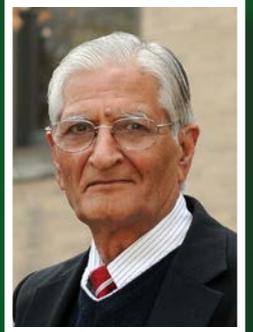


The BRIDGE

Civil, Architectural and Environmental Engineering

Winter 2013 | Vol. 31

MISSOURI
S&T



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Roof turned into teaching tool page 4

Graduate fellowships ... a key to our future

Mark Harms, P.E.
CE'83, MS CE'85

President, SCI Engineering Inc.

President, Missouri S&T
Academy of Civil Engineers

The Missouri S&T Department of Civil, Architectural and Environmental Engineering, the Academy of Civil Engineers and SCI Engineering Inc. are embarking on a collaborative effort to secure and enhance the reputation of the Department and its programs for generations to come. We believe that the Vision 2020 Strategic Plan is more than just an ideal theme — it is truly an insight into the future of engineering education.

In 2006, SCI had a vision to strengthen the graduate program in the CARE Engineering Department. Joining several other alumni and their companies, SCI began funding an annual graduate fellowship in geotechnical and geoenvironmental engineering. A few years ago, that vision was expanded by establishing the SCI Engineering Graduate Fellowship Endowed Fund which provides financial assistance to perpetuate the graduate program — now and in the future.

The graduate program has been identified in the Vision 2020 Strategic Plan as one of the department's greatest needs. Building upon Missouri S&T's long-standing foundation of excellent undergraduate education, SCI and collaborating alumni firms sought to enhance the department's graduate programs and raise



them to the same level of excellence and expectation at a national level.

By providing stipends to cover living expenses as well as tuition and fees, graduate fellowships will facilitate the recruitment of outstanding graduate students that will propel the department's graduate programs to the level of excellence expected from Missouri S&T. Investing in graduate programs significantly strengthens the educational experience for all students, as graduate students endeavor to learn and solve problems by working directly with S&T faculty who allow strategic insight into their intellect.

Missouri S&T has an excellent reputation for graduating "street-ready" engineers at the undergraduate level. By providing

graduate fellowships, we are encouraging undergraduates to continue their education as they take their next steps to becoming "career-ready" engineers in workplaces that increasingly stress higher levels of scientific and technological expertise. Missouri S&T, already one of America's top technological research universities, can then fulfill its mission to educate tomorrow's leaders by equipping them with the knowledge and skills to meet the greatest of challenges and to help change the world for the better.

Your loyal support will leave an indelible legacy at Missouri S&T. We at SCI Engineering hope you will join us in supporting the vision. For information on how to establish an endowed fund, please see the box below.

Currently, the minimum to endow a fund at S&T is \$25,000 and pledges may be paid over five years.

For more information about the Graduate Student Scholars Fellowship Program, please contact **Paula McBurnett**, Senior Development Officer at 1-800-392-4112 or email paulam@mst.edu.



Popsicle Challenge

Dr. Stuart Baur inspired a group of middle school students with his Popsicle Challenge. The students were given 200 Popsicle sticks to build a tower at least one meter high within one hour. The design illustrated the team's architectural engineering capabilities and showcased their ingenuity.

DEPARTMENT ADMINISTRATION

Department Chair William P. Schonberg, Ph.D., P.E.

Associate Chair Joel Burken, Ph.D., P.E., BCEE

Assistant Chairs

Civil: Ronaldo Luna, Ph.D., P.E.

Architectural: Stuart Baur, Ph.D., A.I.A.

Environmental: Mark Fitch, Ph.D.

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Letters should include the writer's full name, address, email and daytime phone number. Copy may be edited for clarity and space.

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S&T's green roof

Research leads to the development of a computer model that can predict green roof water benefits before a roof is ever designed and built.

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Innovative concrete bridge

One of the nation's first bridges to incorporate an unusual concrete mix in its girders and support structure.



The Class of 1963
celebrated its
Golden Alumni
Reunion in May.

Photo by B.A. Rupert

Green roof research

PRESENTED AT INTERNATIONAL CONFERENCE

By Mary Helen Stoltz

Missouri S&T graduate **Grace Harper** spent her final year at S&T studying green infrastructure as an alternative to large-scale grey infrastructure projects for stormwater management. She presented the results of her research in October at the 10th International Phytotechnologies Conference, held in Syracuse, N.Y.



Grace Harper

With funding from the U.S. Geological Survey, Harper performed hydrologic studies on how a green roof attenuates stormwater flows. Her work led to the development of a

computer model in collaboration with **Matt Limmer**, Ph.D. candidate in civil engineering, that can predict green roof water benefits before a roof is ever designed and built.

Harper, who earned a bachelor of science degree in geological engineering in 2012 and a master of science degree in environmental engineering in 2013, both from Missouri S&T, also studied the effects of wind erosion on green roof vegetation and the quantity and chemical composition of the water that drains off of the roof. Her results will be published in an upcoming issue of the journal *Ecological Engineering*.

Harper conducted her research on S&T campus rooftops, including a green roof test bed and the Baker Greenhouse on the roof of Butler-Carlton Civil Engineering Hall and the new green roof atop Emerson Hall. The green roof features 16,000 plants arranged in the shape of a shamrock and provides research and teaching opportunities for S&T faculty and students.

The roof is divided into three sections, each covered with different roofing materials, which will allow S&T researchers to compare the water runoff control, water quality and thermal properties of each material.

The first section is a standard black rubber roof. The second section is covered in white thermoplastic polyolefin (TPO) roofing membranes. TPO roofing systems are believed to improve a building's energy efficiency by reflecting heat from the sun. They provide resistance to ultraviolet, ozone and chemical exposure.

The third section is a GAF-produced GardenScope roof. A base layer of TPO material is covered by a drainage system and then topped with regional vegetation planted in a growing medium similar to the topsoil found in central Missouri. Most of the 16,000 plants growing on the green roof are a variety of sedum and all were chosen for their ability to thrive in direct sun and wind with limited water.



Photo by Matt Limmer

Learn more: care.mst.edu/facilities/greenroof

"The green roof and its subsequent research projects were made possible through a unique collaboration," says **Dr. Joel Burken**, professor of civil, architectural and environmental engineering and director of Missouri S&T's Environmental Research Center. "The physical facilities department at Missouri S&T led the design of the roofing project, and

placed the green roof mat and growing medium on the roof. More than 50 S&T volunteers placed the plants; **Luce Myers**, a lecturer in art at Missouri S&T, created the shamrock design." Materials for the roof, valued at \$75,000, were donated by GAF Materials Corp., the nation's largest roofing technologies firm. **Helene Hardy-Pierce**, vice president of technical services for GAF, was instrumental in securing the donation. Hardy-Pierce is a 1983 engineering management graduate of Missouri S&T and is a member of the Missouri S&T Board of Trustees.

"The green roof has turned into a teaching and research opportunity," says Burken. He says future projects could include green construction, sustainability and green infrastructure, which uses plants to reduce water pollution from urban watersheds while cutting costs and providing additional benefits.

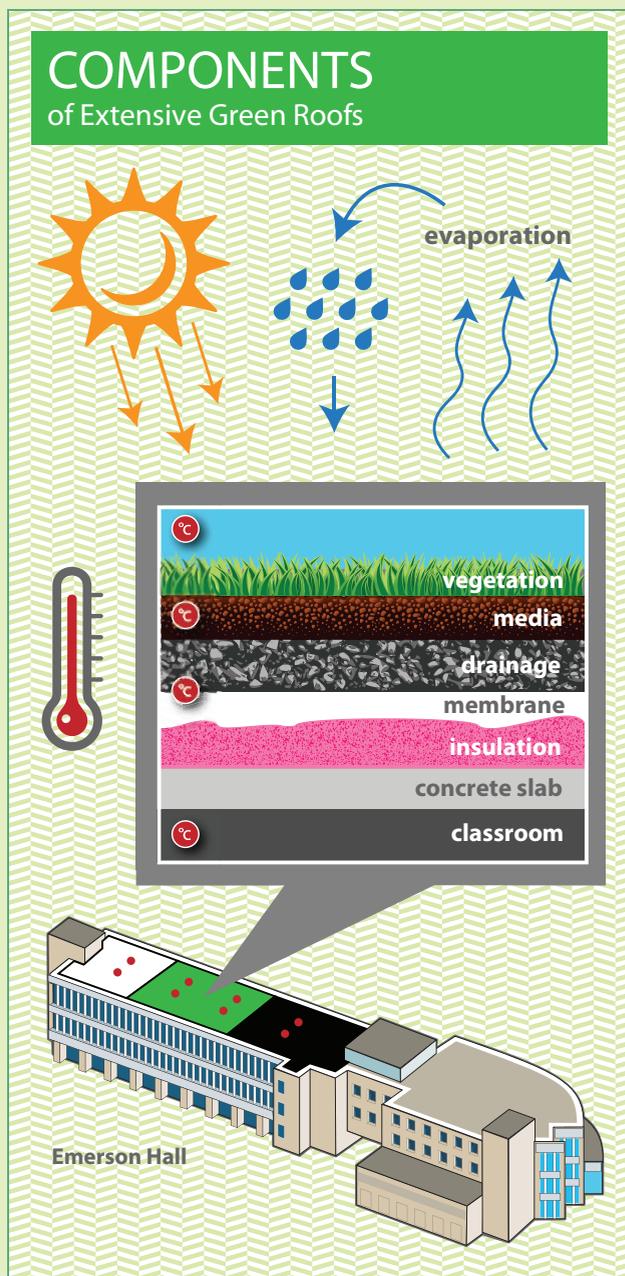


Photo by Terry Barner

From left to right: Grace Harper, GeoE'12, MS EnvE'13, Matt Limmer, Ph.D. candidate in civil engineering and professors Eric Showalter and Joel Burken.

With funding from RCI, **Dr. Eric Showalter**, associate teaching professor of civil, architectural and environmental engineering, is leading a project to study the thermal benefits of a green roof. The roof and the top floor of Emerson Hall are instrumented with a series of thermocouples to monitor temperature and energy flux.

This work led to a National Science Foundation Research Experiences for Undergraduates (REU) project. Tyler Hall, a junior in mechanical engineering at Northeastern University in Boston, worked at Missouri S&T with Burken, Showalter and **Dr. Stuart Baur**, associate professor of civil, architectural and environmental engineering, to install the thermocouples to allow for long-term thermal monitoring and energy modeling. The NSF-REU project is led by **Dr. Jonathan Kimball**, assistant professor of electrical and computer engineering at Missouri S&T.



Green Roof Components, above, were shown to decrease stormwater runoff from the roof by more than 60 percent. Many urban areas have tremendous stormwater issues when dominated by impervious surfaces that do not infiltrate or slow down rainfall. The other great benefit for large urban areas is to mitigate the heat island effect. Large urban areas retain the sun's energy as heat and can be around 4 degrees hotter in the day and 12 degrees hotter at night. When the green roof media retains rainwater, the evaporative cooling can dissipate the sun's energy, just the same as sweat. The savings for reduced air conditioning would be in the billions nationally if we could deal with urban heat island impacts. The team at S&T is looking to help in this endeavor.



ElGawady elected to The Masonry Society



Dr. Mohamed ElGawady, associate professor of civil, architectural and environmental engineering at Missouri S&T, was recently elected to serve as a member of the The Masonry Society (TMS) board of directors.

ElGawady earned his Ph.D. in structural engineering from the Swiss Federal Institute of Technology at Lausanne (EPFL) in 2004. Previously, he earned a bachelor of science degree with honors in civil engineering, as well as a master

of science degree in structural engineering, from Cairo University in Egypt. He has held positions at University of South Australia, Tokyo Institute of Technology, Washington State University and University of Auckland. He also worked in industry as a structural engineer for three years.

ElGawady, a structural engineer, studies the seismic behavior of masonry and concrete structures. His current research interests include seismic behavior of unreinforced masonry (URM) structures, the application of Fiber Reinforced Polymers (FRP) in strengthening and repair of masonry/reinforced concrete structures, seismic behavior of reinforced concrete bridges, damage-free bridge columns, segmental construction, rocking mechanics and the use of sustainable materials in seismic-prone regions.

TMS was founded in 1977 as an international group of professionals dedicated to the advancement and craft of masonry. The society has more than 650 members including: engineers, architects, builders, researchers, educators, building officials, material suppliers, manufacturers and others who want to contribute to and benefit from the global pool of knowledge on masonry.

The Masonry Society gathers and disseminates technical information through its committees, publications, codes and standards, slide sets, videotapes, computer software, newsletter, refereed journal, educational programs, professors' workshop, scholarships, certification programs, disaster investigation team and conferences.

Oerther wins AAEES video contest

By Peter Ehrhard



Dr. Daniel Oerther, the John A. and Susan Mathes Chair of Environmental Engineering at S&T, was named the 2013 winner of the Value of Certification video

contest by the American Academy of Environmental Engineers and Scientists. Certification by the academy is the highest professional recognition of practitioners of environmental engineering. It requires practicing for at least eight years with a P.E. and passing both a written and oral comprehensive examination.

In 2013, the academy solicited members to prepare personal video statements about the value of certification in their professional practice. According to academy comments, Oerther's entry "... perfectly embodied the spirit of being Board Certified as well as his sincere admiration for the Academy and its members. His commitment to excellence in environmental engineering and science practically burst through the screen."

Using clips from entries, as well as a professional editor, the academy assembled its first-ever promotional video, which is available on YouTube.

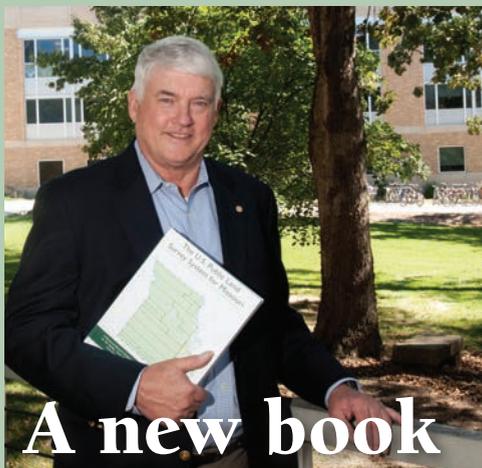


Visit youtube.com and search for aaees.org

Luna visits earthquake site



Last spring, **Dr. Ronaldo Luna**, professor of civil, architectural and environmental engineering, visited areas affected by an earthquake that occurred in Guatemala in November 2012. He visited the area as a member of the Earthquake Engineering Research Institute, a nonprofit technical society. The group collected information about the effects of the earthquake, examined current construction practices in the region and made recommendations to improve seismic risk mitigation practices in Guatemala. The report is available online at www.eeri.org.



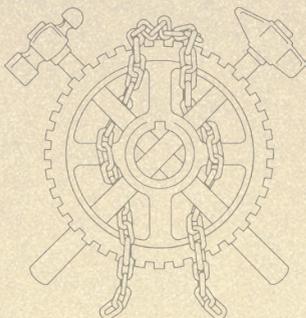
A new book

Photo by B.A. Rupert

Long-time adjunct professor **Dr. Dick Elgin** has written another book. Its subject? Surveying, what else! His latest book, “The U.S. Public Land Survey System for Missouri” is a textbook and reference manual that explains and discusses all aspects of the state’s public land survey system, which is the framework for practically all land titles in Missouri. Subjects include the French and Spanish (pre-America) grants, the original GLO surveys in Missouri, methods and instructions for conducting resurveys, court decisions and early statutes that affect resurveys and example calculation problems. Intended for both the student and practitioner, this landmark book is the first of its kind ... one that addresses all aspects of our public land system for one state. The book is available through the Missouri Society of Professional Surveyors. Elgin can be reached by email at elgin@mst.edu.

ELEVEN INDUCTED INTO ACADEMY

Eleven civil engineers with ties to Missouri University of Science and Technology were inducted into the Missouri S&T Academy of Civil Engineers during the academy's induction ceremony held in April.



Ahlvers



Amsinger



Booher

The academy honors civil engineers for their contributions to the profession, leadership and involvement with Missouri S&T. The academy also serves as an advisory group to the department.

David Ahlvers

of Jefferson City, Mo., state construction and materials engineer with the Missouri Department of Transportation (MoDOT), earned bachelor of science degrees in civil engineering and engineering management from Missouri S&T in 1984. He served as a construction inspector and as district engineer of MoDOT's Northwest District. In 2003, Ahlvers moved to his current position, where he is responsible for the geotechnical section, physical and chemical testing laboratories, pavement design, research, materials testing and oversight of the state construction program. He chairs the American Association of State Highway and Transportation Officials' Roadways and Structures Committee and serves as Missouri's representative to the Research Advisory Council. He was an officer in the St. Joseph Rotary Club and served on the board of directors for the Chamber of Commerce.

Gary Amsinger

of Defiance, Mo., corporate vice president of safety for McCarthy Building Companies Inc., earned a bachelor of science degree in civil engineering from S&T in 1980. He joined McCarthy as a project engineer and worked in the field managing construction projects in both commercial and heavy civil areas. He was a project manager, project director and divisional director of engineering prior to his current position. Amsinger led an effort to require that all personnel use fall protection when exposed to falls greater than 6 feet, which is now an industry standard. He holds a U.S. patent for developing a crane safety device. Amsinger chaired and held executive leadership positions in the Safety and Health committees for the national and St. Louis chapters of the Associated General Contractors (AGC); served on the Executive Committee of the National Construction Safety Executives organization; and served on the editorial board of *Superintendent Magazine*. He is on the S&T Career Opportunities and Employer Relations Advisory Board and led McCarthy's recruiting efforts at S&T for more than 25 years. He led McCarthy's United Way of Greater St. Louis Campaign for more than a decade.

Dan Booher

of Springfield, Mo., retired senior vice president of design and construction for Kohl's Department Stores, earned bachelor of science and master of science degrees in civil engineering from S&T in 1980 and 1981, respectively. His extensive career in the retail construction business began with Walmart Stores Inc., where as vice president for construction international in Mexico City he was involved in the creation of the Walmart Supercenter. Booher joined Einstein Bros. Bagels when it was a start-up and helped grow the company to 600 stores. At Toys "R" Us, he supported domestic and Asian operations, and as vice president of design and construction for Office Depot, he and his team developed stores in the U.S., Asia and Europe. In 2002, he joined Kohl's, where he was responsible for site development, engineering and architectural design, and interior design as well as construction operations. He now does limited consulting work through his company, Blue Ocean Advisers.

John Branham

of Stella, Mo., president of Branco Enterprises Inc., earned a bachelor of science degree in civil engineering from S&T in 1970. He founded Branco Enterprises Inc. in 1976. The construction company was recognized by MoDOT as its top achiever in the small volume category for 2011 and received an Excellence in Paving Award. Branco was recognized by *Engineering News-Record (ENR)* as a top-200 environmental contractor and by *Concrete Construction Magazine* as a top-100 concrete contractor. Branham has been an American Arbitration Association arbitrator since 1986. He served as chapter president of the Missouri Society of Professional Engineers (MSPE) and as chair of the AGC of Missouri. He is now vice president of AGC of Kansas City. He served as president of the Neosho Chamber of Commerce and is a member of the Neosho Planning and Zoning Commission and the Neosho Rotary Club.

Michael L. Davis

of Lebanon, Mo., president and CEO of Barton Engineering Co. Inc., earned a bachelor of science degree in civil engineering from S&T in 1975. A registered engineer in Illinois and Missouri, he worked for Benton & Associates, a consulting engineering firm in Illinois, for eight years prior to joining Barton Engineering Co. Inc. in Lebanon. Barton provides consulting engineering services to the private sector and to municipalities, corporations and governmental entities. Davis served

on his local school board for 12 years and the Missouri State School Board for four years. He is president of the Lebanon Education Foundation and was named Volunteer of the Year by the Laclede Literary Council. He is a board member and past president of the Lebanon Rotary Club, and was named Rotarian of the Year. In 1991, he was appointed to the Selective Service Board by President George H.W. Bush, retiring in 2011. A Chamber Ambassador, he received the Outstanding Community Service Award from the Lebanon Chamber of Commerce in 2002. He is active in the Ozark Chapter of MSPE and was named its Young Engineer of the Year in 1986. In 1997, he received the S&T Alumni Service Award.

Richard Henry

of Lafayette, Calif., president of the Northern Pacific Division of McCarthy Building Companies Inc., earned a bachelor of science degree in civil engineering from S&T in 1983. He was assigned to McCarthy's first project in California and worked in the field as a project engineer, project manager and vice president before his promotion in 2002 to his current position. He is responsible for projects that produced more than \$550 million in revenue last year, including the 1-million-square-foot Kaiser Replacement Hospital in Oakland, Calif., and the new \$857 million Stanford Hospital. Henry is an expert in public school design and construction processes and worked closely with the California State Architect as an appointed Advisory Board member to improve procedures

and delivery guidelines for public projects throughout the state. He is a member of McCarthy's board of directors and serves on the boards of the Construction Employees Association, the Bay Area Council, and the Sacramento Area Commerce and Trade Organization.

Dr. Robert "Bob" Holmes Jr.

of Rolla, Mo., national flood hazard coordinator for the U.S. Geological Survey (USGS), earned bachelor of science and master of science degrees in civil engineering from S&T in 1987 and 1989, respectively. He earned a Ph.D. in civil engineering from the University of Illinois in 2003. He previously served as chief of hydrologic data collection and director of the USGS Illinois Water Science Center. Holmes now works for the USGS Headquarters in Reston, Va., but is based in Rolla, where he coordinates operational response to major flood events nationwide including developing operational plans with other agencies. He also serves as senior advisor to the USGS director and associate directors for flood science issues. Holmes is an adjunct professor in S&T's civil, architectural and environmental engineering department, teaching undergraduate and graduate courses in water resource engineering topics. He is a diplomat in the American Academy of Water Resources Engineers and past president of the Mid-Missouri Section of the American Society of Civil Engineers (ASCE). He has received awards from the USGS, the Department of Interior and the U.S. Army Corps of Engineers.

(continued on the next page)



Branham



Davis



Henry



Holmes



Terry Leeds

of Kansas City, Mo., director of the water services department for the city of Kansas City, Mo., earned a bachelor of science degree in civil engineering from S&T in 1984. After spending 10 years as a design engineer for Black and Veatch, he joined the city of Kansas City where he's held positions as a design engineer, section head, division head, project manager and assistant director. In his current position, he is responsible for drinking water supply treatment and distribution, stormwater management and wastewater collection and treatment. His department includes 960 employees and a budget of approximately \$262 million. Leeds is active in the Water Environment Federation and ASCE and is a board member of the Wet Weather Partnership and Association of Missouri Cleanwater Agencies. He received the Golden Manhole Award from the Missouri Water Environment Association. He is active in many civic organizations and is an ordained deacon.

Fred Palmerton

(Honorary Member)

of Springfield, Mo., vice president of Palmerton and Parrish Inc., earned a bachelor of science degree in civil engineering from Washington University in St. Louis in 1960. After several years working with Reitz and Jens Inc. in St. Louis, Palmerton joined Anderson

Engineering Inc. in Springfield. In 1989, he co-founded Palmerton and Parrish Inc., a consulting engineering and materials testing firm with 45 employees and offices and laboratories in Springfield, Branson and Joplin. He has been active in MSPE, serving in all officer positions and as president in 1998. He has served on many National Society of Professional Engineers (NSPE) committees and was the national chair of its professional engineers in private practice (PEPP) division in 2008. He is a member of ASCE, the American Concrete Institute and ASTM International. His honors and awards include NSPE Fellow, NSPE/PEPP Outstanding Service Award and MSPE Hall of Fame.

Tom Sieckhaus

of Fenton, Mo., senior vice president and partner of Clayco Construction Corp., earned a bachelor of science degree in civil engineering from S&T in 1988 and an MBA from the University of Missouri-St. Louis in 1996. After six years with Turner Construction, he joined Clayco in 1994 as a project manager. He is currently responsible for all commercial projects for the national design build and construction firm, which employs nearly 1,000 people and has annual revenues of nearly \$850 million. In 2005, Sieckhaus received the "40 under 40" award from the *St. Louis Business Journal*. He is on the board of directors of the

Matthews Dickey Boys Club and served on the Carpenters Labor Committee of the AGC and on the St. Paul's Church Building Committee.

Curtis Skouby

of St. Louis, director of public utilities for the city of St. Louis, earned a bachelor of science degree in civil engineering from S&T in 1985 and a master of science degree in civil engineering from the University of Missouri-Columbia in 1999. He began his career with the city of St. Louis as a civil engineer and was appointed to his current position in 2008. Skouby is responsible for the utilities and the water and communications division, operating with a staff of approximately 400 employees. He is a member of the American Water Works Association, served as chair of the Missouri section and received the 6 Guardian Award from AWWA in 2007. He serves on the Missouri Safe Drinking Water Commission and is a plan reviewer for the Partnership of Safe Drinking Water. An Eagle Scout, he is a leader and volunteer with both the Boy Scouts of America and Girl Scouts of the USA.

RE-CAST

Leading the effort to improve sustainability in our nation's transportation infrastructure

Missouri S&T has been selected to lead a consortium of four universities sharing in a 2013 University Transportation Centers (UTC) Tier 1 grant. This program was authorized by Congress under the Moving Ahead for Progress in the 21st Century Act (MAP-21). The center's research will focus on developing the next generation of cement-based construction materials.

S&T will share a \$1,414,100 per year, two-year grant with Rutgers University, Southern University, University of Illinois at Urbana-Champaign and University of Miami. The grant requires a minimum match from non-federal sources, so the overall program will be valued at least \$2,121,150 per year by the time the grant concludes. The goal of the consortium is to meet a 1:1 match to ensure a funding level of approximately \$5.5 million.

"We are honored to be selected to lead this effort," says **Dr. Kamal H. Khayat**, director of Missouri S&T's Center for Infrastructure Engineering Studies. "This consortium has the opportunity to do great things. We have assembled a wonderful team of researchers, staff and students — this grant will give them the opportunity to shine."

A specialist in the development of advanced cement-based materials for structural applications and rehabilitation projects, Khayat is the Vernon and Maralee Jones Chair of Civil Engineering at Missouri S&T and is principal investigator for the grant. Co-PIs from Missouri S&T include **Dr. John J. Myers**, professor of civil, architectural and environmental engineering; **Dr. Dimitri Feys**, assistant professor of civil, architectural and environmental engineering; and Dr. Jeffery Volz, who recently relocated

to Oklahoma University, but will continue to participate in the consortium.

This new UTC, named RE-CAST (Research on Concrete Applications for Sustainable Transportation), will carry out multi-scale and multi-disciplinary studies to investigate the use of innovative materials and structural systems to enhance the durability and sustainability of the transportation infrastructure.



"The ultimate goal of the proposed research program is to fast-track the acceptance of these technologies and develop national standards and guidelines for their use for the reconstruction of the nation's infrastructure for the 21st Century," says Khayat, RE-CAST director.

The U.S. Department of Transportation's Research and Innovative Technology Administration announced that 142 UTC applications were submitted for a share of the \$63 million in grants. A total of

33 grants were awarded to research institutions across the United States.

U.S. Transportation Secretary Anthony Foxx said in a news release that UTCs are key to helping the country address today's transportation needs, from environmental sustainability to safety. "The participating universities are a critical part of our national transportation strategy and to developing a professional workforce with the expertise and knowledge to tackle the challenges of the future," he said.

Innovative concrete BRIDGE

By Mindy Limback



Just east of Jefferson City, Mo., sits a construction site that recently became home to one of the nation's first bridges to incorporate an unusual concrete mix in its girders and support structure. The three-span bridge, which was completed this fall on Highway 50, is outfitted with various sensors and instrumentation to collect data on how well the bridge performs over time.

development length, creep and shrinkage as well as key durability attributes.

Myers and his team found that using high-strength self-consolidating concrete, or HS-SCC, can either extend the span length of the HS-SCC girders, a structure's main support member, or reduce the number of girder lines needed in a given span.



Eli Hernandez, left, Ph.D. candidate in civil and Alex Griffin, right, M.S. student in civil, set up sensors to collect data on the new bridge outside of Jefferson City.

"That's because this material can allow for additional prestressing tendons, which can increase the girder's load-carrying capacity," says Myers.

Myers says they also expected the material to have reduced maintenance costs and an extended service life compared to conventional concrete due to the HS-SCC's improved durability behavior.

Concrete typically has four key components: portland cement, water, fine aggregate like sand and coarse aggregate or rock. In HS-SCC, the coarse aggregate is finer and chemical mixtures are added to increase its flow rate. That allows it to flow into every corner of a form work, by its own weight, eliminating the need for vibration or other types of compacting effort that requires more labor at the precast plant or job-site.

It's another milestone for **Dr. John J. Myers**, professor of civil, architectural and environmental engineering at Missouri S&T, working with the Missouri Department of Transportation and Missouri S&T's National University Transportation Center. Myers has spent the past decade studying and testing high-strength concrete and other innovative concrete systems for implementation.

"In 2012, we completed a two-year study that examined overall behavior of self-consolidating concrete, or SCC, using locally available materials including natural river sands, dolomitic limestone aggregates and river gravels," Myers says. The study examined the concrete and steel reinforcing material's shear strength, transfer and

"It's a more efficient use of the material," Myers says. "With its increased strength, it can extend a span's length by 20 percent or more."

The new bridge will combine three different types of concrete grades in the girders. The first 100-foot span will use traditional concrete. The second, a 120-foot span, will use high-strength, self-consolidating concrete. The final span will use self-consolidating concrete. Using sensors embedded in the material, researchers will monitor to see any differences as they occur. The bridge also includes instrumentation that will allow the research team to collect important data during load testing and normal in-service conditions.

(continued on page 14)

Update: Advanced Construction Materials Lab (ACML)

We are pleased to report that significant progress has been made in the development of our new Advanced Construction Materials Laboratory. Over the past months, **Dr. Kamal Khayat**, Vernon and Maralee Jones Chair of Civil Engineering, and **Dr. William Schonberg**, Department Chair, have worked closely with University Advancement and the Office of Development to plan fundraising efforts for this proposed expansion of Butler-Carlton Civil Engineering Hall. The ACML is a priority for the Department's Vision 2020 Campaign, which was kicked off this fall.

"We are seeking to raise private and corporate funds that will be matched at a 1:1 rate by the State of Missouri. It is a challenging process, however, it is important to reach the teaching and research capabilities that are needed to support our ambitious

mission in becoming the Center of Excellence in the U.S. for civil engineering construction materials research," says Khayat.



New concrete batching plant

The proposed state-of-the-art facility will house 35 pieces of recently acquired equipment that uniquely positions S&T to conduct cutting-edge research in the field of civil engineering construction materials. This major infrastructure investment was made possible by a grant from U.S.

Department of Transportation (amounting to nearly \$2.5 M) that was awarded to the S&T Center of Infrastructure Engineering Studies. This equipment is currently spread over several locations on and off campus until the new laboratory expansion is available.

The largest piece of equipment, a dual-mixer concrete batching plant, is installed at a temporary location off campus. This equipment will enable researchers at S&T and their collaborators from the private and public sectors to actively contribute to the development and implementation of the next generation of cement-based construction materials essential to address the growing technical and environmental requirements of transportation infrastructure, as well as those in the building and energy sectors.

Israel works with EWB

As you well know, Missouri S&T's chapter of Engineers Without Borders (EWB) has a team devoted to a water infrastructure project in Nahualate, Guatemala. The goal of this project is to provide potable water to improve public health and overall quality of life in the community.

Prior to this trip, EWB surveyed the land, planned pipe layouts, drafted structures, drilled a well and met with multiple contractors. In late July the travel team, along with alumnus **Dan Israel**, CE'83, spent 10 days on a successful implementation trip. Israel's extensive experience in ground engineering and infrastructure was instrumental in the installation of the 4-inch main line to fill the tank. He provided sound advice and often got in the trenches to show the locals how it was done.

After assessment and design phases, EWB is happy to report the construction of the water distribution system is finally under way.



"I have really enjoyed working with S&T students on EWB projects. The students involved with this program are the most energized and caring young men and women I have ever worked with. It is great to see them taking an interest in helping the local communities. I am proud to be a part of their lives and to be able to work side by side with these amazing students."

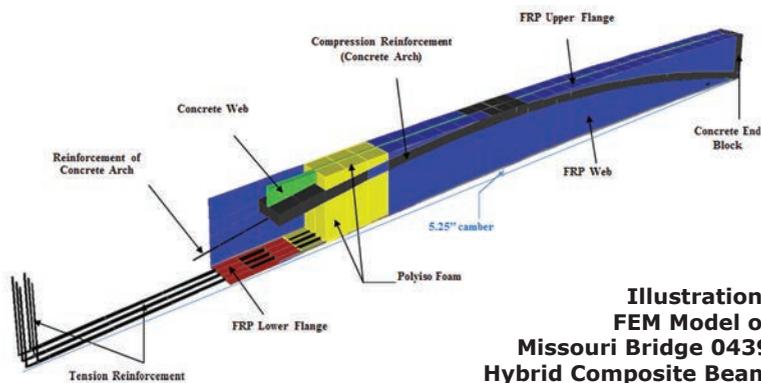
— Dan Israel, P.E., CE'83, PD CE'06

(Top right, #42 blue hat)



Keynote at Queen's

An invited keynote presentation titled "Structural Behavior of Hybrid Composite Beam Bridges in Missouri, USA" was delivered by **Dr. John J. Myers** in September at the 2013 Advanced Composites in Construction (ACIC) Conference at Queen's University in Belfast, Northern Ireland, United Kingdom. The keynote presentation discussed the first multi-hybrid composite bridge projects undertaken around the world along with the load testing and finite element modeling results. S&T graduate students **Mohamed A. Aboel Seoud** (Ph.D. candidate) and **C. Renee Early** (M.S. student) were co-authors on the keynote paper.



**Illustration:
FEM Model of
Missouri Bridge 0439
Hybrid Composite Beam**

Cheng delivers keynote

Franklin Y. Cheng, Curators' Professor emeritus, was invited in August to deliver a keynote presentation at the Overseas Chinese Civil and Structural Engineering Association Funding Conference held in California. The talk included his memorable achievements, as well as future challenges in civil engineering. As a distinguished member of ASCE and editor of the CRC Series on Advances in Earthquake Engineering, Cheng is working on a conference proceeding titled "Hazard Mitigation for Constructed Facilities," which will be a landmark document for the association's inauguration.

Innovative concrete bridge

(continued from pg. 12)...

"The advantage of having one bridge demonstrating four to five types of concrete throughout the entire bridge is that you know the exposure conditions, salts, temperatures, weather conditions are all identical," Myers explains.

In addition, one intermediate support will use concrete with a high-replacement level of fly ash, fine particles from coal that are the by-product of a power plant's combustion process. During the manufacture of traditional cement, limestone and other materials are heated to extreme temperatures, releasing of CO₂ from both chemical reactions and the heating process. By replacing half of the cement with fly ash, the mix not only reduces the amount of fly ash that ends up in landfills but will cut CO₂ emissions as well. It also will make for a more cost-effective concrete mix, which will reduce construction costs.

The state's first bridge to use high-strength, self-consolidating concrete was constructed in 2009 in Rolla and led by Myers' research group. The bridge, designed for rapid construction, was one of two built to demonstrate the mechanical and material properties of high-strength concrete and high-strength, self-consolidating concrete.

Dr. Jeffery Volz, a former S&T assistant professor, is working with Myers on the research. County Materials Corp. in Bonne Terre, Mo., was responsible for fabrication of the prestressed-precast girders. Iron Mountain Construction Services of Maryland Heights, Mo., was responsible for the overall construction of the bridge project.

Geotechnical Engineering

Conference Series comes to a close

The seventh International Conference on Case Histories in Geotechnical Engineering was held in Chicago this past May to commemorate the legacy of Professor Ralph B. Peck for introducing observational methods in geotechnical engineering. In a special session on the subject, six world-renowned leaders who had worked with Peck made technical and non-technical presentations. These included: Gholamreza Mesri, Edward Cording, Elmo Di Biagio, Shamsheer Prakash, Nancy Peck Young and David Rogers.

A symposium was also held to honor Dr. Clyde N. Baker Jr., for his contributions to the design of foundations for high-rise buildings in Chicago, Kuala Lumpur, Taiwan, Dubai and other countries. Six speakers, Tony Kiefer, Bernie Hertlein, Robert Lukas, William Walton, William Baker and Robert Schock, delivered special presentations outlining Dr. Baker's work.

The keynote lecture for the conference was delivered by Professor W. D. Liam Finn, professor emeritus, University of British Columbia, Canada and Guoxi Wu, BC Hydro, Burnaby, Canada.

State-of-the-art practice lectures were delivered by Clyde Baker (USA), Jonathan Bray (USA), George Gazetas (Greece), Buddhima Indraratna (Australia), Ed Kavazanjian (USA), Suzanne Lacasse (Norway), Pedro Pinto (Portugal), Harry Poulos (Australia), Rodrigo Salgado (USA) and Ikuro Towhata (Japan).

A luncheon was held to recognize **Dr. Shamsheer Prakash** for his achievements and to thank him for the direction he has provided for the conference series over the past four decades. After serving the profession for more than 55 years, Dr. Prakash has decided to retire and this conference was his last major professional activity on behalf of Missouri S&T.

Proceedings for this conference consist of a printed abstract volume and CD-ROM containing eleven SOAP Lectures, eight general reports and 315 papers contributed from 58 countries. The proceedings are available for purchase online at <http://7icchge.mst.edu/proceedings/>. The cost of the proceedings is \$250. Papers published in the proceedings of the first four Case Histories conferences can be downloaded free of charge at <https://ICCHGE1984-2013.mst.edu/>.



Prakash

Prakash recognized

Dr. Shamsheer Prakash was honored at the Case Histories Conference for his work and dedication to the geotechnical profession. He advanced the profession of civil engineering and mentored tomorrow's engineers. The American Society of Civil Engineers (ASCE) honored him by awarding the Distinguished Membership of the society. This is the highest recognition the Society confers on its members, second only to the title of president. Since 1852, only 615 individuals have received this recognition from ASCE. Prakash is the only Indian Institute of Technology Roorkee alumnus to receive this honor. Prakash was also recognized for his pioneering work on liquefaction of fine-grained soils and seismic analysis of rigid retaining walls, as well as authoring the first comprehensive text on soil dynamics.

Alumna of the Year

Mariana Rodriguez Risco, president and CEO of Universidad Peruana de Ciencias Aplicadas, the University of Applied Sciences in Lima, Peru, received the 2013 Missouri S&T Alumna of the Year Silver Award. Rodriguez, who earned a bachelor of science degree in civil engineering from Missouri S&T in 1980 and a professional degree in 2001, helped found two universities and two technical institutes in Peru. In 2011 S&T honored her as one of its Alumni of Influence. The Missouri S&T Alumna of the Year Award is given to alumnae who are dedicated to advancing the lives of women and committed to diversity.



Faculty receive tenure, promotions

Three faculty members from civil, architectural and environmental engineering recently received promotions or tenure.

Those faculty members are:



Dr. Glenn Morrison, promoted to professor of civil, architectural and environmental engineering



Dr. John Myers, promoted to professor of civil, architectural and environmental engineering



Dr. Jeffery Thomas, promoted to associate teaching professor of civil, architectural and environmental engineering



Photo by B.A. Rupert

PROFESSIONAL DEGREE

Brady Hays was awarded an honorary professional degree during spring commencement ceremonies held in May. The degree recognizes outstanding S&T graduates for professional achievement. Hays, director of projects and associate vice president of Black & Veatch's water business focused on mining and oil and gas clients, earned a bachelor of science degree in civil engineering from Missouri S&T in 1998. Since 1998, he has managed desalination and water reuse projects in the United States, Australia, the United Kingdom, Chile and Canada. He has traveled with the S&T Engineers Without Borders chapter as a professional sponsor to help implement various water supply projects and has served on the board of the non-profit Primero Agua. Hays helped start an award-winning leadership intern program at Black & Veatch and was corporate sponsor for an annual leadership institute at Howard University. He lives in Overland Park, Kan.



OUR HEROES!

Four civil, architectural and environmental engineering “Super Miners” were honored during the Miner Alumni Association’s Miner Legends Luncheon in October.

Those receiving recognition were:

Daniel P. Ellis of Bella Vista, Ark., who received the Distinguished Young Alumni Award. Ellis, vice president of Crafton Tull and Associates, earned a bachelor of science degree in civil engineering from Missouri S&T in 1999.

Bradley H. Hornburg of St. Louis, who received the Robert V. Wolf Alumni Service Award. Hornburg, CEO of Landmark Contract Management Inc., earned a bachelor of science degree in civil engineering from S&T in 1969.

Jerry D. Parsons of Springfield, Ill., who received the Frank H. Mackaman Alumni Volunteer Service Award. Parsons, a retired materials engineer with the Illinois Department of Transportation, earned a bachelor of science degree in civil engineering from S&T in 1970.

LeRoy Thompson of Pensacola, Fla., who received the Alumni Achievement Award. Thompson, retired principle and vice president at C3TS and emeritus professor at Florida International University, earned bachelor of science and master of science degrees in civil engineering from S&T in 1956 and 1965, respectively.



Photos by B.A. Rupert



NOMINATED TO BE KING

James Hildreth, a senior in civil engineering from Wentzville, Mo., (representing Chi Omega) was one of 13 students at Missouri S&T nominated by student organizations to compete for the title of 2013 Homecoming King.



Cooperative Engineering Program with Missouri State University

In 2010, a seven-figure gift from the Robert W. Plaster Foundation resulted in the naming of the Robert W. Plaster Center for Free Enterprise and Business Development and pushed the renovation of the former Willow Brook facility on the Missouri State Campus toward becoming a cornerstone in the IDEA Commons.

The Missouri State Foundation hosted an official grand opening and dedication ceremony on Oct. 3 for the facility. Remarks by Gov. Jay Nixon and Steve Plaster were followed by others from Missouri State, the University of Missouri System, the U.S. Department of Commerce and the local community. Visitors were invited to tour the building, which now is home to:

- Missouri University of Science and Technology and Missouri State's cooperative engineering program, offering bachelor's degrees in civil and electrical engineering from Missouri S&T
- The eFactory, a technology-focused entrepreneurship center and business incubator designed to assist start-up and growth in new small businesses, and provide continuing education and training for businesses and other organizations

- Springfield Angel Network
- Procurement Technical Assistance Center
- Missouri Enterprise
- SCORE
- Missouri State's printing and postal services

The Missouri S&T/Missouri State Cooperative Engineering Program was established in 2006 to meet the growing demand for engineering degrees among place-bound students in the Springfield area. Through the partnership, students from a 16-county area in southwest Missouri may pursue bachelor of science degrees in civil engineering or electrical engineering from Missouri S&T through courses taught on the Missouri State campus. The first students were enrolled in 2008, and in May 2012, the first 15 graduates of the program received their diplomas.

Visit rol.la/coopdegrees for more information on eligibility requirements for the program.

The plan: Vision 2020

From highways and bridges to environmental cleanup and the development of new construction materials, graduates of civil, architectural and environmental engineering at Missouri S&T are already making the world a better place.

Photo by Stacey Marler

Now, with the input and leadership of alumni and the Academy of Civil Engineers, S&T's Civil, Architectural, and Environmental Engineering Department has developed a strategic plan, called Vision 2020, that emphasizes program changes, greater hands-on learning opportunities, laboratory improvements, and new scholarships and fellowships. "The plan will allow our students, as future leaders and stewards of the world, to make it even better," says **Dr. William P. Schonberg**, chair of the department.

Alumni joined university administrators, department faculty and students to roll out the department's plan on Thursday, Oct. 10, at Sunset Hills Country Club in St. Louis. Thanks goes to **Dr. Robert T. Berry**, CE'72, and **John Mathes**, CE'67, MS CE'68, for securing the wonderful facility. The event was co-sponsored by CE alumni and academy members **Dan Israel**, CE'83, (Terracon), **Mark Harms**, CE'83, (SCI) and **John Komlos**, CE'85, (Arco).

"This event is the culmination of several years of hard work by many alumni and faculty who put their heads together to develop a strategic plan that is unlike any other," says Schonberg. "Vision 2020 is a departure from 'more of the same.' It's a decided move to do the business of educating engineers a bit differently than we're used to doing, in a way that will meet the needs of our alumni, employers of our students, our profession and the world."

The department's Vision 2020 strategic plan is expected to enhance Missouri S&T's ability to attract top students and faculty, improve programs and facilities, enhance student learning experiences and access to world-class faculty, and increase the level and productivity of faculty research and scholarship programs.



Sara Tabatabaei
Ph.D. Candidate
Civil Engineering

"Vision 2020 is a departure from 'more of the same.' It's a decided move to do the business of educating engineers a bit differently than we're used to doing, in a way that will meet the needs of our alumni, employers of our students, our profession and the world."

— **Dr. William P. Schonberg**

The plan and its goals are already getting some traction among the department's alumni. "It's exciting to be able to announce that **Frank Benavides**, CE'70, has been one of the first alumni to step up to fund one of the priorities of Vision 2020 — the department's Faculty Excellence Award," Schonberg says.

"If we are to continue graduating outstanding, street-ready engineers and setting the standard for engineering education, we must prepare our graduates to be problem-solvers in a world that is rapidly changing and increasingly diverse and interdisciplinary," says Schonberg.

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VISION 2020

Civil, Architectural and Environmental Engineering has embraced a new and exciting vision and, with the input and leadership of our alumni, has developed a strategic plan focused on that future.

See the plan at care.mst.edu.

