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| SOU Logo Earthquake Event Procedure |

**Office: EHS**

**Procedure Contact: Russell Deen**

**Related Policy or Policies: FAD.085**

# Revision History

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| **Revision Number:** | **Change:** | **Date:** |
| IR | Initial  | 12/21/2022 |
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## A. Purpose

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| This is to define the actions taken in the unlikely event of an earthquake event. |

## B. Definitions

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| An earthquake is a sudden and violent shaking of the ground, sometimes causing damage, as a result of movements within the earth’s crust or volcanic action. Tremor is a slight earthquake. Earthquake magnitude scale is the severity of an earthquake is generally proportional to the amount of seismic energy it releases. Magnitude scale:1. Less than 3.5 (Recorded on local seismographs, but generally no felt)
2. 3.6 - 5.4 (Often felt, but rarely cause damage.)
3. Under 6.0 (At most slight damage to well-designed buildings. Can cause major damage to poorly constructed buildings over small regions.)
4. 6.1 – 6.9 (Damage to a moderate number of well-built structures in populated areas. Earthquake-resistant structures survive with slight to moderate damage. Poorly designed structures receive moderate to severe damage. Felt in wider areas; up to hundreds of kilometers from the epicenter. Strong to violent shaking in epicentral area.)
5. 7.0 - 7.9 (“Major” earthquake. Can cause serious damage over larger areas.)
6. 8.0 - 8.9 (“Great” earthquake. Can cause serious damage and loss of life in areas several hundred kilometers across.)
7. 9+ (Rare great earthquake. Can cause major damage over a large region over 1000Km 621 Miles across.)

The Modified Mercalli (MM) Intensity ScaleNote: The Modified Mercalli scale is designed to describe the effects of an earthquake, at a given place, on natural features, on industrial installations and on human beings. The intensity differs from the magnitude which is related to the energy released by an earthquake. There are multiple versions of the MM scale, the one listed here being the 1931 version.MM I.Not felt - or, except rarely under especially favorable circumstances. Under certain conditions, at and outside the boundary of the area which a great shock is felt: sometimes birds, animals, reported uneasy or disturbed; sometimes dizziness or nausea experienced; sometimes trees, structures, liquids, bodies of water, may sway - doors may swing, very slowly.MM II.Felt indoors by few, especially on upper floors, or by sensitive, or nervous persons. Also, as in grade I, but often more noticeably: sometimes hanging objects may swing, especially when delicately suspended; sometimes trees, structures, liquids, bodies of water, may sway, doors may swing, very slowly; sometimes birds, animals, reported uneasy or disturbed; sometimes dizziness or nausea experienced.MM III.Felt indoors by several, motion usually rapid vibration. Sometimes not recognized to be an earthquake at first, duration estimated in some cases. Vibration like that due to passing of light, or lightly loaded trucks, or heavy trucks some distance away. Hanging objects may swing slightly. Movement may be appreciable on upper levels of tall structures. Rocked standing motor cars slightly.MM IV.Felt indoors by many, outdoors by few. Awakened few, especially light sleepers. Frightened no one, unless apprehensive from previous experience. Vibration like that due to passing of heavy, or heavily loaded trucks. Sensation like heavy body striking building, or falling of heavy objects to inside. Rattling of dishes, windows, doors; glassware and crockery clink and clash. Creaking of walls, frame, especially in the upper range of this grade. Hanging objects swing, in numerous instances. Disturbed liquids in open vessels slightly. Rocked standing motor cars slightly.MM V.Felt indoors by practically all, outdoors by many or most. Outdoors direction estimated. Awakened many, or most. Frightened few - slight excitement, a few ran outdoors. Buildings trembled throughout. Broke dishes, glassware, to some extent. Cracked windows - in some cases, but not generally. Overturned small or unstable objects, in many instances, with occasional fall. Hanging objects, doors, swing generally or considerably. Knocked pictures against walls, or swung them out of place. Opened or closed, doors, shutters, abruptly. Pendulum clocks stopped, started, or ran fast, or slow. Moved small objects, furnishings, the latter to slight extent. Spilled liquids in small amounts from well-filled open containers. Trees, bushes, shaken slightly.MM VI.Felt by all, indoors and outdoors. Frightened many, excitement general, some alarm, many ran outdoors. Awakened all. Persons made to move unsteadily. Trees, bushes, shaken slightly to moderately. Liquid set in strong motion. Small bells rang -church, chapel, school etc. Damage slight in poorly built buildings. Fall of plaster in small amount. Cracked plaster somewhat, especially fine cracks chimneys in some instances. Broke dishes, glassware, in considerable quantity, also some windows. Fall of knick-knacks, books, pictures. Overturned furniture, in many instances. Moved furnishings of moderately heavy kind.MM VII.Frightened all - general alarm, all ran outdoors. Some, or many, found it difficult to stand. Noticed by persons driving motor cars. Trees and bushes shaken moderately to strongly. Waves on ponds, lakes, and running water. Water turbid from mud stirred up. Incaving to some extent of sand or gravel stream banks. Rang large church bells, etc. Suspended objects made to quiver. Damage negligible in buildings of good design and construction, slight to moderate in well-build ordinary buildings, considerable in poorly build or badly designed buildings, abode houses, old walls (especially where laid up without mortar), spires, etc. Cracked chimneys to considerable extent, walls to some extent. Fall of plaster in considerable to large amount, also some stucco. Broke numerous windows, furniture to some extent. Shook down loosened brickwork and tiles. Broke weak chimneys at the roof-line (sometimes damaging roof. Fall of cornices from towers and high buildings. Dislodged bricks and stones. Overturned heavy furniture, with damage from breaking. Damage considerable to concrete irrigation ditches.MM VIII.Fright general - alarm approaches panic. Disturbed persons driving motor cars. Trees shaken strongly - branches, trunks, broken off, especially palm trees. Ejected sand and mud in small amounts. Changes: temporary, permanent; in flow of springs and wells; dry wells renewed flow; in temperature of spring and well waters. Damage slight in structures (brick) built specially to withstand earthquakes. Considerable in ordinary substantial buildings, partial collapse: racked, tumbled down, wooden houses in some cases; threw out panel walls in frame structures, broke off decayed piling. Fall of walls. Cracked, broke, solid stone walls seriously. Wet ground to some extent, also ground on steep slopes. Twisting, fall, of chimneys, columns, monuments, also factory stack, towers. Moved conspicuously, overturned, very heavy furniture.MM IX.Panic general. Cracked ground conspicuously. Damage considerable in (masonry) structure build specially to withstand earthquakes: threw out of plumb some wood-frame houses build specially to withstand earthquakes; great in substantial (masonry) buildings, some collapse in large part; or wholly shifted frame buildings off foundations, racked frames; serious to reservoirs; underground pipes sometimes broken.MM X.Cracked ground, especially when loose and wet, up to widths of several inches; fissures up to a yard in width ran parallel to canal and stream banks. Landslides considerable from river banks and steep coasts. Shifted sand and mud horizontally on beaches and flat land. Changed level of water in wells. Threw water on banks of canals, lakes, rivers, etc. Damage serious to dams, dikes, embankments. Severe to well-build wooden structures and bridges, some destroyed. Developed dangerous cracks in excellent brick walls. Destroyed most masonry and frame structures, also their foundations. Bent railroad rails slightly. Tore apart, or crushed endwise, pipe lines buried in earth. Open cracks and broad wavy folds in cement pavements and asphalt road surfaces.MM XI.Disturbances in ground many and widespread, varying with ground material. Broad fissures, earth slumps, and land slips in soft, wet ground. Ejected water in large amounts charged with sand and mud. Caused sea-waves ("tidal" waves) of significant magnitude. Damage severe to wood-frame structures, especially near shock centers. Great to dams, dikes, embankments, often for long distances. Few, if any (masonry), structures remained standing. Destroyed large well-built bridges by the wrecking of supporting piers, or pillars. Affected yielding wooden bridges less. Bent railroad rails greatly, and thrust them endwise. Put pipe lines buried in earthy completely out of service.MM XII.Damage total - practically all works of construction damaged greatly or destroyed. Disturbances in ground great and varied, numerous shearing cracks. Landslides, falls of rock of significant character, slumping of river banks, etc. numerous and extensive. Wrenched loose, tore off, large rock masses. Fault slips in firm rock, with notable horizontal and vertical offset displacements. Water channels, surface and underground, disturbed and modified greatly. Dammed lakes, produced waterfalls, deflected rivers, etc. Waves seen on ground surfaces (actually seen, probably, in some cases). Distorted lines of sight and level. Threw objects upward into the air. |

## C. Procedures

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| The following is a list of procedures in after a tremor or earthquake:1. Earthquake or tremor 3.5 or less (MM1 – MM2) no action taken.
2. Earthquake 3.6 – 4.0 (MM3) all structures that are not seismic reinforced will be visually inspected externally for cracks or damage. Internal supports will be inspected for cracks or damage where accessible. Cracks or damage will be evaluated for structural support and follow up inspections will be completed in 4 weeks from the event and 6 months following. If additional damage is noted at any inspection a structural engineer will be consulted for evaluation. Wellness checks will be preformed on occupants of buildings. Notifications will be sent to all employees and students for mental health support services.
3. Earthquake 4.1 – 4.9 (MM4 – MM5) all structures that are not seismic reinforced will be visually inspected externally for cracks or damage Internal supports will be inspected for cracks where accessible. A structural engineer will be consulted before non-seismic reinforced buildings are reoccupied. Seismic reinforced buildings will be visually inspected externally for cracks or damage. Internal supports will be inspected for cracks or damage where accessible. Cracks or damage will be evaluated for structural support and follow up inspections will be completed in 4 weeks from the event and 6 months following. If additional damage is noted at any inspection a structural engineer will be consulted for evaluation. Wellness checks will be performed on occupants of buildings. Notifications will be sent to all employees and students for mental health support services.
4. Earthquake 5.0 – 6.0 (MM6 – MM7) all structures will have a visual inspection for interior spaces for furniture or other potential falling or tip over objects. All structures that are not seismic reinforced will be visually inspected externally for cracks or damage Internal supports will be inspected for cracks where accessible. A structural engineer will be consulted for before non-seismic reinforced buildings are reoccupied. Seismic reinforced buildings will be visually inspected externally for cracks or damage. Internal supports will be inspected for cracks or damage where accessible. Cracks or damage will be evaluated for structural support and follow up inspections will be completed in 4 weeks from the event and 6 months following. If additional damage is noted at any inspection a structural engineer will be consulted for evaluation. Wellness checks will be performed on occupants of buildings. Mental health support will be brought on to site or made available virtually to all employees and students for mental health support services.
5. Earthquake 6.1 – 6.9 (MM7 – MM8) all structures will be inspected visually for interior spaces for furniture or other potential falling or tip over objects. All structures will be visually inspected externally for cracks or damage. Internal supports will be inspected for cracks where accessible. A structural engineer will be consulted before buildings are reoccupied. Internal supports will be inspected for cracks or damage where accessible. Cracks or damage will be evaluated for structural support and follow up inspections will be completed in 4 weeks from the event and 6 months following. If additional damage is noted at any inspection a structural engineer will be consulted for evaluation. Wellness checks will be performed on occupants of buildings. Mental health support will be brought on to site or made available virtually to all employees and students for mental health support services.
6. Earthquake 7.0 – 7.9 (MM9) University tunnels will be inspected for damage visually. All structures will have a visual inspection conducted for interior spaces including furniture or other potential falling or tip over objects. All structures will be visually inspected externally for cracks or damage. Internal supports will be inspected for cracks where accessible. A structural engineer will be consulted before buildings are reoccupied. Internal supports will be inspected for cracks or damage where accessible. Cracks or damage will be evaluated for structural support and follow up inspections will be completed in 4 weeks from the event and 6 months following. If additional damage is noted at any inspection a structural engineer will be consulted for evaluation. Wellness checks will be performed on occupants of buildings. Mental health support will be brought on to site or made available virtually to all employees and students for mental health support services.
7. Earthquake 8.0 + (MM10 – MM12) University tunnels will be inspected for damage visually and by a structural engineer. All structures will have a visual inspection conducted for interior spaces including furniture or other potential falling or tip over objects. All structures will be visually inspected externally for cracks or damage. Internal supports will be inspected for cracks where accessible. A structural engineer will be consulted before buildings are reoccupied. Internal supports will be inspected for cracks or damage where accessible. Cracks or damage will be evaluated for structural support and follow up inspections will be completed in 4 weeks from the event and 6 months following. If additional damage is noted at any inspection a structural engineer will be consulted for evaluation. Wellness checks will be performed on occupants of buildings. Mental health support will be brought on to site or made available virtually to all employees and students for mental health support services.
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| This procedure may be revised at any time without notice. All revisions supersede prior procedures and are effective immediately upon approval. |