

FINAL TECHNICAL REPORT

Award Number 03HQAG0103
The Public Earthquake Resource Center at CERI
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Term Covered by the Award: 8/01/03 – 7/31/05

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Final Report USGS/NEHRP, Award Number 03HQAG0103, *The Public Earthquake Resource Center*

ABSTRACT

The Public Earthquake Resource Center was developed to support the US Geological Survey in its mandate to emphasize earthquake hazards research and outreach and education in four geographic regions, one of which is the New Madrid seismic zone in the Central US. The USGS Earthquake Hazards Program benefits from its collaborative research with the Center for Earthquake Research and Information at the University of Memphis. PERC addresses the need for the USGS to strengthen the regional effort to reduce earthquake hazards, particularly to conduct education and outreach activities at local and regional levels. The PERC is staffed by a dedicated PERC Manager, funded in part by the USGS through this agreement, under contract to CERI. USGS funds in this proposal provided partial salary support for the PERC Manager to work more effectively with USGS staff.

Report

The Center for Earthquake Research and Information (CERI) at the University of Memphis opened the Public Earthquake Resource Center (PERC) in 2002 through a partnership with the US Geological Survey. The USGS award of \$20,000 for this period was used to partially support the PERC Manager. The PERC is a 1300 square foot building that houses a variety of interactive exhibits and information to increase public understanding of Earth Science, earthquake hazards, seismology, and some basic principles of earthquake engineering.

Additionally, the Memphis-based US Geological Survey staff has offices in the PERC facility with signage. This benefits the USGS by allowing greater visibility and direct name recognition in the Memphis area. Facility exhibits were developed in 2003 and constructed in 2004. Through July 2005, the facility hosted over 3700 visitors and has become a focal point for the distribution of earthquake information. The PERC system also supported numerous K-12 teacher and professional development workshops that are organized by CERI and US Geological Survey staff. Considering that most of the teachers attending these workshops teach over 150 students per day, the PERC system indirectly impacts over many thousands of students each year. Because of the very photogenic nature of this facility, the PERC facility has also become a resource for the media following felt earthquakes in the New Madrid seismic zone and other Eastern US seismic source zones.



Figure 1. Jill McCarthy (USGS) and Arch Johnston (CERI) presiding over the Grand Opening of the PERC in May of 2004.



Figure 2. Buddy Schweig (USGS), Joan Gomberg (USGS), and Natasha McCallister (USGS) serving as docents in the PERC's liquefaction displays.

CERI has served as an earthquake education resource for over 25 years speaking to 1000's of K-12 students annually. The PERC facility, formerly the office of Parking Administration, was placed under the management of CERI with the specific goal of becoming a public service area for earthquake information. Interactive displays were designed and built by CERI technical staff with direct input from USGS graphic artists (Susan Rhea) and scientists (Buddy Schweig and Joan Gomberg). The PERC has become a regular presentation destination for K-16 teachers and students, teacher workshops, professional groups, and the media. Shelby County Mayor, A.C. Wharton chose the facility as a press conference area following M 4.1 earthquakes that alarmed residents in May and June of 2005, providing exposure for the USGS and CERI in an public area that is informative, media friendly, and photogenic.

The implementation of the PERC and USGS offices at 3918 Central is significant in that it establishes a long-term strategy to achieve some of the education and outreach goals that are common to the USGS, CERI, and MAEC. The following general goals were pursued and completed from 8/31/03 – 7/31/05

1. Developed exhibits, posters, and other informational material about earthquakes and earthquake hazards to be distributed at the PERC.
2. Developed workshops, including instructional materials, about earthquake and earthquake hazards to be given to K-12 teachers.
3. Participated in activities to enhance the development of the PERC.
4. Gave tours of the PERC and CERI/USGS facilities in Memphis.
5. Coordinated PERC development and activities with other similar centers operated by the USGS and other groups.

The PERC manager also arranged for the facility to be advertised on the web and through the Memphis Convention and Visitors Bureau, which distributes brochures at various visitor and welcome centers. Presentation/tour requests are processed primarily through the PERC website. Prominent signage with USGS recognition is located on highly traveled Central Avenue.

The PERC System

The PERC is more than just a museum, it is a system of information transfer that incorporates web-based, hard copy, and person to person communication strategies that are informed by interactive displays in order to explain very complex scientific topics such as liquefaction, building resonance, earthquake monitoring, earth processes, and rapid earthquake information processing. Special emphasis is placed on reaching out to underserved K-12 students, who are typically located in highly vulnerable unreinforced masonry structures. Earthquake loss estimates for the area indicate thousands of students and teachers could be injured severely, or die, in the event of a magnitude 7.7 in the NMSZ during work hours. Socially vulnerable people who spend a lot of time in

structurally vulnerable environments present an important target for basic education and outreach programs. These factors have greatly influenced CERI management to support K-12 and public outreach activities in the Memphis area.

Internet resources

The PERC manager currently participated in monthly USGS staff meetings of the Central region staff and is listed as a USGS staff member at <http://earthquake.usgs.gov/regional/ceus/contacts/index.php>. The PERC manager also maintains a website calendar that is used for scheduling and documentation. This calendar is on-line at <http://www.ceri.memphis.edu/calendar.html>. The PERC also provides Internet based earth science and earthquake hazard resources through its website at www.ceri.memphis.edu/perc providing basic awareness information as well as lesson plans for engineering and Earth Science teachers.

Operation and Maintenance

The PERC is located at a high visibility location on the University of Memphis campus with handicap access and a dedicated visitor's parking area and USGS staff parking area. The facility is managed by CERI with direct input from USGS staff. The facility is currently open to the public from 10:00 AM to 2:00 PM, Monday – Friday. Michelle Dry was hired in consultation with USGS staff to manage project development, marketing, and operations. A student worker, funded by the Mid America Earthquake Center, is on staff to help with presentations and tours. CERI technical staff and University of Memphis Physical Plant provide routine maintenance of the facility and its displays. CERI and the MAE Center provided over \$25k in 2004 funding to renovate sections the facility, replace all windows, build displays, handicap ramp, interior painting, and install museum-grade track lighting. This does not include the hundreds of labor hours from CERI staff to design and build displays.

The front two offices at 3918 Central are used for PERC displays and the additional space is used for offices of the Memphis-based USGS employees (Figure 1). 100 sq. ft of the facility is shared storage/office equipment area (room 103). Room 102 is the office of the PERC staff. Room 100 currently houses the helicorder/Seismic Monitor display, “make you own earthquake “ display with Lehman seismometer and oscilloscope, liquefaction shake table, real time earthquake displays from CERI (regional) and the USGS (global), and a touch sensitive monitor with embedded PowerPoint presentations covering a variety of earthquake-related topics. Room 101 houses static a full-scale model of a liquefaction trench, a static display about historical Central US earthquakes, and a building resonance shake table display (see Appendix A for display photos). All of these displays have proven extremely useful in effective information transfer to with non-technical users, including engineers, the media, politicians, and emergency managers.

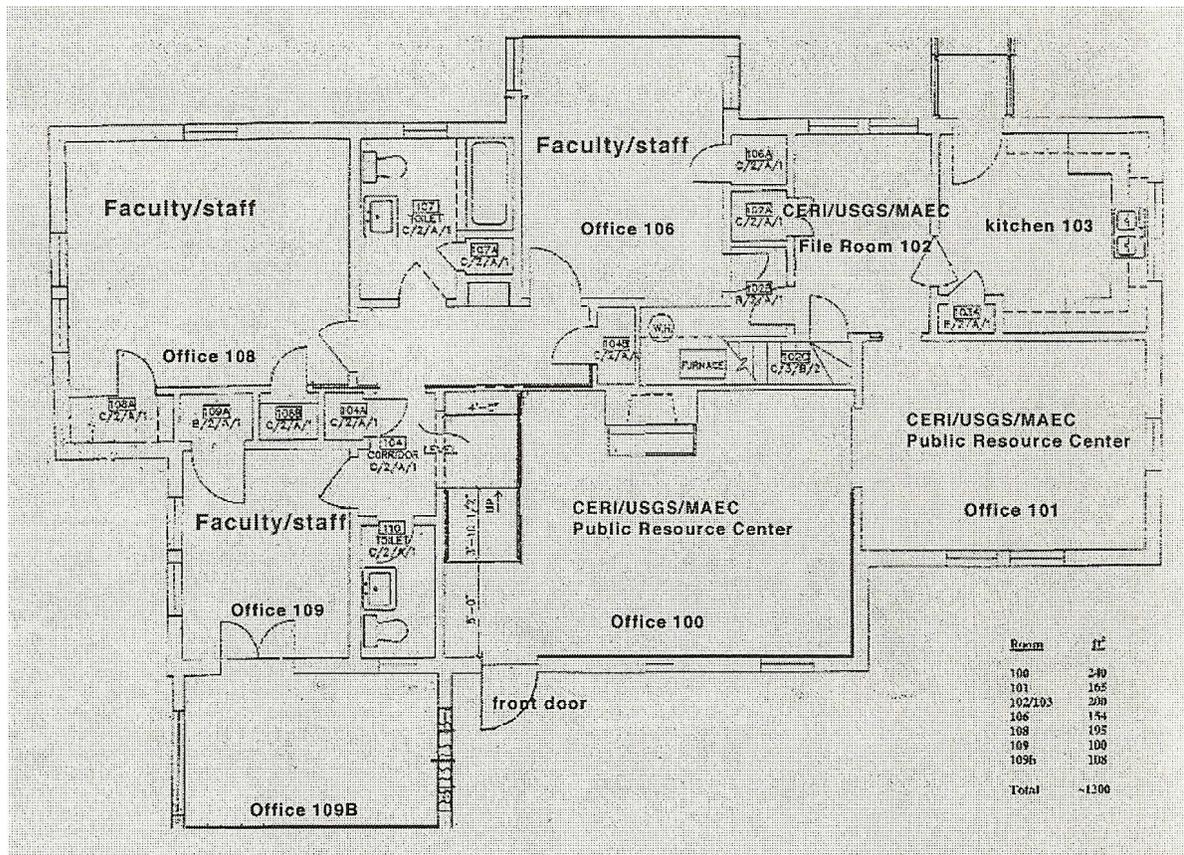


Figure 3. Floor plan for 3918 Central and projected space utilization plan for the PERC.

PERC Staff

The PERC manager, Michelle Dry, markets and develops PERC activities and gives presentations (general K-12 and in-service and pre-service training workshops for teachers) and assists in writing proposals for external funding. The portion of the PERC manager's salary that is not covered by this proposed cooperative agreement is paid currently from MAE Center and State of Tennessee funds. Ms. Dry was hired in consultation with USGS staff. She has an M.S. in Education from the University of Memphis and high school teaching experience in the Memphis area. She provides expertise in working with teachers, a high degree of organizational structure, and has modified our programs to better address the State standards for teaching in learning. This translates into better focus on topics covered at the PERC that are required information for the standardized student aptitude tests and greatly adds to the interest from K-12 teachers and students, and teacher organizations. Ms. Dry has also increased awareness of the PERC and the US Geological Survey's sponsorship through brochures that are distributed in State Visitor's Information Center and membership activities with the Memphis Convention and Visitor's Bureau.

Current MAE Center support to CERI Information Services provides one Earthquake Education Specialist (student worker-EES) to give presentations to K-12 groups and help answer the hundreds of information requests that come to CERI through all written and electronic formats. The EES maintains the displays and staffs the PERC during hours of operation. The PERC Manager helps coordinate technical outreach presentations and also provides gives K-12 presentations and teacher workshops (pre-service and in-service training).

PERC Accomplishments

The following tables record K-16 groups and teachers that have visited the PERC in 2004 and 2005. These include K-16 groups from Tennessee, Mississippi, and Arkansas. These totals do not include workshops for professional groups visitations by the media and public officials, which also number in the thousands. Additionally, the PERC hosted middle school and high school teacher workshops that indirectly impacted over 40,000 students during this period.

2004

MONTH	TOTAL	DROP- IN	SCHEDULED
MAY	307	0	307
JUNE	118	5	113
JULY	92	5	87
AUGUST	9	9	0
SEPTEMBER	295	5	290
OCTOBER	186	18	168
NOVEMBER	281	13	268
DECEMBER	97	1	96
TOTALS	1385	56	1329

2005

MONTH	TOTAL	DROP-IN	SCHEDULED
JANUARY	384	0	384
FEBRUARY	337	14	323
MARCH	520	7	513
APRIL	182	9	173
MAY	72	1	71
JUNE	153	13	140
JULY	335	6	329
AUGUST	39	7	32
SEPTEMBER	53	6	47
OCTOBER	211	5	206
NOVEMBER	202	6	196
DECEMBER	15	0	15
TOTALS	2503	74	2429

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Dr. Steve Horton, CERI

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Dr. Jill McCarthy, USGS

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Greg Steiner, CERI

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David Steiner, CERI

Related Publications: None