Public Works & Utilities

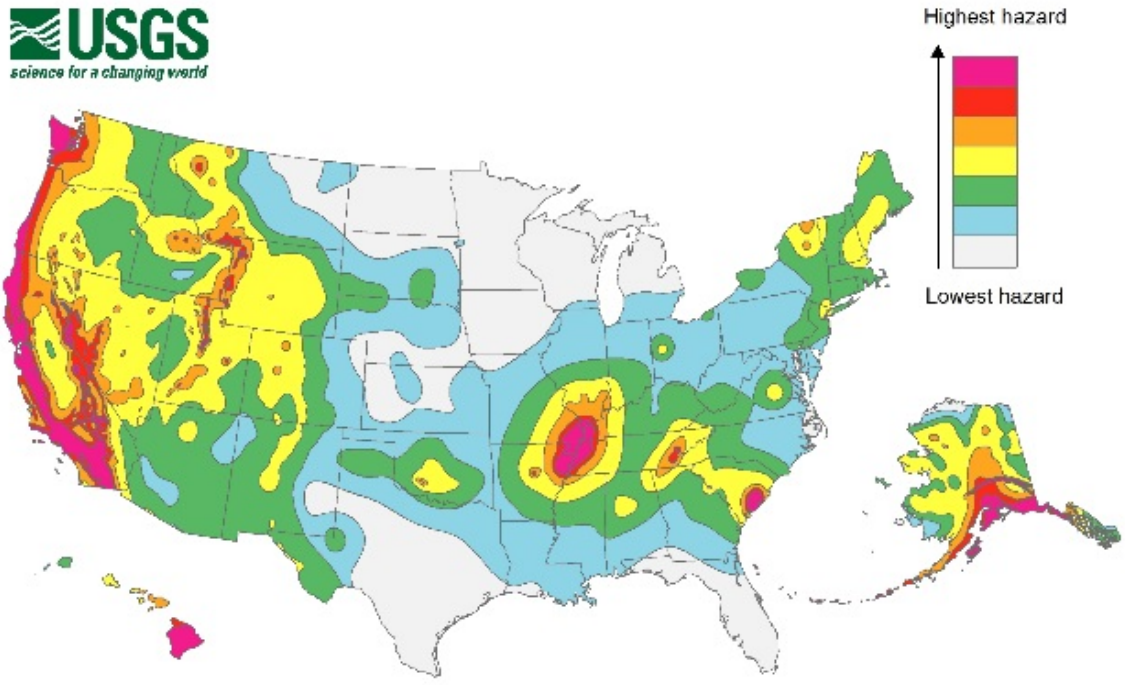
Earthquake Response Plan

Version 1.2
December 18, 2015

Introduction

Due to the recent increase in number and intensity of earthquakes in the region, Public Works & Utilities has drafted the following earthquake response. This plan is intended to be a reference document for Department response when activated. It is not intended to be all inclusive of all activities that may be necessary following an earthquake event. The health and safety of the public and staff are the first priority in all things. No employee shall enter an area that may be unsafe without first assessing the situation and taking appropriate protective actions and/or consulting with their supervisor or others to make safe the work necessary.

The Wichita area has historically been considered to be in a very low area in terms of probability for a significant earthquake event in the immediate area. Statistically, Wichita has been rated at less than a 0.7% chance of a 5.0 or higher earthquake in the next 50 years. However, in Oklahoma that factor and the frequency of lesser earthquakes increases significantly. In recent years several earthquakes that have centered near Caldwell, KS and other communities to the south, have been felt in the Wichita area.



Another important factor in determining the need for an Earthquake Response Plan is the infrastructure the Public Works & Utilities Department is responsible for maintaining. This infrastructure is critical to Wichitans daily life. The Department is responsible for core operations such as: delivery of potable water and water for fire protection; maintenance of City streets and safety of public buildings; ensuring adequate flood control and sanitary sewer services. In essence, the Department is responsible for infrastructure that allows the community to function.

The United States Geological Survey (USGS) has significant amounts of information and data collected and analyzed available at www.earthquake.usgs.gov Additional background information is also available, as well as map and text data updated with the very latest earthquake information from around the world. This website will be the primary source of information regarding earthquake magnitude, intensity, depth, clustering, time, location, and expected levels of damage.

Plan Activation

The activation of this plan shall be at the direction of the Director of Public Works & Utilities or their designee. It may also be activated by any of the three Assistant Directors. A Division Manager may utilize this plan for their infrastructure responsibilities as their discretion but shall report such activities to the Director and their Assistant Director.

The following graphic from the USGS demonstrates the reference scaling for earthquakes. Based on the USGS information available, this plan shall typically be activated for any earthquake rated a V or higher in intensity and felt in the City or rating a IV or higher as felt in the City. The USGS websites for PAGER and Shakemap should be consulted upon word of any event to assist with determining plan activation.

PERCEIVED SHAKING	Not felt	Weak	Light	Moderate	Strong	Very strong	Severe	Violent	Extreme
POTENTIAL DAMAGE	none	none	none	Very light	Light	Moderate	Moderate/Heavy	Heavy	Very Heavy
PEAK ACC.(%g)	<.17	.17-1.4	1.4-3.9	3.9-9.2	9.2-18	18-34	34-65	65-124	>124
PEAK VEL.(cm/s)	<0.1	0.1-1.1	1.1-3.4	3.4-8.1	8.1-16	16-31	31-60	60-116	>116
INSTRUMENTAL INTENSITY	I	II-III	IV	V	VI	VII	VIII	IX	X+

Listing of Infrastructure and Responsibilities

General listing of Public Works & Utilities' areas of infrastructure responsibility. List also included as Appendix.

Type of Infrastructure	General Description and Location	Primary Point of Contact	Cell Phone or Radio Contact	Coordination with Other Agencies
Bridges	All structures in the City used for carrying a road, street, or other lane over or across obstacles such as rivers, railroads, other roads and streets	Gary Janzen, City Engineer	316-200-6054 CMF Dispatch	
Brooks Construction and Demolition Landfill	Landfill near K96 and West St for the disposal of construction and demolition refuse	Shawn Maloney, Environmental Health Superintendent	316-655-0916	
Cheney Dam	The 4.5+ miles long earthen dam at the intersecting corners of SG, RN and KM counties, creating the sixth largest lake in Kansas at a normal pool of 168,000 acre-feet of water	Michael Jacobs, Production & Pumping Superintendent	620-215-2098 Prod & Pump 401	Bureau of Reclamation US Army Corp of Engineers
City Facilities	All City-owned and maintained buildings, parking garages and other types of edifices.	Jay Newton, Facilities Maintenance Superintendent	316-268-4074 Fleet Facilities	
Gilbert & Mosley Remediation Site	Series of wells and piping in downtown Wichita and the Old Town area to convey groundwater to the WATER Center near Pawnee and Broadway for remediation prior to discharge.	Shawn Maloney, Environmental Health Superintendent	316-655-0916	
Railroads	The system of rails or tracks used within the City which impact use of City roads and streets	Gary Janzen, City Engineer	316-200-6054 CMF Dispatch	Union Pacific Railroad BNSF Railroad K&O Railroad Wichita Terminal Association
Sewage Treatment	Cowskin WRF, Plant 1, Lower Ark WRF, Four Mile Creek WRF, Mid-Continent WRF, Fairway Lagoons, and related facilities.	Rebecca Lewis, Sewage Treatment Superintendent	316-393-0785 Sew Treatment 501	Kansas Department of Health and Environment, if operations are impacted
Sewer Collection System	Piping, manholes, and other structures from customer properties across the service area to the six treatment facilities	Bill Perkins, Sewer Maintenance Superintendent	316-670-0087 Sew Treatment 601	
Sewer Pump Stations	61 sanitary sewer pump stations across the service area	Rebecca Lewis, Sewage Treatment Superintendent	316-393-0785 Sew Treatment 501	Kansas Department of Health and Environment, if operations are impacted
Stormwater Pump Stations	Pump station facilities across the area to pump stormwater from low lying aras for the protection of property and the travelling public.	James Hardesty, Stormwater Superintendent	316-312-5464 Stormwater	US Army Corp of Engineers
Streets	Roads, streets, lanes, etc used by the travelling public in the City	Gary Janzen, City Engineer	316-200-6054 CMF Dispatch	
Water Distribution System	Water mains, valves, fire hydrants, air releaases, service lines, and meter sets from transmission mains across the service area to customer properties.	Dan Hiatt, Water Distribution Superintendent	303-242-6402 Water Dispatch 301	Wholesale customers, if impacted
Water Pump Stations	Hess Pump Station, Webb Pump Station, Southeast Pump Station, 37th Street Pump Station, West Maple Pump Station, WSU Elevated Storage, and subsurface stroage at multiple locations	Michael Jacobs, Production & Pumping Superintendent	620-215-2098 Prod & Pump 401	
Water Transmission	Large diameter mains from the Main Water Treatment Plant to pump station and from pump stations	Michael Jacobs, Production & Pumping Superintendent	620-215-2098 Prod & Pump 401	
Water Treatment	Water Filter Plant, ASR, Cheney Ozone, and related facilities	Michael Jacobs, Production & Pumping Superintendent	620-215-2098 Prod & Pump 401	
Wichita-Valley Center Floodway (Big Ditch)	Series of dykes, levees, and structures coonveying elevated waters of the Arkansas River Basin around and through the City	James Hardesty, Stormwater Superintendent	316-312-5464 Stormwater	US Army Corp of Engineers Sedgwick County

Water Distribution Inspection Criteria

Immediately following an earthquake, the Operations Supervisors shall assess new leaks or ruptures to determine if there are any signs the damages are earthquake related. Any failures other than pipe shall also be more stringently investigated. Over the following week, or as long as deemed necessary related to expected level of damage, crew leaders will contact an Operations Supervisor if there are any signs or unusual aspects regarding repairs. Some signs to watch for would be multiple circumferential breaks or multiple longitudinal cracks in the same location or soil movement indications.

If it is believed that damage is earthquake-related, the Operations Supervisors with assistance from Engineering, will complete a review of other areas in the system with similar characteristics, such as: type and vintage of infrastructure, soil conditions, slopes, etc. These areas will be visually inspected for possible leaks that may not yet have been identified.

These additional inspections and review shall be conducted by Department staff. Staff should be prepared to adjust work assignments to allow for additional response to customer calls.

Water Transmission Inspection Criteria

Department staff will drive and/or walk to complete a visual review and search for signs of damage along major transmission main routes. Valve vaults and air release/break structures shall be checked for visual signs of movement and/or damages. Staff will take special care to look for signs of water leakage at all points and take appropriate action. These inspections should be completed within 48 hours of plan activation depending on staff response to other emergencies. Repairs to these facilities shall also receive the type of special inspection indicated within Water Distribution Inspection Criteria.

These inspections shall be conducted by Department staff. Staff should be prepared to adjust work assignments to allow for additional response to customer calls.

Water Treatment Inspection Criteria

The Main Water Treatment Plant as well as the ASR facilities and Cheney treatment facilities, shall have a thorough review completed within 24 hours of plan activation. These facilities shall be inspected for cracking or damage to holding basins and other concrete structures. Steel and other structures shall also be inspected for unusual stress, fatigue, or damage. Building process piping as well as other plumbing, electrical, control, HVAC, and mechanical equipment shall be visually inspected for movement, signs of stress, or damage. Yard vaults and associated appurtenances shall be inspected. Pumps and equipment should be inspected for movement of the base or movement on the base.

Water quality and SCADA data will be reviewed to ensure that systems remained operational throughout the event and that no anomalies occurred following the event.

The inspections of these facilities shall be conducted by Department staff with the responsible party having the option of bringing in outside experts as needed, with Director approval. Staff should be prepared to adjust work assignments to allow for additional response to customer calls.

Water Pump Station Inspection Criteria

Hess Pump Station and related appurtenances shall be inspected within 24 hours of plan activation. Other pump stations and storage shall be inspected within 48 hours depending on level of emergencies at the time. All sites shall be inspected thoroughly to identify any issues that would affect their operation. This shall include, but not be limited to; building condition, all visible brick, concrete, and steel structure; process piping, plumbing, electrical conduits, electrical controls and drives, control cabling and conduits, HVAC systems, and other mechanical equipment. Pumps and equipment should be inspected for movement of the base or movement on the base.

Backup electrical generation equipment and/or buildings shall receive no less inspection.

The inspections of these facilities shall be conducted by Department staff with the responsible party having the option of bringing in outside experts as needed, with Director approval. Staff should be prepared to adjust work assignments to allow for additional response to customer calls.

Sewer Collection System Inspection Criteria

Within 24 hours of activation the responsible person(s) shall have assigned staff to drive/walk major interceptors and mains looking for signs of surcharging, overflows, or other damage. Any response to a stoppage or other damage within the first 72 hours should receive further review to determine if earthquake damage may be a factor

These inspections and work shall be completed by Department staff. Staff should be prepared to adjust work assignments to allow for additional response to customer calls.

Sewage Treatment Inspection Criteria

All five sewage treatment facilities and their appurtenances shall have a thorough review completed within 24 hours of plan activation. The lagoon system and other sewage treatment infrastructure shall be inspected within 72 hours unless there is indication there may be an emergency. These facilities shall be inspected for cracking or damage to clarifiers and other concrete structures. Steel and other structures shall also be inspected for unusual stress, fatigue, or damage. Building process piping as well as other plumbing, electrical, control, HVAC, and mechanical equipment shall be visually inspected for movement, signs of stress, or damage. Yard vaults and associated appurtenances shall be inspected. Pumps and equipment should be inspected for movement of the base or movement on the base.

River testing will be conducted to ensure that sewage treatment operations have not been comprised and therefore compliance with sewage treatment requirements has been maintained.

The inspections of these facilities shall be conducted by Department staff with the responsible party having the option of bringing in outside experts as needed with Director approval. Staff should be prepared to adjust work assignments to allow for additional response to customer calls.

Sewer Pump Station Inspection Criteria

For each plant facility the main pump Station and related appurtenances shall be inspected within 24 hours of plan activation. Other pump stations shall be inspected within 48 hours depending on level of emergencies at the time. Force main air releases and any other related infrastructure shall be inspected over the following week as needed. All sites shall be inspected thoroughly to identify any issues that would affect their operation. This shall include, but not be limited to; building condition, all visible brick, fiberglass, concrete, and steel structure; process piping, plumbing, electrical conduits, electrical controls and drives, control cabling and conduits, HVAC systems, and other mechanical equipment. Pumps and equipment should be inspected for movement of the base or movement on the base.

Backup electrical generation equipment and/or buildings shall receive no less inspection.

The inspections of these facilities shall be conducted by Department staff with the responsible party having the option of bringing in outside experts as needed with Director approval. Staff should be prepared to adjust work assignments to allow for additional response to customer calls.

Facilities Inspection Criteria

Facilities staff shall coordinate with Metropolitan Area Building Construction Department and the Wichita Fire Department on completing inspection of all City facilities. City facilities shall be ordered for inspection over the following week with the buildings having the most visits completed first except where a building has an identified issue or concern. Buildings shall be inspected for overall hazards such as collapse or partial collapse or building lean. They shall be inspected for structural hazards such as foundations where visible, roofs, floors, columns, pilasters, chimneys or vent stacks, bracing, walls and structural connections. They shall also be inspected for cladding, drop ceilings, light fixtures, walls, stairs, elevators, electrical, gas, HVAC, and other mechanical appurtenances. The area should also be checked for slope failures, ground movement or fissures, and debris. Any building or edifice deemed unsafe or if there is a concern of safety shall be closed and placarded as such. Further, all mounted equipment such as HVAC units, transformers, cooling towers, etc shall be inspected for damage or movement on the base or movement of the base.

The inspections of these facilities shall be conducted by Department staff with the responsible party having the option of bringing in outside experts as needed with Director approval.

Transportation - Streets Inspection Criteria

The responsible person or designee from Engineering should coordinate with Maintenance Division for any additional assistance needed to complete inspections of driving lanes. Inspection of driving lanes, traffic signalization, and related items should be prioritized based on public calls, previous ratings, and volume of traffic flow until the areas with the highest probability of damages have been inspected. Damages or decreases in performance level of paved surfaces as well as damage to signalization equipment and wiring should all be recorded.

Transportation - Bridges Inspection Criteria

The City Engineers office shall assign staff as well as the contract bridge inspection firm a list of bridges to complete immediate and longer term inspections on. The assigned bridges for inspection shall be prioritized based on past areas of structural deficiency and traffic volumes as well as incoming calls from the public concerning bridge conditions after an earthquake. The City Engineers office will determine the time needed to complete the assigned inspections but will provide the communications coordinator with an updated report each 24 hours. Bridges shall be inspected for, but not limited to, any driving surface damages; superstructure including girders, expansion joints, deck, beams; substructure including columns, piers, abutments; bearings, secondary systems such as wingwalls, railing, and utilities; soil sloughing, fissures, settlement, liquefaction; and approaches.

Transportation - Railroads Inspection Criteria

While the City does not own or operate rail infrastructure, this is a critical part of the community and has a substantial effect on the traveling public and response times for emergency services therefore, Engineering staff shall be put in place to complete railroad grade crossings, bridges, and elevated rails as needed during the first 72 hours following activation of the plan. The inspector(s) will complete condition inspections and also be responsible to coordinate with staff of the appropriate organization on necessity and timing of clearing or repairs.

Cheney Dam Inspection Criteria

The responsible person or their designee shall assign Department staff to complete a full and thorough walking inspection of the dam and related appurtenances within 24 hours of plan activation.

Dam Operators receive notification from the Bureau of Reclamation when an earthquake meets BoR's criteria for damage assessment. This criteria includes:

- **Earthquake felt on site**
- **BoR Magnitude vs Distance Table**

Richter Magnitude	BoR Distance from Epicenter (miles)	ACE Distance from Epicenter (miles)
<4	Not a concern	
4	9	
4.5	18	10
5	29	50
5.5	43	
6	58	75
6.5	74	
7	88	125
7.5	99	
8	109	200

Wichita-Valley Center Floodway Inspection Criteria

Department staff will drive and/or walk to complete a visual inspection and search for signs of damage along the entire floodway project. Gates, sloughs, and other structures shall be checked for visual signs of movement and/or damages. These inspections should be completed within 96 hours of plan activation depending on rainfall and staff response to other emergencies. Any repairs to these facilities completed in the first week following the event shall also receive special inspection to assist with investigating if the damages are earthquake related.

The inspections of these facilities shall be conducted by Department staff with the responsible party having the option of bringing in outside experts as needed with Director approval.

Stormwater Pump Station Inspection Criteria

Pump stations shall be inspected within 72 hours depending on rainfall and level of emergencies at the time. All sites shall be inspected thoroughly to identify any issues that would affect their operation. This shall include, but not be limited to; building condition, all visible brick, fiberglass, concrete, and steel structure; process piping, plumbing, electrical conduits, electrical controls and drives, control cabling and conduits, HVAC systems, and other mechanical equipment. Again pumps and other equipment should be inspected for movement of their base or movement on their base. Backup generators shall receive no less inspection.

The inspections of these facilities shall be conducted by Department staff with the responsible party having the option of bringing in outside experts as needed with Director approval. Staff should be prepared to adjust work assignments to allow for additional response to customer calls.

Stormwater Conveyance Systems Inspection Criteria

Any response to a stoppage or other damage within the first week following an activation event should receive further review to determine if earthquake damage may be a factor. Staff should be prepared to adjust work assignments to allow for additional response to customer calls depending on rainfall and other factors.

The inspections of these facilities shall be conducted by Department staff with the responsible party having the option of bringing in outside experts as needed with Director approval.

Brooks C&D Landfill Inspection Criteria

Within 72 hours staff shall be assigned to first complete an inspection of the gas collection system and secondary inspection of earth surfaces. The gas collection system shall be inspected for any damage to piping, wells, or equipment that might indicate a leak or plugging. The surfaces of the site shall be visually inspected for unusual settlement or sloughing.

The inspections of these facilities shall be conducted by Department staff with the responsible party having the option of bringing in outside experts as needed with Director approval.

Gilbert & Mosley Project Inspection Criteria

Within 96 hours Department staff will drive and/or walk to complete a visual review and search for signs of damage or leaks along the entire collection piping system. Wells, valves, and other structures shall be checked for visual signs of movement and/or damages. Any repairs to these facilities completed in the first week following the event shall also receive special inspection to assist with determining if the damages are earthquake related. The WATER Center treatment portion of the project shall be inspected thoroughly to identify any issues that would affect its operation. This shall include, but not be limited to; building condition, all visible brick, concrete, and steel structure; process piping, plumbing, electrical conduits, electrical controls and drives, control cabling and conduits, HVAC systems, and other mechanical equipment. Pumps and other equipment should be inspected for movement of their base or movement on their base.

The inspections of these facilities shall be conducted by Department staff with the responsible party having the option of bringing in outside experts as needed with Director approval.

Communications

News briefs and coordination with City Communications Team – Penny Feist, PWU Communications Liaison

Media Questions – Alan King, PWU Department Director

Attendance with Mayor or others at News Conferences – Alan King, PWU Department Director

Communication with others, i.e. Sedgwick County EOC, Risk Management

Analysis and Reporting

As persons responsible for inspections of the various types of infrastructure are completing those inspections they will report initial findings to those responsible for communications. They will also complete further analysis of those findings to determine if any are of an urgent nature and take appropriate action to secure the safety of the public and City staff.

Each area or type of infrastructure shall complete a report of findings and analysis within the timeframe indicated by the Department Director. This timeframe will vary based on the severity of the event.

The reporting will include at minimum the following:

1. **Description of the inspections completed**
2. **Description of the inspections still to be completed and estimated time frame**
3. **Results of the inspection will include a list of observed damages.**
4. **For each observation one shall include a location, a description of the damage, and the potential consequences of the damage, what fix or repairs are needed, and an estimated cost of those repairs.**

The reports from the individual infrastructure types shall be sent to and compiled by Penny Feist or other designated member of staff. The complete report shall include:

1. **Full description of the event including magnitude, intensity, depth, clustering, time, location, and damage levels expected from USGS data.**
2. **Descriptions of the inspections completed and results from the various groups.**
3. **Where reporting is documented and whom it is distributed to.**
4. **Next steps, describing further planned activities and plan for hotwash.**

Next Steps

In the reporting related to the activation after an event, there shall be documented a distribution list for the report and a plan for an event hotwash. The hotwash shall be scheduled to discuss the activation activities and results as well as the experiences of those involved. The results of this hotwash shall be recorded and used to further improve this plan for future events and increase the coordination and cooperation of those involved.