



University of Washington
Department of Civil Engineering
Box 352700, Seattle, WA 98195-2700

8 November 2004

Dear Engineer:

I am writing to request your assistance with a newly awarded research project to investigate the seismic behavior, analysis and design of reinforced concrete structural walls. A group of researchers at the University of Washington and the University of Illinois have recently received a grant from the National Science Foundation, as part of the Network for Earthquake Engineer Simulation Research program. The principle investigators on the project are Laura Lowes and Dawn Lehman, of the University of Washington; and Dan Kuchma and Jian Zhang, of the University of Illinois. I am currently working with Professors Lowes and Lehman.

The primary research objectives of this project are:

- To experimentally determine the performance of several prototype walls considering wall configuration (e.g., c-shaped, coupled), loading, and boundary conditions.
- To develop practical and advanced analytical models to simulate the seismic performance.
- To develop practical design recommendations and engineering expressions to determine the performance.

Our proposed investigation includes laboratory testing of a series of planar, coupled and c-shaped wall sub-assemblages to generate data characterizing the seismic response. Our proposed investigation includes also the development of recommendations for simulation of walls using elastic, simplified nonlinear and high-resolution nonlinear modeling techniques.

To achieve these objectives, we are interested in working with consulting engineers to develop experimental specimens that are representative of current practice and a better understanding of the issues related to design and construction of wall systems. In this way, we will ensure that we are considering the behavior of typical walls and investigating issues that are of concern to practicing engineers. Specifically, we are seeking help to:

- Identify two to three prototype wall buildings. Analysis of these prototype buildings would provide a basis for defining the experiments and evaluating modeling tools.
- Identify inconsistencies and difficulties in current engineering procedures for walls, including design and analysis.

Given your expertise, we believe that you and your colleagues are able to provide valuable input into the project. To facilitate your efforts in providing input, we have developed the attached survey. We are hoping that you and your associates will take a few minutes to answer the questions on the attached questionnaire and consider your recent work to determine if there is a recent building design of yours that might be appropriate for us to use as one of our prototype buildings.

My colleagues and I greatly appreciate your assistance. We hope that your time will be rewarded by research results that address questions of concern to you. If you would like additional information about the project, please feel free to e-mail me or my colleagues

Sincerely,

Aaron Sterns
Graduate Student Researcher

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Questionnaire for NEESR research project investigation the behavior, design and analysis of complex wall systems.

Names of individuals responding to the questionnaire (please identify a primary contact):

Company name:

Phone:

E-mail address:

The following questions should be applied to buildings for which a structural wall system constitutes the primary lateral load resisting system.

Geometry, Reinforcement, Loading

The answers to these questions will be used to define the geometry, reinforcement, and loading on the wall. A table is provided to allow you to provide the answers for each type of wall configuration.

1. For your work, what is the range of buildings heights (in number of stories) that you design? What is the typical number of stories?
2. What percent of the buildings have the following wall configurations: planar, coupled, L-shaped, C-shaped, T-shaped?
3. Do different height buildings typically have a specific wall configuration?
4. What is the range of typical height-to-span aspect ratios for the wall?
5. What is the range of typical longitudinal reinforcement ratios at the base of the wall?
6. What is the range of typical transverse reinforcement ratios at the base of the wall?
7. What is the range of typical wall thickness?
8. What is the range of typical axial load ratios?
9. What percentage of the planar walls have boundary elements?
10. Do coupled walls typically have coupling beams with aspect ratios that require the use of diagonal reinforcement?

Range / Average	Configurations				
	L	T	C	Planar	Coupled
Percent of all walls					
No. of Stories					
Aspect Ratio (H/L)					
ρ_l (base)					
ρ_v (base)					
Thickness					
Axial Load Ratio					
Boundary Elements? (if yes, % of h)					

Please return to Aaron Sterns (University of Washington, Box 352700, Seattle, WA 98195-2700, Phone: 206-543-1075, Fax: 206-543-1543, E-Mail: asterns@u.washington.edu)

Foundations

1. What type of foundation is used typically for a wall? How does this vary with the type of soil or wall configuration?
2. Is the foundation flexibility considered in analyzing the building to determine load distribution and roof drift?

Analytical Procedures

1. What types of analyses are typically performed as part of the design process (e.g. linear or nonlinear? Types of elements used to model walls – solid, shell, beam column elements?)?
2. What software program do you use to perform these analyses?
3. What guidelines are followed in completing these analyses? Are there codes, manuals of standard practice or journal articles that are particularly useful to you?
4. What aspects of the analysis process do you find to be the most difficult or uncertain?

Design and Construction

1. What guidelines are followed in completing the design of a wall? Are there codes, manuals of standard practice or journal articles that are particularly useful to you?
2. What aspects of the design process do you find to be the most difficult or uncertain or inconsistent?
3. What do you find to be the greatest difficulty in constructing a wall? (e.g., dense longitudinal or transverse reinforcement patterns, diagonal reinforcement in coupling beams, wall-slab connections)

Prototype Building

1. What characteristics do you think is most critical that our prototype buildings include?
2. Do you have drawings, and possibly design calculations and an analytical model, of a building that you could provide to us for use as a prototype building?