Knowledge to Practice:

ACI Foundation

CRC Announces New Research Product

The ACI Foundation is pleased to announce the completion of a new research product: *Evaluation of Seismic Behavior of Coupling Beams with Various Types of Steel Fiber Reinforced Concrete*. Gustavo J. Parra-Montesinos, University of Wisconsin – Madison, Madison, WI, served as the project's principal investigator.

Traditionally, coupling beams between special structural walls (shear walls) are reinforced with diagonal bars that are "woven" together with dense transverse reinforcement. The "woven" design, which comes from research conducted in the 1960s and 1970s, is difficult to construct. The ACI Foundation's Concrete Research Council (CRC) and several other financial supporters funded the research to evaluate the use of FRC to allow the design of coupling beams that no longer require the use of diagonal bars.

Casting a fiber-reinforced concrete coupling beam

Example of a traditional coupling beam with "woven" diagonal bars and transverse reinforcement

A total of six FRC mixtures were evaluated, using three types of hooked steel fibers and three different fiber volume fractions. The material properties of the various FRCs were evaluated using four-point bending tests, direct tension tests, and compression tests. Eight FRC coupling beams were tested under large displacement reversals.

The experimental data from the research were used to develop design guidelines for FRC coupling beams linked to material performance criteria. The proposed coupling beam design results in less-congested reinforcing bar configurations—a benefit to owners, designers, and contractors.

These new provisions could be used to develop a code change proposal to ACI Committee 318, Structural Concrete Building Code. "Linking coupling beam drift and shear stress capacity to FRC bending performance obtained through a standard ASTM test is expected to further facilitate adoption of the proposed FRC coupling beam design by structural engineers," stated Parra-Montesinos. "Such a link could also serve as the basis for future design provisions to be proposed to ACI Committee 318." Adding the FRC design option to the current code provisions would translate into simplified and more straightforward construction, saving construction time, financial resources, and labor—creating a positive impact on the concrete construction industry. The results of this research were presented at the 16th World Conference on Earthquake Engineering, January 9-13, 2017, in Santiago, Chile. More information about this research product is available at **www.concreteresearchcouncil.org**.

Join the SDC at Technology Forum 41

The Strategic Development Council's (SDC) Technology Forum 41 will take place February 23-24, 2017, in Dallas, TX. The forum is preceded by Concrete 2029's half-day

The Hyatt Regency Dallas is the location of the Concrete 2029 Roadmapping Workshop 2 and SDC Forum 41

Roadmapping Workshop 2 on February 22. Both events take place at the Dallas Hyatt Regency. Registration for both events is available online at **www.concretesdc.org** and on site.

SDC 41 topics will include artificial intelligence in construction engineering, dynamic testing of walls and wall systems, high-strength reinforcement in reinforced concrete design and construction, and concrete in nuclear construction. Forum 41 will also host several Technology Showcases, highlighting new and innovative equipment, materials, and applications that have the potential to improve and advance the industry. SDC 41 Technology Showcases will include the following technologies:

- ARDEX Concrete Management System™—a new way to finish concrete relevant to those building sectors that have stringent tolerances, fast-track construction, and moisture-sensitive flooring;
- Aridus® Technology—a rapid-drying concrete technology that eliminates costly and time-consuming moisture mitigation systems or extended drying time, from US Concrete;
- PT Plug—an innovative, reliable way to improve and speed the process of providing post-tensioning anchorage corrosion protection;
- CAPCELL™—a technology that uses carbon dioxide to create a stable system of discrete voids (entrained air) in concrete, developed by CellTech, LLC; and
- The Super Air Meter—a test apparatus and method (now an AASHTO standard) for evaluating air content and the air void system in fresh concrete, developed at Oklahoma State University.

The second in a series, the Concrete 2029 roadmapping workshop will build on the workshop held prior to the SDC Technology Forum 40 by mapping improvements in the areas of concrete quality and durability, concrete industry perception, and construction productivity.

More information regarding the Concrete 2029 Roadmapping Workshop and Technology Forum 41, including a complete agenda for the forum, is available at **www.concretesdc.org**.