

GREENING STRUCTURAL SYSTEMS OF BUILDINGS

Gap Analysis Research in Support of Continuing Professional and Graduate Education

Research Description and Report

26 June 2009

research goals and methods

The purpose of this research is to discover what limits the ability of building design and construction professionals to use environmentally responsible materials in the structural systems of buildings. We interviewed Oregon-based building design professionals with experience incorporating structural materials that are more environmentally responsible than the materials used in conventional practice. This research identifies gaps in information as well as gaps in access to or availability of green materials for structural use that will:

- 1) help Oregon-based material producers better understand the needs of designers who are responsible for green material selection.
- 2) inform curriculum development for graduate level courses and professional continuing education.
- 3) identify future research opportunities related to the development and evaluation of green structural materials.

The survey process was divided into two phases. Phase I was a series of eight exploratory interviews with individuals, conducted by phone or in person, who assisted us in refining questions and identifying potential participants in the focus group discussions of Phase II. In Phase II, expert opinion about information gaps in the evaluation of green materials was collected through interviews conducted in four focus groups, two in Portland and two in Eugene. Similar survey questions were used in both phases.

Over thirty professionals in architecture, engineering, construction and development participated in the interviews conducted in Phase I and II. Half of the participants are LEED Accredited Professionals.

overview of research to date

From the transcripts of the four group interviews, the frequency of responses to a survey question was recorded, and the results presented here reflect the responses with the greatest frequency. The number in parentheses notes the number of group interviews in which the response came up.

Question 1 | How do design teams establish performance criteria for materials used in the structural systems of green building projects and how are the approaches for wood, steel, concrete and masonry similar or different?

code (4), cost (4), height, size, form (3), program – structural bay size required (2)

Question 1b | Once the decision about which structural material will be used, how do design teams improve the green aspects of the chosen material and system?

material efficiency within the structural system, using less materials (4), carbon footprint (3), using a high percentage of fly ash (2)

Question 1c | Who are the primary advocates for a greener-than-standard performance objective? Owners? Developers? Designers?

owner/developer (3), design team (3), specification writer with input from others (2)

Question 1d | In your experience with LEED certified projects, how did meeting a LEED standard inform structural materials selection? Are there changes that could be made to LEED criteria that would better accommodate locally produced products without sacrificing (or, preferably, improving) sustainability results?

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LEED has little impact on structural selection (2), increased focus on recycled content (2), availability and cost of FCS timber (2), lack of benchmarks for structures (2)

Question 2 | Are there other aspects of the structural system, besides material selection, that you think need to be considered to optimize green building outcomes? Or to facilitate green materials integration?

thermal mass (4), exposed structure to reduce interior finishes (3), acoustic properties (2), systems integration, system synergies (2), durability and longevity (2)

Question 3 | Which of the following design constraints are most likely to pose challenges when teams attempt to use green structural materials?

cost (4), code and regulation compliance (4), availability of green structural materials (4), client expectations (3), construction time, methods, or quality (3), design/build team's understanding of green material options (3), time available to identify and evaluate material alternatives (3)

Question 4 | What information sources do you currently use to select green materials for structural systems applications? What information sources do you use when you have questions about the environmental impacts of structural material options?

Environmental Building News (EBN) (3), internet/google (3), consultants (2), canvassing or collaborating with other design professionals (2)

Question 5 | How do you determine the credibility or reliability of information about the the environmental advantages of green materials?

don't trust product representatives or literature (3), ask local vendors, superintendents, sub-contractors about their experience (3), third party certification (2)

Question 6 | Do you feel that the information available to you about green structural materials and components is adequate? What information would make the task of designing for green structures more doable?

information is not adequate (4), building information modeling (BIM) potential (3), unknowns about materials from other countries (3), benchmarks for structural systems (2), post-occupancy measurement and verification (2)

Question 7 | What topics would you like to see covered in a continuing education program on green structural materials?

how to work in an integrated design process (4), analysis tools (3), basic theory and ethics of sustainability (3), economics of sustainability (2), life-cycle analysis (2)

investigators

Oregon University System faculty

Chris Knowles, OSU Wood Science and Engineering

Christine Theodoropoulos, UO Architecture

Jennifer Allen, PSU Sustainable Industries

Corey Griffin, PSU Architecture (formerly UO Architecture)

graduate research assistants

Kate Kamke, OSU Wood Science and Engineering

Brian Lockyear, UO Architecture