

# Living on the fault

## Soil dictates damage in next big quake

By MARIA GAURA  
Sentinel staff writer

SANTA CRUZ - Many Santa Cruz homes are on unstable ground, even though geologists have known for years where the geologically hazardous areas are.

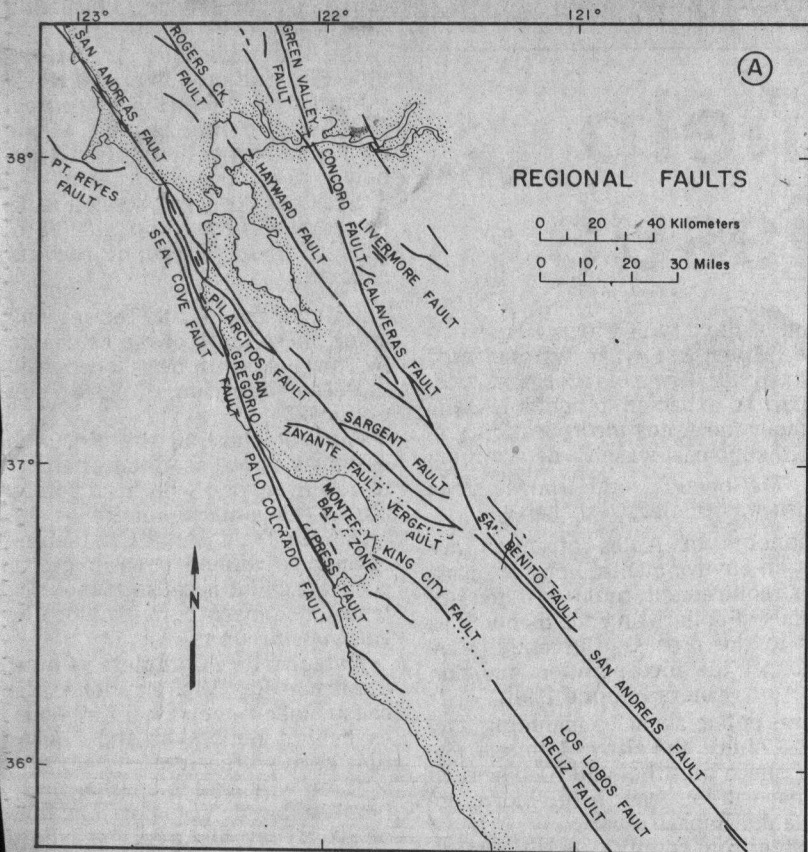
The Loma Prieta earthquake on Oct. 17 proved geologists' predictions true, for the most part. Areas they said would have the most damage, did, toppling hundreds of buildings. And now seismologists are saying another large quake is due in the San Francisco Bay Area.

Experts are predicting major problems in the Bay Area if a large quake hits. Buildings will fall; roads will be cut off; hospitals damaged. Power and water will be cut off for days, and the area will struggle under disaster circumstances.

Experts say Santa Cruz will probably escape the brunt of a large Bay Area quake, but could be shaken almost as badly as it was during the Loma Prieta quake. And although many of the county's most unstable buildings have already been demolished, there's no guarantee that considerable new damage won't result from future earthquakes — particularly to buildings in geologically unstable areas.

A U.S. Geological Survey map prepared in 1977 estimates the shaking likely to be felt along the San Andreas fault if the 1906 San Francisco quake — a magnitude 8.3 temblor centered in Olema — were to happen again. The map shows the areas least — and most — likely to suffer severe ground

*Please see SOIL — A4*





# Soil

Continued from Page A1

shaking in any large earthquake. According to the map, the least amount of shaking would be felt in Bonny Doon, Davenport and on the coastal bluffs throughout the county. The worst shaking and almost total destruction would take place in the Summit area closest to the fault line.

Severe damage would also take place in Watsonville, downtown Santa Cruz and other areas with very unstable soils. The Santa Clara Valley, with its deep sediment deposits and underlying bay mud, would suffer tremendous damage over a very wide area.

Obvious geological problems in Santa Cruz County include ocean bluffs that tend to crumble in earthquakes, very steep mountain slopes and sites atop active fault lines. But such hazards are not frightening to everyone, and precariously perched homes are common sights in Santa Cruz.

"I'm amazed at what some people are comfortable with," said Santa Cruz geologist Vasiliki Vassil, of Smith-Evernden Associates. "I've seen people in the mountains living in houses with traces of the San Andreas fault right in their front yards. They like the sylvan setting, and don't worry about earthquakes too much."

Less obvious hazards include the wet river bottom lands that downtown Santa Cruz and Watsonville are built on, and rocky ridgetops in the Santa Cruz Mountains. Until Oct. 17, nobody considered the Santa Cruz mountain ridgetops a risky place to live. But the quake hit hardest on the ridgetops, which seemed to focus the quake's energy like a prism focuses light.

"Before the earthquake, every geologist in town thought the ridges were a fine place to live, with all that hard bedrock to anchor in," Vassil said. "Now the ridges are considered a new genre of geologic hazard."

Flat coastal bluffs throughout the county are the most stable places to build, according to engineering geologist Gerald Weber, of Weber and Associates. Bonny Doon and Davenport are also considered very solid.

"Mission Hill and the coastal benchlands, the westside and the eastside (of Santa Cruz city) are all good, as long as you're not on a steep slope," Weber said. "It will shake hard there (in a moderate quake), but nothing like downtown

earthquake faults.

"Corralitos has the Zayante fault, the San Andreas fault, and the Corralitos fault complex," Vassil said. "There are also a lot of ancient landslide deposits which are very loose — they might as well be fill unless they're very old and compacted. It really differs site to site. I recommend anyone buying there to look at the geology."

Geologists agree that good engineering can compensate for many stability problems.

In the October quake, very strong ground movement was recorded in Capitola Village, but the lack of damage in the village is a testament to good, earthquake-safe construction, Weber said. While old brick buildings crumbled in Santa Cruz and Watsonville, the low, wood-frame buildings in Capitola and Aptos swayed but did not fall.

In Santa Cruz, economic planners have recommended three-sto-

ry buildings and new housing for downtown Santa Cruz. A low-income housing project is slated for the Neary Lagoon area. Given the hazards of saturated river bottom soils, is it wise to try and rebuild downtown Santa Cruz and Watsonville?

"Downtown may not be the best area for tall buildings," Weber said. "But engineering is now to the point where you can build to withstand almost anything — if you're willing to pay for it. A lot of

houses in the flood plain didn't fall down (in October), it's not that you can't build there, you just have to be careful."

One exception is buildings atop or in the path of large landslide masses. If the ground beneath a building goes, the building will go, Weber said.

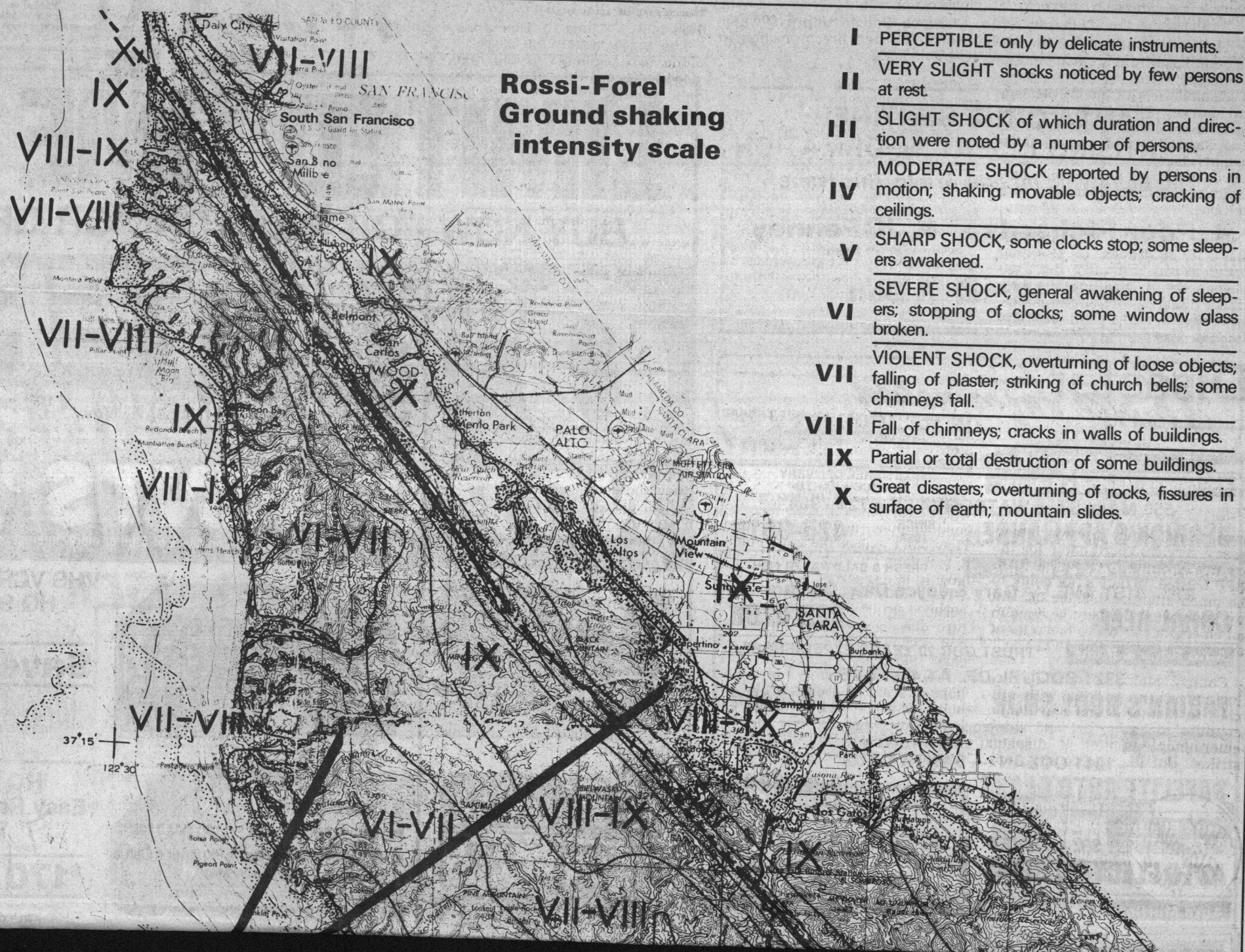
People should prepare to live with quakes instead of panicking, Vassil said.

"I don't want to be alarmist or

sensational," she said. "and I'm really not trying to drum up business. We should take this quake as a warning and work on safety. Anchor heavy furniture, make structural repairs, buy emergency supplies."

"We don't need tornado cellars here," she said. "We do need foundation bolts. We could have another century of increased seismic activity here before there's another big one."

## Rossi-Forel Ground shaking intensity scale





eastside (of Santa Cruz city) are all good, as long as you're not on a steep slope," Weber said. "It will shake hard there (in a moderate quake), but nothing like downtown Santa Cruz or Capitola Village."

Bonny Doon and Davenport are perched on granite, "which is very hard," said Vassil. "The shock waves pass through it more quickly, and there's less shaking. There's a very high number of geologists living there per capita," she said. "that's another good indication."

Other risky sites include the river bottoms, sloughs and wetlands found beneath Neary Lagoon, Capitola Village, Aptos beach flats and Pajaro, geologists say.

"The loose sand, clay and mud in those saturated areas acts like Jello in a strong quake," Vassil said.

Other problem areas include the San Lorenzo River Valley, Scotts Valley, the Soquel hills, Corralitos, and steep lots in the Santa Cruz Mountains. Much of the San Lorenzo Valley has loose deposits of river silt, steep slopes and ancient landslides. Scotts Valley has many loose, sandy soils; and steep lots in the Soquel Hills may be prone to landslide. Corralitos and the Summit ridge sit directly atop active

Dotted areas, widespread from the San Francisco Bay Area to the Monterey County line, signify unstable riverbed areas and loose, sandy, unconsolidated soil deposits. These areas are more subject to intense shaking and ground failures in an earthquake than areas with underlying bedrock or firmer soils.

