



## Bay Area Earthquake Plan, April 2016

### Overview

The Bay Area Earthquake Plan (BAEP) is an update to the San Francisco Bay Area Earthquake Readiness Response: Concept of Operations Plan, 2008. The BAEP frames how local, tribal, state, and federal governments and private and nongovernmental organizations will respond and coordinate immediately following a catastrophic earthquake along the northern California coast. The framework is set around courses of action that enable a rapid and effective response to meet the needs of survivors. The BAEP focuses on immediate application of resources to lifesaving and life-sustaining missions, with a goal of stabilizing the incident within 72 hours.

### Impacted Counties

Alameda, Contra Costa, Marin, Mendocino, Monterey, Napa, Sacramento, San Benito, San Francisco, San Joaquin, San Mateo, Santa Clara, Santa Cruz, Solano, Sonoma, and Yolo.

### Scenario

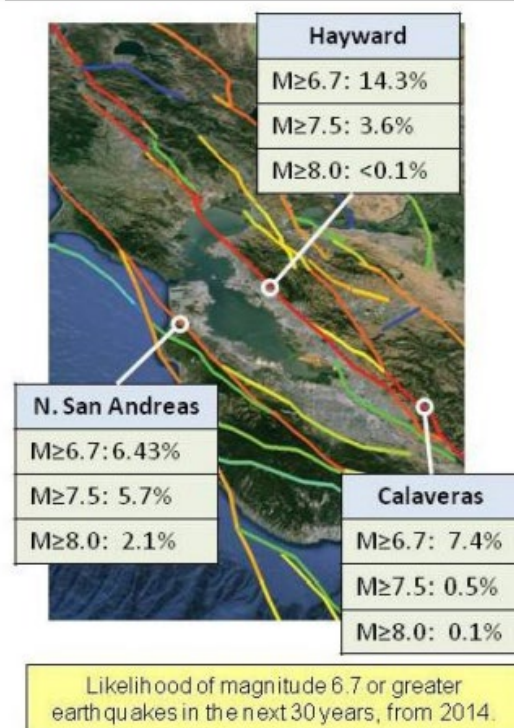
The San Andreas Fault System is a major structural feature located at the boundary between the North American and Pacific tectonic plates. The San Andreas and Hayward faults, both elements of the San Andreas Fault System, have the highest probabilities of causing a significant seismic event in the Bay Area. A seismic event on these faults could cause significant ground shaking, liquefaction, landslides, and surface fault rupture.

The figure to the right presents the probabilities of a severe earthquake in the Bay Area in the next 30 years, according to the United States Geologic Survey,



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California Governor's Office of Emergency Services  
U.S. Department of Homeland Security  
Federal Emergency Management Agency Region IX  
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Southern California Earthquake Center, and California Geological Survey.

The probability for an earthquake is highest for the Hayward Fault. An earthquake along this fault would cause significant loss of life and injuries and extensive damage to homes, businesses, and infrastructure, such as transportation and utility systems. Several hundred thousand people would likely be homeless after such an earthquake. While the Northern San Andreas Fault has a lower likelihood of generating an earthquake, this fault was responsible for the M7.8 San Francisco earthquake in 1906.

### Threat

The Hayward Fault is the single most urbanized earthquake fault in the United States, with more than 2.4 million people live along the fault line. Hundreds of homes and other structures are built directly on the fault itself, and mass transit corridors, major freeways, and many roadways cross the fault at numerous locations. Critical regional gas and water pipelines and electrical transmission lines cross the fault as well.

Scientists have found evidence for 12 earthquakes on the southern Hayward Fault during the past 1,900 years. The past five incidents occurred with an average interval of about 140 years, with the last major seismic incident occurring in 1868.

### Planning Factors

A severe earthquake on the San Andreas or the Hayward Fault would produce physical effects such as surface fault rupture, ground shaking, liquefaction, and landslides. The Bay Area's earthquake risk is primarily related to strike-slip fault movement. Such movement is not expected to produce dramatic surface uplift or undersea floor level changes such as that which would be associated with a Cascadia region earthquake. Tsunamis affecting the Bay Area are rare but could be caused by nearby offshore earthquakes.

San Jose, San Francisco, and Oakland are all located within active fault zones. A major Hayward Fault earthquake is expected to cause significant loss of life and extensive damage to homes, businesses, and infrastructure, including transportation and utilities. Several hundred thousand people are likely to be homeless after such an earthquake. Planning factors for a Bay Area earthquake include:

- There are 17 federally recognized tribes within 3 of the 16 counties covered by the plan. A severe earthquake on the San Andreas Fault would potentially impact two tribes within Mendocino County.
- There could be as many as 2,550 deaths. Up to 60% of morgues and coroner facilities will be non-functioning, and 90% of capacity will be lost in heavy shake zones.
- Thousands of fires will overwhelm local firefighting capabilities. Water infrastructure damage and limited access to affected areas will hinder firefighting operations. Gas pipeline breaks and leaks will create hazardous conditions and fires.

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- The Bay Area has a labor force of 4.3 million. As many as 10,000 commercial buildings will sustain major structural damage and most of the local workforce could be temporarily or permanently displaced. If an earthquake occurs during a workday, over 550,000 commuters in the Bay Area will need transportation to return home.
- Immediate sheltering will be required for approximately 330,000 individuals. Structure damage, personnel shortages, and other effects will result in a sheltering shortfall.
- Feeding operations will be needed for approximately 1.75 million people per day. As many as 5 million people will need 15 million liters of drinking water a day.
- Thousands of collapsed buildings will need to be searched and hundreds or thousands of people will need to be rescued.
- Casualties will include:
  - 21,000 - 82,000 emergency department visits although 25 - 50% of emergency departments across the Bay Area and up to 90% of emergency departments in heavy shake zones will be non-functioning.
  - 720 - 2,900 new patients requiring inpatient care.
  - 120 - 560 new patients requiring ICU-level care.
  - 38,000 - 140,000 persons requiring outpatient care.
  - 23,000 - 28,000 patients with acute mental health needs.
  - Between 19 - 41 hospitals will require full or partial evacuation, of approximately 4,600 to 11,000 patients.
  - Up to 50% of long-term care facilities across the Bay Area will require evacuation, accounting for 150 facilities and a total of 26,000 skilled nursing or intermediate-level care patients; up to 90% of long-term care facilities in heavy shake zones will be non-functioning.
  - 60% of the mental health and public health capacity will be non-functioning; in heavy shake zones, up to 90% may be non-functioning.
- Approximately 150,000 to 160,000 homes and multi-family structures could be rendered uninhabitable post-incident. About 10% of residents carry earthquake insurance, with average deductibles of \$40,000.
- Transportation networks, including road, rail, air, and marine systems will be damaged by ground shaking, landslides, liquefaction and surface rupture and fault after-slip, isolating large communities, and disrupting the regional and national supply chain.
- Damaged water utility pipelines and facilities will result in interrupted supply and loss of service.
  - The earthquake will impact major water conveyance systems in the Bay Area including the Hetch Hetchy aqueducts, East Bay Municipal Utility District aqueducts, and the South Bay Aqueduct. Numerous local pipelines cross the Hayward fault.

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- Damage to wastewater storage and treatment plants will pose health and environmental concerns.
- Oil refining infrastructure in the Bay Area may not be fully operational.
  - Partial or complete failure of refinery storage tanks is possible.
  - Oil pipelines may rupture where they cross faults, such as Richmond, Oakland, Hayward, and Fremont where East Bay pipelines cross the Hayward Fault.
  - Jet fuel pipelines to airports could be damaged and airports have limited fuel storage capacity.
  - Fuel production and distribution could be severely disrupted with consequences extending into Northern California and Nevada.
  - Interruption of fuel supplies through commercial gas stations is probable due to power failure and damaged infrastructure.
- Much of the Bay Area electrical power infrastructure could be damaged. Over half of households in the impacted area could be without electrical power for 24 hours and over 14% would still be without power one week later. Power could be unavailable for weeks in some communities due to repair and part manufacturing delays caused by low supply and high demand.
- Extensive damage to communications infrastructure is expected and could take weeks or months to repair. Landline and cellular telephone systems may not work for the first few days post-event due to system overload and damage to infrastructure. Loss of communications capabilities will hamper response and communication with the public.
- Port facilities and land-based support infrastructure as well as the San Francisco and Oakland international airports will be affected due to their locations in high liquefaction susceptibility zones.

### Plan Structure

This plan includes organizations, outcomes and strategies that are executed by an informed, trained, and exercised team of emergency managers. The Base Plan and its Annexes provide an overview of key actions, a concept of operations, and an execution checklist.

**For more information, please visit:**

<https://www.caloes.ca.gov/office-of-the-director/operations/planning-preparedness-prevention/planning-preparedness/catastrophic-planning/>