

2008 Research Grant Awards: Summary

Grantee	Topic	Grant Amount
University of Notre Dame	Hybrid Precast Wall Systems for Seismic Regions	\$165,000
The Pennsylvania State University	Project Execution Planning for Building Information Modeling	\$282,000
Construction Industry Institute	(Continuation) Enhancing & Expanding Innovation in the Construction Industry	\$28,300
Georgia Tech	Precast Concrete National BIM Standard	\$340,000
UCLA	Large-Scale Testing of Reinforced Concrete Coupling Beams with Embedded Structural Steel Sections	\$150,000
University of Colorado	Influence of Project Delivery Method on Achieving Sustainable, High Performance Buildings	\$200,000
University of Nebraska-Lincoln	Shallow Hollow Core Floor System	\$105,000
Construction Specifications Institute Foundation	GreenFormat: Product Reporting Guide (Supplement)	\$50,202

2008 Research Grant Awards: Details

Title: **Hybrid Precast Wall Systems for Seismic Regions**

Grantee: University of Notre Dame	Grant Award: \$165,000
Period: January 2008 - November 2010	P.I.: Professor Gino Kurama

Industry Champion: Walt Korkosz, CEG, Inc. and PCI R&D Committee

Research Purpose: To develop an innovative, economical building wall system that can survive a large earthquake with little damage, that will prove superior to conventional structural systems in speed, cost and durability. Proposed is a hybrid precast concrete wall system which combines mild steel reinforcement with high-strength post-tensioning steel to resist lateral forces. The objective of the research is to provide the required experimental, analytical and design validation for the classification of hybrid precast wall systems as special reinforced concrete shear walls based on ACI 318 and ACI ITG T5.1.

Deliverables: Code validation of the hybrid precast concrete wall system, and a Design Procedure Document that can be used by practicing engineers and precast producers to construct the system in seismic regions.

Title: **Project Execution Planning for Building Information Modeling**

Grantee: The Pennsylvania State University	Grant Award: \$282,000
Period: March 2008 - July 2010	P.I.: Prof. John Messner

Industry Champions: Deke Smith, buildingSMART Alliance and Dr. Victor Sanvido, Southland Industries

Research Purpose: To develop and disseminate a method by which building project teams can create a Building Information Modeling (BIM) Execution Plan in the early stages of a building project. Many owners and project teams are currently struggling with defining the appropriate level of modeling to perform on a construction project, based on the current state of practice and their future information needs. The proposed Guide, developed primarily for facility owners and other early project participants, will focus on the decisions required to define the scope of BIM implementation on the project; identify process impacts of using BIM; define the team characteristics needed to achieve the modeling, and quantify the value proposition for the appropriate level of BIM modeling at the various stages in the project lifecycle.

Deliverables:

1. The BIM Planning Guide that will clearly define the BIM Execution Planning Process in an easy to use document. The Guide will lead a project team through the decisions that they need to make at the early stages of a project to set up their BIM strategy and utilization.
2. The BIM Planning Tool that will allow a project team to efficiently develop their BIM Execution Plan. This tool will be a computer application that will step the project team through the planning process in an interactive format, and point the team to additional references and information that will be valuable during the planning process.

Title: **Enhancing and Expanding Innovation in the Construction Industry (Continuation of 2006 research grant award)**

Grantee: Construction Industry Institute (CII)	Grant Award: \$28,300 (CPF cost share)
Period: August 2008 - August 2009	P.I.: Professor Paul Chinowsky, Univ. of Colorado

Industry Champion: CII

Research Purpose: To develop a framework for analyzing, adopting and fostering innovations to support a construction organization's strategic competitiveness objectives and enhance construction project operations and processes.

Deliverable: A practical "How To" guide that will provide construction firms with an innovation audit tool, an economic decision support tool, a set of metrics, discussion of the direct and indirect benefits of innovation, and other guidelines that will enable firms to expand their use of innovations in industrial and commercial building construction.

Title: **Precast Concrete National BIM Standard**

Grantee: Georgia Tech Research Corporation	Grant Award: \$340,000
Period: June 2008 - December 2010	P.I.'s: Professors Chuck Eastman and Rafael Sacks

Industry Champions: NIBS; buildingSMART Alliance; PCI R&D Committee

Research Purpose: Develop for submission to the National BIM Standard Committee the National BIM Standard for the precast concrete domain. Develop the Information Delivery Manual (IDM) and corollary work needed for the BIM standard for workflows dealing with the broad domain of precast buildings in general, including stemmed deck members, flat deck members, beams, columns, load bearing walls and spandrels, piles, and architectural facades. Development of the National BIM Standard for precast concrete will follow the NBIMS process defined in Chapter Five of the National BIM Standard, Volume 1.

Deliverables:

1. Produce the National BIM Standard (NBIMS) for precast concrete in a form ready for introduction to the formal standards review process.
2. Deliver a Final Report that will support other AEC industry segments in undertaking similar NBIMS standard activities. This report will provide guidelines for other business sectors within AEC on how to carry out their specifications and how to guide implementation, serving other parties as a case study within AEC showing the process that they may follow to develop BIM Standards in other areas.

Title: **Large-Scale Testing of Reinforced Concrete Coupling Beams with Embedded Structural Steel Sections**

Grantee: UCLA	Grant Award: \$150,000
Period: August 2008 - July 2010	P.I.: Professor John Wallace

Industry Champion: Ron Klemencic

Research Purpose: Through nearly full-scale testing of reinforced concrete coupling beams with embedded structural steel sections, assess the behavior, modeling, and detailing required for structural steel reinforced coupling beams subjected to reversed cyclic loading. Extrapolation of prior tests on relatively small sections to such large sections has yielded questionable results. In the proposed test program, large scale tests will be conducted on realistic scale specimens to address this gap. Test results will be synthesized and presented to ACI and ASCE Committees as a proposed code change for incorporation into the next cycle of the IBC and material codes.

Deliverables: A final, complete technical report describing the testing, results, and design applicability of the results, plus a shorter technical summary suitable for design engineers to implement the research findings into practice and for gaining approval of local code officials.

Title: **Influence of Project Delivery Method on Achieving Sustainable, High Performance Buildings**

Grantee: University of Colorado	Grant Award: \$200,000
Period: September 2008 – September 2010	P.I.: Professor Keith Molenaar

Industry Champion: Greg Gidez & DBIA Research Committee

Research Purpose: The research seeks to determine, analytically and without bias, the influence that project delivery methods can have on achieving sustainable, high performance building projects. Goals for this project are to provide building owners, planners, designers, constructors and operators with recommendations, tools and guidelines for (a) determining the most effective delivery and project management strategies, and for (b) applying best practices by which project teams can capitalize on the delivery method selected.

Deliverables:

1. "Guide to Delivery Methods for Sustainable, High Performance Projects." A set of guidelines for owners and project teams.
2. Technical memo regarding information on enabling legislation relating to sustainable, high performance projects and alternative project delivery.
3. Articles in scholarly journals and trade publications.
4. Model educational curriculum for professional education courses and universities.
5. Presentations at DBIA, USGBC, and/or other appropriate conferences.

Title: **Shallow Hollow Core Precast Floor System**

Grantee: University of Nebraska - Lincoln	Grant Award: \$105,000
Period: October 2008 – October 2010	P.I.: Professors Maher Tadros & George Morcous

Industry Champion: Mark Lafferty, Dave Dieter, & PCI R&D Committee

Research Purpose: A key economic criterion for multi-story office buildings, hotels, and similar structures is to have a continuous shallow floor system that minimizes the floor height and resists lateral loads, such as wind and earthquake. This project aims to develop an economical precast continuous shallow floor system that reduces the floor height and eliminates the need for shear walls. The proposed system has a total depth of 16", made entirely of typical precast/prestressed components for rapid, economic, and green construction.

Deliverable: A Design Procedures Document for the Continuous Shallow Hollow Core Floor System, in sufficient detail to allow a knowledgeable engineer to replicate the design using this Document as the sole source of technical information. The design procedures should be in suitable detail and format for building code adoption and for immediate use in building design and construction practice.

Title: **GreenFormat: Product Reporting Guide (Supplement)**

Grantee: CSI Foundation	Grant Award: \$50,208
Period: October 2008 – May 2009	P.I.: Roger Grant

Industry Champion: CSI; USGBC; Building Green Inc., and NIBS

Research Purpose and Deliverables: As described in the earlier, "2007 Research Grant Awards: Details" for the GreenFormat project. This 2008 Supplement provided additional funding to enable CSI to complete the full scope of the research project.