

# **Comprehensive Emergency Management Plan**



**Section 6-Earthquake Annex**  
*January 2019*

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## Annex 6 – 1 Earthquake Annex

### I. PURPOSE

The earthquake annex is a hazard-specific annex to be used in coordination with the Horry County Comprehensive Emergency Operations Plan. The purpose of this annex is to provide a basis for operational concepts and procedures designed to minimize the loss of life and property and to expedite restoration of essential services following an earthquake.

### II. SITUATION

- A. Horry County is located in the northeastern portion of the state of South Carolina and encompasses 1,133 square miles.
- B. In general, soils found in Horry County are composed of clay, loam, and sand with generally poor draining, thus contributing to the potential of a higher liquefaction factor in the event of an earthquake.
- C. According to the South Carolina Coastal Plain Planning and Mitigation map produced in 1996, the eastern portion and various areas in the western portion of Horry County have been identified to contain areas with potential for liquefaction. Areas with potential for liquefaction are also located along the Grand Strand coastline.
- D. Along the western border of Horry County lies a major fault line.
- E. The likelihood that Horry County would experience impacts from an earthquake directly from this fault line or that from nearby areas is possible. Due to the liquefaction of our area soils, earthquakes originating in surrounding areas such as Charleston, SC could have more significant impacts.
- F. The Charleston area contains a fault line which produced the largest historic earthquake in eastern North America in 1886. Horry County had an intensity of a 7.0 earthquake from this 1886 earthquake event in Charleston SC, according to the Modified Mercalli Intensity Scale. Earthquakes in the eastern U.S. are low probability, high-consequence events. Although earthquakes may occur infrequently, the effects can be devastating.
- G. Therefore, catastrophic damage is expected in the event of another earthquake of this magnitude.
- H. Death, injuries, and extensive property damage are possible.
- I. A moderate earthquake can cause serious damage to non-reinforced buildings, building contents, non-structural systems, and can cause disruption to transportation routes, communication systems, power sources, water, and fuel lines.
- J. In Horry County, many of the structures built were constructed prior to more recent building codes that would require more mitigated practices, thus further exacerbating potential impacts from an earthquake.
- K. Communication systems are expected to be significantly damaged or overloaded.

- L. Secondary effects caused by earthquakes may be fire, hazardous material release, flash flooding, and tsunamis.

### **III. ASSUMPTIONS**

- A. A large earthquake resulting in significant damage to buildings and structures may overwhelm local and state resources. State and Federal assistance may be required to carry out response and short-term recovery efforts to save lives, reduce human suffering and reduce property damage.
- B. Residents are not accustomed to the effects of an earthquake and may not initially grasp the magnitude of the situation or know how to properly respond.
- C. Aftershocks may occur following an earthquake and can cause additional safety concerns and damage.
- D. A detailed operating picture may not be achievable for 24 to 48 hours or more following an earthquake. Response operations may need to begin without a complete or detailed situational awareness.
- E. The earthquake and/or aftershocks may trigger secondary disasters such as fires that can cause additional demand on response operations.
- F. Communication and transportation methods may be compromised from the impacts of an earthquake. Infrastructure capability and utilities may be severely disrupted in areas within and beyond the immediate affected area(s) of an earthquake.
- G. The possibility of widespread interruptions of water distribution, sanitation infrastructure, treatment facilities, and private wells/septic systems may be damaged from the earthquake(s) and may create the potential for serious public health problems.
- H. Residents and tourists may require evacuation, sheltering and medical care.
- I. Hospitals and clinics may not be able to receive injured persons if the structures have suffered impacts from an earthquake. Hospital capacity may be inadequate to treat casualties and other medical emergencies, requiring some severely injured patients to be relocated to facilities outside the area.
- J. An earthquake may be large enough to cause significant damage to buildings and structures and generate large amounts of debris. The amount of debris generated by an earthquake may block roadways and limit movement for emergency vehicles, residents and tourists.
- K. Damage to the county's Emergency Operations Center (EOC) may require activation of contingency plans, delaying response and recovery operations.
- L. Damage Assessment teams will need to be assembled to ensure that buildings are suitable to be reoccupied.
- M. Fatalities may occur and may vary based upon where and when the earthquake strikes.

### **IV. CONCEPT OF OPERATIONS**

- A. Immediately following an earthquake the EOP will be activated and our OPGON level will move directly to OPGON 1.

- B. When an earthquake occurs, all efforts will be made to protect life and property. If local resources prove to be inadequate or are exhausted, assistance may be requested from the state.
- C. The immediate response to a major earthquake will focus on saving lives, providing resources to sustain life, and incident response stabilization.
- D. Normal alert and notification systems may be down or limited following a major earthquake. It may be necessary to augment these systems with mobile public address systems, door-to-door contact, and posting notices on bulletin boards in designated public gathering places such as shelters.
- E. Initial concerns in the event of an earthquake are emergency response (life, safety and property protection), situation assessment, damage assessment, continuity of government and communications.
- F. Based upon the impacts from an earthquake, this plan and the EOC will be activated. Next steps will be to gain situational awareness to prioritize and identify where efforts need to be concentrated.

#### G. Damage Assessment

- 1. Gaining situational awareness will ultimately depend upon what resources are available and the viability of communications.
- 2. The initial information gathered will focus on identification of situations requiring an emergency response and the condition of critical facilities, including roadways, bridges, and utilities.
- 3. The most likely sources of information will be on-duty fire, law enforcement and public works personnel as well as limited news reports.
- 4. As field responders assess their response areas for emergency situations, they will also, to the extent possible, gather information on the overall situation and relay it to their supervisors who will deliver those reports to the EOC. The reports should provide a general description of the area according to:
  - a. the nature of the damage
  - b. the severity of the damage
  - c. the extent of the damage
  - d. estimation of the number of people affected
- 5. Key information needed in performing a more thorough assessment may also include obtaining the following:
  - a. location of the epicenter
  - b. magnitude and intensity of the earthquake
  - c. location and orientation of the source fault (if known)
  - d. site conditions that may result in greater than expected damage (saturated soil, areas underlain by fill material, and large bridges).
  - e. this information may be obtained through USGS.
- 6. This information and more can be found in Attachments A.

#### H. Initial Response / Situational Awareness

- 1. Immediate action to gather damage assessment information from first responders is critical to determine the extent of the injuries and damages.
- 2. As damage assessment data and situational awareness is gained, it is critical that response strategies be developed with an accurate picture of the potential scope of the disaster.
- 3. Immediately following the earthquake, it may be possible to establish an initial assessment of the impact using available analytical tools. This assessment may be used to direct initial response activities toward those areas that are most likely to be seriously affected, given the location and magnitude of the earthquake and secondary impacts.

## I. Emergency Response

1. Emergency response actions are those taken immediately after an earthquake to save lives, alleviate suffering, and prevent further damage. The challenge will be identifying the specific nature and location of damage caused by the earthquake and then prioritizing available resources to respond.
2. The emergency response phase of an earthquake can last from days to weeks, during which emergency services may become overwhelmed by demand.
3. As mentioned previously, the ability to collect information and verify damages will be impacted by limited communication avenues. Phones, both landlines and cell phones, are not expected to function, potentially limiting sources to:
  - a. Observation from responding EOC and county staff;
  - b. Amateur radio;
  - c. News reports; and
  - d. Deployed damage assessment teams
4. The expected activities may include, but not limited to
  - a. Fire Suppression and Hazardous Materials/Waste Containment
    - i. Hazardous Material clean up may be coordinated with the Department of Health and Environmental Control (DHEC).
  - b. Search and Rescue
    - i. The collapse of buildings and other structures may be significant. People can become trapped and/or injured as a result.
  - c. Debris Clearance
    - i. The identification, removal and disposal of rubble, wreckage and other materials that block or hamper the performance of emergency response functions are a high priority action.
  - d. Emergency Public Information
    - i. Emergency notification will be provided through any means of communication available to share details regarding the earthquake and areas of impact.
    - ii. Public information will be vital to the citizens of the county after an earthquake.
  - e. Emergency Public Shelters and Mass Care
    - i. Sheltering actions will be coordinated through the American Red Cross. They will assist in opening and managing shelter operations, as well as, provide locator services to answer inquiries about people in the disaster area.
    - ii. Evacuation in any area of the County will be determined upon need at the time of the incident and based upon location and possible transportation routes.
  - f. Access and Control (re-entry)
    - i. Control of access to areas severely impacted by an earthquake will be accomplished by law enforcement.
    - ii. If evacuation is necessary, then the re-entry plan will be activated by law enforcement.
    - iii. Only those directly involved in emergency response will be allowed entry to areas impacted or deemed unsafe.
    - iv. Restriction or closure of roads and bridges will be coordinated through law enforcement personnel.

## J. Sustained Response / Recovery

1. The damage from an earthquake may be significant and take weeks, months and years to recover. All response actions will continue through the appropriate ESFs; however, there may come a time that sustained actions may continue on a limited basis.

## K. Public Information Officer

1. The Horry County Public Information Officer will immediately begin providing precautionary safety information to the general public. This information will be taken from existing safety procedures.
2. Other general information on affected areas, sheltering, possible aftershocks, unsafe areas, building collapse, or additional information to assist the affected population will be disseminated through the Public Information Officer (PIO).

## V. ROLES AND RESPONSIBILITIES

### A. Local

1. In the event of an earthquake where communications are lost emergency personnel will report to the EOC as soon as possible.
  - a. Reports may be called in to the EOC regarding intelligence gathering for situational awareness so that priorities and strategies may be developed.
2. Preliminary damage assessment teams will be sent into the field to provide a more detailed assessment and provide information to help gain situational awareness.
3. Depending on the magnitude, outside assistance may be requested to assist with rescue, care to the injured, security, damage assessment, disaster assistance, and temporary sheltering.
4. Other contracts or Mutual Aid Agreements may be activated as needed.

### B. State

1. If additional assistance is required, a request will be forwarded to the State South Carolina Division of Emergency Management to assist.

## VI. DEFINITIONS

**Aftershock** – An earthquake of similar or lesser intensity that follows the main earthquake.

**Fault** – A break in the earth’s crust which ruptures during an earthquake, allowing the two sides of the fault to slip past each other. The slippage may range from less than an inch to more than 30 feet in a severe earthquake.

**Earthquake** – Seismic vibrations produced when a fault in the earth’s crust ruptures or breaks, causing movement or slippage of the rocks along the fault

**Liquefaction** – A process by which water-saturated sediment temporarily loses strength and acts as a fluid when exposed to strong seismic shaking. The shaking causes the grains to lose grain-to-grain contact, so the sediment tends to flow. Liquefaction is most likely in loose sandy soil with a shallow water table.

**Magnitude** – The amount of energy released during an earthquake. An increase of one full point on a magnitude scale represents about a 3-fold increase in the energy released. Therefore, an earthquake measuring magnitude of 6.0 is about 30 times more powerful than one measuring 5.0.

**Mercalli Scale** – A scale of earthquake intensity based on observed effects and ranging from I (detectable only with instruments) to XII (Casing almost total destruction).

**Richter Scale** – A logarithmic scale for indicating the magnitude of earthquakes using data from a seismograph: each step represents a magnitude that is about 10 times greater than the preceding step, with 1 indicating a disturbance detectable only by instruments and 7 that can cause major damage to buildings.

**Tsunami** – A tsunami is a sea wave of local or distant origin that results from large-scale seafloor displacements associated with large earthquakes.

## **VII. ANNEX MAINTENANCE**

Horry County Emergency Management has the responsibility of coordinating, developing and maintaining the Earthquake Annex and is the designated Lead Agency. The Earthquake Annex will be updated in conjunction with the CEMP as stated in Section VII, Plan Development and Maintenance.

## **VIII. AUTHORITIES AND REFERENCES**

- A. South Carolina Earthquake Guide
- A. CPG101V2

## **ATTACHMENTS**

### A. Critical Information For The First 24 Hours

## ATTACHMENT A

### Critical Information for the First 24 Hours

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The following information should be collected as soon as reasonably possible to protect life and property.

- The nature and severity of the damage
- Number and location of deaths and injuries.
- Location and extent of secondary events, including aftershocks, fires, and hazardous materials events.
- Requirements for major evacuations and estimated number of people displaced.
- Location of severely damaged or collapsed structures.
- Location and estimated number of people affected and the number of people trapped in collapsed structures.
- Site conditions that may result in greater than expected damage (saturated soil, areas underlain by fill material, and large bridges).
  
- Status of communication systems, including:
  - Public telephone and wireless systems including internet.
  - Critical radio communication systems
  - E911 Center operability
  - Television network broadcasting
  
- Damage to critical public buildings and other infrastructure, including:
  - Emergency Operation Center
  - Police and Fire facilities
  - Hospitals, shelters, and skilled nursing facilities
  - Bridges
  - Schools
  - Jails
  - Transportation Systems
  - Other facilities deemed to be critical infrastructure
  
- Status of and damage to majority utility systems or infrastructure, including:
  - Transportation Systems
  - Water & Sewer, Septic and Well Systems
  - Power Systems
  - Natural Gas
  
- Critical resource shortfalls impacting public health and safety
  
- Information that may be obtained through USGS
  - Location of the epicenter
  - Magnitude and intensity of the earthquake
  - Location and orientation of the source fault (if known)