

## CRC Research Project Seeks to Evaluate Alternative Fly Ash Sources

The ACI Foundation's Concrete Research Council (CRC) approved the funding of four research projects for 2017. This edition of *Knowledge to Practice* features one of the four projects: "Evaluating the Performance and Feasibility of Using Recovered Fly Ash and Fluidized Bed Combustion Fly Ash as Concrete Pozzolan."

This research will help determine if and how recovered stockpiled fly ash and fluidized bed combustion (FBC) fly ash can be used as viable and high-performance pozzolans for concrete. Farshad Rajabipour, Pennsylvania State University, State College, PA, will serve as the project's principal investigator. The project is supported by ACI Committee 232, Fly Ash in Concrete.

Supplementary cementitious materials (SCM) are key ingredients in today's concrete and can vastly improve the durability and sustainability of concrete mixtures. While the demand for fly ash (the most commonly used SCM) and other suitable pozzolans continues to escalate, the supply of high-quality and economically available fly ash has been shrinking. To maintain and expand the market share of concrete in pavements, bridges, buildings, and precast elements, it is critical that high-quality, long-lasting, and cost-competitive concrete is widely available; this requires a stable and abundant supply of inexpensive fly ash. While alternative sources of fly ash do exist (such as landfilled or ponded fly ash), these have not been used due to a lack of guidelines and protocols to evaluate the performance of these ashes and identify necessary beneficiation procedures before they can be incorporated into concrete mixtures.

This study seeks to evaluate the feasibility, performance, and beneficiation of two promising alternative sources of fly ash: recovered dry-disposed fly ash and FBC fly ash. Samples of both materials will be collected from several fly ash landfills and FBC power plants, then characterized to determine their chemical and physical properties, performance in concrete mixtures, and areas of noncompliance with ASTM C618 requirements. Accordingly, the most appropriate and economical methods for treatment and beneficiation of these fly ashes will be identified, developed, and employed. The experimental research will be supplemented with cost analyses to evaluate the economic and practical feasibility of using such unconventional fly ashes as viable concrete SCM. The project findings will be used to potentially develop new ACI guidelines for the evaluation and use of recovered fly ash and FBC fly ash in concrete.

## CRC Announces Update of Guidelines for Performance-Based Seismic Design of Tall Buildings

The original *Guidelines for Performance-Based Seismic Design of Tall Buildings* was published in 2010. Developed by

the Pacific Earthquake Engineering Research Center (PEER) as part of the Tall Buildings Initiative (TBI) and thus widely known as the TBI Guidelines, the document provides a performance-based design procedure for earthquake-resistant tall buildings as an alternative to the prescriptive design procedures incorporated by reference into the International Building Code, including those in ASCE/SEI 7, Minimum Design Loads For Buildings and Other Structures.

Since the initial publication of the TBI Guidelines, structural engineers have gained substantial experience in application of performance-based techniques for the design of buildings around the world. Significant advances have also been made in nonlinear analytical capability and in defining ground motions for use in nonlinear seismic analysis. The updated TBI Guidelines will facilitate the most up-to-date performance-based design, review, acceptance, and construction of buildings using current materials, structural systems, and devices.

The team that produced the update was led by Jack Moehle, University of California, Berkeley, Berkeley, CA, and Ron Hamburger, Simpson Gumpertz & Heger. The project was supported by ACI Committee 318, Structural Concrete Building Code, specifically Subcommittee 318-H, Seismic Provisions. The ACI Foundation was a co-funder of this research project, along with the Charles Pankow Foundation, American Institute of Steel Construction, Federal Emergency Management Agency, Structural Engineering Institute of the American Society of Civil Engineers, and the Structural Engineers Association of California.



Victoria Apartments, a 24-story residential tower in Seattle, WA

# ACI Foundation Awards Student Fellowships and Scholarships for 2017-2018

Applications for the 2018-2019 awards cycle will open mid-summer 2017



The ACI Foundation has awarded nine Student Fellowships, seven Graduate Scholarships, and one Undergraduate Scholarship for the 2017-2018 academic year.

## ACI Foundation Student Fellowships

The ACI Foundation Student Fellowships are offered to high-potential undergraduate and graduate students in engineering, construction management, and other appropriate curricula who are nominated by an ACI faculty member. The purpose of the Student Fellowship Program is to identify, attract, and develop outstanding professionals for productive careers in the concrete field. During the academic year, each student will receive a \$7000 to \$15,000 educational stipend for tuition, residence, books, and materials; appropriate certificates, recognition, and publicity; paid travel expenses and attendance fees to two ACI conventions; assignment to an industry mentor; and an optional summer internship (internships are required to receive the ACI Baker Student Fellowship, ACI Elmer Baker Student Fellowship, ACI Cagley Student Fellowship, and ACI Charles Pankow Student Fellowship).

The last portion of the application process is an interview with the ACI Foundation Scholarship Council. Finalists selected for the ACI Foundation Fellowships were invited to attend The ACI Concrete Convention and Exposition – Spring 2017 in Detroit, MI. The recipients include:

### ACI Baker Student Fellowship

**Frank-Nelson Musemate** attends Drexel University, Philadelphia, PA, where he is pursuing a joint bachelor's degree in civil engineering and a master's degree in structural engineering with a construction management minor. After graduation, he plans to join a top civil/structural/construction engineering firm, pass his professional engineer license exam, and focus on securing project management positions. He aspires to start a design-build company that will focus on

high-rise structures and affordable residential homes. During his spare time, Musemate plans to become an adjunct professor and teach university-level engineering classes.

**Abi Aghayere**, Drexel University, was his Faculty Nominator.

### ACI Barbara S. and W. Calvin McCall Carolinas Fellowship

**David Scott** is a PhD Candidate in infrastructure and environmental systems at the University of North Carolina (UNC) at Charlotte, Charlotte, NC. His career plans include continuing to work in the concrete industry, supporting the advancement of concrete technology, and working with the current and next generation of concrete engineers.

**Tara Cavalline**, UNC Charlotte, was his Faculty Nominator.

### ACI Charles Pankow Student Fellowship

**Megan Voss** is pursuing her PhD in civil engineering, with a concentration in construction materials, at Valparaiso University, Valparaiso, IN. Her career goal is to become a professor at a university that focuses on teaching.

**Jacob Henschen**, Valparaiso University, was her Faculty Nominator.

### ACI Daniel W. Falconer Memorial Fellowship

**Bjorn Vors** will attend the University of Saskatchewan, Saskatoon, SK, Canada, to study for his MS degree. He plans to work in the design industry for several years, then pursue his PhD and transition into research and teaching at a university.

**Lisa Feldman**, University of Saskatchewan, was his Faculty Nominator.

### ACI Darrell Elliott Louisiana Fellowship

**Ryan Whelchel** is a PhD Candidate in civil engineering at Purdue University, West Lafayette, IN. "My goal, as a



Musemate



Scott



Voss



Vors



Whelchel



Delesky

structural engineer, is to learn every day to improve myself and others so that the future will be better than the past,” Whelchel said. He plans to become a licensed engineer, stay active in local and national engineering societies, and work to ensure the safety of structures under all conditions.

**Christopher Williams**, Purdue University, was his Faculty Nominator.

### ACI Presidents' Fellowship

**Elizabeth Delesky** is enrolled in the Materials Science and Engineering Program at the University of Colorado Boulder, Boulder, CO. Her career goal is to become a professor in materials science research and lead the creation of environmentally friendly and sustainable materials for a wide variety of applications.

**Wil Srubar**, University of Colorado Boulder, was her Faculty Nominator.

### ACI Richard D. Stehly Memorial Fellowship

**Rebecca Valliere** is attending Valparaiso University, Valparaiso, IN, working toward her BS in civil engineering. She would like to pursue her MS in materials and continue to further her knowledge through working in the industry. Valliere is undecided as to whether she will pursue academia after gaining experience in the field.

**Jacob Henschen**, Valparaiso University, was her Faculty Nominator.

### ACI Richard N. White Student Fellowship

**Katelyn O'Quinn** will be attending the University of Texas at Austin, Austin, TX, pursuing her MS in structural engineering. After receiving her master's degree, she will work in structural design and obtain her PE and SE licenses. O'Quinn plans to pursue her PhD with the goal of becoming a professor of concrete structure design.

**Tyler Ley**, Oklahoma State University, Stillwater, OK, was her Faculty Nominator.

### ACI Tribute to the Founders Fellowship

**Bret Robertson** is a PhD Candidate in civil engineering at Oklahoma State University. Following his doctoral studies, he hopes to remain in academia as civil engineering faculty, using previous experience to contribute to the advancement of the concrete industry through teaching the next generation of engineers and performing research that provides practical



Valliere



O'Quinn



Robertson

solutions. He plans to stay active with ACI, continuing to contribute and learn.

**Tyler Ley**, Oklahoma State University, was his Faculty Nominator.

### ACI Foundation Graduate and Undergraduate Scholarships

Funded primarily through donations, the ACI Foundation administers these scholarships, which are offered to high-potential, full-time first- or second-year (after bachelor's degree) graduate students. During the academic year, each student will receive a \$3000 educational stipend (\$5000 for the ACI Stewart C. Watson Memorial Scholarship) for tuition, residence, books, and materials and appropriate certificates, recognition, and publicity. The ACI Richard D. Stehly Memorial Scholarship is awarded to an undergraduate student.

Recipients of the 2017-2018 ACI Foundation Graduate and Undergraduate Scholarships are:

#### ACI Bertold E. Weinberg Scholarship

**Jordan Carrette** will be pursuing his MASc in structural engineering with an emphasis on the shear behavior of reinforced and prestressed concrete structures at the University of Toronto, Toronto, ON, Canada. He previously attended the University of Manitoba, Winnipeg, MB, Canada. Carrette's career ambitions include becoming both a university professor and a professional consultant. As a professor, he will continually strive to expand his understanding of concrete structures. As a consultant, he hopes that his industry experience will allow him to advance standards and improve public safety in civil infrastructure.

#### ACI Katharine & Bryant Mather Scholarship

**Robert Bruns** will be attending Lehigh University, Bethlehem, PA, pursuing a master's degree in structural





Carrette



Bruns



Bonis



Standage



Noade

engineering. After Lehigh, he plans to work for a structural design firm in either vertical structures or bridges. Bruns previously attended Rowan University, Glassboro, NJ.

### ACI Richard D. Stehly Memorial Scholarship

**Damien Bonis** is pursuing his BS in concrete industry management with a minor in business at California State University Chico, Chico, CA. His goal after graduating is to work toward an MBA and learn more about industry business management.

### ACI Scholarship

**Richard Standage** is a PhD Candidate in construction management at Arizona State University, Tempe, AZ. His career goal is to teach students what he has learned over the past 40-plus years as an owner of a concrete placement company, particularly regarding concrete materials properties and concrete construction. He started going to college in 2009 and doesn't plan to stop until he receives his PhD.

**Bryanna Noade** is pursuing her MAsc in the Department of Civil Engineering at McMaster University, Hamilton, ON, Canada. After receiving her degree in 2018, she plans to pursue a job in bridge engineering. Noade hopes to participate in novel bridge projects and explore bridge construction from the side of different stakeholders, such as a consultant, owner, or contractor. She is looking forward to exploring what a career in bridge engineering has to offer.

### ACI Schwing America Scholarship

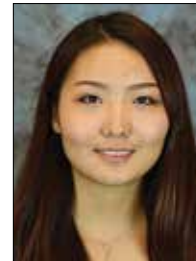
**Frederic Bedard** is pursuing his master's degree in civil engineering (materials and structures division) at Université Laval, Québec City, QC, Canada. He hopes to become a bridge designer, which is his childhood dream. "Concrete is used in a very particular way in these complex structures and the challenge of properly designing them genuinely appeals to me," Bedard said. Additionally, he would like to pursue an international career, working on projects and collaborating with people from around the world.

### ACI Stewart C. Watson Memorial Scholarship

**Otgonchimeg Davaadorj** is pursuing her MS in civil engineering (focus on structural engineering) at the University of Washington, Seattle, WA. "I have always been passionate



Bedard



Davaadorj



Feist

about studying and working with precast and prestressed concrete structures," Davaadorj said. "Upon completion of my master's degree, I will be working as a structural design engineer. As I gain more experience in structural design, I will work toward my professional engineering license so that I can contribute to the precast and prestressed concrete industry more in depth," she added. Eventually, she would like to start her own structural design firm.

### ACI W. Gene Corley Memorial Scholarship

**Jeremy Feist** is studying structural engineering at South Dakota School of Mines and Technology, Rapid City, SD. His career goals include working as a structural engineer and then seeking further education. Feist is undecided if he wants to keep pursuing the technical field or focus on the business side. He plans to work as an engineer for a few years before making that decision.

### Nominate a Student, Submit an Application

The application process will open soon for the ACI Foundation Student Fellowships and Graduate and Undergraduate Scholarships that will be awarded in the 2018-2019 academic year. Instructions to nominate a student for the ACI Foundation Student Fellowship Program are available at [www.scholarshipcouncil.org/Student-Awards/Fellowships](http://www.scholarshipcouncil.org/Student-Awards/Fellowships). Only students nominated by faculty members who are also ACI members will be eligible to receive applications for the ACI Foundation Student Fellowship Program. After a student is formally nominated, the ACI Foundation will e-mail an application to the nominated student.

Applications for ACI Foundation Graduate and Undergraduate Scholarships are available to students whose studies relate to concrete and do not require a faculty nomination. For more information, visit [www.scholarshipcouncil.org](http://www.scholarshipcouncil.org).