MCEER
University at Buffalo
The State University of New York
Red Jacket Quadrangle
Buffalo, New York 14261-0052

Phone: 716-645-3391
Fax: 716-645-3399
Email: mceer@buffalo.edu
Web: http://mceer.buffalo.edu

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Contacts: Ellen Goldbaum (goldbaum@buffalo.edu)
University at Buffalo
Phone: 716-645-4605
Fax: 716-645-3765

Donald J. Goralski (goralski@buffalo.edu)
MCEER
716-645-5151
716-645-3733

MCEER and Calspan Partner for Full-Scale Bridge Test

Ashford N.Y. facility, will serve as site for tests involving extreme events and environmental conditions

Buffalo, N.Y. – Listen up America -- Buffalo's snow and its four-season climate are beautiful!

That's the message that researchers at MCEER, the University at Buffalo's Multidisciplinary Center for Earthquake Engineering Research, and Calspan, Western New York's global leader in independent aviation and transportation testing have for the rest of the nation. The two internationally renowned organizations plan to capitalize on the region's oft-berated climate through a unique partnership and test program that will subject two full-scale bridges and their advanced protective technologies to a full range of naturally occurring environmental and climatic conditions, as well as earthquake vibrations.

The purpose of the partnership and the studies are to combine the talents of both organizations to effectively meet the nation's growing needs for the intelligent renewal and improved resilience of its infrastructure, in this case, bridges, from natural-occurring phenomena and extreme events. In a 2009 Report Card for America's Infrastructure, the American Society of Civil Engineers assigned an overall grade of "D" to our nation's infrastructure. The report also noted that "more than 26 percent, or one in four, of the nation's bridges are either structurally deficient or functionally obsolete."

The MCEER-Calspan partnership will leverage the infrastructure-research skills of MCEER, a national center of excellence dedicated to improving the disaster resilience of engineered structures, with the testing expertise of Calspan Corporation, internationally recognized for its rich heritage of innovation and proven excellence in technology and science.

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"This partnership puts each of our organizations into exciting, new worlds," said Andre Filiatrault, Ph.D., MCEER director and professor of civil, structural and environmental engineering at UB. "There is a tremendous synergy in the ability of Calspan to apply its testing expertise to develop full-scale experimental capabilities that enable MCEER to test large infrastructure components, such as roads and bridges, under multiple hazards including earthquakes and other extreme events." Filiatrault also noted that Calspan's Ashford Facility near Springville, N.Y., provides ample acreage to conduct such full-scale tests, as well as a wide array of naturally occurring weather conditions to expose infrastructure test specimens to the natural elements.

"Structural engineers have traditionally sought solutions to infrastructure problems in the confines of a laboratory," he added. "Calspan's Ashford Facility provides an opportunity to test new technologies and infrastructure remedies in the great outdoors, where they will have to perform over time and varying climatic and other conditions."

Thomas Pleban, executive vice president of Calspan, said that the new relationship not only has the potential to enhance Calspan's current test capabilities but will also benefit Western New York as a whole, by making it the world's premier destination for full-scale infrastructure testing.

"Calspan is enthused about this new partnership, because it gives us the opportunity to work with world-renowned MCEER, and provides Calspan the opportunity to enlist UB for synergistic engineering assistance as Calspan broadens its business base, both in the U.S. and internationally," said Pleban.

Filiatrault said that the aging infrastructure in the U.S. is reaching a critical point.

"As infrastructure approaches the end of its lifespan, it becomes increasingly susceptible to tremendous damage, especially during extreme events," he said. "Our nation needs to renew its infrastructure but how shall we go about it? Do we simply replace the old with the new, or do we rebuild it more intelligently so that it is designed and built to withstand multiple hazards throughout its lifetime? The MCEER-Calspan partnership will focus on finding ways to protect our growing population and way of life, by renewing and preserving our infrastructure through the development and validation of the most innovative and cost-effective methods available."

The initial focus of the partnership is the development of a full-scale bridge test at Calspan's 700-acre Ashford facility. The Ashford facility, about 35 miles south of Buffalo, will enable MCEER researchers to subject two adjacent single lane bridges equipped with state-of-the-art seismic isolation technologies, to harsh, real-world conditions -- and earthquake vibrations.

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Construction of the 72-foot long bridges will begin this fall, with a five-year test program scheduled to begin on July 1, 2010. Eleven concrete bridge girders donated by Hubbell Concrete of Utica, NY, have already been transported to the Ashford site.

Testing will chronicle the performance of seismic isolation technology over time and over a wide spectrum of temperatures and other environmental conditions. Seismic isolation decouples a structure from its foundation, effectively isolating it from damaging ground vibrations. The initial test program will examine the change in properties of elastomeric or rubber isolation bearings in a wide range of temperature settings. Bearings are being provided by Dynamic Isolation Systems, Inc., a world leader in the seismic isolation of bridges and buildings, with nearly 300 projects to its credit around the world.

The project is supported by funding from New York State and industry donations.

Michael Constantinou, professor of civil, structural and environmental engineering at UB, acknowledges that "while seismic isolation technology is widely accepted in the civil engineering field, expanded understanding and continued development can only help to further its use – and the resilience of structures that it protects."

According to George C. Lee, principal investigator for the project, and leader of MCEER's 17-year-old Federal Highway Administration-funded research program, studies show that the US presently has some 590,000 highway bridges – most built during the 1950s and '60s, – due to reach their 75-year design lifespan within the next two decades. "This is certainly true for bridges in New York State," Lee added. "Aging bridges will have to be replaced or retrofitted or they could unexpectedly collapse, as has happened in recent years for various reasons."

On August 1, 2007, the rush-hour collapse of the I-35W bridge over the Mississippi River in Minneapolis, Minnesota, plunged dozens of cars and their occupants into the river, killing 13 people and injuring another 145. The bridge was one of Minnesota's busiest, believed to carry 140,000 vehicles per day. In Washington County, Pennsylvania, a concrete bridge similar to the ones MCEER researchers will test, collapsed onto Interstate 70 in December of 2005.

"This is indeed a problem," echoed Harvey Stenger, dean of UB's school of engineering and applied sciences. "But this opportunity with Calspan enables engineering researchers at MCEER and UB's department of civil, structural and environmental engineering to once more, push back the boundaries of discovery, and develop solutions that will address this urgent need and renew, preserve and protect our nation's bridge infrastructure from a variety of hazards and extreme real-world conditions." Stenger added that he is excited about the promise of this new university-industry partnership with Calspan.

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The project will also be a strong catalyst for innovative educational initiatives in UB's department of civil, structural and environmental engineering. "In addition to adding to UB's legacy in bridge and highway engineering research, this project provides unique, hands-on learning opportunities for students enrolled in transportation engineering and the new Master of Engineering (M. Eng.) program with a concentration in bridge engineering at UB," said A. Scott Weber, chair of the school's department of civil, structural and environmental engineering. "The full-scale, real-world experience that students will gain, coupled with opportunities to work alongside industry in this project, will best prepare them to meet our nation's growing needs for engineers highly-skilled in infrastructure renewal," he added.

UB Provost Satish K. Tripathi said that the agreement between MCEER and Calspan intensifies the work of the UB 2020 strategic strength in extreme events, in which MCEER has played a pivotal role.

"Tackling the issue of how to protect and improve the nation's aging infrastructure in the face of extreme events, required MCEER to embrace a bold, new vision," he said. "Our MCEER researchers knew that in order to adequately address such big-picture issues, they would need resources that matched the size of the problem. They went looking for a way to make it happen and that's when they approached Calspan."

The new full-scale bridge testing capabilities will better enable MCEER to expand its discovery of knowledge, tools and technologies to improve and preserve the resilience of the nation's infrastructure against a variety of hazards. "This couldn't have been possible without Calspan's collaborative spirit and unique capabilities," said Filiatrault. "We look forward to what's to come."

Founded in 1986, MCEER, the Multidisciplinary Center for Earthquake Engineering Research, headquartered at the University at Buffalo is a national center of excellence in advanced technology applications dedicated to reducing losses from earthquake and other hazards nationwide. One of three such centers in the nation established by the National Science Foundation, MCEER has been funded principally over the past two decades, with more than $67 million from NSF; more than $47 million from the State of New York and more than $34 million from the Federal Highway Administration. Additional support comes from the Federal Emergency Management Agency, other state governments, academic institutions, foreign governments and private industry.

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Conceived in 1940, Calspan Corporation was originally founded in 1943 as part of the Research Laboratory of Curtis-Wright Division at Buffalo, NY. Internationally recognized for proven excellence in technology and science, the company has built its reputation on a rich heritage of innovation. Calspan's corporate structure includes six operating groups, five in Buffalo: flight research, transonic wind tunnel, transportation research, crash data research, and systems integration and design; and one, Bicycleworks located in Mojave CA. The company's main complex is located at 4455 Genesee St. in Cheektowaga, NY. Calspan has 245 employees.

The University at Buffalo is a premier research-intensive public university, a flagship institution in the State University of New York system and its largest and most comprehensive campus. UB's more than 28,000 students pursue their academic interests through more than 300 undergraduate, graduate and professional degree programs. Founded in 1846, the University at Buffalo is a member of the Association of American Universities.

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