

CALIFORNIA DEPARTMENT OF TRANSPORTATION

SEISMIC GATES

By Patrick Hipley

An unusual situation has occurred on a remote stretch of Highway 271 in District 1 near Leggett. The old route has been closed off for part of its already short length due to the close proximity of the much more modern Highway 101. By closing part of Highway 271, Big Dann and Cedar Creek Arch bridges are only accessible from one direction to serve a few residences in the region. Therefore, the average daily traffic count is very low. The day I was there, from 8:00 am to 9:00 am one car drove by. Consider this rush hour. The seismic retrofit of the two arches was estimated to be in the tens of millions of dollars because the difficulties were many for these deep canyon environments.

Meetings with the local community and Caltrans put forth the proposal to place gates similar to those at railroad crossings that would close in the event of strong ground motions. The Division of Mines and Geology have teamed up with Caltrans to place gates at the entrances to each bridge that will trigger in an earthquake and close. This is to prevent crossing after a major event until inspection can take place. The gates themselves will create an awareness by the local people as to the possible vulnerability of these structures to earthquakes. The probability that anyone will be on the bridges for a random 15 seconds of strong shaking is very low. It is less than 1% if you estimate needing 8 seconds to cross the bridge for one hundred cars in a 24 hour period. Low odds. So, to me the gates make sense instead of a multi million retrofit effort. The people that live there are in favor of the gates and many committees such as our Seismic Advisory Board have reviewed the situation and are in favor of the gate solution.

The early plan is to link the seismic gates through a spread spectrum radio link to cut down on the long distance runs needed for a hard wire link. The gate nearest the free-field sensors (triggering sensors) will be hard wired to close at a pre-determined threshold, then automatically a radio signal will close all other gates in the local vicinity. Each bridge will have its own triggering sensors and will trigger all gates in the area shaken with large accelerations to create a more robust system in case one system is down for any reason.

Once a system is triggered, a signal is also sent to CDMG, Caltrans Headquarters, the local maintenance shop and the Highway Patrol. The local Maintenance and Highway Patrol personnel will be responsible for lifting the gates following inspection after an event or due to false triggering. The gate closure signals will be sent via conventional phone lines and backed up by a cellular satellite phone system. Temporary seismic gates will also be placed at the three Somoa Channel Crossings in Eureka as an interim measure until the very complicated retrofit decisions are made for these structures.