



## Cape Mendocino Seismic Retrofit

### Full Mitigation Best Practice Story

#### *Humboldt County, California*



**Humboldt County, CA** - On April 25 and 26, 1992, three powerful earthquakes rocked the Cape Mendocino area of Northern California. This series of quakes, measuring 7.1, 6.2 and 6.5 respectively, emanated from a complex geological area known as the Mendocino Triple Junction. Three major faults, the San Andreas, the Mendocino fracture zone and the Cascadia subduction zone, meet at this point forming one of the most seismically active areas in the United States.

Effects of the series of earthquakes were greatest in Humboldt County, with significant damage reported throughout the county. Hundreds of homes slid off foundations. Chimneys failed or collapsed completely. Some buildings experienced separation of roofs and exterior walls. No deaths resulted from the earthquakes. Close to 100 people were treated for injuries resulting primarily from falling debris, shattered windows, broken ceiling fixtures and smoke inhalation. Over 1,000 homes were damaged and 200 were demolished due to structural inadequacies. The loss of these residences was estimated at \$37.2 million.

The reality is that there is an extreme likelihood that Humboldt County will experience more earthquakes of equal or greater magnitude. Vulnerability for future earthquake damage is very high, particularly for housing of the low to moderate income population.

The Redwood Community Action Agency (RCAA), based in Eureka, CA, is a non-profit organization for Humboldt County. The Agency applied for and received a grant from FEMA's Hazard Mitigation Grant Program of \$324,000 to retrofit homes of low income owner-occupants. This grant, in combination with funds from local sources, provides funding for what has become the Seismic Safety & Retrofit for Residential Structures Program. (There is over \$1 million in potential matching funds.)

The program has specific target areas throughout Humboldt County and combines seismic retrofitting with housing rehabilitation. The goal is to assist individual low/moderate income homeowners directly in financing appropriate, cost effective seismic retrofit activities. Specific mitigation measures in this program address both structural and non-structural needs. A large percentage of the housing stock in Humboldt County is more than 60 years old and was originally built with a pier and post method that did not attach homes to foundations. This structural defect allowed hundreds of homes to slide off their foundations. Many sustained damage and, in some cases, were destroyed.

Structural mitigation includes foundation bolting, building perimeter foundations, site improvements, strengthening of shear walls and pony walls, and installation of state-certified earthquake-resistant bracing systems. Non-structural mitigation includes replacing and bracing masonry chimneys, providing flexible connections to utility lines, installation of state-certified gas safety shut-off valves, water heater strapping, securing of ceiling light fixtures and bolting of heavy furniture.

A unique aspect of this program is the integration of the HMGP money into the RCAA's ongoing housing program. RCAA has reached out for housing rehabilitation funds through CDBG, HOME Investment Partnerships Program and Rural Housing Service money for no interest/low interest loans to qualified low and middle income families, and its own ongoing Humboldt Home Repair Program. All funding sources, including the \$324,000 HMGP grant, combine to provide approximately \$1 million for the program. To date, the projected number of low income family homes benefiting from this program is 100-125 at an estimated \$3,000 per house.

The primary benefit of this program is life safety, reduction in expected future damage and loss to older structurally and mechanically inadequate residences occupied by low and moderate income homeowners. Minimizing potential injuries and deaths is a critical life safety goal. Structural and non-structural mitigation will not only reduce property damage but also significantly reduce relocation/displacement expenses that could total many times the program costs.

American Red Cross and California Office of Emergency Services data show a total of \$37.2 million in estimated damages to 1,194 residences resulted from the Cape Mendocino event. The on-going vulnerability of Humboldt County for future earthquakes is well documented. Historically, risk is clearly demonstrated.

While a non-structural benefit/cost model has not yet been developed for use to verify this projects cost effectiveness, experiences of the Northridge earthquake demonstrate that non-structural retrofit projects are cost-effective mitigation.

Potential savings from the reduction of repetitive property damages, relocation/displacement expenses as well as the human toll clearly outweighs the cost of the RCAA Seismic Safety & Retrofit for Residential Structures program.

### Activity/Project Location

Geographical Area: **Single County (County-wide)**

FEMA Region: **Region IX**

State: **California**

County: **Humboldt County**

### Key Activity/Project Information

Sector: **Public**

Hazard Type: **Earthquake**

Activity/Project Type: **Retrofitting, Structural**

Structure Type: **Wood Frame**

Activity/Project Start Date: **01/1999**

Activity/Project End Date: **01/2002**

Funding Source: **Hazard Mitigation Grant Program (HMGP); Local Sources**

Funding Recipient: **Property Owner - Residential**

Funding Recipient Name: **Redwood Community Action Agency**

### Activity/Project Economic Analysis

Cost: **\$1,000,000.00 (Estimated)**

Non FEMA Cost:

### Activity/Project Disaster Information

Mitigation Resulted From Federal  
Disaster? **Yes**

Federal Disaster #: **942 , 05/02/1992**

Value Tested By Disaster? **No**

Repetitive Loss Property? **No**

## Reference URLs

Reference URL 1: <http://neic.usgs.gov/>

Reference URL 2: <http://www.oes.ca.gov/Operational/OESHome.nsf/1?OpenForm>

## Main Points

- Northern California was rocked by a series of powerful earthquakes in 1992 that caused major injuries and significant damages.
- The RCAA combined funds from federal and local grants to establish the Seismic Safety & Retrofit for Residential Structures Program.
- The retrofit program is targeted for the low to middle income home owner group.
- The primary benefit of this program is life safety, reduction in expected future damage and loss to older structurally and mechanically inadequate residences.