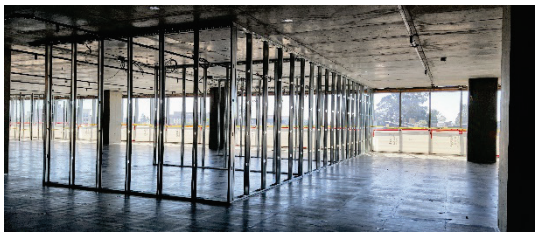
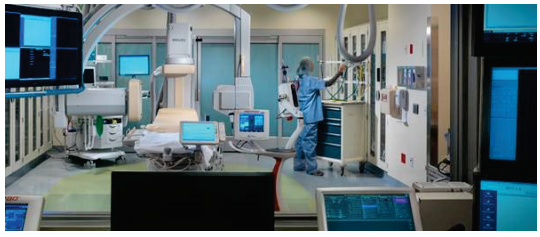
NIST GCR 18-917-43





Recommendations for Improved Seismic Performance of Nonstructural Components

Applied Technology Council

This publication is available free of charge from:
https://doi.org/10.6028/NIST.GCR.18-917-43

September 2018

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NIST GCR 18-917-43

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https://doi.org/10.6028/NIST.GCR.18-917-43

September 2018

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Preface

In 2014, the Applied Technology Council (ATC) commenced a task order project (ATC-120) under National Institute of Standards and Technology (NIST) Contract SB1341-13-CQ-0009 to improve the seismic design of nonstructural systems and components in the areas that will have the largest impact to public safety and economic welfare, with an emphasis on construction regulated by building codes. This project was conceived in direct response to recommendations provided in the NIST GCR 13-917-23, *Development of NIST Measurement Science R&D Roadmap: Earthquake Risk Reduction in Buildings*, (NIST, 2013). In particular, NIST GCR 13-917-23 identified nonstructural issues as a top priority, calling for problem-focused studies in critical areas related to nonstructural design criteria. In the first phase of the ATC-120 project, a year-long study was undertaken to collect and summarize the body of available knowledge related to nonstructural components that could serve as the foundation for future investigations. The study drew from documented earthquake observations, past code development efforts related to nonstructural requirements, analytical research, and nonstructural component and system testing. This work also included a practitioners' workshop to identify the most pressing needs of the profession. This background information was used to identify and prioritize research needed to improve technical aspects of nonstructural system design. The findings and recommendations of this study are summarized in NIST GCR 17-917-44, *Seismic Analysis, Design, and Installation of Nonstructural Components – Background and Recommendations for Future Work*, (NIST, 2017).

The goal of this second phase of work is to improve technical aspects of nonstructural system design in the areas that will have the largest impact for public safety and economic welfare. This report summarizes the body of knowledge gathered and developed to advance the understanding of the response of nonstructural components to earthquakes. The report also makes recommendations for changes to building codes and practice.

ATC is indebted to the leadership of Maryann Phipps, who served as Project Technical Director, and to the members of the Project Technical Committee consisting of John Gillengerten, Bill Holmes, Bret Lizundia, Ricardo Medina, Eduardo Miranda, and Bob Pekelnicky, for their contributions in developing this report and the resulting recommendations. They were assisted by Working Group members including Hamidreza Anajafi, Dago De La Rosa, Nancy Kazantzi, David

Lam, Megan Leon, Matthew Namy, and Dimitrios Vamvatsikos. The Project Review Panel, consisting of Bob Bachman (chair), Andre Filiatrault, Jim Harris, Mike Mahoney (ex officio member), Shannon Rose, Jeff Soulages, Bill Staehlin (ATC Board Contact), and Chris Tokas provided technical review and comment at key developmental stages of the project. The names and affiliations of those who contributed to this report are provided in the list of Project Participants at the end of this report. In addition, Tali Feinstein, Steve Mahin, Marlou Rodriguez, John Silva, and Jim Tauby provided valuable input.

The Applied Technology Council also gratefully acknowledges Steven L. McCabe (NIST Program Manager and Contracting Officer's Representative) and Matthew Hoehler (NIST Project Manager and Technical Point of Contact) for their input and guidance in the preparation of this report, Scott Schiff for project management support, and Carrie Perna for ATC report production services.

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