

## RECONNAISSANCE REPORT OF THE JANUARY 1983

### MAMMOTH LAKES EARTHQUAKE SWARM

by

J. F. Meehan, Principal Structural Engineer  
Structural Safety Section, Office of the State Architect  
State of California

This report will be directed to observations made on January 10, 1983 at selected sites in the area.

The two strongest shocks occurred at 5:38:15 p.m. and 7:24:22 p.m. on January 6, 1983. They are reported to be between 5 and 5½ magnitude. (See site map, Figure 1 for location.)

#### MAMMOTH HIGH SCHOOL

This site is located about 3.5 km. from the 5:38:15 p.m. epicenter and 2.3 km. from the 7:24:22 p.m. epicenter. This building was constructed under the Field Act in 1974. There was no structural or non-structural damage observed at the Mammoth High School site. Very few loose articles fell from the shelves.

The gymnasium is a one story concrete shear wall building with steel trusses and plywood roof. The horizontal roof bracing system, for seismic resistance, is composed of steel framing placed at the lower chord of the trusses. This bracing was necessary because of the rather heavy design load of 200 pounds per square foot on this roof and a portion of which, or at least 66 pounds per square foot, is required in the seismic design. There was snow on the roof at the time of the earthquakes but the amount is not known.

The gymnasium was instrumented under the State of California Strong Motion Instrumentation Program. The maximum peak acceleration at the base of the shear wall was 26% g and the maximum peak acceleration in the lower chord steel framing was 49% g. The California Division of Mines and Geology OSMS Report 83-1.1 provides complete details of the records from this building as well as other instrumental data.

#### NEW MAMMOTH ELEMENTARY SCHOOL

A new group of relocatable buildings has been installed on the high school site. This group of buildings is the new temporary elementary school which was formerly located down in the valley. There was no structural or non-structural damage nor was shelved material displaced of any consequence in these relocatable buildings.

#### MAMMOTH HOSPITAL

The new Mammoth Hospital, constructed in 1977 under the provisions of the Hospital Act, received a few plaster cracks in the corners of several walls and at the corners of several doors. A few items fell from shelves. Cracks reopened in the recently repaired paving in the parking lot. No other damage was observed or reported.



SITE MAP

FIGURE 1

FROM USGS MT. MORRISON 1953

## FORMER MAMMOTH ELEMENTARY SCHOOL

At the original Mammoth Elementary School, located within the Long Valley Caldera, there was additional non-structural damage over that from the 1980 earthquakes. As indicated above the students had been moved into relocatable buildings at a temporary location at the high school site in 1980. This move was made at the request of the school board for several reasons:

- The population is centered in the community of Mammoth Lakes some 6 or 8 miles away; thus requiring bus transportation for most of the students.
- The runways of the Mammoth Airport were somewhat in alignment with the school site which tended to disturb the teaching program and was felt to represent some hazard to the school.
- After the May 1980 earthquakes the building site developed substantial ground cracking and areas of subsidence. Cracks in the playground and paved areas extended under the buildings resulting in cracks and vertical offsets in the concrete floor slabs of the buildings. A geological investigation indicated that the cracking could be secondary faulting occurring in the complex subsurface formations that exist in this ancient volcano caldera.
- Substantial non-structural damage occurred throughout the buildings at this site.

As indicated above the original school buildings experienced additional non-structural damage as follows:

- Cracks in the floor slab and parking lot paving increased a bit, perhaps in the range of an additional 1/8".
- Non-structural partitions moved at the ceiling level producing light damage at the ceiling line and some "wavy" surfaces in the walls.
- Additional portions of the plaster on several walls and several ceiling tile fell to the floor.
- A water storage tank which was repaired following the 1980 earthquake again toppled. (See Photo 1)
- The school bus garage, not approved by the Office of the State Architect, showed evidence of additional motion in the rod bracing, the bus exit doors became inoperable and several light fixtures fell (See Photo 2). A cantilevered vertical channel, which provided all of the lateral bracing for the end wall containing the bus exit door, was spliced about 3 feet above the floor. The welds on this splice were broken (See Photo 3 and 4).
- An interesting observation was made concerning the cracks in the parking lot paving. That is, the recent earthquake movement of the parking lot segments was evidenced by a crack pattern transferred or projected up through the approximately 1½' of snow to the surface of the snow. The snow surface indicated the same pattern of cracking as that of the parking lot. This cracking in the snow strongly suggests that the length of the ground surface waves were rather short. (See Photo 5)

## MAMMOTH AIRPLANE HANGER

An airplane hanger collapsed during one of the shocks. It is reported that there was snow on the roof of the hanger. The hanger was constructed of aluminum trusses supported on aluminum columns. It is understood that two identical hangers were constructed. One hanger was sheathed with plywood on the interior of the walls and on bottom chord of the trusses. The interior sheathed hanger did not collapse. Photograph No. 6 shows the standing hanger and a portion of the collapsed hanger. A major portion of the collapsed hanger had been cleared away at the time of this visit. Photograph No. 7 shows the damaged airplane that had been in the collapsed hanger.



Photo 1  
Toppled water tank.  
Former Mammoth Elementary School



Photo 2  
Displaced light fixture in bus garage.  
Former Mammoth Elementary School

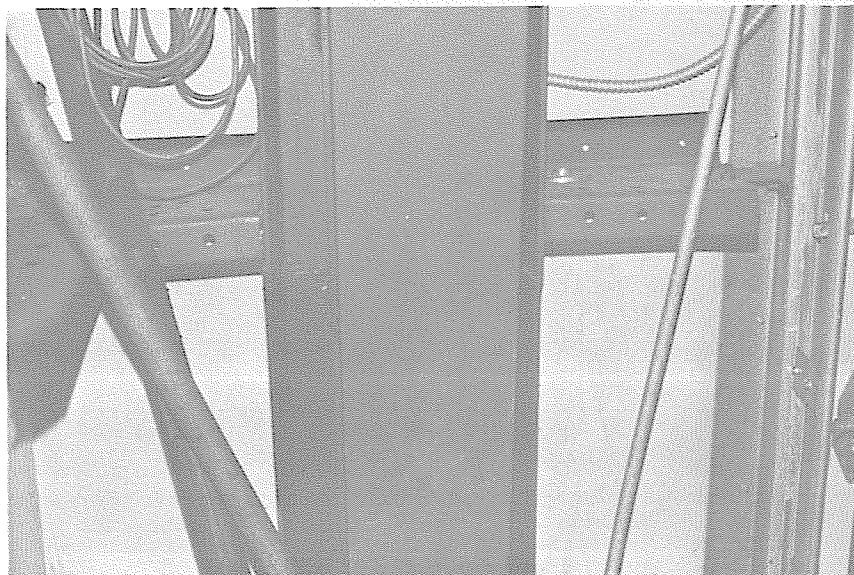


Photo 3  
Weld failure in bus garage.  
Former Mammoth Elementary School

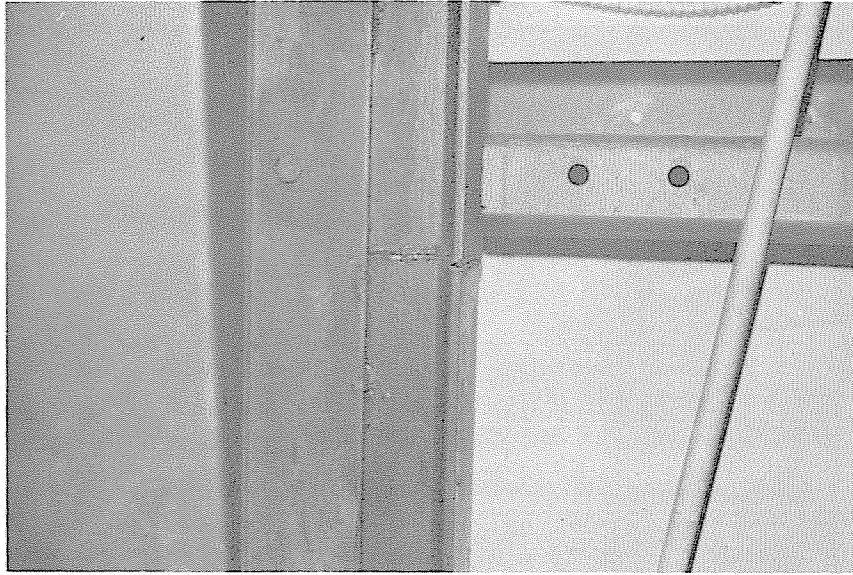


Photo 4  
Weld failure in bus garage  
Former Mammoth Elementary School



Photo 5  
Cracks in parking lot paving projected through snow  
Former Mammoth Elementary School

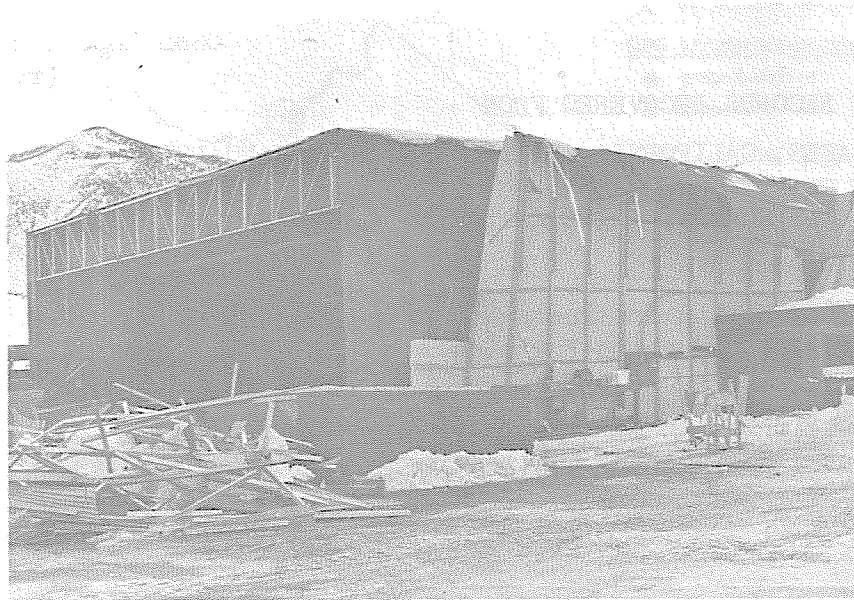


Photo 6  
Collapsed hanger at right.  
Mammoth Airport

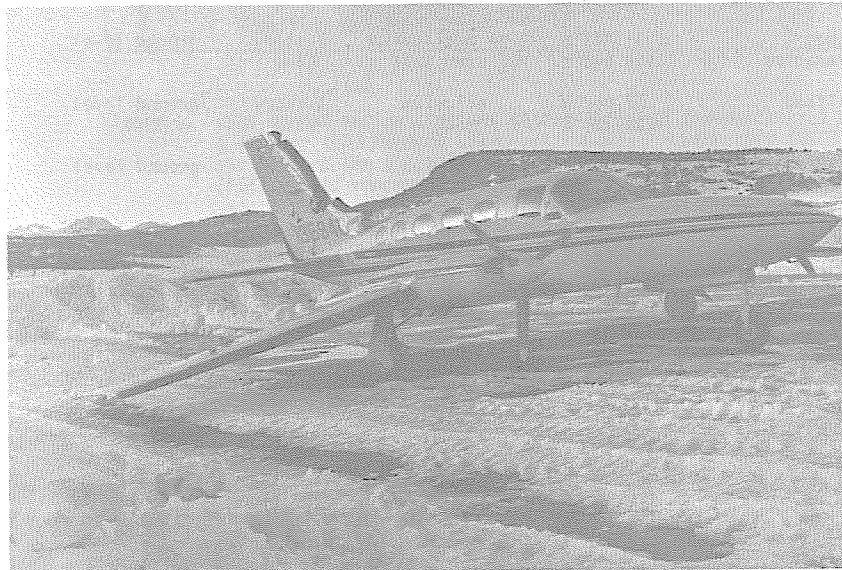


Photo 7  
Airplane damage from collapsed hanger.