458-5537

Watsonville Community Hospital
75 Nielson Street
Watsonville
(831) 724-4741

SANTA MARIA

Santa Barbara Medical Foundation Clinic
2801 Santa Maria Way
(805) 938-3000

Industrial Medical Group of Santa Maria
3070 Skyway Drive
(805) 922-8282

Urgentcare Center
340 Betteravia Road, Suite C
(805) 922-0561

SOLVAG

Santa Ynez Valley/Cottage Hospital
700 Alamo Pintado Road
(805) 688-6431

TEMPLETON

Medi-Stop
225 Posada Lane, Suite C
(805) 434-3699

Twin Cities Community Hospital
1100 Las Tablas Road
(805) 434-3500

District 6

FRESNO

Functional Industrial Rehabilitation Medical Association
5084 N. Fruit, Suite 103
(559) 224-6754

Fresno Community Hospital
Fresno & R Street
(559) 442-6000

Concentra Medical Center
7265 North First Street, Suite 105
(559) 431-8181

Concentra Medical Center
2555 East Street
(559) 445-0606

St. Agnes Hospital
1303 Herndon
(559) 431-5000

Kaiser Occupational Health Center
7300 N. Fresno St., Oak 1 Bldg.
(559) 448-4886
[Clinic Manager: Joanne Jerome
(559) 448-4831

Valley Industrial & Family Medical Group
Main Office
2610 Tuolumne Street (at "P" St.)
(559) 268-0666

Valley Industrial & Family Medical Group
North Office
6011 N. Fresno Street, Suite #115
(559) 440-9112

Clovis Community Hospital
2755 Herndon
Clovis
(559) 323-4000

Concentra Medical Center
6042 Fresno Street
(559) 431-8181

Sierra Meadows Medical Center
48677 Victoria Lane
Oathurst
(559) 686-2199

St. Agnes Occupational Health Center
1189 E. Herndon Ave., Suite 103
(559) 440-7777

Palm Medical Group
222 W. Shaw
(559) 222-9200

Sierra Kings Industrial Health Care
1419 Acacia Avenue, Suite 110
Reedley
(559) 637-2355

WESTERN FRESNO COUNTY

Coalinga District Hospital
Washington & Sunset
(559) 935-2051

KERN COUNTY

Bakersfield Occupational Medical Group
4580 California Avenue
Bakersfield
(661) 327-4527

Central Valley Family Medical Group
333 S. 10th Street
Taft
(661) 763-3338

Delano Regional Medical Center
1401 Garces Highway
Delano
(661) 725-4800

Dr. A. Giffen
109 Addison Way
Taft
(661) 765-2173

Kaiser Occupational Clinic
3501 Stockdale Highway
Bakersfield
(661) 398-5039
[Case Manager: Elise Gonzales
(661) 398-3470

Memorial Hospital
420-34th Street
Bakersfield
(661) 327-1792

Mercy Hospital
2215 Truxtun Avenue
Bakersfield
(661) 632-5275

Mercy Medi Center
Bernard & New Market Way
Bakersfield
(661) 632-5100

Mercy Medi Center
Stockdale & Old River Road
Bakersfield
(661) 663-6011

Ming & Ashe Medical
6501 Ming Avenue
Bakersfield
(661) 397-4004

Valley Industrial Medical Group
2501 "G" Street
Bakersfield
(661) 327-2225

Westside District Hospital
110 E. North
Taft
(661) 763-4211

EASTERN KERN COUNTY

Kern Valley Hopsital
6412 Laurel Avenue
Lake Isabella
(760) 379-2681

KINGS COUNTY

Immediate Care Center
450 Greenfield Avenue
Hanford
(559) 582-9000

Job Care
500 Greenfield
Hanford
(559) 585-5126

Sierra Valley Medical Group
869 W. Lacey Blvd.
Hanford
(559) 582-9313

MADERA

Functional Industrial Rehabilitation Medical Assocation
500 E. Almond, Suite 5B
(559) 674-3153

Concentra Medical Center
509 S. I Street
(559) 673-9020

TULARE COUNTY

Kaweah Delta Hospital
400 W. Mineral King
Visalia
(559) 635-2211

Morinda Medical Group
841 W. Morton
Porterville
(559) 781-8080

Sierra View District
465 W. Putman
Porterville
(559) 784-1110

Valley Prompt Care Medical Corp.
784 Prospect Street
Porterville
(559) 781-3014

Valley Prompt Care Medical Corp.
981 E. Prosperity
Tulare
(559) 684-8950

Visalia Medical Clinic
5400 Hillsdale
(559) 627-5222

District 7

BALDWIN PARK

Kaiser Occupational Health Center
1011 Baldwin Park Blvd.
(626) 851-5396
[Case Manager: Irene Kuwaki-Chuman
(626) 851-5641]

BELLFLOWER

Kaiser Occupational Health Center
9449 E. Imperial Hwy. Bldg. D, Ste. #140
(562) 803-2200
[Case Manager: Kelly Zoern
(562) 803-2013]

BURBANK

Providence St. Joseph Occupational Health Center
3413 Pacific Avenue
(818) 953-4408

CAMARILLO/OXNARD

Santa Rosa Walk-in Med Center
4934 Verdugo Way
Camarillo
(805) 484-0095

St. John's/Pleasant Valley Hospital
2309 Antonio Avenue
(805) 484-2831

CERRITOS/SANTA FE SPRINGS

Health First Medical Group
11817 E. Telegraph Road
Santa Fe Springs
(562) 949-9328

COMMERCE

U. S. Health Works
3430 South Garfield Avenue
(323) 722-8481

EL MONTE

Health Care Partners Medical Group
3144 Santa Anita Avenue
(626) 582-7989

FILLMORE

Fillmore Medical Center
852 Ventura Street
(805) 524-2672

GARDENA/SOUTH LOS ANGELES

Centerpointe Medical Group
16630 Broadway
(310) 768-8155

HARBOR CITY

Kaiser Occupational Clinic
25965 S. Normandie Avenue
(310) 517-3739
[Case Manager: Susan Ward
(310) 517-3731]

IRWINDALE/MONROVIA

Foothill Medical Center
6520 N. Irwindale Avenue
(626) 812-0366

LANCASTER/PALMDALE

Antelope Valley Occupational Medical
43845 N. 10th Street West, Suite 2E
(661) 949-9126

LEBEC

Bakersfield Family Medical
4580 California Avenue
Bakersfield
(661) 327-4411

LONG BEACH/COMPTON/CARSON

U. S. Health Works
2107 East Del Amo Blvd.
Rancho Dominguez
(310) 637-9611

LOS ANGELES

Kaiser Occupational Health Center
1526 Edgemont Bldg. G
(323) 783-6621
[Case Manager: Connie Alvarez
(323) 783-6621]

Stacy Medical
1744 North Main Street
(323) 225-2261

U. S. Health Works-Metropolitan
1212 Flower Street
(213) 747-0634

MISSION HILLS/SAN FERNANDO VALLEY

Facey Medical Group
11211 Sepulveda Blvd.
Mission Hills
(818) 365-9531

NEWHALL/SANTA CLARITA

First Medical Care
25327 Avenue Stanford, Suite 105
Valencia
(661) 253-8686

PANORAMA CITY

Kaiser Occupational Health Center
13652 Cantara Street
(818) 375-2233
[Case Manager: Susan Biag
(818) 375-2795]

PASADENA/GLENDALE

Verdugo Hills Urgent Medical Care
544 North Glendale Avenue
(818) 241-4331

POMONA

U. S. Health Works
801 Corporate Center Drive, Suite 130
(909) 594-7551

SIMI VALLEY/MOORPARK

Med Center
1980 Sequoia Avenue
(805) 583-5555

VAN NUYS

U. S. HealthWorks
16300 Roscoe Blvd.
(818) 893-4426

VENTURA

Community Memorial Industrial/Hospital
138 W. Main Street
(805) 667-2850

Community Memorial Hospital
147 N. Brent Street
(805) 667-2850

WEST LOS ANGELES

Kaiser Occupational Health Center
5971 Venice Blvd., 4th Floor
(310) 915-4400
[Case Manager: Nasmeen Razak
(310) 915-4419]

Airport Urgent Care
1117 West Manchester Blvd.
Inglewood
(310) 216-7100

Citizens Medical Group
11560 West Pico Blvd.
Los Angeles
(310) 477-8285

WOODLAND HILLS

Kaiser Occupational Health Center
5601 De Soto Avenue
(818) 719-3006
[Case Manager: Youngsoon Lim
(818) 719-2413]

Dr. Allan L. Kurtz
Warner Medical Center
6325 Topanga Canyon Blvd, Suite 501
(818) 346-1440

District 8

PARKER, ARIZONA

LaPaz Regional Hospital
1200 Mojave Road
(520) 669-9201

APPLE VALLEY

Santa Fe Family Health
18182 Highway 18, Suite 105
(760) 242-1234

St. Mary Regional Medical Center
18300 Highway 18
(760) 242-2311

Desert Valley Medical Group
18077 Highway 18
(760) 242-8000

Central Occupational Medical Providers
16003 Tuscola Road, Suite F
(760) 242-8808

BANNING

San Gorgonio Pass Memorial Hospital
600 North Highland Springs Avenue
(909) 845-1121

BARSTOW

Desert Valley Medical Group Inc.
1301 E. Main Street
(760) 256-3864

Barstow Hospital
555 South 7th Street
(760) 256-1761

Dr. Mike's
716 East Main Street
(760) 256-6426

BIG BEAR

Bear Valley Community Hospital
41870 Garstin Road
(909) 866-6501

BLYTHE

Leon Peter Y. Chua, M.D.
500 W. Barnard/ 500 N. Broadway, Ste.17
(760) 922-2152

CATHEDRAL CITY

Desert Primary Care Express
68-325 Highway 111
(760) 323-6789

Eisenhower Immediate Care Center
67-780 E. Palm Canyon Drive
(760) 328-1000

COACHELLE VALLEY

Santa Rosa del Valle Medical Group
1293-6th Street
(760) 391-5151

COLTON

U. S. Healthworks
850 E. Washington Street
(909) 370-0572

CORONA

Comp Access
760 S. Washburn, Suite 4A
(909) 808-6700

Central Occupational Med. Providers
1690 West 6th Street, Suite K
(909) 736-9500

DESERT HOT SPRINGS

Desert Primary Care
13570 Palm Drive
(619) 329-1776

FONTANA

Fontana Industrial Medical Clinic
8110 Mango Avenue, Suite 106
(909) 357-1595

Kaiser Occupational Health Center
9961 Sierra Avenue, Bldg. 3B
(909) 427-3917
[Case Manager: Gloria Duck
(909) 427-6100]

HEMET

Talbort U.S. Family Care
1545 W. Florida
(909) 652-2961

HESPERIA

Friendly Medical Center
15462 Main Street
(760) 949-7000

JOSHUA TREE

Hi Desert Medical Center
6601 White Feather Road
(760) 366-3711

LA QUINTA

Eisenhower Immediate Care Center
78-822 Highway 111, Suite C
(760) 564-7000

LOMA LINDA

Central Occupational Medicine Providers
24630 Redlands Blvd.
(909) 478-7878

MIRA LOMA

Tri-Industrial Medical Center
10427 San Sevaine Way, Suite J
(909) 360-8333

MORENO VALLEY

U. S. Healthworks
6485 Day Street, Suite 302
(909) 653-5291

Moreno Valley Ambulatory Surgery Center
24384 Sunnymead Blvd.
(909) 247-8080

NEEDLES

Colorado River Medical Center
1401 Bailey Avenue
(760) 326-4531

ONTARIO

Milliken Medical Group
1101 South Milliken Avenue, Suite C
(909) 390-2799

Inland Industrial Medical Group
1910 South Archibald Avenue, Unit E-2
(909) 930-5270

U. S. Healthworks
3200 Inland Empire Blvd., Suite 100
(909) 945-5011

Central Occupational Medicine Providers
59 S. Milliken Avenue, Suite 100
(909) 605-8888

U. S. HealthWorks
2171 S. Grove Avenue, Suite A
(909) 923-4080

PALM DESERT

Desert Urgent Care
74-990 Country Club Drive #310
(760) 341-8800

PERRIS

First Care Industrial
2226 Medical Center Drive #101
(909) 657-6559

PHELAN

Phelan Clinic
3936 Phelan Road, Suite F1
(760) 868-6622

REDLANDS

Redlands Community Hospital
350 Terracina Blvd.
(909) 335-5500

RIVERSIDE

Parkview Ctr. for Occupational Medicine
9041 Magnolia Avenue, Suite 302
(909) 354-8020

U. S. Healthworks
1760 Chicago Ave., Suite J-3
(909) 781-2200

Riverside Industrial Medical Clinic
2002 Iowa Avenue, Suite 104
(909) 682-2222

Central Occupational Medicine Providers
4300 Central Avenue
(909) 222-2206

Kaiser Occupational Health Center
10800 Magnolia Ave., Module 4J
(909) 353-4322
[Case Manager: Sue Carter
(909) 353-4214]

SAN BERNARDINO

U. S. Healthworks
599 Inland Center Drive, Suite 105
(909) 889-2665

Fox Occupational Medical Center
1375 Camino Real, Suite 130
(909) 884-1500

Cornerstone Medical Group Inc.
201 E. Airport Drive, Suite B
(909) 890-1888

TEMECULA

Rancho Urgent Care
27699 Jefferson Avenue, Suite 109
(909) 676-6668

First-Care Industrial
28991 Front Street #104
(909) 699-8563

VICTORVILLE

Desert Valley Medical Group
15860 Bear Valley Road
(760) 241-8000, ext. 8600

WILDOMAR

Inland Valley Regional Medical Center
36485 Inland Valley Drive
(909) 677-1111

Inland Urgent Care
36243 Inland Valley Drive, Suite 180
(909) 600-0110

YUCCA VALLEY

Avalon Urgent Care Center
58471 Twenty-Nine Palms Hwy., Ste. 303
(760) 365-0851

HENDERSON, NEVADA

Saint Rose Dominican Hospital
102 E. Lake Mead Drive
(702) 564-2622

LAS VEGAS, NEVADA

Sunrise Hospital Medical Center
3186 Maryland Parkway South
(702) 564-2622

District 9

BAKERSFIELD

Kaiser Occupational Health Center
3501 Stockdale Highway
(661) 398-5070
[Case Manager: Eillen Lua
(661) 398-5093]

Memorial Hospital
420-34th Street
(661) 327-1792

Bakersfield Occupational Medical Group
4580 California Avenue
(661) 327-4527

Mercy Hospital
2215 Truxtun Avenue
(661) 632-5275

Mercy Medi Center
Bernard & New Market Way
(661) 632-5100

Valley Industrial Med Group
2501 "G" Street
(661) 327-2225

EASTERN INYO

Nevada Rural Health Centers, Inc.
Beatty Clinic
P. O. Box 431
Beatty, NV
(702) 553-2208

Nevada Rural Health Centers, Inc.
Amargosa Valley Medical Clinic
845 Farm Road HCR 69, Box 401-V
Amargosa Valley, NV
(775) 372-5432

Death Valley Health Clinic
P. O. Box 158
Shoshone, CA
(760) 852-4383

Desert Spring Hospital
2075 E. Flamingo Road
Las Vegas, NV
(702) 733-8800

North Las Vegas Community Hospital
1409 E. Lake Mead Blvd.
N. Las Vegas, NV
(702) 649-7711

NORTHERN INYO

Family Health Center
686 W. Line Street
Bishop
(760) 872-4311

Northern Inyo Hospital
150 Pioneer Lane
Bishop
(760) 873-5811

Rural Health Clinic
153 Pioneer Lane
Bishop
(760) 873-2849

SOUTHERN INYO

M. R. Jones, M.D.
131 W. Whitney Portal Road
Lone Pine
(760) 876-8118
501 E. Locust Street
Lone Pine
(760) 876-5501

EASTERN KERN

Kern Valley Hospital
6412 Laurel Avenue
P. O. Box 1628
Lake Isabella
(760) 379-2681

Drummond Medical Group, Inc.
1111 China Lake Blvd.
Ridgecrest
(760) 446-0240

SOUTHEASTERN KERN

Alpine Medical Clinic
20211 Valley Blvd.
Tehachapi
(661) 822-5544

Antelope Valley Occupational Medical
43845 N. 10th Street West, Suite 2E
Lancaster
(661) 949-9126

Tehachapi Hospital
115 West E. Street
Tehachapi
(661) 822-3241

Gary Olsen, M.D.
20693 Valley Blvd.
Tehachapi
(805) 822-0583

Sierra Family Care
20797 Santa Lucia
Tehachapi
(661) 822-9105

Mojave Medical Clinic
2041 Belshaw Street
Mojave
(661) 824-4511

NORTHERN MONO

Mono County Medical Clinic
P. O. Box 677
Twin Lakes Road
Bridgeport
(760) 932-7011

Minden Medical Center
925 Ironwood Drive
Minden, NV
(775) 782-8181

Washoe Medical Center
77 Pringle Way
Reno, NV
(775) 982-4100

Carson-Tahoe Hospital
775 Fleischmann way
Carson City, NV
(775) 882-1361

Carson Valley Medical Center
1107 Hwy. 395 South
Gardnerville, NV
(775) 782-1500
(775) 782-1615 Occupational Center

Sierra Park Family Medical Clinic
P. O. Box 555
Mammoth Lakes
(760) 934-2511

Mammoth Hospital
Sierra Park Road
Mammoth Lakes
(760) 934-3311

Mono County Medical Clinic
P. O. Box 677
Twin Lakes Road
Bridgeport
(760) 932-7011

District 10

ANGLES CAMP

Angels Camp Medical Clinic
222 South Main
(209) 736-0813

ARNOLD

C. A. Cunnington, M.D.
771 Highway 4
(209) 795-4193

JACKSON

(Emergencies Only)
Amador County Hospital
810 Court Street
(209) 223-7500

LOS BANOS

J. F. Mevi, M.D.
400 West "I" Street, Suite A
(209) 826-3200

MANTECA

Kaiser Occupational Health Center
1721 W. Yosemite Avenue
(209) 824-5059
[Clinic Coordinator: Denise Giordano
(209) 824-5019]

MARIPOSA

Mariposa Family Medicine & Assoc.
5300 Highway 49
(209) 966-3672

MARKLEEVILLE

Alpine County Health Dept.
75 B Diamond Valley Road
(530) 694-2146
Physician on duty Tues. & Thurs.ONLY

MERCED

Lifetime Health Care Medical Assoc.
and Mercy Urgent Care
374 West Olive, Suite B
(209) 383-3076

Mercy Medical Center
301 East 13th Street
(209) 385-7100

(Emergencies Only)
Mercy Hospital
2740 "M" Street
(209) 984-6501

MODESTO

Gould Medical Group
600 Coffee Road
(209) 524-1211

Healthsouth Center
2101 Tenaya Drive
(209) 527-0080

Kaiser Occupational Health Center
3800 Dale Road
(209) 557-6145
[Clinic Manager: Melanie Hatchel
(209) 476-3324]

U. S. HealthWorks
1524 McHenry Avenue, Suite 500
(209) 575-5801

MURPHYS

Ryan Thompson, M.D.
300 Church Street
(209) 728-2021

PIONEER

Sutter Amador Health Centers
Highway 88
(209) 295-5544

PLYMOUTH

Sutter Amador Health Centers
9279 Locust Street
(209) 245-6968

SONORA

(Emergencies Only)
Prompt Care – Indian Rock
14540 Mono Way
(209) 532-3167

SOUTH LAKE TAHOE

Tahoe Urgent Care
2130 Lake Tahoe Blvd.
(530) 541-3277

(Emergencies Only)
Barton Memorial Hosptal
South Avenue & 4th Street
(530) 541-3420

STOCKTON/LODI

Dameron Urgent Care Center
525 W. Acacia Street
(209) 461-3194

Sierra Occup. Services Medical Clinic
1429 W. Fremont Street
(209) 546-7767

Kaiser Occupational Health Center
7373 West Lane, 1st Floor
(209) 476-3694
[Clinic Manager: Melanie Hatchel
(209) 476-3324]

Healthsouth
3663 E. Arch Road, Suite 400
(209) 943-2202

TRACY

Dr. Jagdish Patel
644 W. 12th Street
(209) 832-8984

TURLOCK

Turlock Medical Clinic
1015 E. Main Street
(209) 632-3909

WOODFORDS

Carson Valley Medical Center
1107 Hwy. 395, Suite F
Gardenville, NV
(775) 782-1615

District 11

BRAWLEY

Valley Comp. Health & Immediate Care
608 G Street, Suite B
(760) 344-7454

CARLSBAD

U. S. HealthWorks
5814 Van Allen Way, Suite 210
(760) 438-4466

CHULA VISTA

U. S. HealthWorks
111 Broadway, Suite 305
(619) 425-8212

EL CENTRO

Valley Comp. Health & Immediate Care
2026 N. Imperial Avenue
(760) 353-6600

ESCONDIDO

U. S. HealthWorks
362 West Mission Avenue, Suite 104
(760) 747-2330

HILLCREST

U. S. HealthWorks
3930 4th Avenue, Suite 200
San Diego
(619) 297-9610

KEARNY MESA

U. S. HealthWorks
5575 Ruffin Road
San Diego
(858) 227-2744

LA MESA

U. S. HealthWorks
8090 Parkway Drive
(619) 277-2744

MIRAMAR

U. S. HealthWorks
7590 Miramar Road, Suite C
San Diego
(858) 549-4255

NATIONAL CITY

U. S. HealthWorks
102 Mile of Cars Way
(619) 474-9211

SAN DIEGO

Kaiser Occupational Health Clinic
4647 Zion Avenue
(619) 528-5062
[Case Manager: Margaret Smith
(619) 528-6077]

SANTEE

U. S. HealthWorks
9745 Prospect Avenue, Suite 100
(619) 448-4841

SORRENTO MESA

U. S. HealthWorks
5897 Oberlin Drive, Suite 100
San Diego
(858) 455-0200
Sorrento Mesa (continued)

Kaiser Occupational Health Center
780 Shadowridge
(760) 599-2333
[Case Manager: Margaret Smith
(619) 528-6077]

VISTA

U. S. HealthWorks
2023 West Vista Way, Suite C
(760) 941-2000

District 12

ANAHEIM-ORANGE

Concord Medical dba
Goldenwest Medical
915 East Katella Avenue, Suite 200
(714) 517-2100

Kaiser Occupational Health Center
411 N. Lakeview Avenue
(714) 279-5500
[Case Manager: Deborah Lopez
(714) 279-5458]

FULLERTON

St. Jude Heritage Health Foundation
2151 N. Harbor Blvd.
(714) 992-3967

GARDEN GROVE

Kaiser Occupational Health Center
12100 Euclid Street
(714) 741-3688
[Case Manager: Wendy Green
(714) 741-3684]

Tustin Irvine Medical
7052 Orangewood
(714) 903-1100

IRVINE

San Canyon Urgent Care Med. Center
16100 Sand Canyon, Suite 150
(949) 417-0272

U. S. Healthworks
2362 Morse Avenue
(949) 863-9103

LAKE FOREST

Saddleback Urgent Care Center
22581 Lake Forest Drive
(949) 770-1023

MISSION VIEJO

Saddleback Urgent Care Center
23962 Alicia Parkway
(949) 770-6000

ORANGE

Convenient Medical Care
1045 North Tustin Avenue
(714) 921-0911

Sunrise Multispecialist Medical Center
867 South Tustin Avenue
(714) 771-1420

PLACENTIA

St. Jude Heritage Health Foundation
1501 N. Placentia Avenue
(714) 524-7333

SAN JUAN CAPISTRANO

South Coast Family
25500 Rancho Niguel Road, Suite 100
(949) 643-0500

SANTA ANA

East Edinger Medical Clinic
1530 East Edinger
(714) 542-8904

TUSTIN-SANTA ANA

Kaiser Occupational Clinic
1900 E. 4th Street
(714) 967-4600
[Case Manager: Gloria Soto
(714) 967-4600

APPENDIX A

Caltrans Safety Manual Excerpts

CHAPTER 5: OFFICE AND FIELD SAFETY (FEBRUARY 2013 REVISION)

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5.00 INTRODUCTION

Employees who work in an office environment need to be aware of risks they may encounter in order to avoid injury. Staff who occasionally travel and may enter an active work zone face a different, and often less predictable, set of hazards. In addition to office safety, this chapter covers basic safety for travel and various types of field work.

Please use the link here: http://admin.dot.ca.gov/tr/ldo/field_safety_e_learning.shtml or in appendix A to access the online course, *Field Safety for Office Workers*, which is mandatory training for all Caltrans office-based employees that perform field work.

5.01 PURPOSE

This chapter provides information regarding health and safety in office settings and instructions for supervisors and employees who may have to perform fieldwork.

5.02 POLICY STATEMENT

Managers, supervisors, and employees shall do everything reasonably possible to maintain a safe and healthy work environment in all places of employment. This applies both when an employee is in the office and when performing other assigned duties.

5.03 BACKGROUND

The policies, practices, and standards described in this chapter are based on the following regulations: the California Occupational Safety and Health Administration (Cal-OSHA); Uniform Building Code (UBC) standards; or other cited authorities. Some of the requirements are based on departmental policies, Director's Policies, Deputy Directives, Department of General Services Management Memos, and/or the State Administrative Manual (SAM).

5.04 RESPONSIBILITY FOR HEALTH AND SAFETY

Supervisor

Supervisors are responsible for the health and safety of their employees and to ensure that the work environment does not contribute to injury or illness. In order to achieve this, supervisors are required to:

- Routinely conduct safety inspections and have regularly scheduled safety meetings with their employees to discuss health and safety issues;
- Enforce all health and safety policies, procedures and work practices. Whenever an employee violates a health and safety policy, law, regulation or rule, supervisors shall consider appropriate disciplinary action;
- Discuss medical or other emergency situations with their employees and emergency procedures contained in their local Emergency Action Plan;
- Maintain in their files a copy of each employee's "Emergency Notification Information" form for emergency information purposes (see Chapter 9 for details); and
- Discuss potential hazards when an employee leaves his/her office to participate in a field trip.

Employee

Employees are responsible to do everything reasonably necessary to protect their own health and safety and that of others by complying with all occupational health and safety policies, procedures, laws, rules and/or regulations. To achieve this, employees are required to:

- Report to work mentally and physically capable of performing all of their assigned duties without jeopardizing the health and safety of themselves, other employees, or the public;

- Be free from the effects of medication, controlled substances, alcohol or the complications arising from illness or injury that might impair their judgement and/or ability to perform their work;

- Promptly report all injuries, illnesses, or unsafe conditions to their supervisor; and

- Inform their supervisor of any changes in home address, medical condition, name of a family member or designated person to contact following an emergency, choice of predesignated personal physician, and advise their supervisor if they will need assistance during an emergency evacuation.

5.05 PHYSICAL SAFETY

Offices, storerooms, personal service rooms, hallways and passageways shall be kept clean, orderly and sanitary to the extent that the nature of the work allows. Office furniture and equipment should be arranged for efficiency, convenience, and safety.

All floors shall be free of dangerous projections or obstructions and any tripping hazards. All floors shall be maintained in good repair, and be dry or slip-resistant. Defective tiles or carpet are to be reported to the building maintenance staff to be repaired.

Ergonomic standard

Employees shall be provided with furniture and equipment that meets state standards (see Chapter 7 - ERGONOMICS for more details).

Moving furniture, equipment, or storage boxes

Employees should not move office furniture and equipment. Supervisors should contact the Building Manager or Facility Operations office in their District or other Caltrans facility to arrange for professional movers.

Lifting of equipment, supplies, and other items

There are no written standards to control the amount of weight that a person can lift without causing injury. Whenever any object is to be lifted, some discretion or judgment must be used. Employees should never lift anything that may cause injury. **Always ask for assistance.**

Inspect storage boxes, supplies, or containers with unknown or heavy contents before attempting to lift using proper lifting techniques (see Chapter 7 - ERGONOMICS for information regarding proper lifting techniques).

Aisle and Hallway/Corridor Widths

The minimum space requirements for aisles and hallways/corridors are based on the Cal-OSHA, General Industry Safety Orders (GISO), California Building Code and UBC construction standards.

The minimum requirements for office areas are:

- **Within an office or workstation, use:** **The 24-inch standard**

This standard requires unobstructed walking space between and around desks, chairs, bookcases, file cabinets, credenzas, other general office furniture or equipment, and/or wall partitions. The wall partitions may be portable or permanent.

- **Aisle, hallways/corridor width:** **Not less than 44-inches**

The UBC has established a 44-inch minimum width for routes of travel by persons with disabilities. Designated hallways and walkways may be wider than 44 inches, but must have at least 44 inches of unobstructed walking space.

The 44-inch standard applies to all types of hallways and walkways, i.e., those used as egress and ingress to work areas or offices. These walkways may be main hallways of a building or they may be lateral hallways connecting work areas and/or offices. They may be between or adjacent to permanent or moveable wall partitions. An unobstructed 36-inch minimum width is required for entrance/exit from office cubicles.

The 44-inch standard is also required in walking or standing spaces found in common work areas, such as in front of storage areas or equipment or copier machines, drinking fountains, file cabinets, kitchen areas, work tables for common use, and generally any work area that is used by employees during a work shift.

Electrical Safety

Office work areas are subject to the Cal-OSHA Electrical Safety Orders (ESO). The following represents some pertinent electrical safety standards:

- Electrical power cords for computers, printers, or other electrical devices shall not be placed on the floor unprotected or where they may create a tripping hazard;
- Electrical extension cords are permitted, but shall not be used as a substitute for fixed wiring. Where possible, new electrical outlets should be installed to eliminate the need to use extension cords.
- When a telephone or electrical box on the floor is exposed, the box should be marked as a hazard until the hazard is removed.

Securing Furniture and Equipment

To be prepared for emergencies such as earthquakes, certain office furniture and equipment should be secured to walls or floors. The following guidelines should be followed when securing office furniture and equipment:

- File /storage cabinets, five (5) feet or shorter need not be secured to walls or floors;
- File /storage cabinets between five (5) feet and six (6) feet should be placed against and secured to permanent walls;
- If wall space is not available, file/storage cabinets between five (5) feet and six (6) feet may be placed back-to-back in open areas, and secured to each other or the floor;
- File /storage cabinets (6) feet or taller shall be placed against and secured to permanent walls.
- If wall space is not available, file/storage cabinets six (6) feet or taller may be placed in open areas, provided they are placed back-to-back and secured to each other and to the floor.

Material and Office Supply Storage

Office supplies should be stored in appropriate areas set aside for that purpose, and not where they could contribute to injury.

Do not:

1. Store materials on top of modular furniture, overheads or cabinets;
2. Store materials above the level of your shoulders;
3. Place objects such as flower pots and vases on windowsills or ledges;

4. Place card index files, dictionaries, or other heavy objects on top of file cabinets taller than five (5) feet;
5. Use storage boxes (cardboard boxes) as room dividers; and/or
6. Use walkways, hallways, stairwells and/or landings for storage.

Walkways and hallways should be maintained free of all obstructions or impediments for use in case of an emergency.

NOTE:
If materials (office supplies or records) must be stored in cardboard boxes, they are to be piled, stacked, or racked in a manner designed to prevent them from tipping, falling, collapsing, rolling, or spreading.

Stairways

All stair tread surfaces shall be slip-resistant. Stairways shall be maintained in good repair having handrails on each side. Stairways shall not be used as storage areas and must be kept free of tripping hazards.

Exit/Directional Signs

Exit signs, directional signs, or both, shall be provided at every exit door, at the intersection of corridors, at exit stairways or ramps, and at other locations as necessary to inform occupants of the means of egress available.

Electrically illuminated exit signs shall be lighted with at least two electric lamps. Burnt out electric lamps shall be replaced in a timely manner.

Door Openings

- Door openings should be kept clear.
- Doors marked "Fire Door, Do Not Block," or other special notice should not be changed or altered.

Solid doors (without windows) can present hazards when approached from both sides at the same time. Employees should be warned of this hazard and instructed to:

- Approach solid doors slowly;
- Stay out of the path of an opening door; and/or,
- Reach for the doorknob to avoid contact with the body and arms.

Doors that open onto a hallway or open directly into the path of oncoming foot traffic should be approached slowly. The swing radius of doors can be marked on the floor.

5.06 TRIP PLANNING

In preparation for field work, the employee should review the Code of Safe Work Practices (COSWP) for field trips located at the end of this chapter. The supervisor shall discuss with the employee the following items:

- Scope and COSWP applicable for any of the worksites they may enter;

- Risks of the work area, facility, or highway, including such things as traffic volume, number of lanes, shoulder widths, possible sites for parking, fences, gates, etc;

- Assembly of all safety and personal protective equipment, materials, and other equipment that will be required to perform the work; and

- Transportation arrangements, including the use of seat belts and shoulder harnesses while in the vehicle.

5.07 MOTEL, HOTEL, DINING OUT AND SIGHTSEEING SAFETY

Supervisors shall discuss information about travel status, visiting other cities, and potential hazards associated with being in a different working environment. Discussions should include personal safety and precautions regarding motel/hotel safety, dining out, shopping and sightseeing.

NOTE: National media reports continue to focus attention on employees in both the public and private sector that have become victims of assaults or other forms of violent acts while working. It is important that managers, supervisors, and employees are aware of any potential for violence while working in the field and what actions can be taken if an employee is confronted with an act of violence, a threat, verbal or personal harassment, or intimidation.

Chapter 6 - WORKPLACE VIOLENCE, provides information that may help employees understand and/or handle a potentially dangerous situation that they may encounter while in field work.

5.08 PERSONAL CLOTHING

Employees are expected to report to work reasonably dressed to protect them from exposure to usual and/or predictable physical and environmental conditions found in the work place.

Employees shall be given adequate advance notice of field trips so they may properly dress to protect themselves while in the new work environment, and/or be protected from exposure to potentially unsafe conditions in a new assignment.

5.09 VISITING A CONSTRUCTION OR MAINTENANCE PROJECT

To ensure employee safety when visiting a Construction or Maintenance project the following guidelines should be followed:

- Phone or e-mail the Resident Engineer (RE) in advance so he/she knows that you will be visiting. The RE will be able to advise what operations the contractor may be doing when you visit.

- All personnel should check in at the RE office prior to entering the construction site. If no one is available at the office, please check in with the field inspector at the job site. You will be provided with a quick review of the Code of Safe Operating Practices (CSOP) for the ongoing activity that day and any other significant information you might need to ensure both your safety and the contractor's ability to continue the job progress unabated.

- Bring Personal Protective Equipment. You will be required to wear, at the minimum, a hardhat, appropriate warning garments (i.e., a safety vest), and safety glasses. Other safety gear may be required. Check with the RE to see if additional safety equipment is needed. You will not be allowed to enter or stay in the construction zone without this equipment.

5.10 WORKING ON STREETS AND HIGHWAYS

Whenever employees work on a city street, highway or freeway, the work should be planned and organized to minimize exposure to moving vehicular traffic. The supervisor should contact the local Maintenance Region office or Construction office for information regarding planned lane closures or construction work in the area.

When parking and/or stopping on the shoulder area of a highway, motor vehicles shall be parked in a manner to provide a physical barrier between the employee and any traffic that may enter the work zone. If the vehicle is not needed as a physical barrier, it shall be parked as far off the paved shoulder area as possible. Carefully choose a location to ensure the vehicle will not affect passing traffic, nor interfere with employees' view of oncoming traffic.

When it is impractical to use barrier vehicles, guardrails or other physical barriers, a lookout should be assigned to provide errant vehicle warnings. The lookout is exclusively responsible to closely observe approaching traffic to assess any unusual vehicle movement or errant driver behavior and warn other workers whenever trouble is anticipated. Lookout assignments should be changed frequently to maintain a high degree of alertness.

Working in Median Areas

All employees should receive specialized training regarding the hazards unique to median work areas, and when working adjacent to moving highway traffic prior to working in median areas.

For work performed in a median area, the following precautions shall be taken:

- Employees should park their vehicles within the median area where crossing the traffic lane on foot is not necessary;
- Exit the vehicle on the off-traffic side; and
- In narrow medians, exit the vehicle on the side that will present the least exposure.

If it is not possible to park in the median area and crossing on foot is necessary, the following precautions must be taken:

- Cross only when there is a break in traffic adequate to allow for walking across the lanes.
- Workers shall not carry tools or items that would slow them down and make the crossing unsafe.
- If the traffic is too heavy and a traffic break is not available, workers shall wait for a safe time to do the job. If they must cross, they shall call for traffic control or ask for a CHP traffic break.
- If the work cannot be performed as planned due to high traffic volumes, the supervisor shall reevaluate the work activity to prevent unnecessary exposure of employees to vehicular traffic.

Amber Warning Lights

Section 25256 of the California Vehicle Code (CVC) allows Caltrans vehicles to display flashing/rotating amber warning lights, "…when such vehicles are parked or working on the highway."

Amber lights should only be used to alert motorists of workers on foot or operations near the traveled way. Do not use the amber lights while driving, when parked in an established lane closure, or when no danger to employees exists.

5.11 NIGHT WORK

Employees should be given sufficient advance notice of a night work operation to allow them to adjust their schedules and avoid unnecessary fatigue.

Supervisors shall discuss the hazards and PPE unique to working at night. If employees will be exposed to vehicular traffic, PPE (including hard hat, eye protection, foot wear, and other clothing, such as for cold weather or heat stress) shall be discussed and/or required.

5.12 HAZARDOUS SPILLS

If an employee discovers a spill of an unknown material or substance on a highway or street, the employee should:

- During regular working hours, call the Maintenance RM's office, if known, or the Caltrans Communications Center, or the California Highway Patrol (CHP) (through 911);

- Stay clear and "up wind," if possible, and avoid contact with the unidentified material;

- Provide traffic control (e.g., closing a traffic lane or other traffic management); and;
- Call for assistance and wait for the experts.

If an employee determines that his/her personal safety may be in jeopardy, he/she should leave the area, and telephone appropriate authorities from the nearest safe location.

5.13 WORKING IN RAILROAD/TRANSIT "RIGHT OF WAY" (ROW)

A. Employees performing work on a railroad, transit, or trolley line in which either (1) equipment or materials will enter the right-of-way, or (2) special hazards are present (i.e. limited visibility or frequent train movements) **shall not** enter the area unless all of the following occur:

   a. Permission (oral or written) from the controlling entity (usually a railroad or transit company) has been granted

   b. Caltrans employees have received a safety briefing from the controlling entity

      A safety briefing is the minimal amount of training required to access a rail or transit right of way. Some entities will require completion of a formal training program or orientation specific to the rail/transit company's safety and operational procedures. In other situations, Roadway Worker Protection [RWP][1] training will likely be required as determined by the controlling entity. These can be viewed as three progressively higher levels of training—a briefing, an orientation, and an orientation in combination with RWP training.

   c. Caltrans employees are accompanied by a railroad or transit employee

      The railroad/transit representative, usually referred to as a flag person or lookout, watches for conflicting train movement that would endanger the crew or crews working in the foul of the tracks. The lookout will notify the crew each time there is a need to move personnel and equipment to a designated clearance area.

B. Employees performing work that requires entering a railroad or transit right-of-way where (1) no equipment or materials will enter that ROW, and (2) no special hazards are present, **may** enter provided the following safety procedures are carried out:

   a. The person in charge has developed a work plan and conducted a safety briefing. The briefing shall include a review of this section with all employees who will be working on the railroad/transit right of way. The plan shall include a designated person to look out for trains when conditions warrant it.

   b. Wear Caltrans Personal Protective Equipment for working in a ROW.

   c. Minimize their time in the ROW, and stay clear of tracks whenever possible.

   d. Obey instructions given by railroad/transit personnel encountered at the worksite and carry a Caltrans identification badge or card.

   e. Use designated entry points whenever possible. Do not climb over or under fences or walls. Do not pass through any holes in fences.

   f. Watch for moving equipment on tracks. Trains or other equipment may operate on any track, in either direction, at any time.

   g. When a train is approaching or passing by, seek to stand at least 50 feet from the tracks.

h. In multiple track territory, do not stand on or close to one track while a train is passing on another track.

i. Avoid walking or standing on a track. If it is necessary to walk or work on a track, do so along the outside of the track whenever possible. Look back frequently for on-track equipment to ensure adequate time to walk away from the tracks. When there is a good line of sight to see approaching trains, adequate time means that a worker can be clear of inbound trains 15 seconds before a train moving at the maximum operating speed on that track can pass the location of the worker.

j. Look in both directions before stepping onto a track, crossing a track, or walking around visual obstructions near a track.

k. Do not step or walk on top of rails, frogs, switches, guard rails, etc.

l. Keep at least 20 feet from standing equipment. Do not cross between cars or other on-track equipment standing on the same track unless they are separated by at least 50 feet.

Supervisors are responsible for requesting permission from the rail entity and ensuring that the procedures listed above are fulfilled. In order to secure an on-site railroad/transit representative, contact the railroad or transit entity as soon as possible and a minimum of three days prior to the planned work. The Caltrans District Right of Way office can provide contact information for railroad/transit entities in their area.

Caltrans railroad/transit safety procedures apply equally to all work in railroad right of ways, railroad crossings[2] and to work on or near rail, transit, or trolley lines that run within our right-of-way when the work is in the "fouling distance" of the rail line. (The fouling distance is any area in which personnel, equipment or materials could be struck by the widest vehicle that could operate on that track or in any case is within four [4] feet of the field side of the near running rail.)

These are basic procedures. If the work will involve frequent access and/or work in many different rail/transit company ROWs, the supervisor should require specialized railroad safety training for each employee to include Roadway Worker Protection (RWP)[1] and safety orientations by the railroad/transit entities owning the right-of-ways.

[1] On-track safety procedures prescribed under federal RWP regulation 49 CFR, Part 214, Subpart C.

[2] Most railroad crossings allow public access, but only for the purpose of crossing the tracks when safe to do so.

APPENDIX A **CODE OF SAFE WORK PRACTICES**

FIELD TRIPS & PREPARING FOR A FIELD TRIP

PHYSICAL AND ENVIRONMENTAL HAZARDS

TYPICAL FIELD TRIP HAZARDS:

1. Adverse weather conditions
2. Slippery roadways
3. Moving vehicular or equipment traffic/traffic congestion
4. Hazardous parking areas
5. Noise
6. Impaired drivers
7. Footing on uneven terrain
8. Poor visibility
9. Contact with flying particles
10. Bending, stooping and lifting objects

SAFE WORK PRACTICES

TYPICAL PRECAUTIONS TO AVOID INJURY:

1. Review Safety Manual for fieldwork safety items
2. Wear appropriate footwear, hard hat, safety glasses and warning garments
3. Wear appropriate personal clothing
4. Perform pre-operation inspection on vehicle
5. Bend, stoop, and lift properly
6. Obey traffic laws
7. Be alert for other motorists
8. Stop and/or park vehicle in safe place
9. Exit vehicle properly, away from traffic
10. Avoid backing vehicle if possible
11. Use physical protection from traffic where practical (i.e.; a vehicle, guard-rail, K-rail, etc.)
12. Work facing traffic and/or use a lookout
13. Wear hearing protection as required

CHAPTER 20: EARTHQUAKE PREPAREDNESS (JUNE 2009 REVISION)

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20.0 INTRODUCTION

This chapter focuses on preparations prior to the occurrence of an earthquake, steps to prepare for and cope with the destructive forces of an earthquake and employee survival techniques, before, during, and after an earthquake occurs.

20.01 PURPOSE

Provide employees with information about how they can make the workplace and themselves safer in the event of an earthquake.

This chapter does not deal with actual emergency procedures or instructions. For specific emergency instructions on how to act and respond in the event of an earthquake, building evacuation, assembly points, and medical emergency responses, refer to the EMERGENCY ACTION PLAN for the building in which you work. (Each Caltrans facility is required to have a site specific EMERGENCY ACTION PLAN. See Chapter 8, Section 8.05 and 8.06 for details.)

20.02 POLICY STATEMENT

Prepare for and cope with an earthquake, all Caltrans facilities, rented, or leased, shall have a written Emergency Action Plan. The plan shall include the specific instructions on emergency procedures to be followed in the event of an earthquake.

20.03 WORKPLACE PREPAREDNESS

Earthquake-related injuries and damages can be minimized simply by becoming aware of potential hazards and taking some basic earthquake preparedness measures.

Earthquakes strike without warning so it is important that specific preparedness measures be taken be re-evaluated on a regular basis. The following is a list of items that should be considered when preparing your workplace for a possible earthquake:

- Check first aid supplies;
- Secure all cabinets and shelving to prevent tipping.
- Be aware of overhead hazards (hanging plants, pictures, etc.).
- Remove heavy items from high shelves.
- Keep aisles clear of stacked materials and file cabinets.
- Ensure that computers, printers, and typewriters will not fall.
- Arrange partitions to prevent “domino effect”.
- Arrange work areas to prevent “trapping” of personnel.
- Make sure that exits are clearly marked.

Supervisors should arrange to have Facilities complete necessary corrections and/or repairs to ensure that the above suggested actions are implemented.

20.04 PERSONAL PREPAREDNESS

Individuals can protect themselves and others in the event of an earthquake. Following is a list of things to do and items to be familiar with the work area before an earthquake occurs:

- Building managers shall appoint emergency coordinators for each work location;
- Hold earthquake drills for all employees;
- Know where to go in the event of an earthquake;
    a. stand in a doorway;
    b. get under a sturdy table or desk; or
    c. crouch near the wall and cover your head if caught in a hallway.
- Know where building exits are located;
- Know the location of fire extinguishers in the immediate work area;
- Decide on a safe predesignated meeting place;
- Have a flashlight available if working during the hours of darkness;
- Know the location of the nearest first aid kit;
- Keep emergency supplies available at your worksite;
- Have a battery powered radio available, if possible;
- Be familiarize with the facility‘s Emergency Action Plan; and
- Encourage disabled employees to develop a “buddy” system with co-workers.

Additional information regarding personal preparedness is available at the U.S. Geological Survey Earthquake Hazards Program located at: http://earthquake.usgs.gov/

20.05 DURING THE EARTHQUAKE

Earthquakes strike without warning and there will be only seconds to react. Most casualties result from falling debris and objects, splintering window glass, and fire. The chances of being injured will be reduced by following these procedures:

- **DUCK-** When an earthquake occurs, duck under a sturdy table or desk. Stay away from windows, bookcases, file cabinets, tall furniture, heavy mirrors, hanging plants, and other heavy objects that could fall. Watch out for falling plaster or ceiling tiles.
- **COVER-** Stay under cover until the shaking stops. If no table or desk is available, seek cover against an interior wall and protect your head and neck with your arms.
- **HOLD-** Hold onto the table or desk. If it moves, move with it. Hold the position until the ground stops shaking and it is safe to move.

The following are additional tips for specific locations:

- In a high rise building and not near a table or desk, move against an interior wall and protect your head with your arms. Do not use elevators. Do not be surprised if the fire alarm sounds or sprinkler systems come on.
- In an elevator, stop at the nearest floor. Exit the elevator and take cover against the interior wall.
- In hallway or corridor, brace yourself against the wall and try to avoid moving. Duck and cover your head with your arms.
- Outside, move to a clear area away from trees, buildings, or downed electrical power lines and poles.
- On a sidewalk near buildings, duck into a doorway to protect yourself from falling building materials, window glass, and other building debris.
- While driving a vehicle, pull over to the side of the roadway and stop. Avoid driving under or over highway bridges and underpasses. Avoid driving near electrical power lines. Stay inside your vehicle until the shaking has stopped.
- In a crowded store or other public place, do not go outside or rush to the exits. Move away from window displays and shelves containing objects that could fall on you.
- If you are handicapped, such as confined to a wheelchair, stay in the chair. Move to cover. If possible, lock the wheels and protect your head with your arms.
- At home, move away from cabinets, refrigerator, and overhead cupboards. (Consider anchoring appliances to the wall).
- At a sporting event; i.e., stadium, theater, stay in your seat and protect your head with your arms. Do not try to leave the facility until the shaking has stopped.
- Always leave a building in a calm and orderly manner.

20.06 AFTER THE EARTHQUAKE

After an earthquake, there are likely to be aftershocks and confusion. The following steps should be taken immediately after an earthquake to minimize the chance of injury.

- Remain under cover for a few minutes and prepare for the possibility of after-shocks. Aftershocks often cause more damage to buildings already weakened by the initial shock. Plan where you will seek cover in the event of an after-shock.
- If the building appears to have significant damage, evacuate to a safe pre-determined location, until emergency personnel advises you of the ability to return to your work location.
- Replace telephone receivers back on the telephone cradle. Replacing the receiver will allow telephone circuits to operate properly. Do not use the telephone for personal calls. Use telephones only to report emergencies.
- Check your work area for injured employees and give first aid as may be deemed appropriate. Seek medical treatment as may be required. Do not attempt to move injured persons unless they are in immediate danger.

- Check for fire hazards. Do not smoke or light matches. Do not turn on lights or other electrical circuits until you are certain that there is no risk of gas leaks.
- Do not use elevators. Use stairs or fire escape to exit buildings.
- Turn on portable radio for instructions and news reports.
- Cooperate fully with emergency personnel.
- Remain calm and assess your situation carefully. Do not spread rumors, as they often do more harm after the disaster. Reassure and help others.
- Assist others with special needs.
- Be aware of other possible dangers which may follow an earthquake such as fire, flood, or landslide.
- Follow all emergency instructions and if ordered, evacuate according to the Emergency Action Plan for your facility.

20.07 EMERGENCY ACTION PLANS

Supervisors are required to have a copy of, and be familiar with the emergency action plan covering their work area.

See Chapter 8, Section 8.05 EMERGENCY ACTION PLAN REQUIREMENTS, and Section 8.06 EVACUATION REQUIREMENTS FOR EMPLOYEES THAT NEED ASSISTANCE for more details.

APPENDIX B

California Earthquake Related Information

CALIFORNIA STRONG MOTION INSTRUMENTATION PROGRAM

CSMIP Instrumented Bridges

Item	Station Name	Station No.	Bridge No.	Post Mile	Const. Date	No. of Sensors	Instr. Date
1	Klamath - Hwy 101/Klamath River Bridge	99710	01-28	01-DN-101-R4.04	1965	6	4/13/1995
2	Rio Dell - Hwy 101/Eel River Bridge	89973	04-16R	01-HUM-101-53.9	1941	18(15+3FF)	8/9/2001
3	Arcata - Hwy 101/Murray Road Bridge	89708	04-170	01-HUM-101-R92.99	1964	12(9+3FF)	4/6/1995
4	Eureka - Samoa Channel Bridge	89686	04-228	01-HUM-255-1.2	1971	33 (30+FF)	4/12/1996
5	Eureka - Middle Channel Bridge	89735	04-229	01-HUM-255-0.7	1971	17 (14+FF)	4/12/1996
6	Eureka - Eureka Channel Bridge	89736	04-230	01-HUM-255-0.2	1971	27 (24+FF)	4/9/1996
7	Rio Dell - Hwy 101/Painter Street Overpass	89324	04-236	01-HUM-101-R52.89	1976	20(17+3FF)	9/29/1977
8	Redding - I5/Shasta Lake Bridge	88194	06-21	02-SHA-5-R28.4	1940	18(15+3FF)	9/25/2002
9	Albion - Hwy 1/Salmon Creek Bridge	79683	10-134	01-MEN-1-43.00	1951	9(6+3FF)	3/17/1994
10	Fort Bragg - Hwy 1/Noyo River Bridge	79296	10-176	01-MEN-1-96.9	2006	24	4/4/2007
11	Leggett - Big Dann Creek Bridge	79761	10-30	01-MEN-271-4.9	1933	12(9+3FF)	2/27/1998
12	Leggett - Cedar Creek Bridge	79757	10-31	01-MEN-271-5.2	1933	12(9+3FF)	2/27/1998
13	Hopland - Hwy 101/Railroad Bridge	69760	10-81	01-MEN-101-R9.53	1966	16(13+3FF)	5/22/1997
14	Crescent City - Hwy 101/Smith River Bridge	99190	1-20	01-DN-101-36.06		6	10/28/2003
15	Truckee - I80/Truckee River Bridge	76741	17-58L	03-NEV-80-20.23	1989	8(5+3FF)	10/24/1995
16	Jenner - Hwy 1/Russian River Bridge	69671	20-195	04-SON-1-19.72	1984	6	9/29/1993
17	Rohnert Park - Hwy 101 Bridge	68717	20-235	04-SON-101-13.88	1973	12(9+3FF)	5/3/1995
19	West Sacramento - I80/Yolo Causeway	67972	22-45	03-YOL-80-5.6	1962	12(9+3FF)	6/1/2000
20	Vallejo - Hwy 37/Napa River Bridge	68065	23-64	10-SOL-37-R7.39	1967	15(12+3FF)	6/14/2001
21	Novato - Hwy 37/Petaluma River Bridge	68778	27-13	04-MRN-37-14.47	1958	12(9+3FF)	3/5/1999
22	Oakland - Alameda Webster Tube	58139	33-106L	04-ALA-260-R1.20/R1.84		12	10/7/2003
23	Oakland - Alameda Posey Tube	58138	33-106R	04-ALA-260-R1.12/R1.87		12	10/7/2003
24	Hayward - Hwy 580/238 Interchange Bridge	58658	33-214L	04-ALA-580-30.80	1988	10(7+3FF)	6/11/1993
25	Oakland - Hwy 580/24 Interchange Bridge	58657	33-302H	04-ALA-580-45.23	1970	6	5/20/93
26	Oakland - Hwy 580/13 Interchange Bridge	58656	33-347S	04-ALA-580-R39.15	1965	6	5/26/93
27	Santa Clara- Hwy 237/Alviso Overpass	57748	34-470L/K	04-SCL-237-6.10	1994	21(18+3FF)	10/25/1995
28	Pacifica - Hwy 1/Devils Slide Bridge	58414	35-0331R		2008	27	9/15/2008
29	South San Francisco - Sierra Point Overpass	58536	35-130	04-SM-101-23.7	1957	16(13+3FF)	12/5/1985
30	Belmont - I280 Pedestrian Bridge	58678	35-285	04-SM-280-10.56	1973	6	11/19/1993
31	Half Moon Bay - Hwy 1/Tunitas Cr. Bridge	58754	35-31	04-SM-1-20.82	1962	9(6+3FF)	5/22/1997
32	Watsonville - Hwy 1/Struve Slough Bridge	47707	36-88R	04-SCR-1-R1.59	1990	9(6+3FF)	11/23/94
33	San Juan Bautista - Hwy 101/156 Overpass	47315	43-31E	05-SBT-156-0.00	1958	15(12+3FF)	5/77 & 6/02

Item	Station Name	Station No.	Bridge No.	Post Mile	Const. Date	No. of Sensors	Instr. Date
34	Big Sur - Hwy 1/Pfeiffer Canyon Bridge	47729	44-60	05-MON-1-45.5	1968	18(15+3FF)	4/3/1996
35	Lake Crowley - Hwy 395 Bridge	54730	47-48	09-MNO-395-13.9	1969	9(6+3FF)	8/30/1995
36	Parkfield - Hwy 46/Cholame Creek Bridge	36668	49-36	05-SLO-46-54.77	1979	6	8/4/1993
37	San Simeon - Hwy 1/San Simeon Creek Bridge	37728	49-46	05-SLO-1-52.92	1984	12(9+3FF)	9/6/1995
38	Grapevine - I5/lebec Rd Bridge	24775	50-271	06-KER-5-4.1	1964	16(13+3FF)	6/30/1998
39	Ridgecrest - Hwy 395/Brown Road Bridge	33742	50-340	09-KER-395-R25.08	1966	9(6+3FF)	2/22/1996
40	Mojave - Hwy 14/Railroad Bridge	34715	50-402R	09-KER-14-15.32	1973	12	3/22/1995
41	Santa Barbara - San Roque Canyon Birgde	25749	51-104	05-SB-192-1.77	1984	9(6+3FF)	10/24/1996
42	Cuyama - Hwy 166/Cuyama River Bridge	25758	51-66	05-SB-166-R69.94	1980	12(9+3FF)	4/8/1997
43	Lompoc - Hwy 1/El Jaro Creek Bridge	26917	51-90	05-SB-01-R6.78	1968	11(8+3FF)	5/18/2000
44	Ventura - Hwy 101/Telephone Rd Bridge	25725	52-214L	07-VEN-101-R26	1961	12(9+3FF)	5/5/1995
45	Moorpark - Hwy 23/118 Bridge (Arroyo Simi)	24738	52-331L	07-VEN-023/118-21.0	1993	12(9+3FF)	5/8/1996
46	Los Angeles - I405/San Gabriel River Bridge	14690	53-1185	07-LA-405-0.02	1964	6	4/27/1994
47	Los Angeles - I10/405 Interchange Bridge	24670	53-1630G	07-LA-405-29.43	1963	7	9/13/1993
48	Palmdale - Hwy 14/Barrel Springs Bridge	24706	53-1794	07-LA-14-R57.37	1965	12(9+3FF)	12/8/1994
49	San Fernando - I210/Hwy 118 Bridge	24714	53-2102G	07-LA-118/210-6.0	1973	36(33+3FF)	4/17/1996
50	Pasadena - Hwy 134/210 Interchange Bridge	24689	53-2318G	07-LA-134-R13.25	1974	9(6+3FF)	4/21/1994
51	Los Angeles - I10/La Cienega Bridge	24704	53-2791	07-LA-10-8.8	1994	15	11/2/1994
52	Sylmar - I5/14 Interchange Bridge	24694	53-2795/97F	07-LA-5-24.5	1994	42(39+3FF)	12/20/1995
53	Devore - I15/215 Interchange Bridge	23650	54-783R	08-SBD-15-16.35	1969	6	12/18/92
54	San Bernandino - I10/215 Interchange	23631	54-823G	08-SBD-215-4.05	1966	37(34+3FF)	1/10/1992
55	Capistrano Beach - I5/Via California Bridge	13795	55-225	07-ORA-5-6.62	1960	12(9+3FF)	6/24/1999
56	Beaumont - I10/60 Interchange Bridge	12649	56-452F	08-RIV-10-6.67	1961	6	12/16/92
57	North Palm Springs - I10/62 Interchange Bridge	12666	56-474F	08-RIV-62-0.00	1962	7	6/30/93
58	Corona - I15/Hwy 91 Interchange Bridge	13705	56-586G	08-RIV-15-R41.57	1989	9	9/29/1994
59	San Diego - I5/Hwy 52 Interchange Bridge	03731	57-520L	11-SD-5-25.91	1966	24(21+3FF)	5/18/1995
60	El Centro - Hwy 8/Meloland Overpass	01336	58-215	11-IMP-8-43.6	1971	32(29+3FF)	4/78 & 12/91
61	Oakland - Caldecott Tunnel	58359				24	1984
62	Oxnard - Hwy 101/Santa Clara Rvr Bridge	25324				15	6/6/2007
63	Vallejo - Carquinez Bridge Wind Motion	68268			2003	12	2003

PEQIT investigators should be aware of bridges with special features such as those with accelerometers. Your observations may be the only correlation available between recorded performance and the condition of the bridge. Take extra time to record everything of relevance to instrumented bridges.

INSTRUMENTED TOLL BRIDGES

	Name of Bridge	Station No.	Type and Length of Main Structure	Total Length (mile)	Year Built	No of Sensors.	Associated Geotechical Array	Instrum. Date
1	Antioch - San Joaquin River Bridge	67771	composite steel girder, 9437 ft	1.8	1978	15+3FF	1 array, 15 sensors	4/16/1998
2	Benicia - Martinez/I680 East Bridge	68322	concrete box girder, 2066 m	1.3	2008	95	2 arrays	1/17/2008
3	Benicia - Martinez/I680 West Bridge	68682	steel truss, 4884 ft	1.2	1962	78+3FF	none	10/11/2001
4	Hayward - San Mateo Bridge Trestle	58799	concrete girder, 30 ft	5.0	1967	27	1 array, 15 sensors	5/19/1999
5	San Mateo - San Mateo Bridge	58677	steel box girder, 750 ft	1.8	1967	64	see trestle	4/27/2000
6	Los Angeles - Vincent Thomas Bridge	14406	suspension, steel towers, 2512 ft	1.1	1964	26	3 arrays, 33 sensors	10/22/1981
7	Richmond - San Rafael Bridge	58258	2 steel truss cantilever spans, 2145 ft each	4.0	1956	82+3FF	1 array, 6 sensors	8/15/2005
7	San Diego - Coronado Bridge	03679	steel box girder, 1880 ft	1.6	1969	72	2 arrays, 27 sensors	9/25/2002
8	San Francisco - Oakland Bay East Bridge	58633	self-anchored suspension, steel tower, 622 m	2.2	under constr uction	9	1 array, planned	(199 in progress)
9	San Francisco - Oakland Bay West Bridge	58632	suspension, steel towers, 10051 ft	2.0	1936	79	1 array, 9 sensors	8/27/2003
10	San Francisco Bay - Dumbarton Bridge	58596	steel girder, 3150 ft	1.6	1982	26+6FF	none	6/10/1987
12	Vallejo - Carquinez/I80 East Bridge	68184	steel truss, 3350 ft	1.0	1958	79	1 array, 9 sensors	6/1/2002
13	Vallejo - Carquinez/I80 West Bridge	18185	suspension, steel box girder, concrete towers, 1056 m	1.0	2003	103	1 array, 9 sensors	10/3/2003

DOWNHOLE ARRAYS

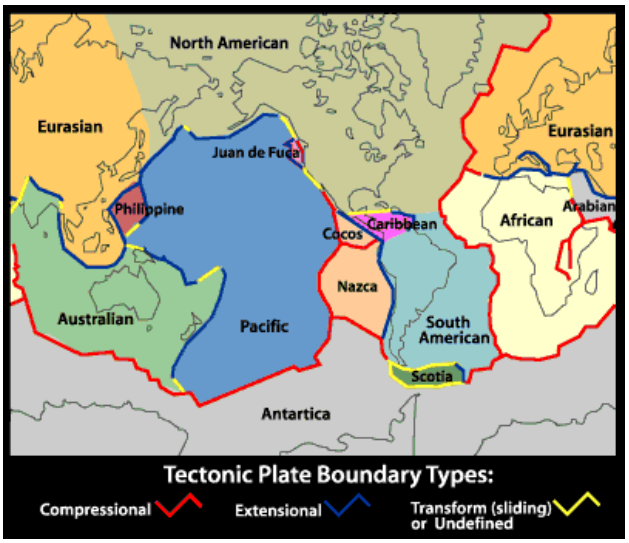
	Station Name	Station No.	No. of Sensors	No. of Depths	Sensor Depths (m)	Site Geology
1	Alameda - Posey & Webster Geotech Array	58137	12	4	Surface, 6, 13, 40	Deep alluvium
2	Antioch - San Joaquin River S. Geo. Array	67266	15	5	Surface, 11, 24, 51, 102	Deep alluvium
3	Benecia-Martinez Br., No Geotech Array	68321	9	2	Surface, 16, 39	Shallow fill over bay mud
4	Benecia-Martinez Br., So.Geotech Array	68323	9	2	Surface, 11, 35	Thin Alluvium over soft rock
5	Corona - I15/Hwy91 Geotech Array	13186	12	4	Surface, 7, 24, 46	Shallow alluvium over hard rock
6	Crockett – Carquinez Bridge Geotech Array #1	68206	9	3	Surface, 20, 46	Shallow clay over sed. rock
7	Crockett – Carquinez Bridge Geotech Array #2	68259	9	3	Surface, 61, 125	Shallow clay over soft rock
8	El Centro - Meloland Geotechnical Array	01794	12	4	Surface, 30, 100, 195	Deep alluvium
9	Eureka - Geotechnical Array	89734	15	5	Surface, 19, 33, 56, 136	Deep soft alluvium
10	Foster City – San Mateo Bridge Geotech Array	58968	12	4	Surface, 16, 22, 35	Shallow alluvium over rock
11	Half Moon Bay – Tunitas Geotech Array	58964	12	4	Surface, 5, 12, 45	Alluvium over soft rock
12	Hayward - San Mateo Br Geotech Array	58798	15	5	Surface, 10, 23, 46, 91	Deep alluvium
13	Los Angeles - La Cienega Geotech Array	24703	12	4	Surface, 18, 100, 252	Deep alluvium
14	Los Angeles - Vincent Thos Geo Array East	14785	12	4	Surface, 18, 46, 91	Deep alluvium
15	Los Angeles - Vincent Thos Geo Array W1	14783	12	4	Surface, 30, 91, 189	Deep alluvium
16	Los Angeles - Vincent Thos Geo Array W2	14784	9	3	Surface, 15, 30	Deep alluvium
17	Moorpark - Hwy118/Arroyo Simi Geotech Array	24185	9	3	Surface, 20, 47	Shallow alluvium over sed. rock
18	Novato - Petaluma River Geotech Array	68285	15	5	Surface, 10, 23, 54, 73	Alluvium

EARTHQUAKES

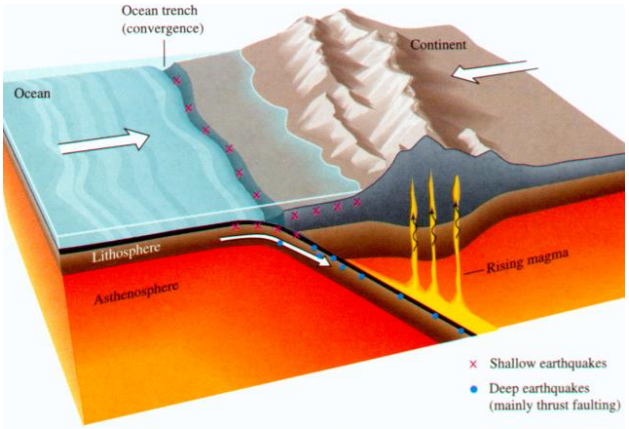
SOURCES OF EARTHQUAKES

Most earthquakes occur on faults at the boundaries of tectonic plates, especially in California. As the plates move, the faults become stressed until one suddenly ruptures, causing an earthquake. Plates move a few millimeters to centimeters in a year and it requires a few centimeters to meters of movement before an earthquake occurs.

There are different types of faults, reflecting the behavior of the prevailing tectonic forces. The figure below shows the earth's lithosphere divided into tectonic plates. The plate boundaries may be pushing together (compression or convergent boundaries), pulling apart (divergent or extensional boundaries), or sliding against each other (sliding or transform boundaries). Faults do not always follow the expected behavior from the global tectonic model due to significant local variation of prevailing forces.



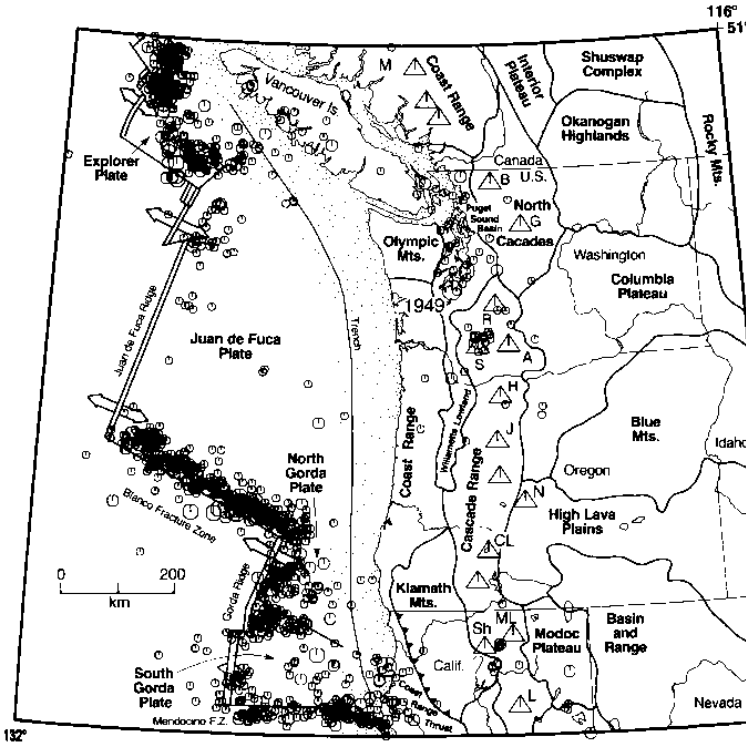
Compressional plate boundaries are where heavy oceanic plates collide with lighter continental plates; pushing the oceanic plate downward and causing thrust faulting. Compression against the continental plate forms mountains and the ensuing friction melts rock causing volcanoes. An example is along the coast of Northern California, Oregon, and Washington State where the Juan de Fuca and Gorda Plates are being pushed under the North American Plate.



Compressional boundaries cause thrust faults.

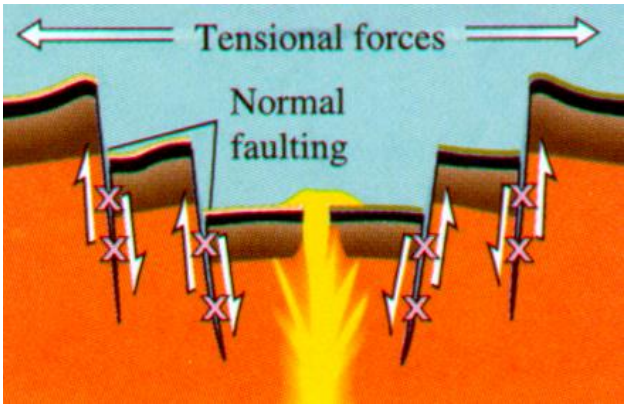
This has created a string of volcanoes (shown with triangles in the figure below) along the Cascadia Mountain Range and it has also caused a series of moderate earthquakes (shown with circles). Globally, earthquakes in these 'subduction-zones' are responsible for about 90% of the seismic energy released by earthquakes and it is

believed that the Cascadia Subduction Zone is capable of producing a very large earthquake which could devastate the Northwestern United States. However, this is an area of very low seismic activity for California, but the potential of a large earthquake with an MCE magnitude of 8.5 exists and is considered by Caltrans.

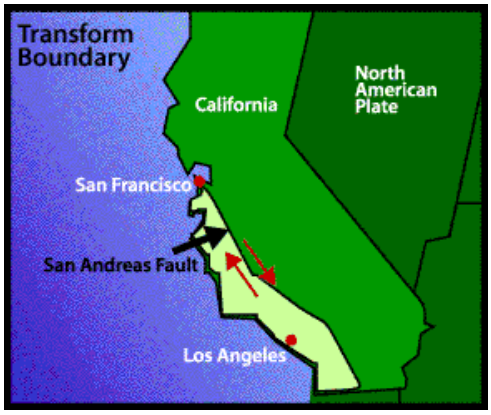


Extensional boundaries are where adjacent plates move apart. This occurs at spreading ridges between oceanic plates and at rift zones between continental plates. An example of an extensional boundary is on the west side of the Gorda and Juan de Fuca plates (shown above). Earthquakes occurring at extensional

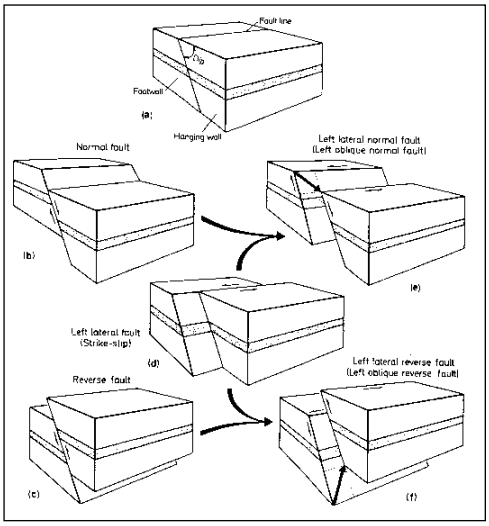
boundaries are shallow and smaller than at compressional boundaries.

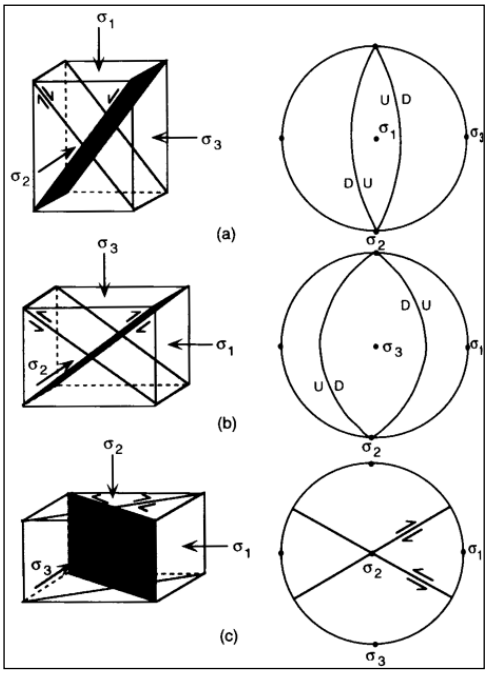


Extensional boundaries cause normal faults.



Transform boundary and strike-slip fault.



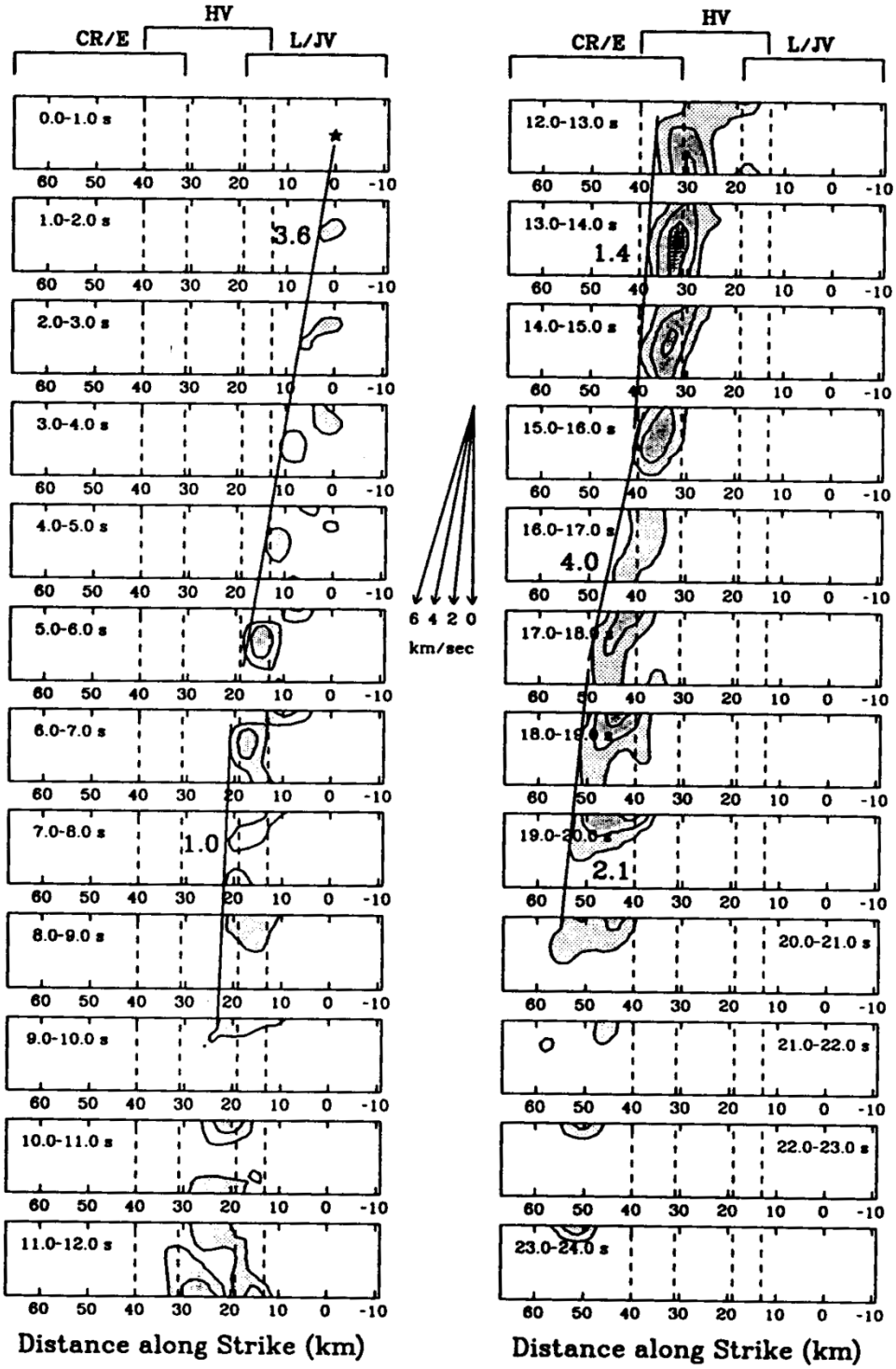


In California we are most familiar with the sliding action of the transform boundary between the Pacific and North American Plates. This has created many long strike-slip faults such as the San Andreas. We can also see transform fault zones between the extensional faults on the west side of the Juan de Fuca and Gorda fault ridges.

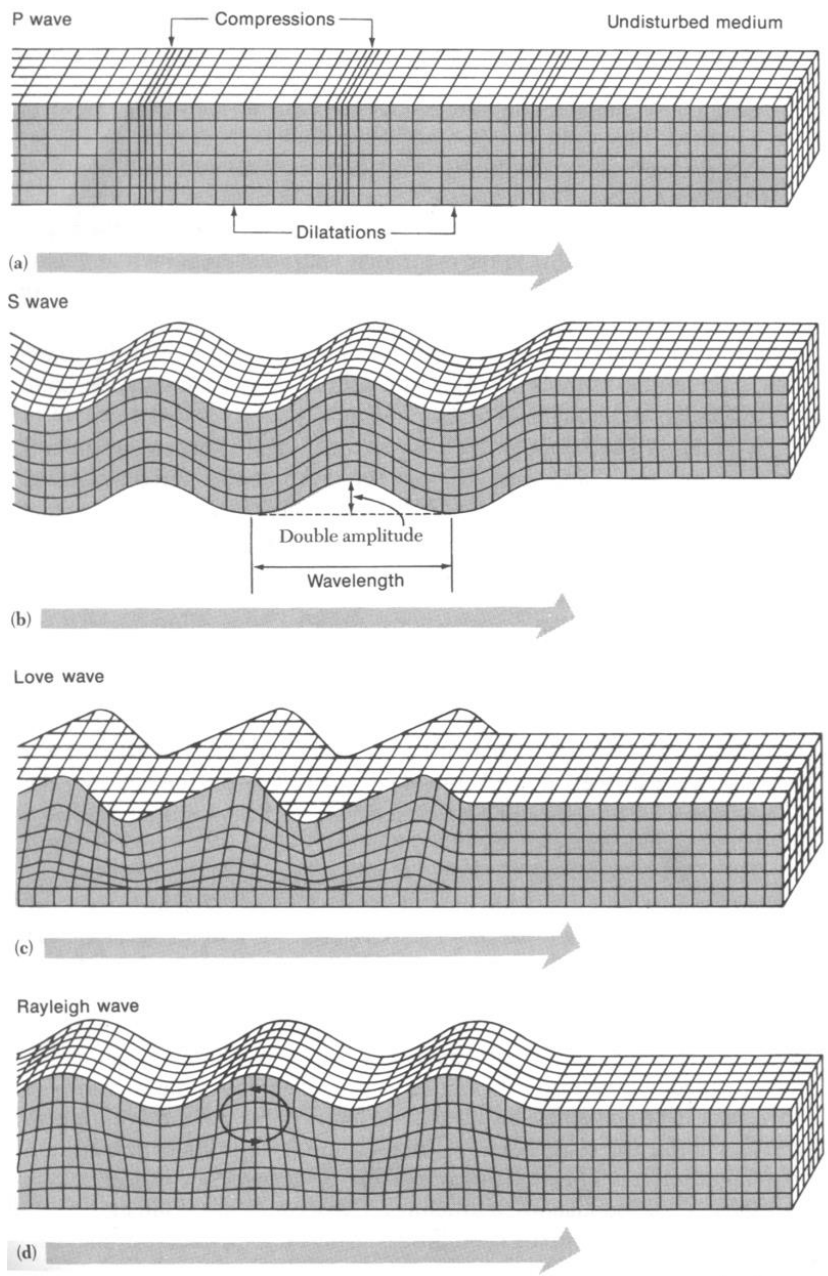
During actual earthquakes, faulting can be considerably more complicated depending on the state of stress in the earth's crust. The figures below show how normal faulting (b) can be combined with strike-slip faulting (d) to create an oblique normal fault. Similarly, reverse (or thrust) faulting (c) can be combined with strike-slip faulting to cause an oblique reverse (or thrust) fault. Faults are left or right lateral based on the movement of the rock on the other side of the fault from where an observer is standing. Figure (a) shows some of the features of a fault, such as the fault line (or trace), the fault dip, the footwall extending under the dipping fault, and the hanging wall extending above the fault (a thrust fault is a reverse fault where the dip angle is less than 45° and the fault line often does not reach the ground surface).

The drawing on the right shows stress blocks and stereographic projections of the maximum shear-planes in relation to principal stresses for a normal (a), reverse (b), and strike-slip (c) fault. The normal fault (with the hanging wall moving downward) occurs when the maximum principal compressive stress is vertical while a reverse fault (with the hanging wall moving upward) occurs when the minimum principal stress is vertical. However, pre-existing planes of weakness usually determine the location of the fault-plane rather than these models of isotropic material. However, the next section (on seismic waves) shows some additional uses for these 'beach-ball' diagrams.

A rupture will suddenly relieve the accumulated stress at a fault and cause an earthquake. The direction and velocity of the rupture has gained considerable attention to engineers because these 'velocity pulses' can cause very large, long period motion that may knock over a bridge. The figure below shows the movement of a rupture 'front' along the Camp Rock/ Emerson Faults to the Homestead Valley Fault to the Landers/Johnson Valley Faults during the 1992 Landers, California earthquake.



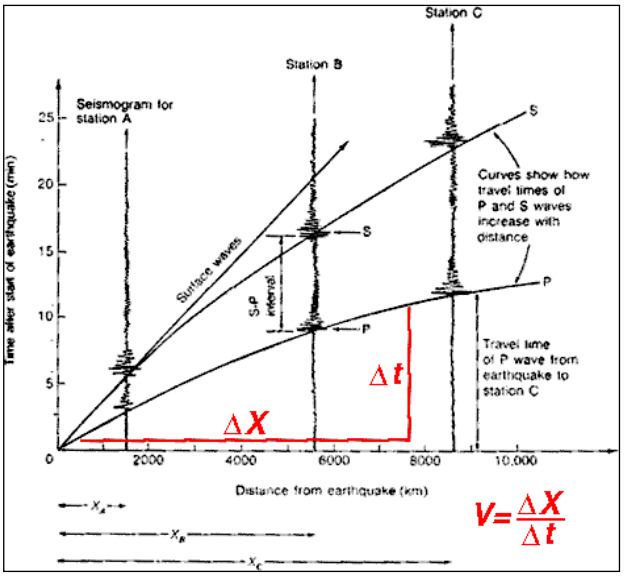
SEISMIC WAVES



The fault rupture produces a series of waves moving out from the source. These waves cause the ground motion we feel during an earthquake. The compressive (or P) wave is the fastest wave at speeds between 1.5 and 8 kilometers per second through rock. It alternately pushes and pulls the ground in the direction of its motion. Next come the slower shear (or S) waves moving perpendicular to the direction of motion. P and S waves are called body waves because they propagate in a body of rock.

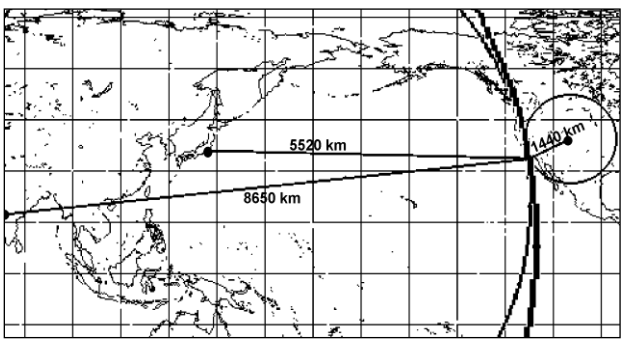
There are two slower waves called surface waves because they're confined to the ground surface. Love waves are similar to shear waves but without a vertical component of motion and the slowest Rayleigh waves move similar to ocean waves vertically and longitudinally in a retrograde motion along a vertical plane in the direction of travel.All of these waves, but particularly the shear waves, can damage structures. In fact, the worst damage occurs when geologic or topographic conditions amplify the waves at a bridge site. Moreover, the length and frequency of the waves plays a role in the characteristics of the ground motion. For instance, long bridges are damaged when adjacent bents are at the peak and trough of a wave resulting in out-of-phase motion. Certain soils are sensitive to long or short shear-wave velocities and can create resonance for structures with similar sensitivities.

Although wave speeds vary, the ratio between the average speed of a P wave and the following S wave is approximately constant. This fact enables seismologists to use the delay between the arrival of the P wave and the arrival of the S wave to get a quick estimate of the distance of the earthquake from the observation station. By multiplying the S-minus-P (S-P) time, in seconds by the factor 8 km/sec (5 miles/sec) will provide the approximate distance in kilometers from the earthquake source.

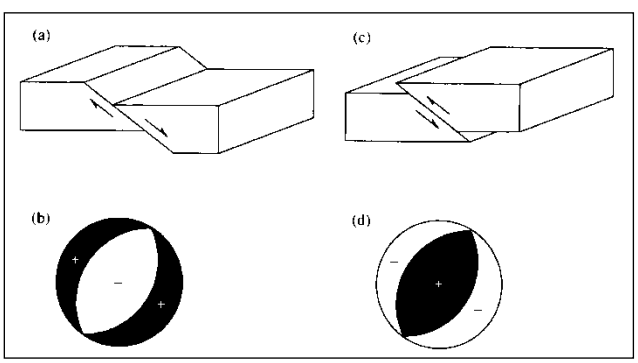


For instance, Station A has a separation of three minutes or 180 seconds between the P and S wave for a distance of 1440 km. Station B has 11.5 minutes or 690 seconds between the P and S waves for a distance of 5520 km form the source. Station C has 18 minutes or 1080 seconds between the arrival of the P and the S wave for a distance of 8650 km from the source. We can precisely locate the source of an earthquake from three recordings by drawing circles using the distances computed above as radii. Where the three circles intersect is the location of the earthquake.

For instance, if Station A is in Denver, Colorado, Station B is in Tokyo, Japan, and Station C is in New Delhi, India the intersection of circles drawn around these locations (and with radii derived above) would be Los Angeles, California. However, the error can be considerable, even for California's dense network.

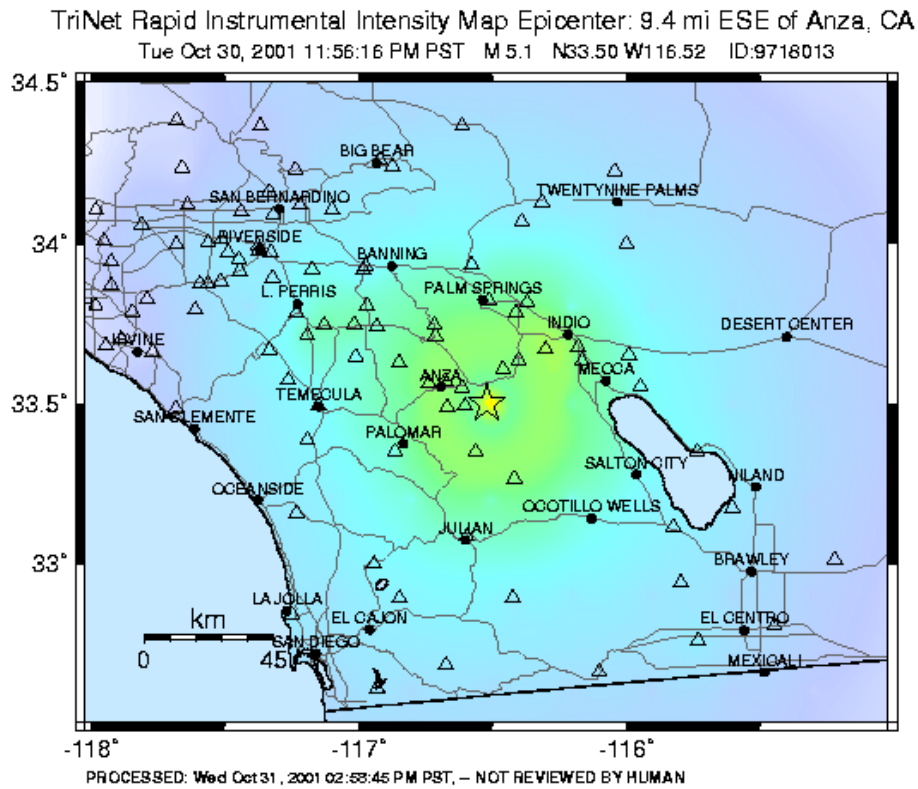


Seismograms have many other uses. For instance, a better way of deriving the stereographic projection of the fault plane is by mapping locations where the first P wave is dilatational (pulling) or compressional (pushing). Figure (b) shows dilation as white and compression as black for a normal fault and Figure (d) shows the areas for a thrust fault.



THE SIZE OF AN EARTHQUAKE: INTENSITY AND MAGNITUDE

In the 19th century, the intensity of an earthquake was determined from the severity of damage at different sites. Isoseismal maps were created showing areas of equal intensity based on interviews with local residents and a survey of the damage. Intensity is measured today using the Modified Mercalli Scale that relates damage to the peak ground acceleration (as shown below). This is not a measure of the size but of the effects on buildings and on common structures.



PERCEIVED SHAKING	Not felt	Weak	Light	Moderate	Strong	Very strong	Severe	Violent	Extreme
POTENTIAL DAMAGE	none	none	none	Very light	Light	Moderate	Moderate/Heavy	Heavy	Very Heavy
PEAK ACC.(%g)	<.17	.17-1.4	1.4-3.9	3.9-9.2	9.2-18	18-34	34-65	65-124	>124
PEAK VEL.(cm/s)	<0.1	0.1-1.1	1.1-3.4	3.4-8.1	8.1-16	16-31	31-60	60-116	>116
INSTRUMENTAL INTENSITY	I	II-III	IV	V	VI	VII	VIII	IX	X+

However, seismologists required a scale that could be used to compare the size of different earthquakes. Charles Richter developed the 'size' idea (in 1935) by using local magnitude (M_L) to measure earthquakes. Richter defined local magnitude as the base 10 logarithm of the maximum seismic wave amplitude (in thousandths of a millimeter) recorded on a standard seismograph at a distance of 100 kilometers from the earthquake epicenter. The standard seismograph had a mass suspended from a torsional spring that recorded the incoming waves as a function of time and of amplitude in millimeters. A logarithmic scale was used to make the magnitude a single digit number. Thus, when the amplitude of the waves increased by ten, the magnitude would increase one unit (from magnitude 4 to magnitude 5 - $10^5/10^4 = 10$). The following table shows how local magnitude is calculated from a seismograph of an earthquake but there are several modified or equivalent methods in use today.

Step 1: Measure the distance to the initial point of rupture from the time interval between S and P waves (S – P = 24 sec.).

Step 2: Measure the maximum wave amplitude on the seismograph (23 millimeters).

Step 3: Place a straight edge on the right using the previously derived distance (24 sec) and amplitude (23 mm) to obtain the local magnitude (M_L= 5.0).

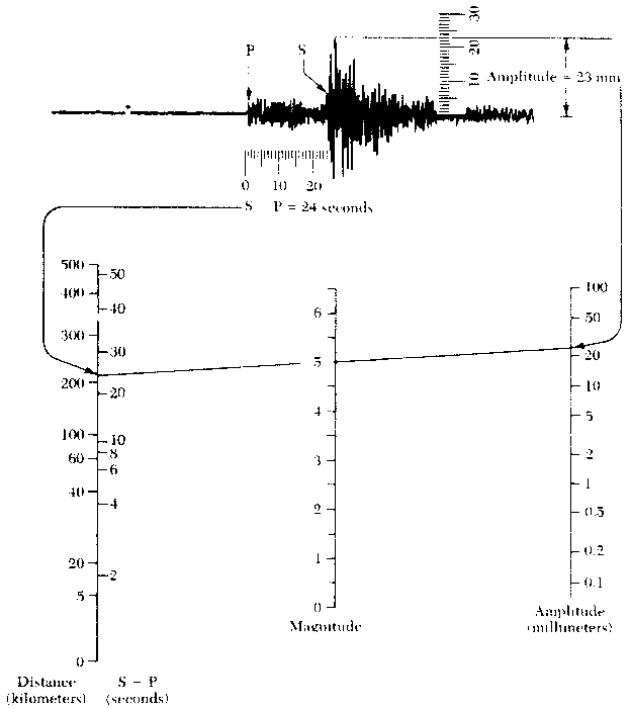
Local magnitude was meant to measure earthquakes in Southern California. As acceptance of the magnitude scale grew, problems using the local magnitude were recognized by seismologists.

To obtain uniformity when measuring earthquakes, moment magnitude (M_W) was developed (shown below).

$$M_W = (2/3)[\log(M_o) - 16.05]$$

M_o is the equivalent seismic moment at the source as the two sides of the fault move in opposite directions during the earthquake

$$M_o = GAD \quad \text{(in dyne-cm)}$$



where 'G' is the shear modulus of the rock, 'A' is the area of the fault, and 'D' is the average slip or movement of the fault.

The maximum earthquake magnitude that can occur on a fault is related to the product of the fault length times its width (A, in cm^2) and the average slip (D, in cm). Caltrans uses the fault area and style of faulting in addition to other criteria to determine the moment magnitude of the maximum credible earthquake (MCE).

EARTHQUAKE INDUCED BRIDGE DAMAGE

Much of the bridge damage that occurs during earthquakes is a result of soil problems. Unstable soil can cause landslides and loose alluvium can settle or liquefy. Shaking of the bridge itself can cause failure of bridge members and connections or can cause excessive movement at expansion joints dropping bridge spans. There are also a variety of secondary effects such as surface ruptures occurring directly under a bridge, or tsunamis, avalanches, etc. During the 1958 Hebgen Lake earthquake in Montana, an enormous landslide changed the course of the Madison River causing floods that washed away several bridges. Bridges are sometimes damaged due to failure of nearby lifeline components. Broken water mains can wash away abutments, broken gas lines can incinerate bridges, and fallen buildings or other structures can damage and close bridges.

On the following pages are examples of typical types of earthquake induced damage that have occurred to bridges.

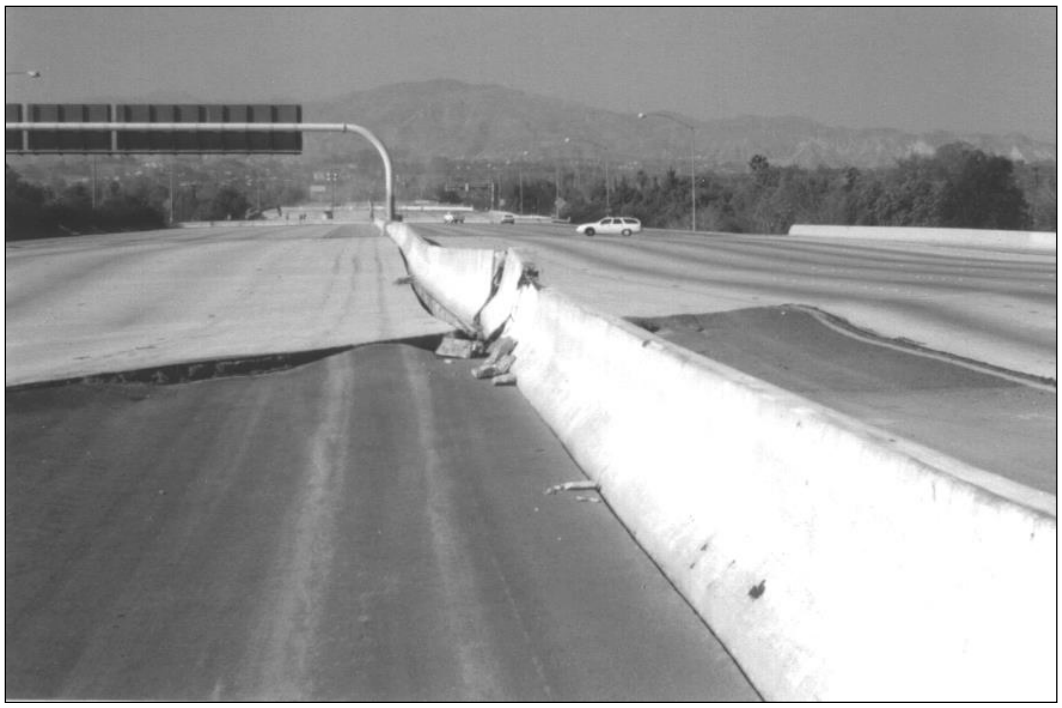
SOIL RELATED BRIDGE DAMAGE

Bridges Supported on Cohesionless Material

Struve Slough Bridge after Loma Prieta.

Bridges Supported on Liquefiable Soils

Rio Vascaya Bridge after 1991 Costa Rica Quake



Approach Settlement on I-118 after Northridge.

Bridges Supported on Sloping Ground

Landslide Damage in the Philippines.

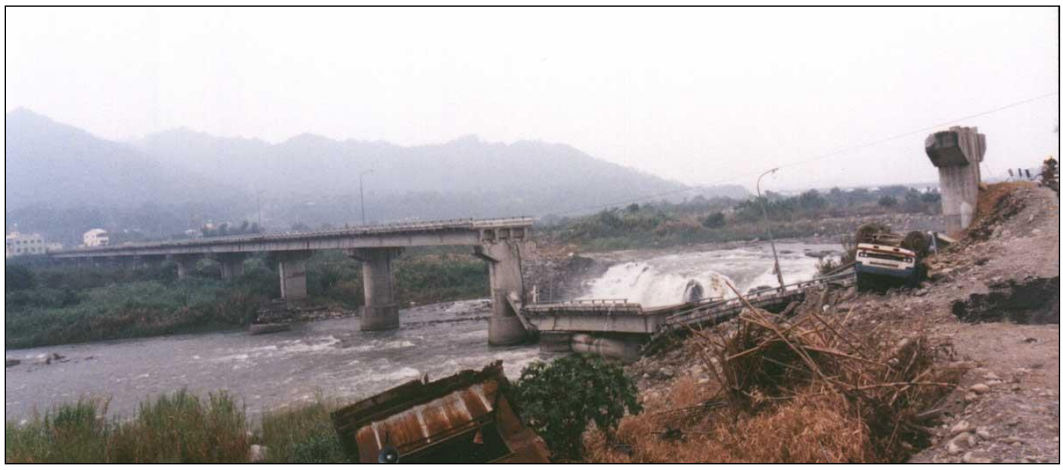
Foundation Damage

Foundation Movement at Kobe.

Abutment Damage

Tilting of Railroad Abutment in Kobe.

Fault Rupture and Surface Deformation



Taiwan Fault Rupture.

Landers Fault Rupture.

Landers Surface Deformations

Structural Vibration Related Bridge Damage

Unseating

San Francisco Bay Bridge.

Minatogawa Interchange after Kobe.

Mission Gothic UC after Northridge.

Gavin Canyon After Northridge.

Expansion Joint, Restrainer, and Shear Key Damage

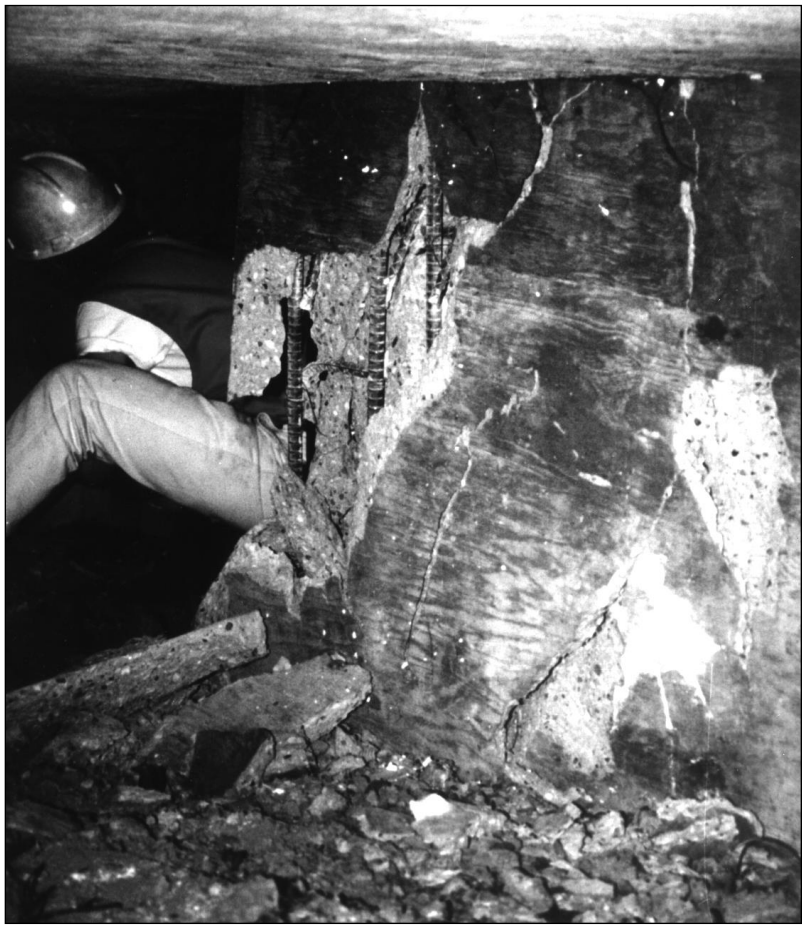
Expansion Joint Damage.

Restrainer Damage at Gavin Canyon.

Damaged Restrainer.

Broken Restrainers at Nishinomiya.

Restrainer Damage in Cell.



Shear Key Damage.

Bearing Damage

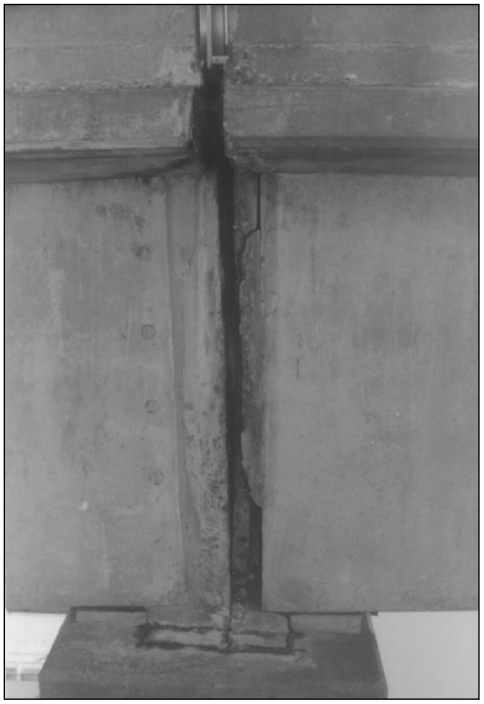
Missing Abutment Bearing After Northridge EQ.

Broken Bearing at Nishinomiya-ko Bridge.

Superstructure Damage

Superstructure Collapse on 14/5 Interchange during Northridge.

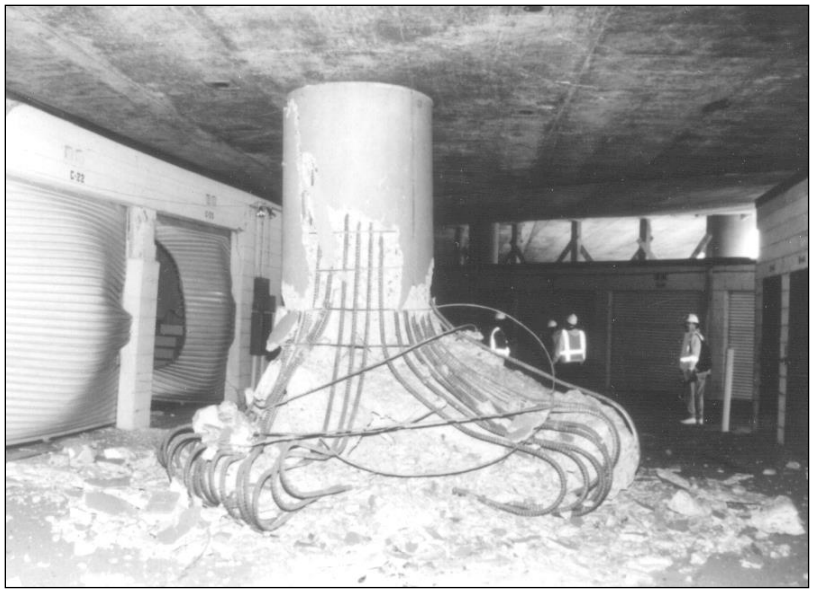
Damage at Takatori.



Napa River Bridge Precast Girder Damage.

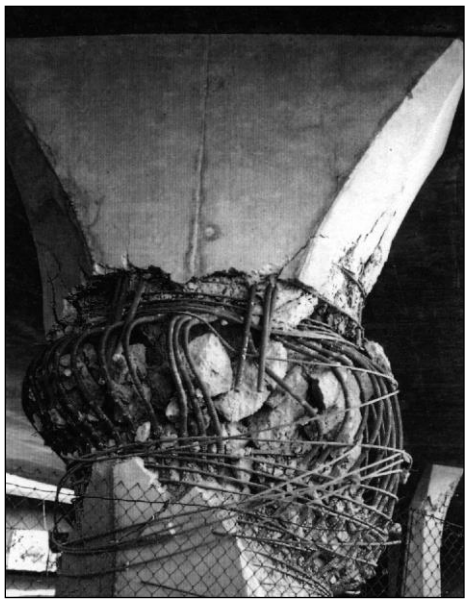
Damage to Rokko Island Bridge During the Kobe Earthquake.

Concrete Column Damage



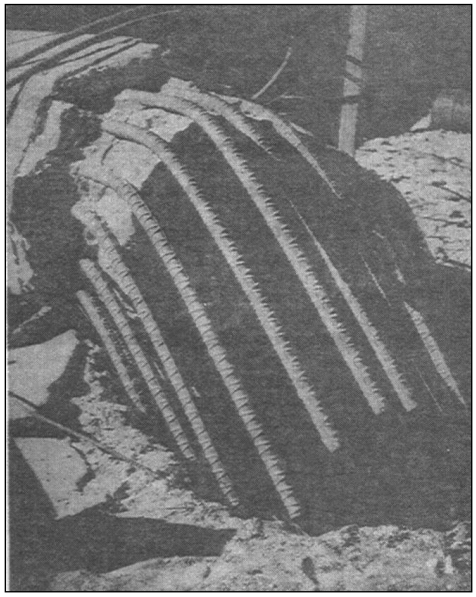
Damage at Santa Monica Fwy.

Minor Damage to Confined Bridge Column During Northridge EQ.



Column Flare Damage.

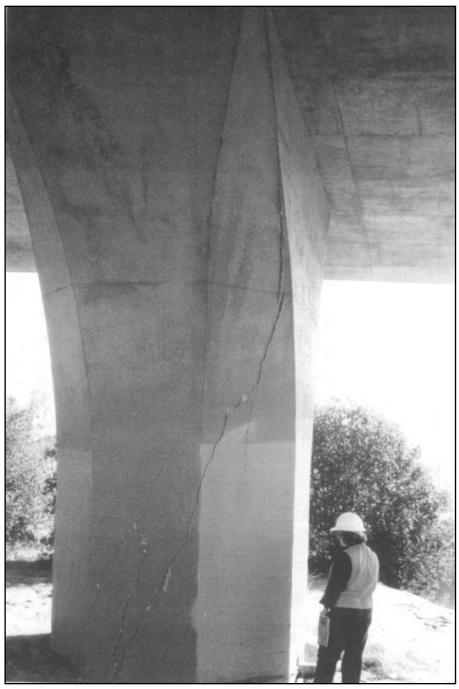
Midheight Flexural Damage.



Longitudinal Bar Pullout.

Shear Column Damage During the Kobe Earthquake.

Poor Transverse Reinforcement.



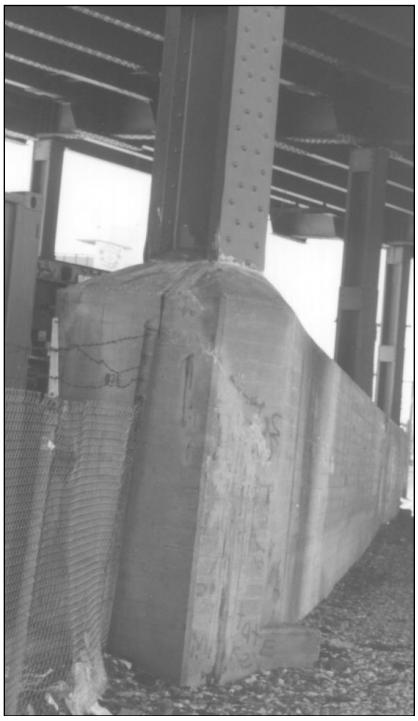
Torsional Column Damage at 5/118 Interchange during the Northridge Earthquake.

Pier Wall Damage after Kobe.

The North Connector on the 14/5 Interchange Collapsed as a Result of Failure of Short, Stiff Pier #2 During the Northridge Earthquake.

Steel Column Damage

Steel Column Damage at Kobe.



Fifth Avenue Overhead after Loma Prieta.

Connection Damage

Joint Shear Damage.

Kobe Joint Damage

Cypress Viaduct Damage.

Pounding Damage

Southern Freeway Pounding Damage from Loma Prieta

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EVALUATING THE PERFORMANCE OF RETROFITTED BRIDGES

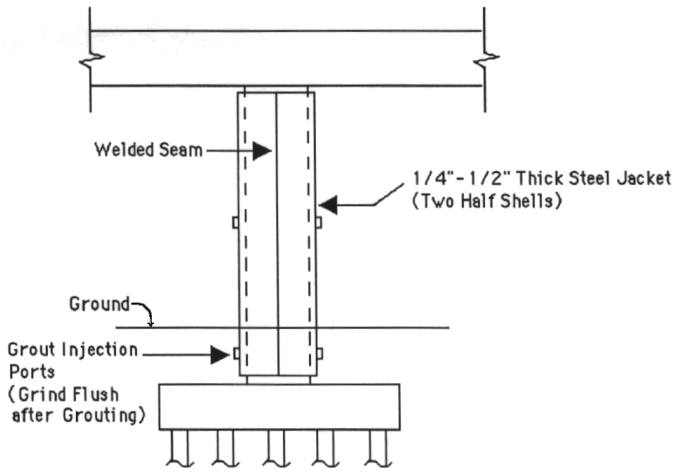
California has a large inventory of bridges retrofitted in the 1990's. There are columns wrapped in steel and fiber shells, hinges retrofitted with pipe-seat extenders, and abutments attached to large-diameter CIDH piles. One of the biggest responsibilities of the PEQIT is to evaluate the performance of retrofitted structures. Are there signs that the concrete columns have suffered damage inside the shells? Have the restrainers yielded (Structures maintenance is putting yield indicators on cable restrainers to alert engineers if the cables have yielded)? The PEQIT should carefully examine the retrofitted bridges to determine their performance. Typical (and not so typical) retrofits are shown below.

Caltrans Bridge Retrofit Program

Not only are retrofits available for different bridge elements but they can be categorized by their ability to modify the strength, stiffness, ductility, or damping of bridge members. The following pages provide a sampling of some of these retrofits.

Bent Retrofits

The most common retrofit procedure for vulnerable columns is to wrap them in a steel shell. Steel shell retrofits are divided into two classes. A class F retrofit is when the space between the shell and the column is grouted to allow the columns to form plastic hinges during the earthquake. The class P retrofit is when the annulus is filled with compressible polystyrene that allows the columns to form pins. The class P retrofit protects the columns without the expense of having to design the entire bridge for the plastic column moment and shear. The class F retrofit greatly increase the ductility and shear capacity while adding only about 10% to the flexural strength of the columns. This has made them very popular and they are used in many situations. Sometimes, a short steel shell is just placed around a vulnerable area of the column. Steel shells are often used on rectangular columns that are so wide that the shells must be restrained with bolts or wide flange beams. Steel shells have even been used on nonprismatic columns and column flares.



Steel Column Casing Retrofit

Non-Prismatic Column with Steel Shell.

A variety of other materials have been developed to provide ductility to existing concrete bridge columns. The figure below shows a fiberglass wrapped column near Griffith park in Los Angeles after the Northridge earthquake. Composite material retrofits are now used in many of the same situations as steel shells. The one exception being that if a plastic hinge is required in a region with a lap splice, only steel shells provide enough confinement to prevent slip. However, composite fibers can safely be used when a class P retrofit is needed.

Griffith Park OC with Fiberglass Wrapped Concrete Columns.

There are many other materials and techniques used to provide confinement and increased ductility for concrete columns. These include carbon-fiber wrapped columns, wire wrapped columns, and concrete encased columns. However, because of unfamiliarity with some of these materials, a cautious approach should be adopted in their use.

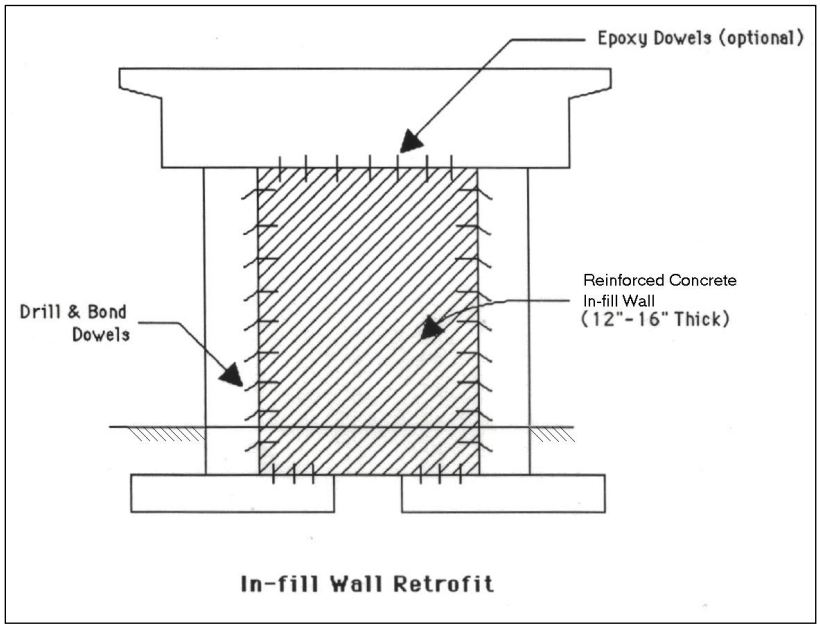
Bents are often retrofitted to increase their strength. A very popular retrofit for weak single column bents and pierwalls has been to built an outrigger bent cap and add pileshafts to the bent. Sometimes a single pileshaft is added to provide more strength but usually pileshafts are placed on each side of the bent. These retrofits may

be used when the soil may liquefy and deep pileshafts can continue to support the structure. Or they may be used when a steel shell cannot provide enough displacement capacity to make the bent survive the earthquake.

Outrigger Pileshaft Retrofit for Pier Wall.

The figure above shows a pier wall with an outrigger pileshaft retrofit. Note that the pier wall also has a steel shell that allows it to continue provide support during the earthquake. The advantage of the outrigger pileshaft retrofit is that it provides a great deal more ductility and flexural strength without appreciably increasing its stiffness.

Another popular retrofit provides increased strength in both directions and increased transverse stiffness. These in-fill wall retrofits are an inexpensive method of protecting multicolumn bents. Dowels are drilled and bonded to the existing concrete (as below), reinforcement is placed between the columns, and new concrete is poured turning the multi-column bent into a pier wall.



The ability to provide increased strength and stiffness in a particular direction is accomplished by attaching triangular shear walls to existing bents. These have been particularly popular for pedestrian overcrossings whose wandering geometry creates a center of mass far from the center of stiffness. Moreover, the single column bents for these delicate structures are usually incapable of handling earthquake forces. The shear wall is either placed

to be normal to the curve or, as in this case, a wall is provided in two directions.

Triangular Shear Walls.

Isolation devices are often used to modify a bent's behavior during earthquakes. This is particularly effective for a stiff bent which is part of a flexible structure. We will look at this in more detail in the section on bridge system retrofit strategies. Another possible retrofit for bents is replacement. Sometimes a vulnerable portion of the bent will be replaced like an existing bent cap or connection. Often, a completely new bent is provided. Sometimes a single column will be used to support two structures. This can occur for double-deck viaducts or at interchanges. Since it would be exceedingly difficult for this column to survive a large earthquake, it is replaced with a separate column for each structure.

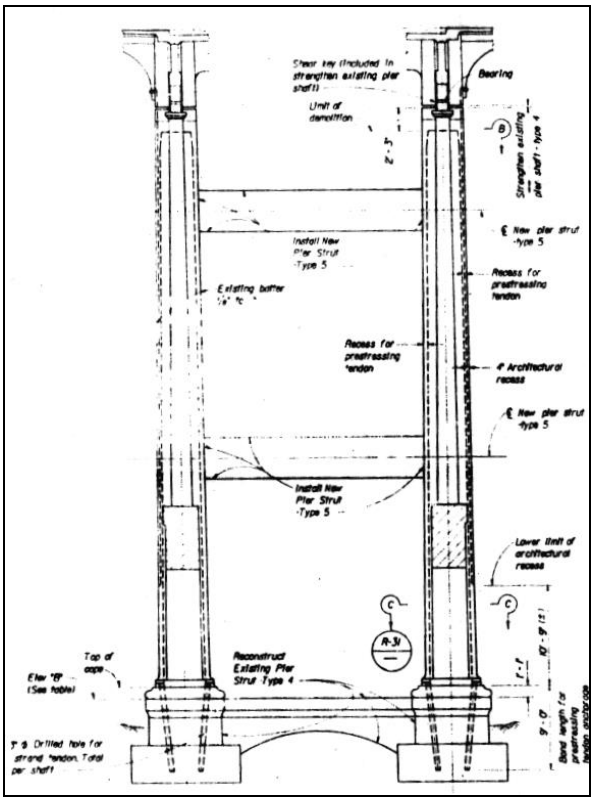
Link Beam Retrofit at the Santa Monica Freeway.

The use of link beams on multicolumn bents has been particularly effective. This method is used for very flexible columns that are too weak to handle large displacements. Link beams stiffen the bent and reduce the displacement. The figure above shows a link beam retrofit on the Santa Monica Expressway. Link beams can be designed to be weaker than the columns but to have great ductility. As the bent displaces transversely, the beams can absorb energy and protect the columns.

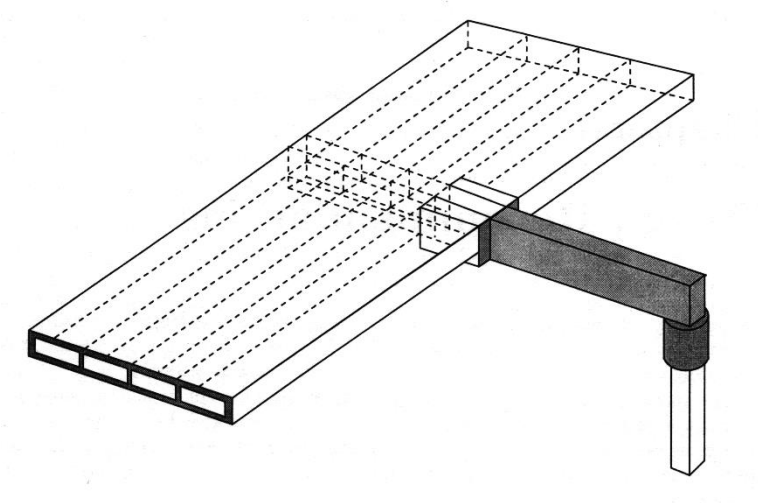
Sometimes, the columns can be post-tensioned to provide them with added flexural and shear strength. This was done for the Colorado Street Bridge in Pasadena which had extremely weak columns with almost no reinforcement. A geology drilling unit was set up on the bridge deck and drilled straight down through the existing columns. Then prestressing strands were placed in the holes and post-tensioned. Also, link beams were added to stiffen the bents.

Steel bents have also been retrofitted. A common retrofit is to add steel plates to the flanges of steel bents. This increases their strength without adding much additional stiffness. Encasing steel bents in concrete is another alternative.

The preceding discussion is just a small sampling of the many bent retrofits that have been done in recent years. Most of these retrofits were the result of research and testing. Pier wall steel shell retrofits were investigated at UC Irvine. Most of the composite shell and link beam retrofits were tested at UC San Diego. UC Berkeley (Stojadinovic, 1995) has been looking at retrofitting Outrigger knee joints. Currently, older knee-joint connections have been removed and replaced with larger, more ductile joints. The testing program looked at the behavior of both long and short bent caps. A ductile retrofit and a strength retrofit strategy was studied using both a steel jacket and a post-tensioned reinforced concrete jacket. The final recommendation is for a strength retrofit using a steel plate jacket that forces plastic hinging in the column for both longitudinal and transverse motion. The figure below shows a retrofit which is composed of a concrete bolster that strengthens the connection to the superstructure, a steel plate jacket around the bent cap and the joint, and steel casing around the column.

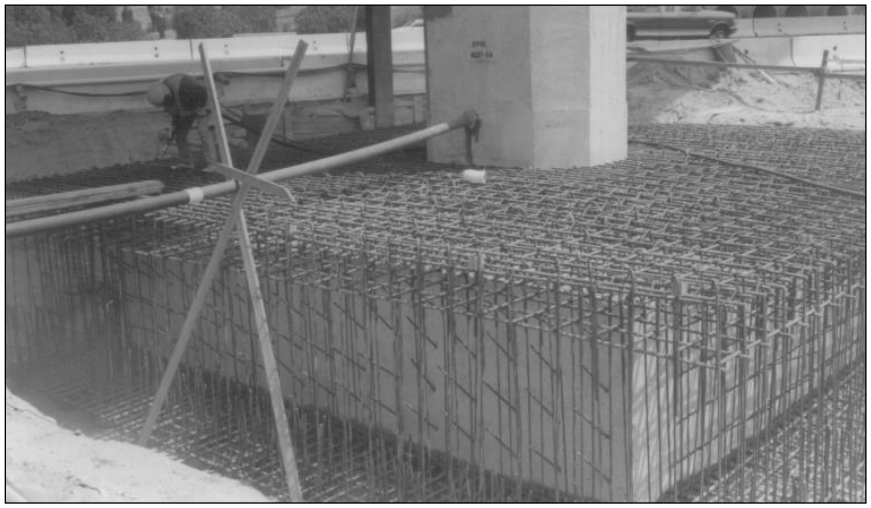


Link Beam and Post-Tensioned Column Retrofit.



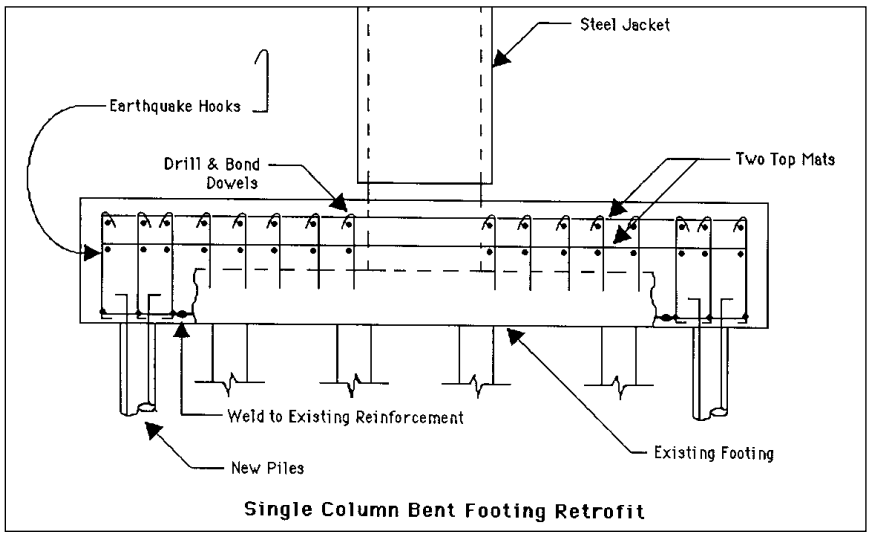
Final Recommended Knee-Joint Retrofit.

Foundation Retrofits



Reinforcement For Footing Retrofit.

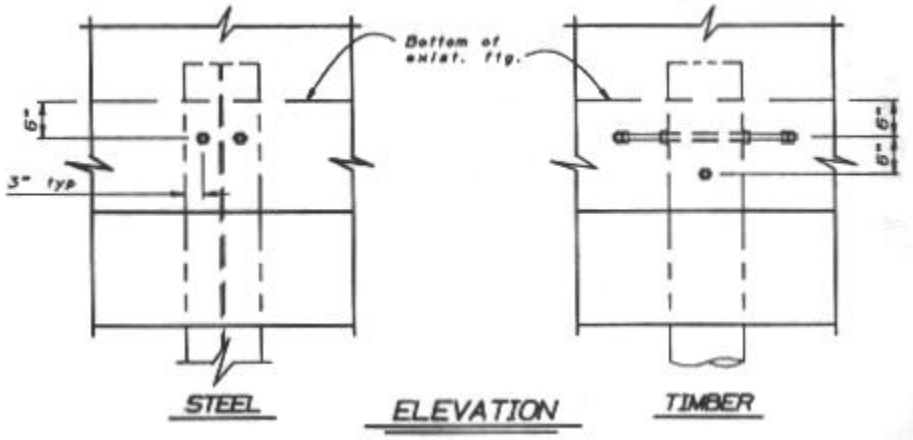
If the columns are strengthened or the footing is found to be inadequate, then a footing retrofit is required. This is often the case for single column bents that are fixed for moment. Sometimes the existing footing has no top mat of reinforcement, no ties to join the top and bottom mats, inadequate piles (particularly for tension), and too small a section for shear and flexure. The retrofit shown below may have additional piles driven around the footing perimeter and additional reinforcement and concrete placed around the existing footing. Drill and bond dowels connect the new footing to the old. These are designed to handle the shear friction at the interface. A beam is designed above the existing footing that must be strong enough to handle the moment and shear of the column being transferred to the piles on each side of the existing footing.



One of the problems that confronts engineers is the inability of many piles to act in tension as the foundation rocks back and forth. Both timber and steel piles (which are strong in tension) have very poor connections to the footing, older concrete piles have inadequate reinforcement, and many piles have inadequate friction to engage the surrounding soil. These problems have resulted in a number of innovative foundation retrofits. Sometimes holes are drilled through the existing footings and tie-down anchors are placed and grouted in the holes.

Tie-Down Rods being Connected to Existing Footing.

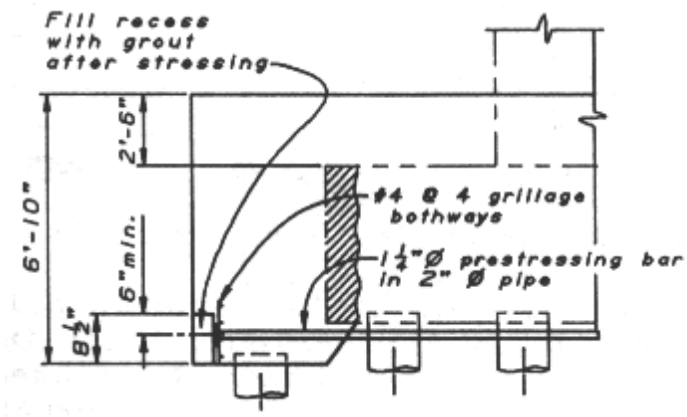
Sometimes the existing piles are reattached by excavating under the footing, attaching high strength bolts to the top of the piles, placing new reinforcement under the footing, and casting new concrete in the excavation.



Reattaching Existing Piles to Footing.

A testing program at Caltrans (Mason, 1995) identified a number of innovative new piles that are able to provide tension even in Bay mud. Some of these pile systems, like the Dutch Fundex System, are segmental and can be placed under bridge decks which make them well suited for retrofits.

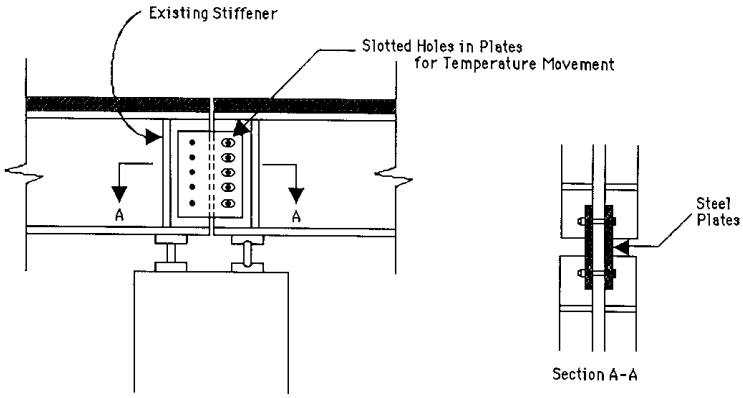
In situations where there is not enough reinforcement in the bottom of footings to handle the moment, prestressing tendons can be used. This has the added advantage of increasing the shear capacity of the footing. The Coyote Wells Overhead on Route 8 in Imperial County had a footing retrofit. New piles were placed along the outside of the existing footing, and the footing was extended outward and below the existing footing. Then holes were drilled under the existing footing and through the new footing extension. Prestress ducts with prestress tendons were placed in the holes. When the tendons were stressed and anchored to the new footing, the required moment capacity was provided. The prestressing also helped to secure the footing extension and piles to the existing footing.



Prestressed Footing Retrofit at Coyote Wells.

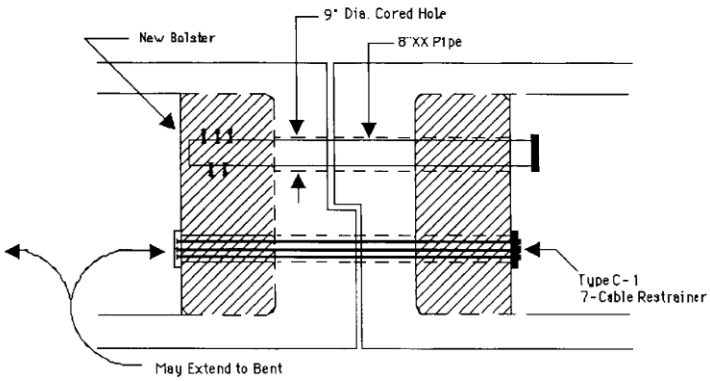
Expansion Joint Retrofits

Retrofits to prevent the superstructure from falling at expansion joints have become more sophisticated over the years. Originally, cable restrainers were used to prevent superstructures from falling off narrow seats. However, because of the ambivalent performance of restrainers during past earthquakes, newer retrofits provide a more reliable method of preventing unseating, either by locking the joint or by extending the seat in various ways. For steel superstructures, plates are sometimes used to connect the girders at expansion joints. This provides a strong, positive load path for the inertia force as well as providing a seat if one of the girders falls off of its support.



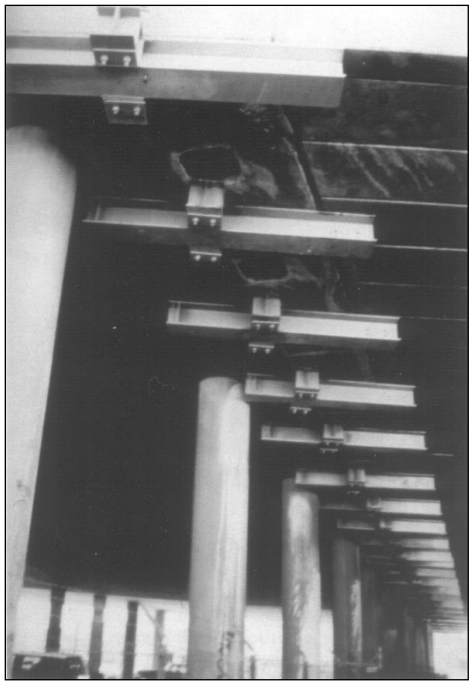
Steel Girder Hinge Plate Retrofit

Similarly, pipe seat extenders are placed at the hinges of reinforced concrete box girder bridges to prevent unseating. Holes are cored through the hinge, steel pipes are inserted in the holes, and concrete bolsters are cast at both ends. One end of the pipe is fixed to the bolster while the other end is free to translate back and forth. If the hinge opens too far, the double extra strong pipe can support the superstructure.



Retrofit Pipe Hinge Seat Extender

There are many variations to these devices that either lock or provide support at expansion joints. Steel girders were placed under the hinges at the Santa Monica Freeway in Los Angeles to provide a longer seat.



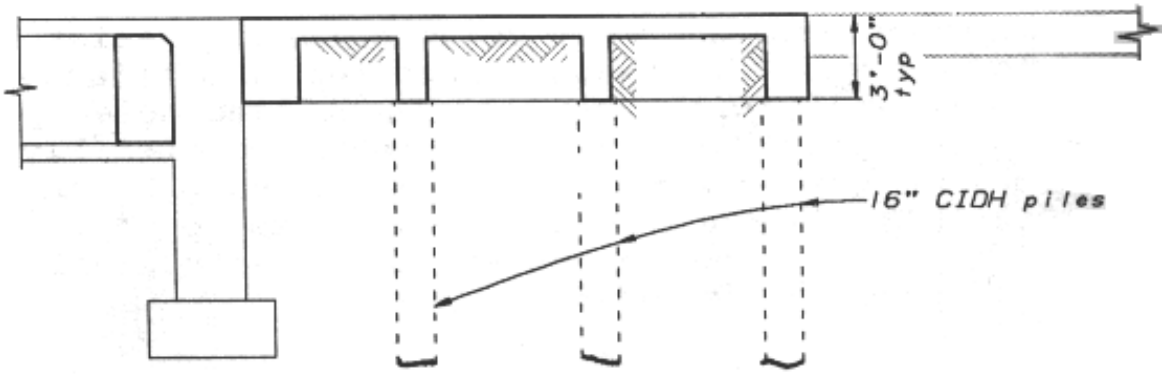
External Hinge Extenders on Santa Monica Freeway

Locking Device at Abutment Seat of Pedestrian Overcrossing.

Catcher blocks are often cast in front of the ends of steel and concrete girders to prevent them from falling. Transverse and longitudinal shear keys, vertical restrainers, keeper plates, etc. are all common retrofits. Sometimes steel rods and brackets are used to lock a short seat. One must provide abundant strength for these connections, as they are otherwise likely to break during large earthquakes.

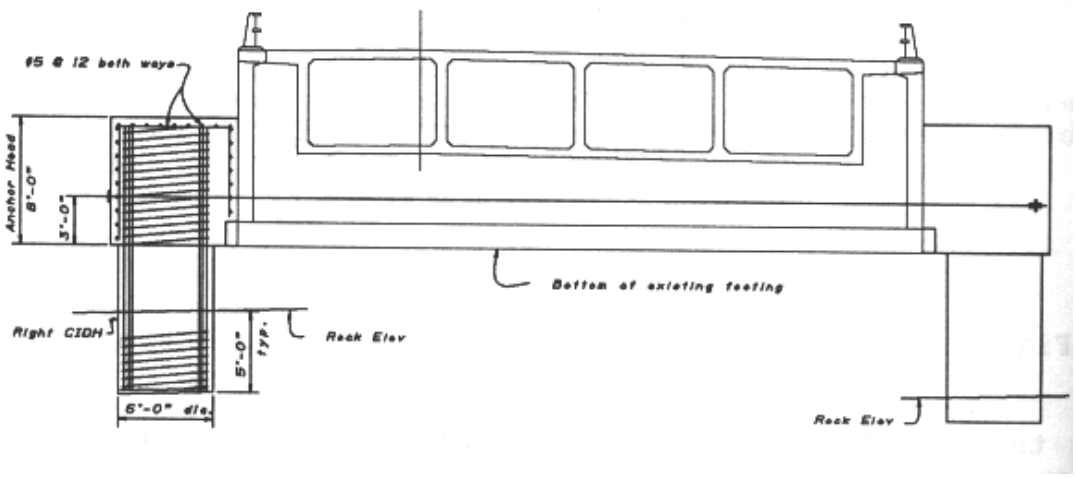
Abutment Retrofits

Stiffening and strengthening abutments to take more load and to immediately engage the soil has become a big part of new seismic retrofits. This is particularly helpful when the end bents are very stiff and would otherwise take much of the load and fail during a large earthquake. Timber is often placed between the abutment backwall and the superstructure end diaphragm to immediately engage the soil during an earthquake. Then special approach slabs, piles, and tieback systems help hold onto the bridge while absorbing energy. The figure below shows a waffle approach slab that is sometimes used to anchor the abutment to the surrounding soil.



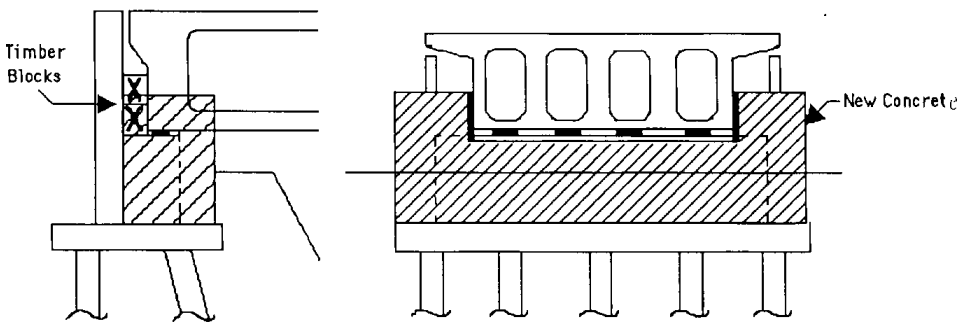
Seismic Waffle Slab.

Similarly, concrete blocks and other devices extend behind the abutment to engage the soil. Concrete haunches (often supported on large diameter piles) are used to support the structure transversely. Often, the haunches on each side of the abutment are tied together with cables to make them work together as the abutment moves from side to side.



Abutment Haunch with CIDH Piles and Cable.

Photo of Abutment Retrofit with Haunches.



Exterior Shear Key Retrofit @ Abutment

Abutment Shear Key Retrofit

The figure above shows what used to be the most common bridge retrofit which was to provide exterior shear keys at abutments to prevent transverse movement of the superstructure. Note that timber blocking is provided in the gallery between the backwall and the superstructure so that the soil will be more quickly engaged during the earthquake, less banging will occur, and the brittle concrete backwall is protected.

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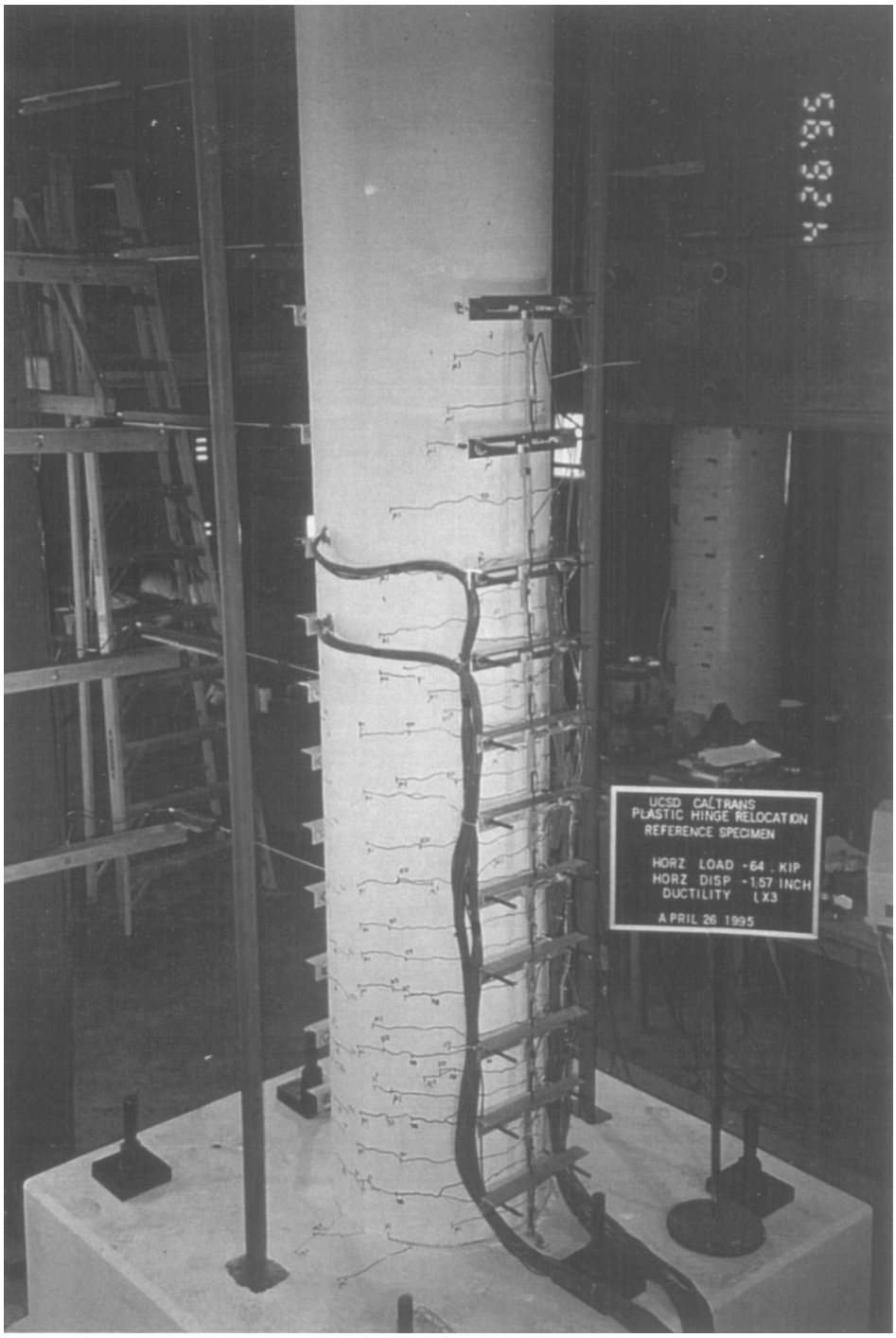
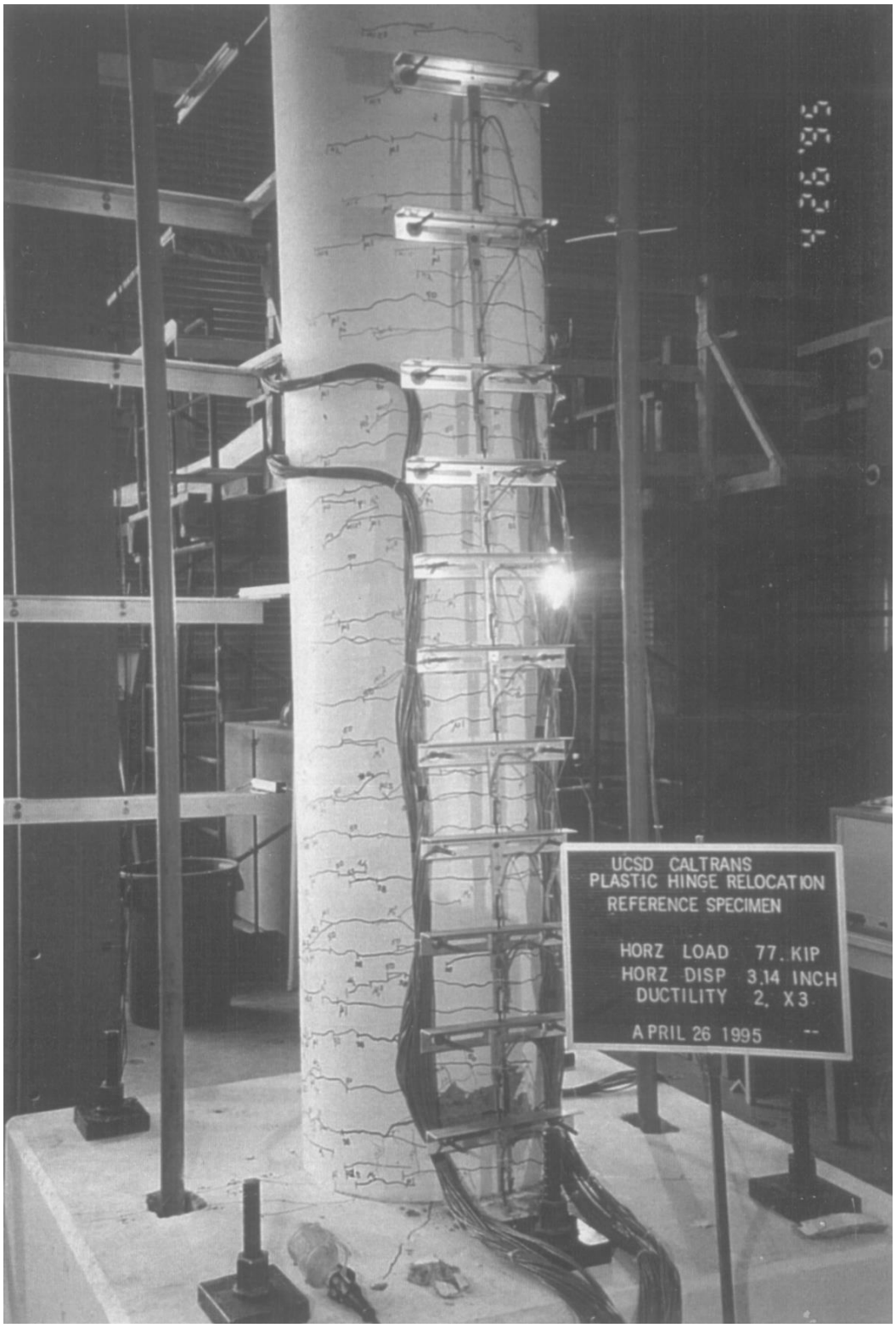
DAMAGE PHOTOS FROM THE TESTING OF BRIDGE COLUMNS

A good way to determine the extent of damage to bridges in the field is by familiarizing yourself with damage in the lab. By studying these and other photos, the investigator will obtain a better perspective on what a column looks like after displacing two, three, or four times past yield.

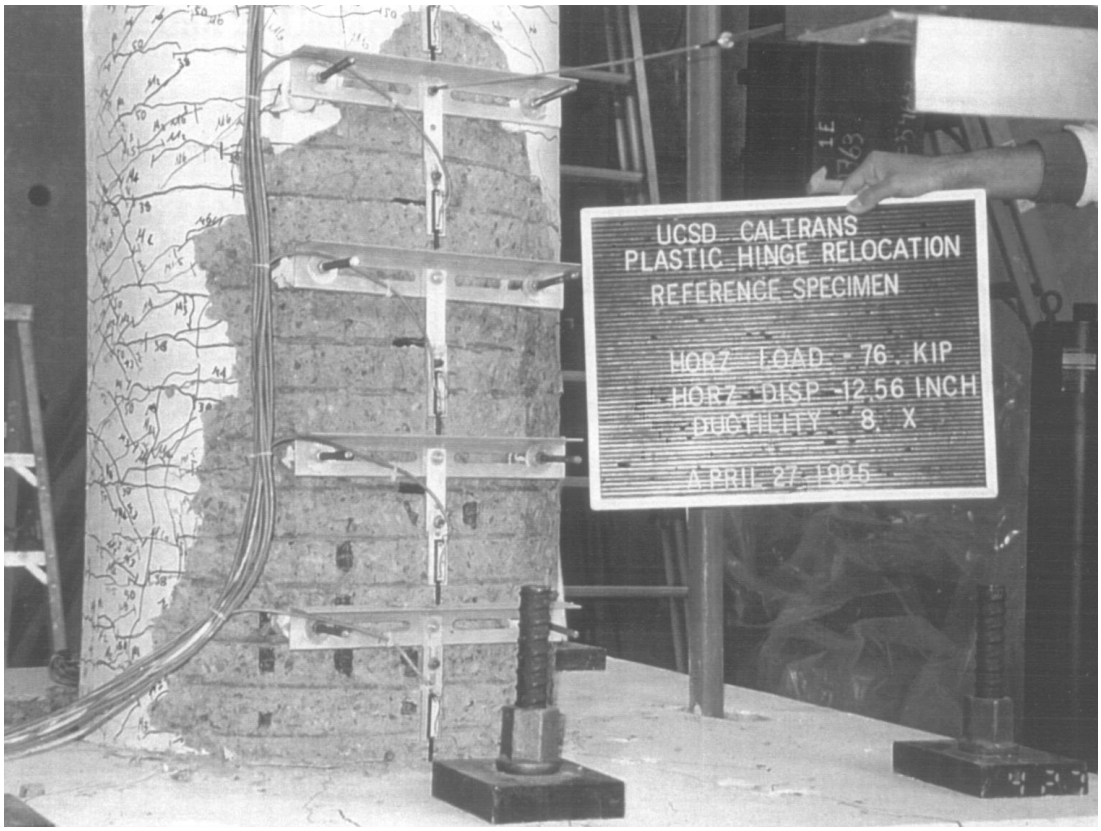


Third Cycle at Disp. = Ductility 1.0 at UCSD for Reference Column (Relocation of Plastic Hinge Tests).

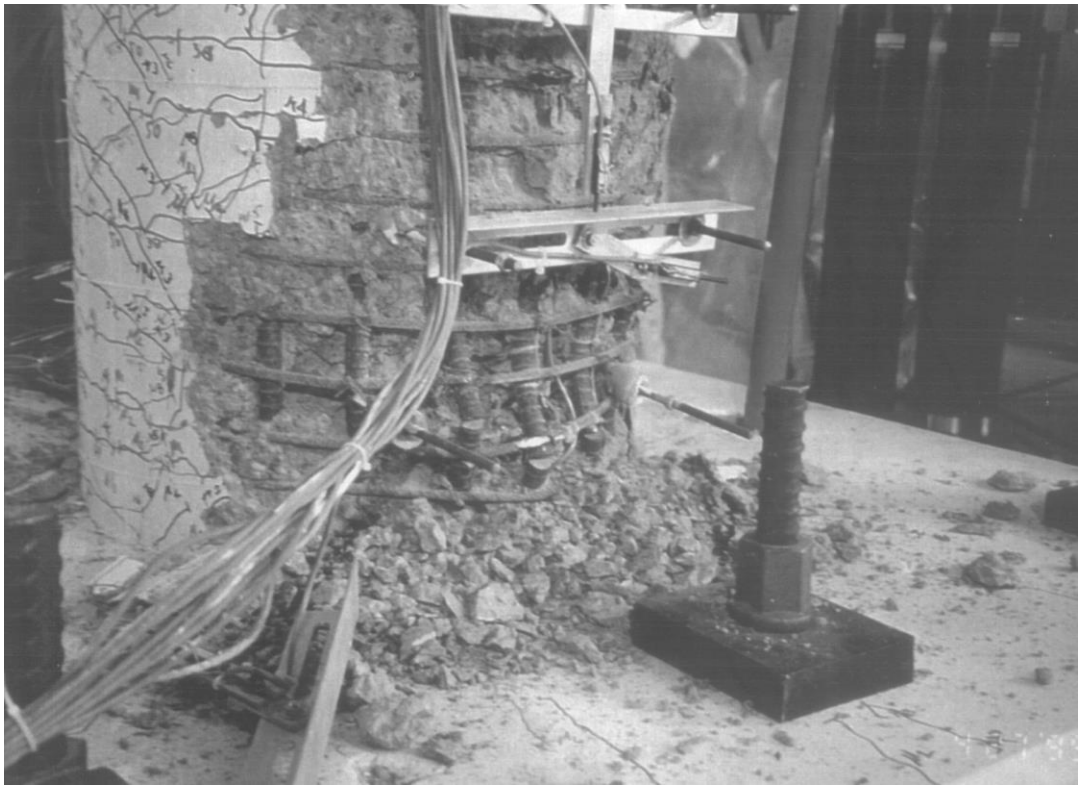
This specimen was designed conventionally to allow a column hinge to form at the footing. It is a 2 ft diameter, 12 ft tall concrete column with 20 #7 bars and a #3 spiral at a 3" pitch.



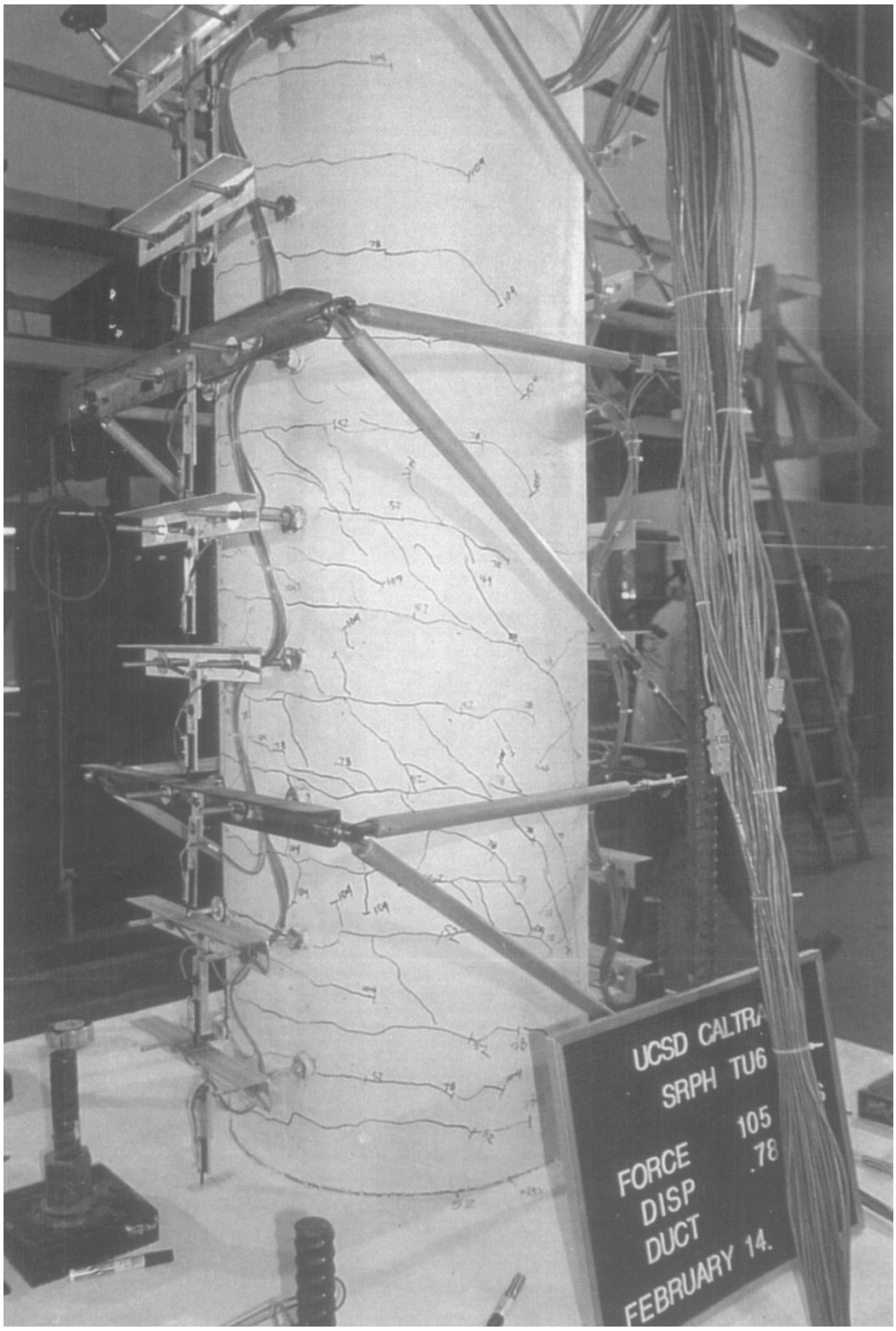
Third Cycle at Disp. = Ductility 2.0 at UCSD for Reference Column (Relocation of Plastic Hinge Tests).



Ductility 8.0 at UCSD for Reference Column (Relocation of Plastic Hinge Tests).

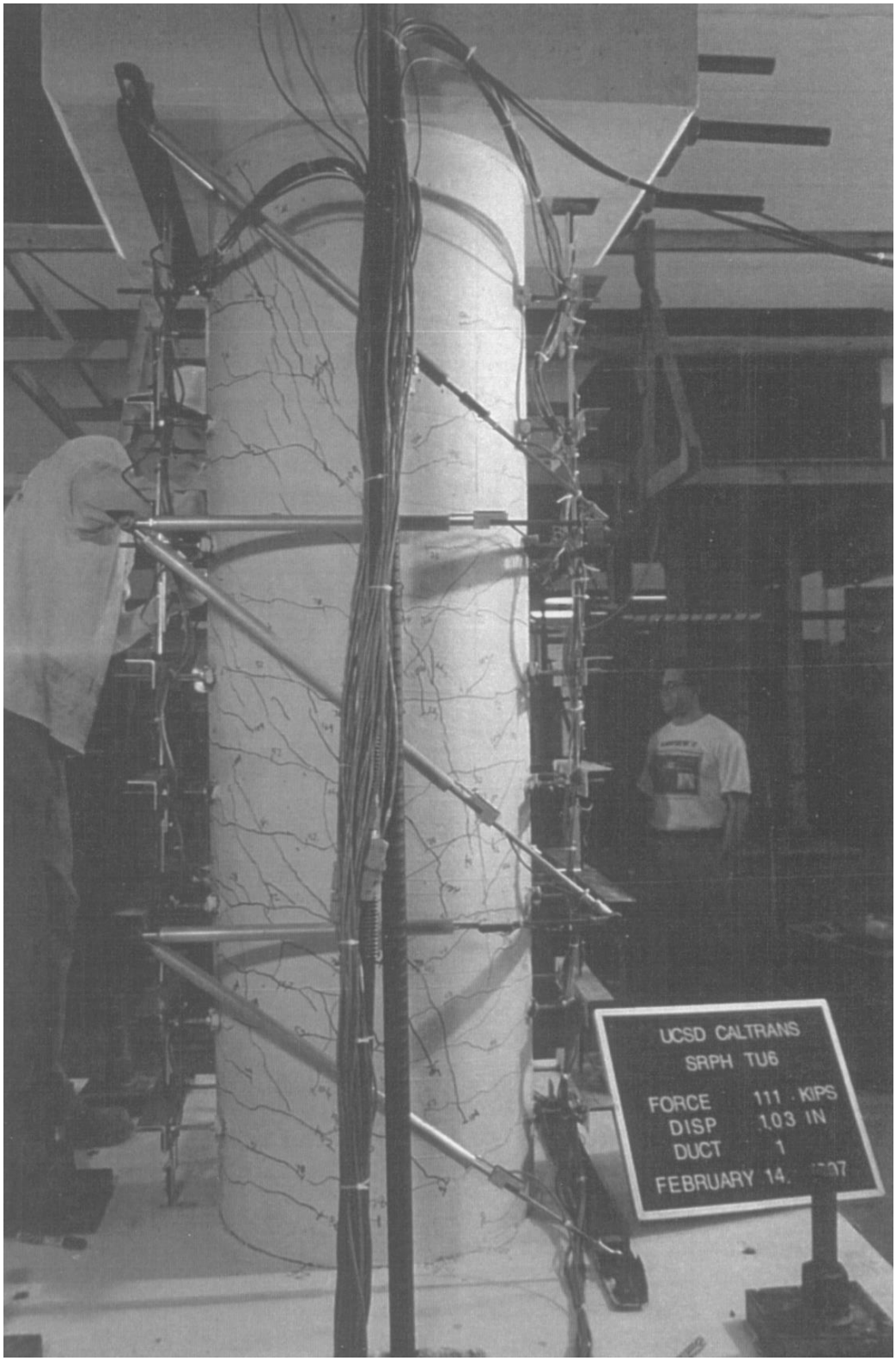


Failure at UCSD for Reference Column (Relocation of Plastic Hinge Tests).

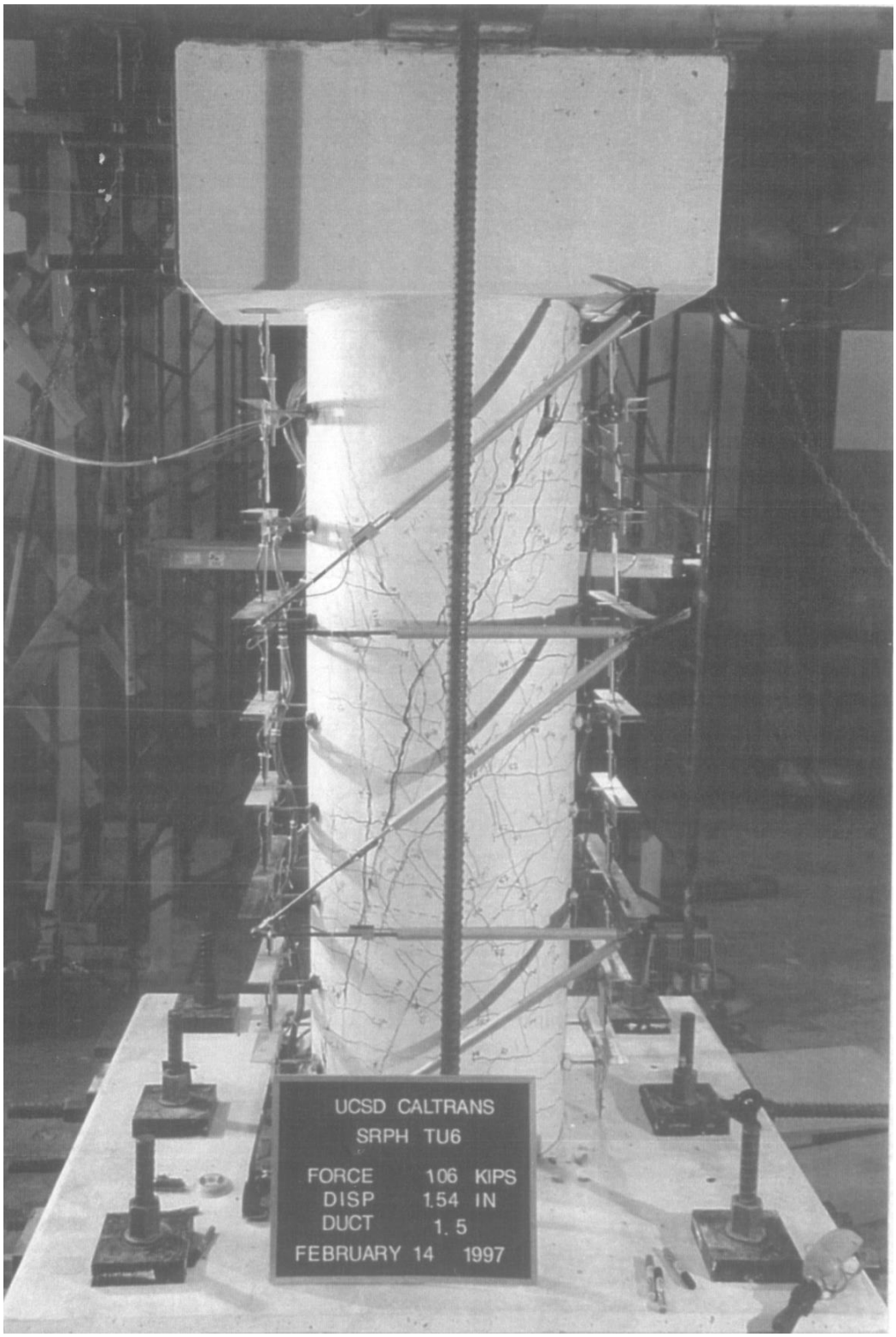


Yield for Shear Column at UCSD
(Relocation of Plastic Hinge Tests).

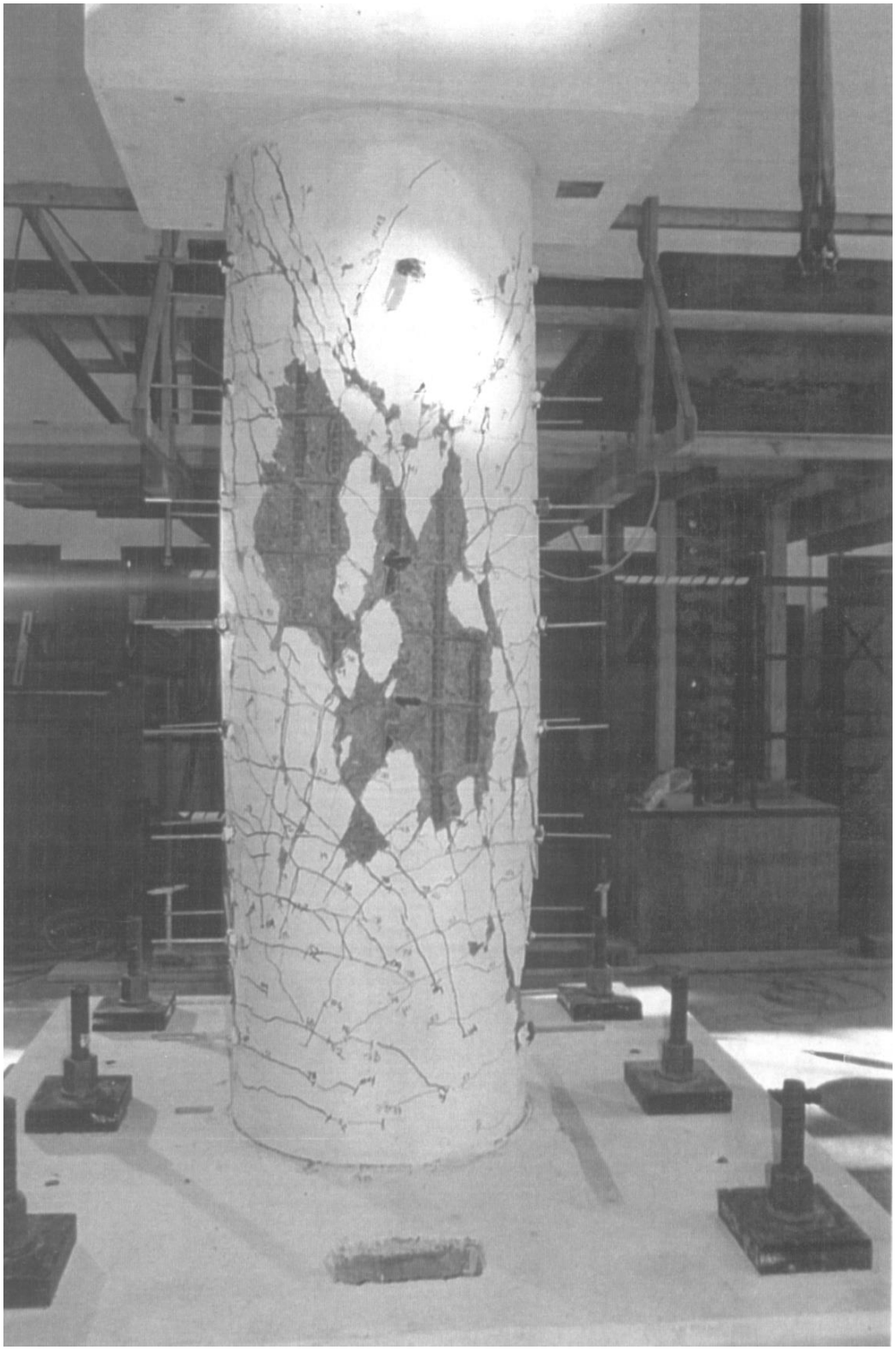
This specimen was designed with additional longitudinal reinforcement at the base of the column to force plastic hinging one column diameter above the footing. However, the transverse reinforcement was limited to cause a shear failure at a ductility of 2.0.



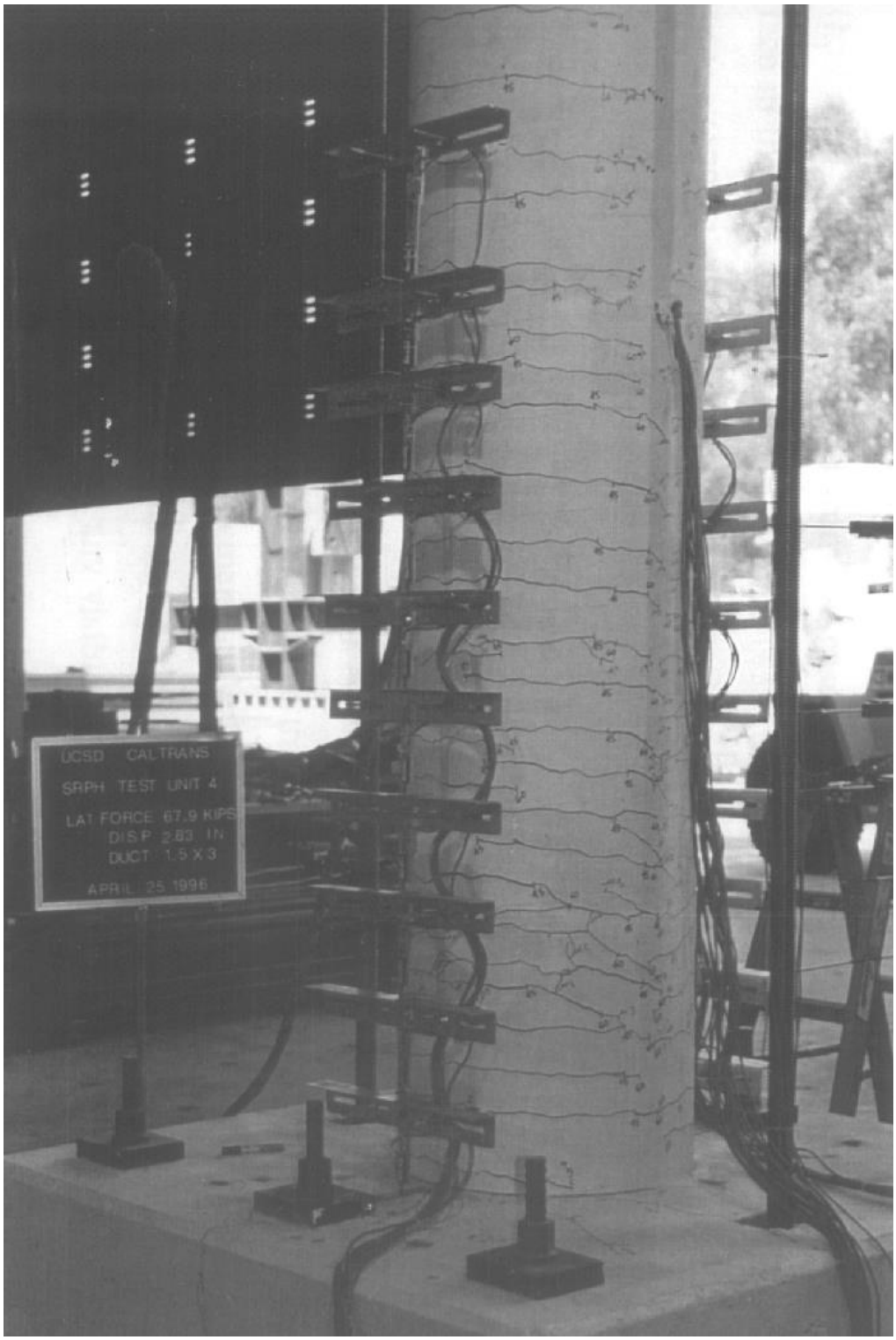
Ductility of 1.0 for Shear Column at UCSD (Relocation of Plastic Hinge Tests).



Ductility 1.5 for Shear Column at UCSD (Relocation of Plastic Hinge Tests).

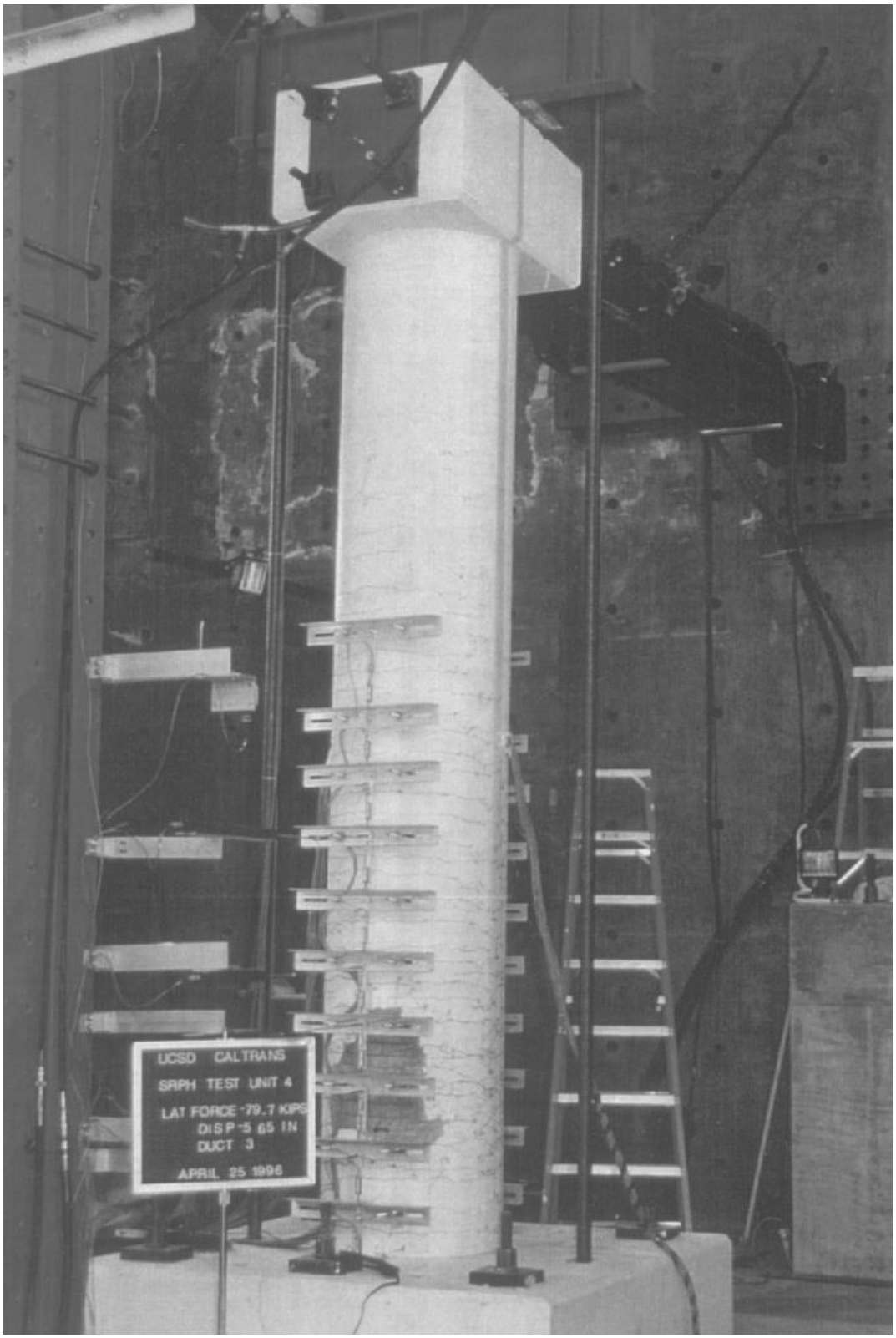


End of Test at UCSD for Shear Column (Ductility < 2.0)
(Relocation of Plastic Hinge Tests).

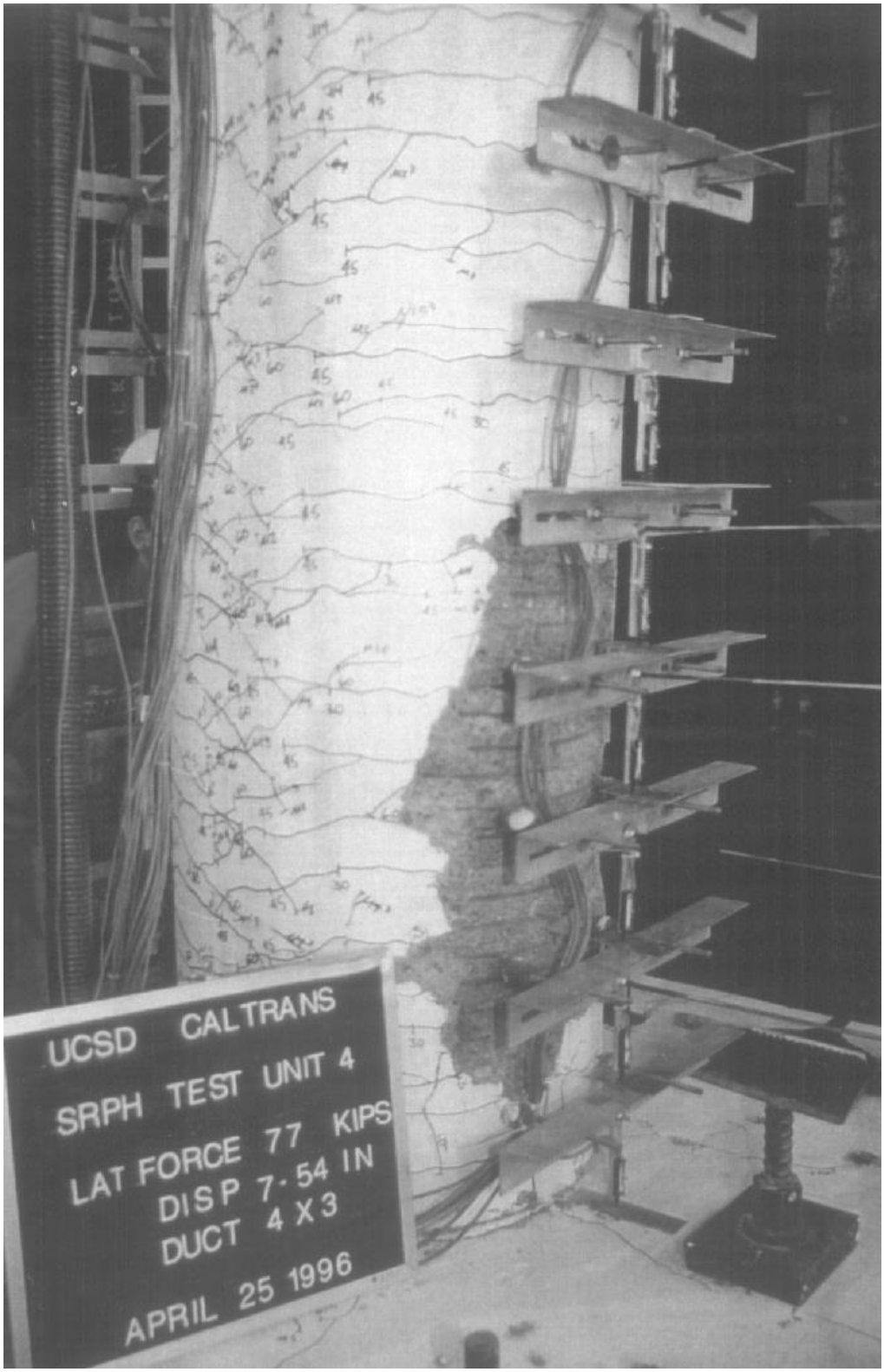


Ductility 1.5 at UCSD for Test Unit 4, Staggered Termination □s = 2.3%
(Relocation of Plastic Hinge Tests).

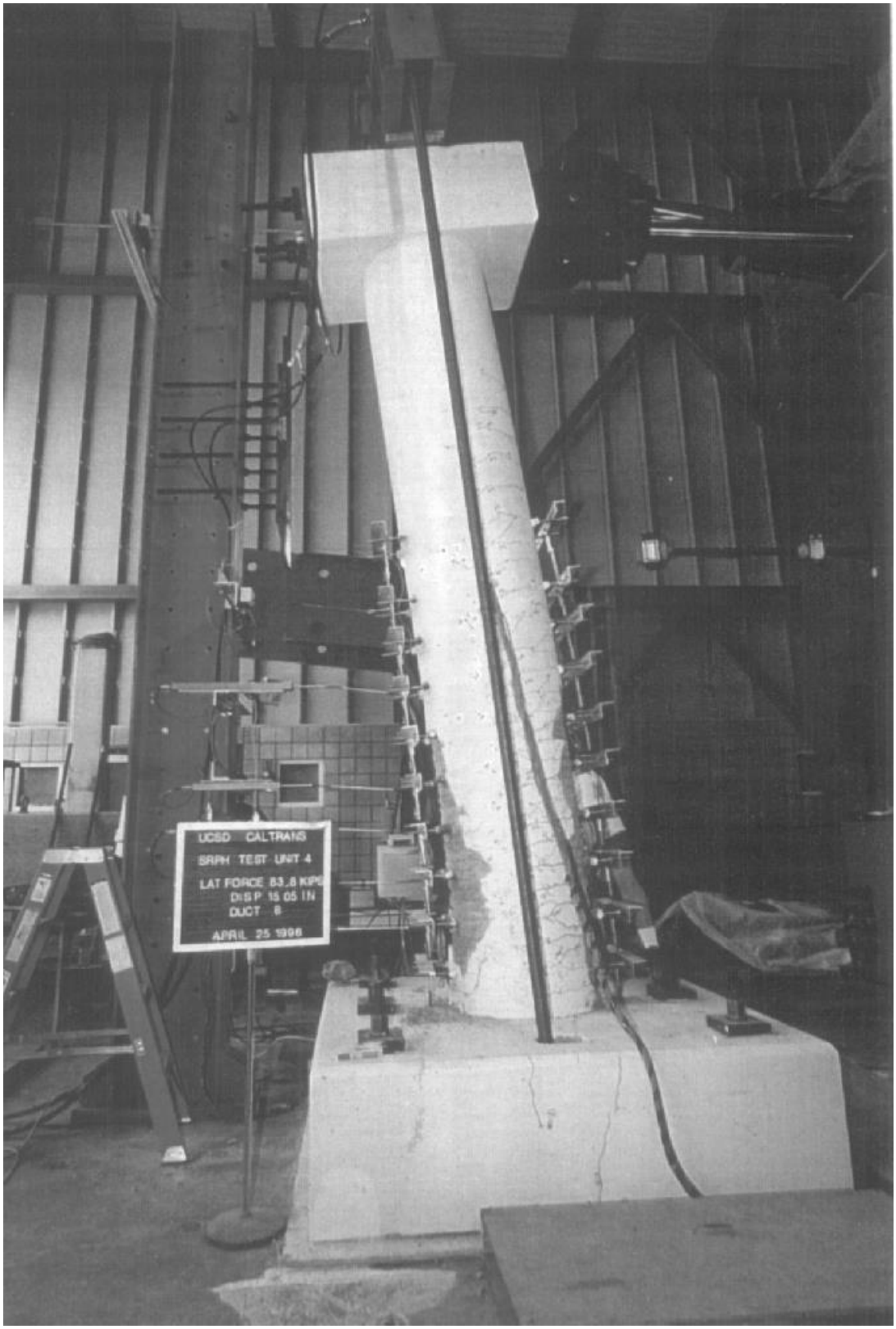
An extremely ductile column (#4 spiral w/ 1.5" pitch) with inner cage bars terminated to force the plastic hinge to occur 18" above the footing.



Ductility 3.0 at UCSD for Test Unit 4 (Relocation of Plastic Hinge Tests).



Ductility 4.0 at UCSD for Test Unit #4
(Relocation of Plastic Hinge Location Tests).



Ductility 8.0 at UCSD for Test Unit #4
(Relocation of Plastic Hinge Location Tests).

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CALIFORNIA EARTHQUAKE HISTORY

Studying previous California earthquakes will give the investigator a better perspective on the earthquake they are investigating. This list includes California, Baja California, and Nevada events The **magnitude** listed here is the "summary magnitude". For most events prior to 1898 this is based on the adjusted intensity magnitude, and for events after 1898 it is the surface wave magnitude. The list includes known earthquakes with a magnitude of at least 6 and selected smaller events. The smaller events since 1898 all have at least one reported magnitude of at least 5.8, even if the summary magnitude is smaller. Some of these magnitudes may be different than what is reported in the Southern California or Northern California Earthquake Catalog. The **date and time** for each earthquake are given as "24 hour" time referenced to Greenwich Mean Time (now UTC). To convert a time to Pacific Standard Time (PST), subtract 8 hours. To convert a time to Pacific Daylight Time (PDT), where appropriate, subtract 7 hours. **Example:** The 1989 Loma Prieta earthquake occurred at 00:04 UTC on October 18, 1989 or 5:04pm PDT on October 17, 1989.

Ellsworth, W. L., "Earthquake History, 1769-1989" USGS Professional Paper 151 (modified to present)

DATE	TIME(GMT)	LATITUDE	LONGITUDE	MAG	LOCATION
1769	7 28 0 0	34 0.00	118 0.00	6.0	Los Angeles Basin
1800	11 22 2130	33 0.	117 18.00	6.5	San Diego region
1808	6 24 0 0	37 48.00	122 30.00	6.0	San Francisco region
1812	12 8 15 0	34 22.00	117 39.00	7.0	Wrightwood
1812	12 21 19 0	34 12.00	119 54.00	7.0	Santa Barbara Channel
1827	9 24 4 0	34 0.	119 0.	5.5	Los Angeles region
1836	6 10 1530	37 48.00	122 12.00	6.75	Hayward Valley
1838	6 0 0 0	37 36.00	122 24.00	7.0	San Francisco Peninsula
1852	11 29 20 0	32 30.00	115 0.	6.5	Volcano Lake, B.C.
1855	7 11 415	34 6.00	118 6.00	6.0	Los Angeles region
1856	2 15 1325	37 30.00	122 18.00	5.5	San Francisco Peninsula
1857	1 9 16 0	35 42.00	120 18.00	8.25	Great Fort Tejon quake
1857	9 3 3 5	39 18.00	120 0.	6.25	W. Nevada or E. Sierra
1858	11 26 835	37 30.00	121 54.00	6.25	San Jose region
1858	12 16 10 0	34 0.	117 30.00	6.0	San Bernardino region
1860	3 15 19 0	39 30.00	119 30.00	6.5	Carson City,Nevada
1861	7 4 011	37 48.00	122 0.	5.75	San Ramon Valley
1862	5 27 20 0	32 42.00	117 12.00	6.0	San Diego region
1864	2 26 1347	37 6.00	121 42.00	6.0	S. Santa Cruz Mountains
1864	3 5 1649	37 42.00	122 0.	5.75	E. of San Francisco Bay
1865	10 8 2046	37 0.00	122 00.00	6.5	S. Santa Cruz Mountains
1866	7 15 0630	37 30.00	121 18.00	6.0	W. San Joaquin Valley
1868	5 30 510	39 18.00	119 42.00	6.0	Virginia City, Nevada
1868	10 21 1553	37 42.00	122 6.00	7.0	Hayward fault
1869	12 27 155	39 24.00	119 42.00	6.25	Olinghouse fault, Nevada
1869	12 27 10 0	39 6.00	119 48.00	6.0	Carson City, Nevada
1870	2 17 2012	37 12.00	122 6.00	6.0	Los Gatos
1871	3 2 21 5	40 24.00	124 12.00	6.0	Cape Mendocino
1872	3 26 1030	36 42.00	118 6.00	7.6	Owens Valley
1872	3 26 14 6	36 54.00	118 12.00	6.75	Owens Valley
1872	4 3 1215	37 0.	118 12.00	6.25	Owens Valley
1872	4 11 19 0	37 30.00	118 30.00	6.75	Owens Valley
1872	5 3 1 0	33 0.	115 0.	5.75	Imperial Valley (?)
1872	11 12 0 0	39 0.	117 0.	6.0	Austin, Nevada region(?)
1873	11 23 5 0	42 0.	124 0.	6.75	Crescent City
1875	1 24 1200	40 42.	120 30.	6.0	Honey Lake
1875	11 15 2230	32 30.00	115 30.00	6.25	Imperial Valley to ColRv
1878	5 9 425	40 6.00	124 0.	6.0	Punta Gorda region
1881	2 2 011	36 0.	120 30.00	5.75	Parkfield
1881	4 10 10 0	37 24.00	121 24.00	6.0	W. San Joaquin Valley
1882	3 6 2145	36 54.	121 12.	5.75	Hollister
1883	9 5 1230	34 12.00	119 54.00	6.25	Santa Barbara Channel
1884	1 28 730	41 6.	123 36.	5.75	Klamath Mountains
1884	3 26 40	37 6.	122 12.	6.0	Santa Cruz Mountains
1885	1 31 545	40 24.	120 36.	5.75	Susanville
1885	4 12 4 5	36 24.00	121 0.	6.25	S. Diablo Range
1887	6 3 1048	39 12.00	119 48.00	6.5	Carson City, Neveda area
1888	4 29 448	39 42.00	120 42.00	6.0	Mohawk Valley

1889	5	19	1110	38	0.	121	54.00	6.25	Antioch
1889	6	20	6 0	40	30.00	120	42.00	6.0	Susanville
1889	9	30	520	37	12.	118	42.	5.75	Bishop region
1890	2	9	12 6	33	24.00	116	18.00	6.5	San Jacinto Fault region
1890	4	24	1136	36	54.00	121	36.00	6.25	Pajaro Gap
1890	7	26	940	40	30.00	124	12.00	6.25	Cape Mendocino
1891	7	30	1410	32	0.	115	0.	6.0	Colorado R. delta region
1892	2	24	720	32	33.00	115	38.00	7.0	Laguna Salada, B.C.
1892	4	19	1050	38	24.00	122	0.	6.5	Vacaville
1892	4	21	1743	38	30.00	121	54.00	6.25	Winters
1892	5	28	1115	33	12.00	116	12.00	6.5	San Jacinto fault region
1892	11	13	1245	36	48.00	121	30.00	5.75	Hollister
1893	5	19	035	34	6.00	119	24.00	5.75	Pico Canyon
1894	7	30	512	34	18.00	117	36.00	6.0	Lytle Creek region
1894	9	30	1736	40	18.	123	42.	6.0	Cape Mendocino region
1894	10	23	23 3	32	48.00	116	48.00	5.75	E. of San Diego
1896	8	17	1130	36	42.00	118	18.00	6.0	SE Sierra Nevada
1897	6	20	2014	37	0.	121	30.00	6.25	Gilroy
1898	3	31	743	38	12.00	122	24.00	6.5	Mare Island
1898	4	15	7 7	39	12.00	123	48.00	6.5	Mendocino
1899	4	16	1340	41	0.	126	0.	7.0	W. of Eureka
1899	7	6	2010	37	12.	121	30.	5.75	Morgan Hill
1899	7	22	2032	34	18.00	117	30.00	5.75	Lytle Creek region
1899	12	25	1225	33	48.00	117	0.	6.4	San Jacinto and Hemet
1901	3	3	745	36	0.	120	30.00	6.4	Parkfield
1903	1	24	527	31	30.00	115	0.00	6.6	Colorado R. delta region
1903	6	11	1312	37	24.00	121	54.00	5.5	San Jose
1903	8	3	649	37	18.00	121	48.00	5.5	San Jose
1906	4	18	1312	37	42.00	122	30.00	8.25	Great 1906 earthquake
1906	4	19	030	32	54.00	115	30.00	6.2	Imperial Valley
1906	4	23	910	41	0.	124	0.	6.4	Arcata
1907	9	20	154	34	12.00	117	6.00	5.3	San Bernardino region
1908	11	4	837	36	0.	117	0.	6.0	Death Valley region
1909	10	29	645	40	30.00	124	12.00	5.8	Cape Mendocino
1910	3	11	652	36	54.00	121	48.00	5.8	Watsonville
1910	3	19	011	40	0.	125	0.	6.0	W. of Cape Mendocino
1910	5	15	1547	33	42.00	117	24.00	5.5	Glen Ivy Hot Springs
1910	8	5	131	42	0.	127	0.	6.6	W. of Crescent City
1911	7	1	22 0	37	15.00	121	45.00	6.5	Calaveras fault
1914	2	18	1817	39	30.00	119	48.00	5.5	Truckee region
1914	4	24	834	39	30.00	119	48.00	6.0	Truckee region
1915	5	6	12 9	40	0.00	126	0.	6.2	W. of Cape Mendocino
1915	6	23	359	32	48.00	115	30.00	6.0	Imperial Valley
1915	6	23	456	32	48.00	115	30.00	5.9	Imperial Valley
1915	10	3	652	40	30.00	117	30.00	7.3	Pleasant Valley, Nevada
1915	11	21	013	32	0.	115	0.	7.1	Volcano Lake, B.C.
1915	12	31	1220	41	0.	126	0.	6.5	W. of Eureka
1916	2	3	5 3	41	0.	117	48.00	5.9	N. of Pleasant Valley,NV
1916	10	23	244	34	54.00	118	54.00	5.3	Tejon Pass region
1916	11	10	911	35	30.00	116	0.	6.1	S. of Death Valley
1918	4	21	2232	33	48.00	117	0.	6.9	San Jacinto
1918	7	15	023	41	0.	125	0.	6.5	W. of Eureka
1922	1	26	931	41	0.	126	0.	6.0	W. of Eureka
1922	1	31	1317	41	0.	125	30.00	7.3	W. of Eureka
1922	3	10	1121	36	0.	120	30.00	6.3	Parkfield
1923	1	22	9 4	40	30.00	124	30.00	7.2	Cape Mendocino
1923	7	23	730	34	0.	117	18.00	6.0	San Bernardino region
1925	6	4	12 2	41	30.00	125	0.	6.0	W. of Eureka
1925	6	29	1442	34	18.00	119	48.00	6.3	Santa Barbara
1926	10	22	1235	36	37.00	122	21.00	6.1	Monterey Bay
1926	10	22	1335	36	33.00	122	11.00	6.1	Monterey Bay
1926	12	10	838	40	45.00	126	0.	6.0	W. of Cape Mendocino
1927	9	18	2 7	37	30.00	118	45.00	6.0	Bishop region
1927	11	4	1350	34	42.00	120	48.00	7.3	SW of Lompoc
1932	6	6	844	40	45.00	124	30.00	6.4	Eureka
1932	12	21	610	38	45.00	118	0.	7.2	Cedar Mountain, Nevada
1933	1	5	651	38	46.00	117	44.00	5.9	Cedar Mountain, Nevada

1933	3	11	154	33	37.00	117	58.00	6.3	Long Beach
1933	6	25	2045	39	4.00	119	20.00	6.1	Yerington, Nevada
1934	1	30	2016	38	18.00	118	24.00	6.3	Excelsior Mountain,NV
1934	6	8	447	36	0.	120	30.00	6.0	Parkfield
1934	7	6	2248	41	15.00	125	45.00	6.5	W. of Eureka
1934	12	30	1352	32	15.00	115	30.00	6.5	Laguna Salada, B.C.
1934	12	31	1845	32	0.	114	45.00	7.0	Colorado R. delta
1935	2	24	145	31	59.00	115	12.00	5.3	Colorado R. delta
1936	6	3	915	40	0.	125	30.00	5.9	W. of Cape Mendocino
1937	3	25	1649	33	24.00	116	16.00	6.0	Buck Ridge
1940	2	8	8 5	39	45.00	121	15.00	6.0	Chico
1940	5	19	436	32	44.00	115	30.00	7.1	Imperial Valley
1940	12	7	2216	31	40.00	115	5.00	5.5	Colorado R. delta
1941	2	9	944	40	42.00	125	24.00	6.6	W. of Cape Mendocino
1941	4	9	1708	31	0.00	114	0.00	5.3	Gulf of California
1941	5	13	16 1	40	18.00	126	24.00	6.0	W. of Cape Mendocino
1941	7	1	750	34	22.00	119	35.00	5.9	Carpenteria
1941	9	14	1643	37	34.00	118	44.00	5.8	Tom's Place
1941	9	14	1839	37	34.00	118	44.00	6.0	Tom's Place
1941	10	3	1613	40	24.00	124	48.00	6.4	W. of Cape Mendocino
1942	10	21	1622	33	3.00	116	5.	6.5	Fish Creek Mountains
1942	12	3	944	39	42.00	119	18.00	5.9	N. of Wadsworth, Nevada
1945	5	19	15 7	40	24.00	126	54.00	6.2	W. of Cape Mendocino
1945	9	28	2224	41	54.00	126	42.00	6.0	W. of Crescent City
1946	3	15	1349	35	44.00	118	3.00	6.3	Walker Pass
1947	4	10	1558	34	59.00	116	33.00	6.4	Manix
1948	12	4	2343	33	56.00	116	23.00	6.5	Desert Hot Springs
1948	12	29	1253	39	33.00	120	5.00	6.0	Verdi, Nevada
1949	3	25	456	41	18.00	126	0.	6.2	W. of Eureka
1949	5	2	1125	34	1.	115	41.00	5.9	Pinto Mountain
1951	10	8	410	40	15.00	124	30.00	6.0	W. Of Cape Mendocino
1951	12	26	046	32	48.00	118	18.00	5.9	San Clemente Island
1952	7	21	1152	35	0.	119	1.00	7.7	Kern County earthquake
1952	7	21	12 5	35	0.	119	0.	6.4	Kern County
1952	7	23	038	35	22.00	118	35.00	6.1	Kern County
1952	7	29	7 3	35	23.00	118	51.00	6.1	Bakersfield
1952	11	22	746	35	44.00	121	12.00	6.0	Bryson
1954	1	12	2333	35	0.	119	1.00	5.9	W. of Wheeler Ridge
1954	3	19	954	33	17.00	116	11.00	6.2	Arroyo Salada
1954	7	6	1113	39	25.00	118	32.00	6.6	Rainbow Mountain, Nevada
1954	7	6	22 7	39	18.00	118	30.00	6.4	Rainbow Mountain, Nevada
1954	8	24	551	39	35.00	118	27.00	6.8	Stillwater, Nevada
1954	8	31	2220	39	30.00	118	30.00	6.3	Stillwater, Nevada
1954	10	24	944	31	30.00	116	0.	6.0	W. of Santo Tomas, B.C.
1954	11	12	1226	31	30.00	116	0.	6.3	W. of Santo Tomas, B.C.
1954	11	25	1116	40	16.00	125	38.00	6.5	W. of Cape Mendocino
1954	12	16	11 7	39	19.00	118	12.00	7.1	Fairview Peak, Nevada
1954	12	16	1111	39	30.00	118	0.	6.8	Dixie Valley, Nevada
1954	12	21	1956	40	56.00	123	47.00	6.6	E. of Arcata
1956	2	9	1432	31	45.00	115	55.00	6.8	San Miguel, B.C.
1956	2	9	1524	31	45.00	115	55.00	6.1	San Miguel, B.C.
1956	2	14	1833	31	30.00	115	30.00	6.3	San Miguel, B.C.
1956	2	15	120	31	30.00	115	30.00	6.4	San Miguel, B.C.
1956	10	11	1648	40	40.00	125	46.00	6.0	W. of Cape Mendocino
1956	12	13	1315	31	0.	115	0.	6.0	W. shore, Gulf of Calif.
1959	3	23	710	39	36.00	118	1.00	6.3	Dixie Valley, Nevada
1959	6	23	1435	39	5.00	118	49.00	6.1	Schurz, Nevada
1960	8	9	739	40	19.00	127	4.00	6.2	W. of Cape Mendocino
1966	6	28	426	36	0.	120	30.00	6.0	Parkfield
1966	8	7	1736	31	48.00	114	30.00	6.3	Gulf of California
1966	9	12	1641	39	25.00	120	9.00	6.0	Truckee
1968	4	9	228	33	11.00	116	8.00	6.5	Borrego Mountain
1968	6	26	142	40	14.00	124	16.00	5.4	Punta Gorda
1971	2	9	14 0	34	25.00	118	24.00	6.5	San Fernando
1973	2	21	1445	34	4.00	119	2.00	5.2	Point Mugu
1976	11	26	1119	41	18.00	125	42.00	6.3	W. of Orick
1979	8	6	17 5	37	7.00	121	31.00	5.7	Coyote Lake

1979	10	15	2316	32	36.00	115	18.00	6.5	Imperial Valley
1980	01	24	1900	37	50.00	121	47.00	5.8	Livermore
1980	5	25	1633	37	36.00	118	50.00	6.1	Mammoth Lakes
1980	5	25	1649	37	39.00	118	54.00	5.9	Mammoth Lakes
1980	5	25	1944	37	33.00	118	49.00	5.8	Mammoth Lakes
1980	5	27	1450	37	29.00	118	48.00	6.0	Mammoth Lakes
1980	6	9	328	32	12.00	115	5.00	6.4	Victoria, B.C.
1980	11	8	1027	41	7.00	124	40.00	7.2	W. of Eureka
1981	4	26	1209	33	8.00	115	39.00	6.0	Westmorland
1981	9	4	1550	33	40.00	119	7.00	5.9	N. of Santa Barbara Isl.
1981	9	30	1153	37	35.00	118	52.00	5.8	Mammoth Lakes
1983	5	2	2342	36	14.00	120	19.00	6.5	Coalinga
1983	7	22	239	36	14.00	120	25.00	5.7	Coalinga
1984	4	24	2115	37	19.00	121	39.00	6.1	Morgan Hill
1984	9	10	314	40	23.00	127	9.00	6.7	Mendocino Fracture Zone
1984	11	23	18 8	37	27.00	118	36.00	5.7	Round Valley
1985	8	4	12 1	36	8.00	120	10.00	5.9	North Kettleman Hills
1986	7	8	920	34	0.	116	36.00	6.0	North Palm Springs
1986	7	20	1429	37	34.00	118	26.00	5.6	Chalfant Valley
1986	7	21	1442	37	32.00	118	26.00	6.2	Chalfant Valley
1986	7	31	722	37	28.00	118	22.00	5.2	Chalfant Valley
1987	10	1	1442	34	3.00	118	5.00	5.8	Whittier Narrows
1987	11	24	153	33	4.00	115	47.00	6.2	Elmore Ranch fault
1987	11	24	1316	33	1.00	115	51.00	6.6	Superstition Hills
1989	10	18	0004	37	2.19	121	52.98	7.1	Loma Prieta
1991	8	16	2226	41	38.00	125	52.00	6.3	W. of Crescent City
1991	8	17	1929	40	17.00	124	14.00	6.2	Punta Gorda
1991	8	17	2217	41	41.00	126	3.00	7.1	W. of Crescent City
1992	4	23	450	33	58.00	116	19.00	6.1	Joshua Tree
1992	4	25	1806	40	20.00	124	14.00	7.2	Cape Mendocino
1992	4	26	741	40	26.00	124	36.00	6.5	Cape Mendocino
1992	4	26	1118	40	23.00	124	35.00	6.6	Cape Mendocino
1992	6	28	1157	34	12.00	116	26.00	7.3	Landers
1992	6	28	1505	34	12.00	116	50.00	6.2	Big Bear
1993	5	17	2320	37	9.00	117	50.00	6.1	Big Pine
1994	1	17	1230	34	13.00	118	32.00	6.7	Northridge
1994	9	01	1515	40	27.00	125	54.00	6.9	Mendocino Fracture Zone
1994	9	12	1223	38	49.00	119	37.00	6.0	Carter's Station, Nevada
1995	2	19	403	40	37.00	125	54.00	6.6	W. of Eureka
1995	9	20	2327	35	46.00	117	38.00	5.5	Ridgecrest
1996	7	24	2016	41	47.04	125	54.66	5.7	W. of Eureka
1997	1	22	717	40	16.32	124	23.64	5.7	Punta Gorda
1999	8	1	1606	37	23.40	117	4.80	5.7	Scotty's Junction,Nevada
1999	10	16	947	34	35.64	116	16.26	7.1	Hector Mine
2000	3	16	1520	40	23.16	125	16.74	5.9	Mendocino Fracture Zone
2003	12	22	1916	35	41.98	121	5.84	6.5	San Simeon
2004	9	28	1815	35	48.60	120	22.22	6.5	Parkfield