Shake it out

Earthquake drill highlights some longtime faults in state's preparedness

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- By Phillip Sitter phillip@newstribune.com

Students in Tawnya Veit's first-grade room at Cedar Hill Elementary School stayed under the desks during Thursday's earthquake drill. Bryan Martinez, left, and Teague Schwindel wait for the all clear signal as they hold on to the desks and survey the room.

The magnitude 6.5 earthquake struck at 10:19 a.m, centered somewhere in the Bootheel of Missouri.

The shaking lasted for about 45 seconds, and was felt as far away as the East Coast. The most severe damage occurred in the areas of Missouri, Illinois, Arkansas, Tennessee and Kentucky that border the Mississippi River, where soft soils liquefied and added to the quake's destructive power.

There was "widespread damage" to drinking water distribution and wastewater collection systems, the national power grid, oil and gas transmission pipelines, roads, railroad tracks, cellphone towers, phone lines, dams and levees — resulting in fires, flooding and a breakdown of basic services.

Casualties numbered in the thousands, with about 100 deaths. Most people's injuries were caused by falling furniture and appliances, broken glass and pieces of buildings.

Fortunately, none of this actually happened Thursday morning, but the

"basic earthquake scenario" of a damaging temblor in the New Madrid Seismic Zone was one provided for planning purposes in the Great Central U.S. Shake Out — a regional earthquake drill that involved 2.6 million participants in 14 states.

First-grade teacher Tawyna Veit's students at Cedar Hill Elementary School in Jefferson City were among approximately 380 children who took part in the drill at 10:19 a.m. Thursday — 10:19 on 10/19.

Veit had just begun reading a book titled "Fun at the Beach" to some students when an announcement came over the school's intercom. "Teachers and students, at this time please take cover for our earthquake drill. This is an earthquake drill."

With that, Veit's students calmly got under their desks and held on to them for a little more than two minutes. For a simulated earthquake, the scene was actually pretty quiet; only background music and a barking cartoon dog from an open application on a tablet broke the silence.

"'So when it's over, do you want us to help you pick up?'" Veit said her students asked her ahead of time about fallen classroom items, but the Shake Out didn't have quite that degree of realism.

First-grader Bryan Martinza was a little shy afterward, but he nodded affirmatively when asked if he felt ready for an earthquake.

Cedar Hill's Principal Stacy Fick said students do an earthquake drill twice a year, just like other emergency drills for situations like fires and tornadoes.

"A damaging earthquake in the NMSZ of magnitude 6.0 or greater occurs about once every 80 years," according to information from the Missouri State Emergency Management Agency. The last time such an event occurred was a magnitude 6.6 quake in 1895 near Charleston.

SEMA reports that according to the United State Geological Survey, there's a 25-40 percent chance a similar-size quake could hit within the next 50 years.

In the same timespan, there's also an estimated 7-10 percent chance of a repeat quake akin to one of several that hit the region in late 1811 and early 1812, with magnitudes estimated to be between 7.0 and 8.0. Earthquakes of that size are estimated to hit the region about every five or six centuries.

While the smaller, more imminently likely quake would not be as destructive, "Un-reinforced masonry buildings and other structures from Memphis to St. Louis could experience serious damage," SEMA information said.

"We expect there to be a lot of damage in St. Louis," said Jeff Briggs, Jefferson City-based Earthquake Program Manager for SEMA.

He said not as much damage would be expected in Jefferson City because of its distance from a likely epicenter in the Bootheel or thereabouts, but shaking would still be felt across the entire state in the event of a repeat of 1811 or 1812. "That's what we prepare for."

Eric Sandvol said he's not aware of any historical accounts from Mid-Missouri from 1811 and 1812, so "it's tricky to say" what the effects of a similar-size quake would have been or would be here. Sandvol added while accounts from the time do exist from roughly the same distance but to the east, seismic waves don't travel from an earthquake epicenter with perfect symmetry.

Sandvol is an assistant professor in the University of Missouri's Department of Geological Sciences, with his expertise in seismology.

He said river basins are the areas of highest concern because of the sandy, wet soils there, and bridges in particular located as far west as Jefferson City could be at risk of damage from liquefaction. "Whether that can happen this far away is questionable," he caveated, though, mostly because he doesn't know of any tell-tale evidence of

liquefaction in the area like “sand blows” — spots where geysers of groundwater shot up during earthquake shaking and deposited sand.

However, he also doesn’t know if anyone’s ever looked for that evidence in Mid-Missouri.

In terms of other local structures, Jefferson City Building Official Larry Burkhardt said “yes, there is a city-wide earthquake code” that addresses seismic design categories B through D.

A seismic design category is a way of quantifying the vulnerability of a structure to an earthquake; letters toward the beginning of the alphabet on a scale of A-F signify a lesser level of risk, and E and F have the highest levels of risk, according to information from the International Code Council.

Vulnerability is calculated based on a building’s occupancy category and the intensity of the ground motion to be expected at its location.

What that means in terms of what features a given building is required to incorporate into its design depends on things like what it will be used for, its site and its structural rigidity, Burkhardt said.

“If the frame is rigid, it’s more subject to any type of ground motion, a lateral force that’s going against the building,” he said. “That’s when you have to increase the structural components to withstand that,” he added.

“There is no statewide (seismic) building code in Missouri,” Briggs said, adding such decisions are all left to be made on the local level.

The Missouri Seismic Safety Commission has urged the adoption of a statewide standard since at least October 1999.

State statute requires all new public buildings in areas of the state at risk for severe shaking from a New Madrid

earthquake to meet seismic codes. This does not apply to public buildings built before August 1991 or private structures, including single-family homes or duplexes in those areas.

The Seismic Safety Commission was formed in 1995, and consists of 17 members: 15 professionals in relevant fields, one Missouri House-appointed member and another from the state Senate.

The commission’s 2016 annual report, dated April 20, 2017, and addressed to Gov. Eric Greitens details numerous efforts of continued work on the group’s objectives, including an increase in earthquake awareness and education, the reduction of hazards through mitigation, improved post-earthquake recovery and continued assessments of earthquake hazards.

The report also notes eight of its members are serving on expired terms — one since 2010, six since 2012 and another since 2014. Commissioners volunteer to serve until replaced by new appointees. Commission members serve without compensation, but can receive $50 “for each day devoted to the affairs of the commission,” according to state statute.

Another six seats were listed as vacant: public education; mechanical engineering; the American Red Cross; geology; business; and emergency management.

Briggs confirmed Thursday the list was still up to date.

“We would love to get all those vacancies filled. We could certainly take on more tasks,” he said of having more people, though he added the commission does the best it can with the resources it has.

“There’s no question it’s limited the effectiveness of the commission,” Sandvol said, who was last year’s chairman. He’s vice chairman this year after he reached term limits.

“Trying to keep the commission going becomes a part of what the commission does,” he said, adding this subtracts from more productive things they could be doing.

He said the problem seems to lie with the office of the governor. Names of potential new commission appointees are submitted there, and while Sandvol said he doesn’t know much about the executive branch’s process other than “it appears to be difficult and time-consuming,” he added “This is truly where the bottleneck is.”

After the governor’s office, appointees to the commission go through a confirmation process by the state Senate

— a “typically quick and perfunctory” half day at most, Sandvol said of his experience.

He said the problem with the governor’s office is not particular to any one administration and probably dates since before the Gov. Jay Nixon years.

He added the commission has an idea to have professional societies help “remove this burden of going through whatever process this is,” and let people stop “holding on by their fingernails” just to let the commission keep a quorum.

“I’m optimistic about it,” he said of the commission’s future. “I don’t think you will see the commission going away,” but he added a longer-term solution is needed.

Meanwhile, he said the commission’s biggest achievements in his experience have been the continued development of the “rapid visual screening” program for schools, and continued public awareness raising. The latter is where he said he’s taken a lead.

The rapid visual screening program is a free service provided to school districts that has volunteer structural engineers, architects and other construction professionals look for potential seismic hazards in school buildings.

Sandvol called the program “amazingly cost effective” and said money from grants covers the expenses. The engineering and building professionals draw up a report to summarize their findings and give it to school administrators.

This can help prioritize structural retrofits or non-structural improvements that could be made.

Jason Hoffman, Jefferson City Public Schools’ chief financial and operating officer, said Thursday he wasn’t aware of the program, but would like to learn more about it, especially given the district will soon have a new security, safety and transportation coordinator.

More information on the rapid visual screening program can be accessed through Jeff Briggs at 526-9232 or at jeff. briggs@sema.dps.mo.gov.

In terms of other measures the general public can do to better prepare for earthquakes, Sandvol mentioned bolting down water heaters and pipes, and securing bookshelves and other tall furniture.

The best general advice for preventing injury during an earthquake is to drop to the ground, take cover under a sturdy desk or table if available, cover the head and neck with hands and arms, and hold on until the shaking stops.