

EARTHQUAKE ENGINEERING  
RESEARCH INSTITUTE

**NEWSLETTER**

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## Housner: Note on Wood Frame Buildings

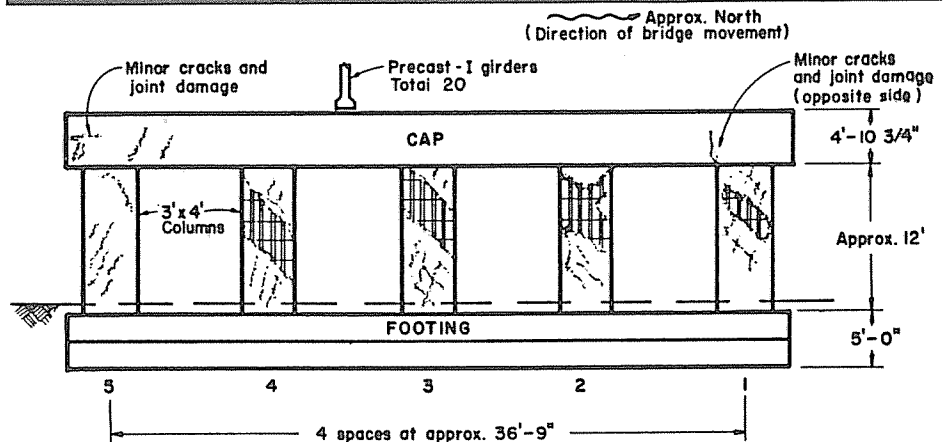
Members of EERI are often asked about the earthquake safety of typical wood frame residences in California and the answers usually are along the lines of:

"Experience shows that those built in the last 40 or so years perform well, though they are not engineered but are built according to specified rules; the plans will be examined in the city building department to see if there is anything unusual about the residence that would require the services of a structural engineer, and during construction several visits would be made by an inspector, who is not an engineer, to check that construction is proceeding according to the plans and the rules; in most cases the construction is carried out and supervised by a contractor, also not an engineer, who hires

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## NEWS OF THE PROFESSION

# CALTRANS BRIDGES DURING WHITTIER 1987 EARTHQUAKE



ROUTE 605/5 SEP. (BR No. 53-1660)

BENT 6 EAST FACE

EARTHQUAKE DAMAGE  
OCTOBER 1- 4, 1987

NO SCALE

CALIFORNIA DEPT OF TRANS  
DIV OF STRUCTURES  
11/87

A short Seismic Report from the Office of Structures Design by the Post Earthquake Investigation Team describes the number of bridges affected by the Whittier event. The details of damage to the Route 605/5 Separation bear repeating:

This bridge is a 9-span structure with a total length of 567.5 feet and a width of 124+ feet. It is supported by 5-column bents and abutment seats. The two main spans over Route 5 are simply supported prestressed I girders. The remainder of the superstructure consists of continuous cast-in-place reinforced concrete box girders. This structure was built in 1964 and earthquake retrofitted in 1981. The retrofit consisted of longitudinal cable restrainers at Bents 5, 6, and 7 and additional abutment pedestals.

The most damaged area was Bent 6, the center support for the two main spans. All 5 columns were damaged with the three interior more damaged than the 2 exterior columns. Major cracking occurred on the east and west faces (wide sides) of

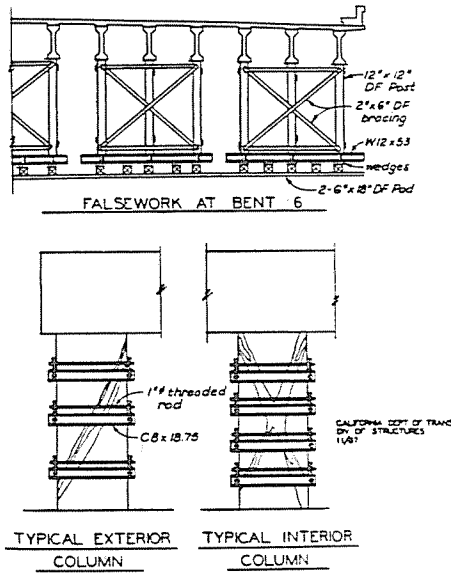
all columns. Minor cracks were observed on the north and south faces (short sides). The shear reinforcement in the middle column fractured at two levels and necked at another; however there was no evidence of rebar fracture in the remaining four columns. Also there were cracks in the bent cap adjacent to the most southerly column (column #5).

Many keeper plate bolts sheared at the rocker bearings at Abutment 10. The rocker bearings remained plumb; however most came to rest with a transverse displacement of 2 inches. At Abutment 1, many rocker bearings showed similar damage to that of Abutment 10, but no final translation. There were some minor spalls at both abutments due to predominantly transverse earthquake movements.

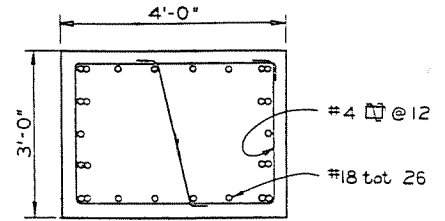
There was minor spalling at the tops of many columns at Bents 2, 3, and 4.

At Bent 5 there was a large spall at the north end of the cap beneath the exterior I girder. There was also some slight cracking at the southerly end of this cap.

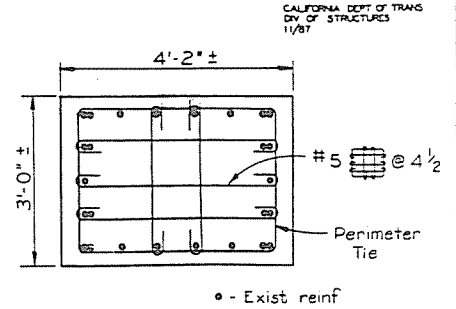
see page 8



Structures Maintenance Engineers, on the scene in less than an hour, determined that this structure was unsafe for traffic. Both Route 605 and Route 5 traffic was detoured around the bridge. Due to the extent of the column damage and the potential for aftershocks, Structures Maintenance decided to construct temporary falsework bents. By combining the resources of Bridge and Road Maintenance crews and a Bridge Contractor, under the supervision of Structures Construction, falsework bents were placed, K-rail was placed, and Route 5 traffic lanes were restriped. Within an amazingly short time, 22 hours after the quake occurred, the 605/5 Separation was reopened to traffic.



EXISTING EXTERIOR COLUMN



REPAIRED EXTERIOR COLUMN

At Bent 7 an interior girder was cracked, full depth, near the rocker bearing. Also a few vertical cracks were noticed at both ends of the bent cap.

The earthquake restrainer cables at Bent 5 and 7 showed no sign of damage. In fact there was no evidence that they had been engaged during the earthquake.

After the October 4 aftershock, Structures Maintenance placed collars around the columns to confine the main column rebar.

Preparation of Contract Plans by the Division of Structures for the repair of this structure was started on October 2,

1987. On October 27, 1987 the plans, specifications, and estimate was completed. The contract was advertised on November 3, 1987 and the bids were opened on November 17, 1987. The repairs were completed in February, 1988, at a cost of \$406,500.



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