Comprehensive Emergency Management Plan

Section 6-Earthquake Annex

January 2025

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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. This annex aims to provide a basis for operational concepts and procedures designed to minimize the loss of life and property and to expedite the restoration of essential services following an earthquake.

II. SITUATION

A. Horry County is located in the northeastern portion 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 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 liquefaction potential. In addition, areas with liquefaction potential are 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 nearby areas is possible. However, due to the liquefaction of our area soils, earthquakes originating in the surrounding regions, such as Charleston, SC, could have more significant impacts.

F. The Charleston area contains a fault line that produced the largest historic earthquake in eastern North America in 1886. According to the Modified Mercalli Intensity Scale, Horry County had an intensity of 7.0 earthquake from this 1886 earthquake event in Charleston, SC. 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, injury, and extensive property damage are possible.

I. A moderate earthquake can cause serious damage to non-reinforced buildings, building contents, and non-structural systems and can cause disruption to transportation routes, communication systems, power sources, water, and fuel lines.

J. In Horry County, some of the structures built were constructed before 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 that significantly damages 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 respond appropriately.

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. Therefore, response operations may need to begin without complete or detailed situational awareness.

E. The earthquake or aftershocks may trigger secondary disasters such as fires that can cause additional demand on response operations.

F. The impacts of an earthquake may compromise communication and transportation methods. In addition, infrastructure capability and utilities may be severely disrupted in areas within and beyond an earthquake's immediate affected area(s).

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). Therefore, it 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. In addition, 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. In addition, 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 the 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 depending on where and when the earthquake strikes.

IV. CONCEPT OF OPERATIONS

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

B. When an earthquake occurs, all efforts will be made to protect life and property. However, if local resources prove inadequate or are exhausted, assistance may be requested from the state.

C. The immediate response to a significant 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. Therefore, 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 an earthquake are emergency response (life, safety, and property protection), situation assessment, damage assessment, continuity of government, and communications.

F. Based on the impacts of an earthquake, this plan and the EOC will be activated. The 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 will focus on identifying 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, public works personnel, and limited news reports.
    4. As field responders assess their response areas for emergencies, 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 the following:
        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. Essential 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. information may be obtained through USGS.
    6. This information and more can be found in Attachment 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, response strategies must 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 direct initial response activities toward areas 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, limited communication avenues will impact the ability to collect information and verify damages. 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 are 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 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 high-priority actions.
        d. Emergency Public Information
            i. Emergency notification will be provided through any communication available to share details regarding the earthquake and areas of impact.
            ii. Public information will be vital to the county's citizens 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 and 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. Law enforcement personnel will coordinate the restriction or closure of roads and bridges.
        g. Communications
            i. The Communications Department may need to establish alternate communication methods to ensure uninterrupted coordination among first responders, including conventional/direct radio channels.
            ii. Satellite phones will be deployed to maintain connectivity in areas where traditional communication infrastructure has been compromised.
            iii. Amateur radio (HAM) operators may be utilized to provide backup communication support, ensuring critical messages can be relayed if other systems fail.

iv. Communication plans will prioritize interoperability among agencies and jurisdictions to enhance response efficiency and situational awareness.

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 when 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 neighborhoods, 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 an earthquake where communications are lost, emergency personnel will report to the EOC as soon as possible.
      a. Reports may be called into the EOC regarding intelligence gathering for situational awareness to develop priorities and strategies.
   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 the 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 that ruptures during an earthquake, allowing the fault's two sides 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 are 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 ranging from I (detectable only with instruments) to XII (Causing almost total destruction).

Richter Scale – A logarithmic scale for indicating the magnitude of earthquakes using data from a seismograph: each step represents a magnitude about ten 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 Department is responsible for 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
B. CPG101V2

ATTACHMENTS

A. Critical Information for The First 24 Hours

ATTACHMENT A

Critical Information for the First 24 Hours

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.
- The location and extent of secondary events, including aftershocks, fires, and hazardous materials.
- The requirements for major evacuations and the estimated number of people displaced.
- Location of severely damaged or collapsed structures.
- The location and estimated number of people affected, along with the number of people trapped in collapsed structures.
- Site conditions 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 the internet.
  - Critical radio communication systems
  - E-911 Center operability
  - Television network broadcasting

- Damage to critical public buildings and other infrastructure, including:
  - E-911 Communication Center
  - 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 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)