THE YUNNAN, CHINA EARTHQUAKE
OF NOVEMBER 6, 1988

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Introduction

Strong earthquakes of magnitude 7.6 and 7.2 struck the Lancang
and Gengma areas of southwestern Yunnan Province at 9:03
and 9:15 p.m., respectively, on November 6, 1988. (The USGS
FDE reports Nov 6, 13:03,
17.1 s, Gmt; 22.808 N, 99.765
E, MB 6.1, Ms 7.0 (BRK) and Nov
6, 13:15, 43.4 s, 23.213 N,
99.533 E, MB 6.4, no Ms.) The
depths of foci were found to be
13 km and 8 km respectively.
Earthquake intensity near the
epicenter was estimated to be 9
and up to 10 at a few locali-
ties. The scale is China's
earthquake intensity scale,
with maximum value 12, and, in
the 8 to 10 range, very close
to MML. On November 30,
Lancang county was hit again by
a strong aftershock of M=6.7.

Earthquake disaster effects
covered 20 counties in the
southwestern part of Yunnan
Province, among them 3 counties
seriously damaged. The most
serious effects were scattered
among villages of Gengma county:
Yansoi, Tuanji, Mengseng,
Szepaihashan, Muga, Zutang, and
Zamapo, amongst others.
People affected by the disaster
numbered 5.16 million, deaths
totalled 748, 3759 seriously
injured and 3992 lightly
injured. The number of rooms in
collapsed houses was 1,308,000;
934,800 rooms were damaged.
Over 4000 schools and medical

Figure 1. Lancang Gengma Earthquake.
Contour-line of earthquake intensity.

In comparing earthquakes in
China within past 25 years, the
direct economical loss estima-
ted is second to that of the
Tangshan earthquake of 1976.

service buildings were damaged.
More than one million cubic
meters of rock slide caused
damage of highways and blocked
river transportation.
Building Performance

Most village houses were constructed with adobe-filled wooden framing and bundled straw roofing (photo 1). Many office buildings and warehouses were constructed with brick piers, adobe walls, and reinforced concrete floors (photo 2). Brick walls laid with lime-mud or lime-sand mortar were badly damaged (photos 3, 4). Collapse and serious damage of 3- to 5-storied reinforced concrete frame buildings which were poorly designed and constructed with low strength concrete and incorrect detailing of reinforcement were observed (photos 5-8).

Most buildings in this area were constructed without...


Photo 8. Mengseng tea factory, after earthquake intensity 8. Two-storied reinforced concrete frame structure; top story collapsed.

consideration of earthquake resistance. However, several buildings exhibiting adequate seismic behavior were designed or strengthened for earthquake resistance, for example the Gengma cinema building, designed for seismic intensity 8, suffered no evident damage from the earthquake's intensity 8. The ward building of Lancang county hospital was strengthened for earthquake resistance just before the earthquake; no significant damage can be observed after the earthquake. In contrast, the clinic building, a similar masonry structure but not strengthened, suffered heavy damage after the earthquake. It has had to be demolished and rebuilt. In Yansoi, Gengma county, a masonry residential
building strengthened by reinforced concrete tied columns and tied beams was completed just before earthquake. It sustained shaking of intensity 9 without any damage (photo 9).


Figure 2. Distribution of epicenters, Lancang Gengma Earthquake.