

EARTHQUAKE

DEFINITION – An earthquake is the motion or trembling of the ground produced by sudden displacement of rock usually within the upper 10-20 miles of the Earth's crust. Earthquakes result from crustal strain, volcanism, landslides, or the collapse of underground caverns. Earthquakes can affect hundreds of thousands of square miles, cause damage to property measured in the tens of billions of dollars, result in loss of life and injury to hundreds of thousands of persons, and disrupt the social and economic functioning of the affected area. Most property damage and earthquake-related deaths are caused by the failure and collapse of structures due to ground shaking which is dependent upon amplitude and duration of the earthquake. (FEMA, 1997).



MITIGATION ACTIONS FOR RESIDENTS

- ▶ **Personal Preparedness** – It is important to plan for disasters. Families may not be together or at home. Consider completing the following to be prepared.
 - **Family Emergency Communication Plan** (FEMA) serves as a comprehensive checklist for household disaster preparedness. [FEMA Family Emergency Communication Plan Checklist](#)
 - **Family Disaster Plan** (American Red Cross) – Communication networks and electricity could be disrupted. Planning in advance will help ensure that all the members of your household know how to reach each other and where to meet up in an emergency. [American Red Cross Family Disaster Plan Template](#)
 - **Emergency Kits** – It is always a good idea to have an emergency kit on hand. Consider basic items as well as special needs.
 Build a Kit (Ready.gov) [ready.gov Build-a-Kit](#)
 Survival Kit Supplies (American Red Cross) [American Red Cross Survival Kit Supplies Checklist](#)
- ▶ **Emergency Alerts and Warnings** – To receive emergency alerts and warnings, refer to the following websites, mobile apps, and other resources.
 - **American Red Cross Mobile Apps** (Apple App Store, Google Play, or text to “90999”
[Mobile Apps - The American Red Cross](#)
 - **South Central Alert** – This service allows residents and businesses in an eight county area to be notified of an emergency situation and important alert messages in a variety of ways, including on their cell phones, home and work phones, by text messaging and e-mail.
[South Central Alert - Sign Up](#)
 - Monitor police news feeds, weather, and news on social media or websites. Receiving periodic updates is vital.
- ▶ **Retrofitting (Securing Building Components and Contents)** – Many injuries in earthquakes are caused by nonstructural hazards, such as attachments to buildings. Activities that can reduce the

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risk of injury and damage include: anchoring tall bookcases and file cabinets, installing latches on drawers and cabinet doors, restraining desktop computers and appliances, using flexible connections on gas and water lines, mounting framed pictures and mirrors securely, and anchoring and bracing propane tanks and gas cylinders.

- ▶ **Identify Safe Places** – Within each room of home identify safe places under sturdy furniture, against insider walls, and away from glass. Outside of home locate safe places away from buildings, trees, electric lines, and bridges.
- ▶ **In-Home Safety** – Know how to turn off gas, electricity and water within home.



MITIGATION ACTIONS FOR MUNICIPALITIES

- ▶ **Adopt the York County Hazard Mitigation Plan** by resolution or develop and implement a municipal hazard mitigation plan. [York County Hazard Mitigation Plan](#)
- ▶ **Prepare a Continuity of Operations Plan** to ensure that essential functions continue to be performed under a broad range of circumstances, protecting residents and minimizing business interruption. Consider what capital improvements are needed to adequately protect business or properties. [FEMA Continuity of Operations Brochure](#)
- ▶ **Prepare an Emergency Operations Plan** which describe who will do what, as well as when, with what resources, and by what authority – before, during, and immediately after an emergency. [FEMA Guide for All Hazards Emergency Operations Planning Guide](#)
- ▶ **Coordination** – Develop pre-disaster Memorandums of Agreements or Memorandum of Understanding with adjacent jurisdictions. Build partnerships (neighborhoods, emergency management/first responders, businesses, utility service providers, and local government agencies to strengthen response and recovery.
- ▶ **Public Education and Outreach** – Educate residents regarding risk and impact of hazards, how to prepare and protect themselves and their property. Facilitate funding for mitigation measures and technical assistance programs that address measures that citizens can take.
- ▶ **Seismic Hazard Mapping and Related Hazard Mapping** – Information gained from seismic hazard mapping can be used to assess risk. The first step is collection of geologic information on seismic sources, soil conditions, and related potential hazards. The second step is to prepare a map showing the approximate locations of various hazards. Other earthquake-related hazards include liquefaction and landslides. Maps of these related hazards may be used for vulnerability analysis and risk assessment.
- ▶ **HAZUS** – FEMA's HAZUS is a computer-based tool that can be used to quantitatively estimate losses from an earthquake.

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- ▶ **Loss Estimation Studies** – After seismic hazards have been identified, planners can create an earthquake scenario to estimate potential loss of life and injuries, the types of potential damage, and existing vulnerabilities within a community. Scenarios can be particularly useful in predicting lifeline performance, i.e., the sustainability of critical public services or systems such as electricity, water, or roadways. This knowledge can be used to develop earthquake mitigation priorities.
- ▶ **Capital Improvement Planning** – School districts, local governments, corporations, and others have developed capital improvement plans to ensure that facilities remain operational for years down the road. It is more efficient and cost effective to incorporate structural and nonstructural seismic strengthening actions into on-going building plans and activities, rather than to rehab later.
- ▶ **Guidelines and Model Ordinances** – Earthquake hazards can be mitigated through land use planning. Communities can develop and distribute guidelines or pass ordinances that require developers/building owners to locate lifelines, buildings, critical facilities, and hazardous materials out of areas subject to significant seismic hazards. Particular consideration should be given to enforcing such ordinances in areas with steep slopes or subject to ground displacement, severe ground shaking, or liquefaction.
- ▶ **Building Codes** – Although land use management that avoids building on hazardous sites is an effective way to reduce earthquake risk, there may be times when it is necessary to build on such sites. Engineers and architects have designed buildings in ways that reduce the impact of ground shaking. Encouraging all local governments to adopt and enforce updated building code provisions is one effective way to reduce earthquake damage risk.
- ▶ **Infrastructure Hardening** – Identification and hardening of critical lifeline systems, i.e., critical public services such as utilities and roads, to meet "Seismic Design Guidelines and Standards for Lifelines," or equivalent standards, may distinguish a manageable earthquake from a social and economic catastrophe.
- ▶ **Bridge Strengthening** – State and local highway departments should review construction plans for all bridges to determine their susceptibility to collapse. Problem bridges should be retrofitted.