

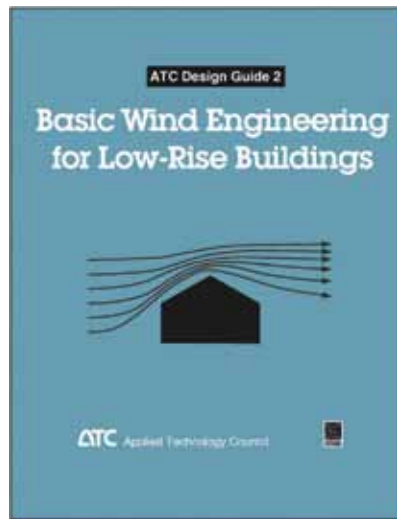
GUEST COLUMN

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A Brief History of ATC...

By Vicki Arbitrio, P.E., SECB, F.SEI

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ATC products funded by the Henry J. Degenkolb Memorial Endowment Fund.

The Council

The Applied Technology Council (ATC) was created by practicing professionals with the intent of serving the evolving needs of engineering practice. Begun in 1971 after the San Fernando earthquake demonstrated the need for improved hazard mitigation

strategies and seismic design standards, the founders came up with the novel idea to pay engineers and researchers to develop these technologies instead of relying on volunteer labor. ATC became a nonprofit, tax-exempt corporation in 1973.

Since its inception, ATC has engaged the services of highly qualified expert consultants in design practice, building regulation, academia and other specialty areas, to “review research, decide what is useful, and convert it to a format readily useable by the practicing engineer,” in the words of its first two Executive Directors, Ronald Mayes and Roland Sharpe. ATC’s mission is to develop and promote state-of-the-art, user-friendly engineering resources and applications used in mitigating the effects of natural and other hazards on the built environment. ATC also identifies and encourages needed research and develops consensus opinions on structural engineering issues in a nonproprietary format. ATC thereby fulfills a unique role in funded information transfer.

ATC is guided by a Board of Directors consisting of representatives appointed by the American Society of Civil Engineers’ Structural Engineering Institute (ASCE-SEI), the National Council of Structural Engineers Associations (NCSEA), the Structural Engineers Association of California (SEAOC), the Structural Engineers Association of New York (SEAoNY), the Western States Council of Structural Engineers Associations (WSCSEA), and four at-large representatives concerned with the practice of structural engineering. The Board members are balanced between practicing and academic experts with a wide knowledge of

different hazards: earthquakes, wind storms, floods, fires and tsunamis.

Project management and administration for all ATC projects are carried out by ATC’s technical staff, led by the Executive Director. Because the technical development work is conducted by a wide range of highly qualified consulting professionals, including individuals from academia, research, and professional practice, each project benefits from experience which would not be available from any single organization. Funding for ATC projects is obtained from government agencies such as the Federal Emergency Management Agency (FEMA) and the National Institute of Standards and Technology (NIST), state agencies such as the State of California, local municipalities such as the City of San Francisco, and from the private sector in the form of tax-deductible contributions.

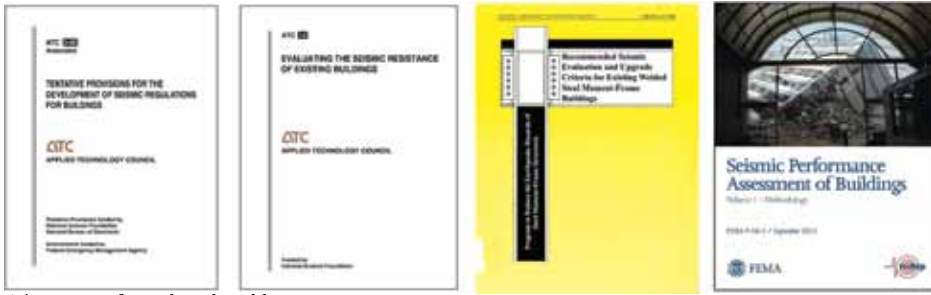
In 1989, ATC established the Henry J. Degenkolb Memorial Endowment Fund, named in honor of a dedicated international leader in structural and earthquake engineering. The ATC Endowment Fund supports projects of critical importance to structural engineering design practice, but for which funds are not available from traditional funding sources. In 2015, ATC will take over management of the James Merriam Delahay Foundation, named in honor of a leader known nationwide for his work on wind codes and standards. The ATC Board of Directors would like the ATC Endowment Fund to support at least one significant project annually.

Most recently, the ATC Endowment Fund has contributed funding to the development of the following (*for a complete list, please visit the ATC website*):

ATC-20-1 Bhutan, *Field Manual: Postearthquake Safety Evaluation of Buildings* (2014)

ATC *Windspeed by Location* website, <http://windspeed.atcouncil.org/> (2011)

ATC Design Guide 2, *Basic Wind Engineering for Low-Rise Buildings* (2009)



The covers of Landmark publications.

ATC-20-1, *Field Manual: Postearthquake Safety Evaluation of Buildings, Second Edition* (2005)

ATC-45, *Field Manual: Safety Evaluation of Buildings after Windstorms and Floods* (2004)

Extraordinary Impacts

Reviewing ATC's history and products, it is difficult to imagine building without this knowledge. ATC-3-06, *Tentative Provisions for the Development of Seismic Regulations for Buildings* (1982), was funded by the National Science Foundation (NSF) and the National Bureau of Standards (NBS), with amendments funded by the Federal Emergency Management Agency (FEMA). The provisions served as the basis for the seismic provisions of the 1988 and subsequent issues of the Uniform Building Code and the National Earthquake Hazards Reduction Program (NEHRP) *Recommended Provisions for the Development of Seismic Regulation for New Buildings*.

In 1987, ATC-14, *Evaluating the Seismic Resistance of Existing Buildings*, was published with funding from NSF. This document provided standardized checklist procedures for evaluating seismic deficiencies in existing buildings, and has evolved into the standard, ASCE31-03, *Seismic Evaluation of Existing Buildings*.

The ATC-20 family of documents, including ATC-20-1 *Field Manual: Post-Earthquake Safety Evaluation of Buildings*, provides procedures, criteria, and forms to enable structural engineers, building inspectors, and other qualified personnel to determine if an earthquake-damaged structure can be safely occupied. These documents, funded by the California Governor's Office of Emergency Services (OES) and the California Office of Statewide Health Planning and Development (OPHPD), were initially published in 1989, two weeks prior to the Loma Prieta earthquake, and were used by the City of San Francisco to post buildings following the earthquake.

ATC-45, *Field Manual: Safety Evaluation of Buildings After Wind Storms and Floods*,

published in 2004, is modeled after ATC-20-1 to provide guidelines and procedures to evaluate buildings damaged by wind storms or floods. Upon publication, this document was immediately deployed in inspections performed following Hurricanes Katrina and Rita in 2005.

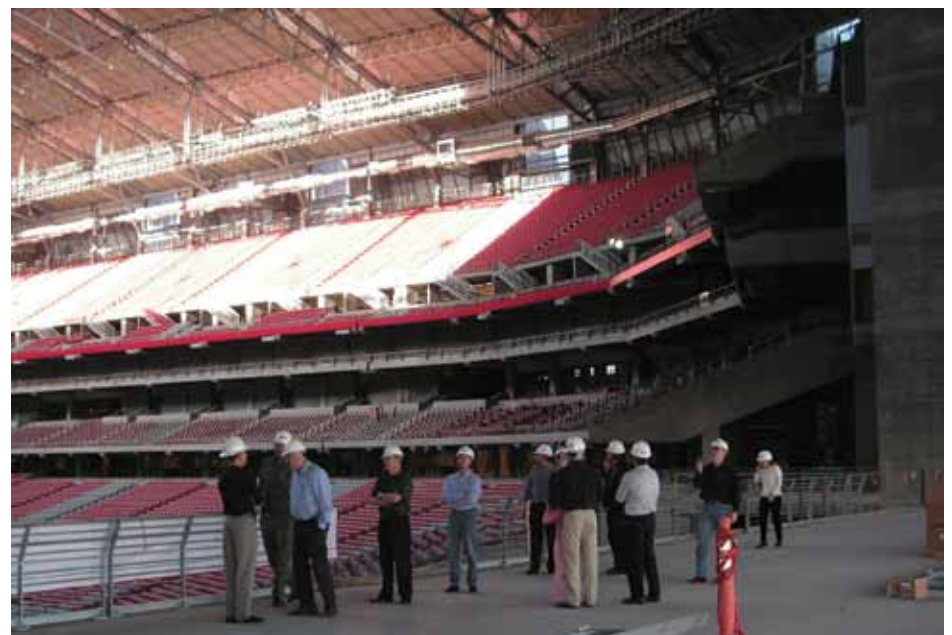
The SAC Joint Venture, a partnership between the Structural Engineers Association of California (SEAOC), ATC, and the California Universities for Research in Earthquake Engineering, (CUREe), was funded by FEMA and the California OES to investigate the failure of welded connections in numerous steel moment-frame buildings after the 1994 Northridge earthquake. In 2000, the SAC Joint Venture produced the FEMA 350 through FEMA 353 series of reports, along with supporting technical and background documentation, that changed the practice of steel design and construction across the country.

FEMA P-58, *Seismic Performance Assessment of Buildings, Methodology and Implementation* (2012), was funded by FEMA. This more than 10-year work effort on the ATC-58 series of projects developed a next-generation system for seismic performance assessment

of individual buildings that accounts for uncertainty in our ability to accurately predict response, and communicates performance in ways that better relate to the decision-making needs of stakeholders. A three volume set was produced that described the methodology, as well as the development of basic building information, response quantities, fragilities and consequence data which are used as inputs. The work included data for most common structural systems and building occupancies, and developed an electronic *Performance Assessment Calculation Tool* (PACT) for performing the probabilistic computations and calculating the accumulation of losses in terms of repair costs, repair times, casualties, and unsafe placarding.

Extraordinary People

ATC's remarkable contributions to our industry have been overseen for the last 34 years by ATC Executive Director, Christopher Rojahn. Chris became ATC's third Executive Director in 1981, following Ronald Mayes and Roland Sharpe. Over the years, Chris has nurtured a very talented team of technical personnel, project managers, editors, document production specialists, and administrative staff who have assisted him in running ATC projects and producing ATC reports. Having spent more than 40 years in the field of structural engineering, he has served in leadership roles on a wide range of research and development (R&D) projects, and has served as Principal Investigator/Project Manager/Senior Advisor on more than 60 major technical projects. He has been at the helm of the organization and



ATC staff and Board of Directors touring Cardinals Stadium in Arizona.



Chris Rojahn and spouse Stephanie King in Vancouver, BC for the 13th World Conference on Earthquake Engineering, August 2004.

overseen the production of every landmark ATC document produced to date.

Chris has also served as ATC's Ambassador, working to expand ATC's reputation at home and abroad. ATC has written papers for World Conferences on Earthquake Engineering in Lisbon 2012, Beijing 2008, Vancouver 2004, Auckland 2000, Acapulco 1996, Madrid 1992, Tokyo-Kyoto 1988, and San Francisco 1984. ATC has held bi-annual workshops sponsored in conjunction with the Japan Structural Consultants Association (JSCA) to develop policy recommendations for improved engineering practice. The 2014 Workshop was the 15th in a series that started in 1984, and was focused on community resilience following typhoons, hurricanes, earthquakes, and other disasters, based on the current state-of-practice, innovative engineering solutions, and new and emerging technologies.

ATC has teamed with the Structural Engineering Institute of ASCE on a series of hazard-mitigation conferences. In 2009, ATC and SEI co-sponsored a conference on *Improving the Seismic Performance of Existing Buildings and Other Structures* in San Francisco and in 2012, they co-sponsored a conference on *Advances in Hurricane Engineering: Learning from our Past* in Miami. A second ATC-SEI Conference on *Improving the Seismic Performance of Existing Buildings and Other Structures* is planned to take place in San Francisco December 10-12, 2015. This conference will provide a forum for the presentation and exchange of new information on seismic evaluation and seismic retrofit of existing buildings, including case studies, new discoveries, innovative use of new technologies and

materials, implementation issues, needed improvements to existing standards and methods, and socio-economic issues. Visit www.atc-sei.org for more details.

Under Chris's leadership, ATC has successfully expanded its focus to encourage needed research on structural engineering issues involving high wind and flood hazard events, including hurricanes and tornadoes. Chris and ATC have built international relationships, teaming with Japanese, Chilean, Dutch, British and Bhutanese structural engineers to share knowledge and document ideas for additional research. Chris has accomplished this work by bringing together an extraordinary staff with diverse expertise, including Tom McLane as Director of Business Development and William L. Coulbourne, Director, Wind and Flood Hazard Mitigation, now both retired.



Chris Rojahn began his career as a deck officer for USGS.

Current staff includes Jon A. Heintz, Director of Projects, Ayse Hortacsu, Associate Director of Projects, Bernadette Hadnagy, Operations Manager, and Amber Houchen, Administrative, Marketing, and Publications Specialist. In the fall of 2014, ATC hired new talent: Anna Olsen began working as Research Applications Manager, and Veronica Cedillos joined the team as a second Associate Director of Projects. In January of 2015, Scott D. Schiff joined the staff as Director of Projects, and will be located on the East Coast.

In May 2015, Chris will become Director Emeritus and Jon Heintz will step into the Executive Director role. Jon joined ATC in 2005, after many years as a practicing structural engineer and more than 25 years of experience in earthquake engineering practice and research, natural hazard mitigation, seismic evaluation and strengthening, advanced analysis methods, and strategic planning on structural engineering research needs at the national level.

The Future

Over the last 40 years, ATC has achieved an unmatched success in developing and implementing diverse seismic mitigation strategies. Products like ATC-20 will endure for many generations to come to mitigate against losses for people around the world. And more recently, ATC has completed successful projects to improve engineering practice for making structures resistant to wind, flood, and blast, as well as providing practical guidance for service conditions such as floors vibration response. ATC will continue its current practice of bringing together the brightest minds and the latest research to solve engineering challenges, implement hazard mitigation, and improve community resilience in the United States.

The ATC family includes incredibly talented and generous members, including staff, consultants, and clients, all striving to improve the structural engineering profession. The Board of Directors would like to take this opportunity to thank the dedicated staff, and particularly Chris Rojahn, for their tireless efforts to make the Applied Technology Council synonymous with excellence.

For additional information about the history of ATC, or to read more about current projects, please see the online version of this article, review *The Structural Design of Tall and Special Buildings* (Vol 14, Number 3, September 2005, Editor Gary C. Hart, published by Wiley), or visit the Applied Technology Council website, www.atccouncil.org/. Both of the latter were primary sources for this article. ■

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Bruce C. Olsen*	(1978-1982)	William E. Staehlin	(2002-2003, 2013-2016)
Gerard Pardoen	(1987-1991)	Scott Stedman	(1996-1997)
Robert B. Paullus, Jr.	(2014-2017)	Donald R. Strand	(1982-1983)
Stephen H. Pelham*	(1998-2005)	James L. Stratta	(1975-1979)
Norman D. Perkins	(1973-1976)	Edward J. Teal	(1976-1979)
Richard J. Phillips	(1997-2000)	W. Martin Tellegen	(1973)
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Sherrill Pitkin	(1984-1987)	Charles H. Thornton*	(1992-2000, 2005-2011)
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Christopher Rojahn	(1981-present)		

Applied Technology Council Projects and Report Information

One of the primary purposes of the Applied Technology Council is to develop engineering applications and resources that translate and summarize useful information for practicing building and bridge design professionals. This includes the development of guidelines and manuals, as well as the development of research recommendations for specific areas determined by the profession. ATC is not a code development organization, although ATC project reports often serve as resource documents for the development of codes, standards and specifications.

Applied Technology Council conducts projects that meet the following criteria:

1. The primary audience or benefactor is the design practitioner in structural engineering.
2. A cross section or consensus of engineering opinion is required to be obtained and presented by a neutral source.
3. The project fosters the advancement of structural engineering practice.

Funding for projects is obtained from government agencies and tax-deductible contributions from the private sector. Brief descriptions of completed ATC projects and reports are provided below.

ATC-1: This project resulted in five papers published as part of *Building Practices for Disaster Mitigation, Building Science Series 46*, proceedings of a workshop sponsored by the National Science Foundation (NSF) and the National Bureau of Standards (NBS). Available through the National Technical Information Service (NTIS), 5285 Port Royal Road, Springfield, VA 22151, as NTIS report No. COM-73-50188.

ATC-2: The report, *An Evaluation of a Response Spectrum Approach to Seismic Design of Buildings*, was funded by NSF and NBS and was conducted as part of the Cooperative Federal

Program in Building Practices for Disaster Mitigation. Available through ATC. (Published 1974, 270 Pages)

ATC-3: The report, *Tentative Provisions for the Development of Seismic Regulations for Buildings* (ATC-3-06), was funded by NSF and NBS. The tentative provisions in this report served as the basis for the seismic provisions of the 1988 and subsequent issues of the *Uniform Building Code* and the *NEHRP Recommended Provisions for the Development of Seismic Regulation for New Building and Other Structures*. The second printing contains proposed amendments prepared by a joint committee of the Building Seismic Safety Council (BSSC) and the NBS. Available through ATC. (Published 1978, amended 1982, 505 pages plus proposed amendments)

ATC-3-2: The project, “Comparative Test Designs of Buildings Using ATC-3-06 Tentative Provisions”, was funded by NSF. It consisted of a study to develop and plan a program for making comparative test designs of the ATC-3-06 Tentative Provisions. The project report was intended for use by the Building Seismic Safety Council in its refinement of the ATC-3-06 Tentative Provisions.

ATC-3-4: The report, *Redesign of Three Multistory Buildings: A Comparison Using ATC-3-06 and 1982 Uniform Building Code Design Provisions*, was published under a grant from NSF. Available through ATC. (Published 1984, 112 pages)

ATC-3-5: The project, “Assistance for First Phase of ATC-3-06 Trial Design Program Being Conducted by the Building Seismic Safety Council,” was funded by the Building Seismic Safety Council to obtain assistance in conducting the first phase of its program to develop trial designs for buildings in Los Angeles, Seattle, Phoenix, and Memphis.

ATC-3-6: The project, “Assistance for Second Phase of ATC-3-06 Trial Design Program Being Conducted by the Building Seismic Safety Council,” was funded by the Building Seismic Safety Council to obtain assistance in conducting the second phase of its program to develop trial designs for buildings in New York, Chicago, St. Louis, Charleston, and Fort Worth.

ATC-4: The report, *A Methodology for Seismic Design and Construction of Single-Family Dwellings*, was published under a contract with the Department of Housing and Urban Development (HUD). Available through ATC. (Published 1976, 576 pages)

ATC-4-1: The report, *The Home Builders Guide for Earthquake Design*, was published under a contract with HUD. Available through ATC. (Published 1980, 57 pages)

ATC-5: The report, *Guidelines for Seismic Design and Construction of Single-Story Masonry Dwellings in Seismic Zone 2*, was developed under a contract with HUD. Available through ATC. (Published 1986, 38 pages)

ATC-6: The report, *Seismic Design Guidelines for Highway Bridges*, was published under a contract with the Federal Highway Administration (FHWA). Available through ATC. (Published 1981, 210 pages)

ATC-6-1: The report, *Proceedings of a Workshop on Earthquake Resistance of Highway Bridges*, was published under a grant from NSF. Available through ATC. (Published 1979, 625 pages)

ATC-6-2: The report, *Seismic Retrofitting Guidelines for Highway Bridges*, was published under a contract with FHWA. Available through ATC. (Published 1983, 220 pages)

ATC-7: The report, *Guidelines for the Design of Horizontal Wood Diaphragms*, was published under a grant from NSF. Available through ATC. (Published 1981, 190 pages)

ATC-7-1: The report, *Proceedings of a Workshop on Design of Horizontal Wood Diaphragms*, was published under a grant from NSF. Available through ATC. (Published 1980, 302 pages)

ATC-8: The report, *Proceedings of a Workshop on the Design of Prefabricated Concrete Buildings for Earthquake Loads*, was funded by NSF. Available through ATC. (Published 1981, 400 pages)

ATC-9: The report, *An Evaluation of the Imperial County Services Building Earthquake Response and Associated Damage*, was published under a grant from NSF. Available through ATC. (Published 1984, 231 pages)

ATC-10: The report, *An Investigation of the Correlation Between Earthquake Ground Motion and Building Performance*, was funded by the U.S. Geological Survey (USGS). Available through ATC. (Published 1982, 114 pages)

ATC-10-1: The report, *Critical Aspects of Earthquake Ground Motion and Building Damage Potential*, was co-funded by the USGS and the NSF. Available through ATC. (Published 1984, 259 pages)

ATC-11: The report, *Seismic Resistance of Reinforced Concrete Shear Walls and Frame Joints: Implications of Recent Research for Design Engineers*, was published under a grant from NSF. Available through ATC. (Published 1983, 184 pages)

ATC-12: The report, *Comparison of United States and New Zealand Seismic Design Practices for Highway Bridges*, was published under a grant from NSF. Available through ATC. (Published 1982, 270 pages)

ATC-12-1: The report, *Proceedings of Second Joint U.S.-New Zealand Workshop on Seismic Resistance of Highway Bridges*, was published under a grant from NSF. Available through ATC. (Published 1986, 272 pages)

ATC-13: The report, *Earthquake Damage Evaluation Data for California*, was developed under a contract with the Federal Emergency Management Agency (FEMA). It presents expert-opinion earthquake damage and loss estimates for industrial, commercial, residential, utility and transportation facilities in California. Included are damage probability matrices for 78 classes of structures and estimates of time required to restore damaged facilities to pre-earthquake usability. Available through ATC. (Published 1985, 492 pages)

ATC-13-1: The report, *Commentary on the Use of ATC-13 Earthquake Damage Evaluation Data for Probable Maximum Loss Studies of California Buildings*, was developed with funding from the ATC Endowment Fund. It provides guidance for using ATC-13 expert-opinion data for probable maximum loss (PML) studies of California buildings. Included are discussions of the limitations on the use of the ATC-13 expert-

opinion data, and appendices containing information not included in the original ATC-13 report, such as model building type descriptions, beta damage distribution parameters for ATC-13 model building types, and PML values for ATC-13 model building types. Available through ATC. (Published 2002, 66 pages)

ATC-14: The report, *Evaluating the Seismic Resistance of Existing Buildings*, was developed under a grant from the NSF. It describes a methodology for performing preliminary and detailed seismic evaluations of buildings. A precursor to the eventual ASCE 31 Standard, *Seismic Evaluation of Existing Buildings*, it contains useful background information including a state-of-practice review; seismic loading criteria; data collection procedures; a detailed description of the building classification system; preliminary and detailed analysis procedures; and example case studies, including nonstructural considerations. Available through ATC. (Published 1987, 370 pages)

ATC-15: The report, *Comparison of Seismic Design Practices in the United States and Japan*, was published under a grant from NSF. Available through ATC. (Published 1984, 317 pages)

ATC-15-1: The report, *Proceedings of Second U.S.-Japan Workshop on Improvement of Building Seismic Design and Construction Practices*, was published under a grant from NSF. It includes state-of-the-practice papers and case studies of actual building designs and information on regulatory, contractual, and licensing issues. Available through ATC. (Published 1987, 412 pages)

ATC-15-2: The report, *Proceedings of Third U.S.-Japan Workshop on Improvement of Building Structural Design and Construction Practices*, was published jointly by ATC and the Japan Structural Consultants Association. It includes state-of-the-practice papers on steel braced frame and reinforced concrete buildings, base isolation and passive energy dissipation devices, and comparisons between U.S. and Japanese design practice. Available through ATC. (Published 1989, 358 pages)

ATC-15-3: The report, *Proceedings of Fourth U.S.-Japan Workshop on Improvement of Building Structural Design and Construction Practices*, was published jointly by ATC and the Japan Structural Consultants Association. It includes papers on postearthquake building damage assessment; acceptable earthquake damage; repair and retrofit

of earthquake-damaged buildings; base-isolated buildings, Architectural Institute of Japan recommendations for design; active damping systems; and wind-resistant design. Available through ATC. (Published 1992, 484 pages)

ATC-15-4: The report, *Proceedings of Fifth U.S.-Japan Workshop on Improvement of Building Structural Design and Construction Practices*, was published jointly by ATC and the Japan Structural Consultants Association. It includes papers on performance goals and acceptable damage; seismic design procedures and case studies; seismic evaluation, repair and upgrade; construction influences on design; isolation and passive energy dissipation; design of irregular structures; and quality control for design and construction. Available through ATC. (Published 1994, 360 pages)

ATC-16: The FEMA 90 report, *An Action Plan for Reducing Earthquake Hazards of Existing Buildings*, was funded by FEMA and was conducted by a joint venture of ATC, the Building Seismic Safety Council and the Earthquake Engineering Research Institute. Available through FEMA. (Published 1985, 75 pages)

ATC-17: The report, *Proceedings of a Seminar and Workshop on Base Isolation and Passive Energy Dissipation*, was published under a grant from NSF. It includes papers describing case studies in the United States, applications and developments worldwide, recent innovations in technology development, and structural and ground motion issues in base-isolation and passive energy-dissipation. Also included is a proposed 5-year research agenda. Available through ATC. (Published 1986, 478 pages)

ATC-17-1: The report, *Proceedings of a Seminar on Seismic Isolation, Passive Energy Dissipation and Active Control*, was published under a grant from NCEER and NSF. Available through ATC. (Published 1993, 841 pages in two volumes)

ATC-18: The report, *Seismic Design Criteria for Bridges and Other Highway Structures: Current and Future*, was developed under a grant from NCEER and FHWA. Available through ATC. (Published, 1997, 151 pages)

ATC-18-1: The report, *Impact Assessment of Selected MCEER Highway Project Research on the Seismic Design of Highway Structures*, was developed under a contract with the Multidisciplinary Center for Earthquake Engineering Research (MCEER, formerly

NCEER) and FHWA. Available through ATC. (Published, 1999, 136 pages)

ATC-19: The report, *Structural Response Modification Factors* was funded by NSF and NCEER. Available through ATC. (Published 1995, 70 pages)

ATC-20: The report, *Procedures for Postearthquake Safety Evaluation of Buildings*, was developed under a contract with the California Office of Emergency Services (OES), California Office of Statewide Health Planning and Development (OSHPD) and FEMA. It provides procedures and guidelines for inspecting buildings that have been damaged in an earthquake, and making decisions regarding their continued use and occupancy. Written for volunteer structural engineers and building inspectors, it includes rapid and detailed evaluation procedures for posting buildings as “inspected” (apparently safe, green placard), “limited entry” (yellow) or “unsafe” (red). Available through ATC (Published 1989, 152 pages)

ATC-20-1: The report, *Field Manual: Postearthquake Safety Evaluation of Buildings, Second Edition*, was funded by Applied Technology Council. A companion to the ATC-20 report, the *Field Manual* summarizes postearthquake safety evaluation procedures in a concise format designed for ease of use in the field. Available through ATC. (Published 2004, 143 pages)

ATC-20-2: The report, *Addendum to the ATC-20 Postearthquake Building Safety Procedures* was published under a grant from the NSF and funded by the USGS. It provides updated assessment forms, placards, and evaluation procedures based on application and use in five earthquake events that occurred after the initial release of the ATC-20 report. Available through ATC. (Published 1995, 94 pages)

ATC-20-3: The report, *Case Studies in Rapid Postearthquake Safety Evaluation of Buildings*, was funded by ATC and R.P. Gallagher Associates. Containing over 50 case studies using the ATC-20 Rapid Evaluation procedure, the report is intended for use as a training and reference manual describing how buildings are inspected and evaluated. Illustrated with photos and completed safety assessment forms and placards. Available through ATC. (Published 1996, 295 pages)

ATC-20-T: The *Postearthquake Safety Evaluation of Buildings Training CD* was developed in cooperation with FEMA. The 4½-hour training seminar includes photographs, schematic drawings, and textual information. Available through ATC. (Published 2002, 230 PowerPoint slides with Speakers Notes)

ATC-21: The FEMA 154 report, *Rapid Visual Screening of Buildings for Potential Seismic Hazards: A Handbook, Second Edition*, was developed under a contract with FEMA. It describes a rapid visual screening procedure for identifying buildings that might pose serious risk of loss of life and injury in the event of a damaging earthquake. Available through ATC and FEMA. (Published 2002, 161 pages)

ATC-21-1: The FEMA 155 report, *Rapid Visual Screening of Buildings for Potential Seismic Hazards: Supporting Documentation, Second Edition*, was developed under a contract with FEMA. It provides the technical basis for the updated rapid visual screening procedure. Available through ATC and FEMA. (Published 2002, 117 pages)

ATC-21-2: The report, *Earthquake Damaged Buildings: An Overview of Heavy Debris and Victim Extrication*, was developed under a contract with FEMA. (Published 1988, 95 pages)

ATC-21-T: The report, *Rapid Visual Screening of Buildings for Potential Seismic Hazards Training Manual, Second Edition*, was developed under a contract with FEMA. Training materials include 120 slides in PowerPoint format and companion narrative coordinated with the presentation. Available through ATC. (Published 2004, 148 pages and PowerPoint presentation on companion CD)

ATC-22: The report, *A Handbook for Seismic Evaluation of Existing Buildings (Preliminary)*, was developed under a contract with FEMA in 1989. Based on the information originally developed in ATC-14, this report was revised by BSSC and published as the FEMA 178 report, *NEHRP Handbook for the Seismic Evaluation of Existing Buildings* in 1992, revised by ASCE and published as the FEMA 310 report, *Handbook for the Seismic Evaluation of Buildings – a Prestandard* in 1998. Currently available through the American Society of Civil Engineers as the ASCE 31 Standard, *Seismic Evaluation of Existing Buildings*.

ATC-22-1: The report, *Seismic Evaluation of Existing Buildings: Supporting Documentation*, was developed under a contract with FEMA. (Published 1989, 160 pages)

ATC-23A: The report, *General Acute Care Hospital Earthquake Survivability Inventory for California, Part A: Survey Description, Summary of Results, Data Analysis and Interpretation*, was developed under a contract with the Office of Statewide Health Planning and Development (OSHPD), State of California. Available through ATC. (Published 1991, 58 pages)

ATC-23B: The report, *General Acute Care Hospital Earthquake Survivability Inventory for California, Part B: Raw Data*, was developed under a contract with the Office of Statewide Health Planning and Development (OSHPD), State of California. Available through ATC. (Published 1991, 377 pages)

ATC-24: The report, *Guidelines for Seismic Testing of Components of Steel Structures*, was jointly funded by the American Iron and Steel Institute (AISI), American Institute of Steel Construction (AISC), National Center for Earthquake Engineering Research (NCEER), and NSF. Available through ATC. (Published 1992, 57 pages)

ATC-25: The report, *Seismic Vulnerability and Impact of Disruption of Lifelines in the Conterminous United States*, was developed under a contract with FEMA. Available through ATC. (Published 1991, 440 pages)

ATC-25-1: The report, *A Model Methodology for Assessment of Seismic Vulnerability and Impact of Disruption of Water Supply Systems*, was developed under a contract with FEMA. Available through ATC. (Published 1992, 147 pages)

ATC-26: This project, "U.S. Postal Service National Seismic Program," was funded under a contract with the U.S. Postal Service (USPS), and resulted in the following interim documents:

ATC-26 Report, *Cost Projections for the U. S. Postal Service Seismic Program* (Completed 1990)

ATC-26-1 Report, *United States Postal Service Procedures for Seismic Evaluation of Existing Buildings (Interim)* (Completed 1991)

ATC-26-2 Report, *Procedures for Post-disaster Safety Evaluation of Postal Service*

Facilities (Interim). Available through ATC. (Published 1991, 221 pages)

ATC-26-3 Report, *Field Manual: Post-earthquake Safety Evaluation of Postal Buildings (Interim)*. Available through ATC. (Published 1992, 133 pages)

ATC-26-3A Report, *Field Manual: Post Flood and Wind Storm Safety Evaluation of Postal Buildings (Interim)*. Available through ATC. (Published 1992, 114 pages)

ATC-26-4 Report, *United States Postal Service Procedures for Building Seismic Rehabilitation (Interim)* (Completed 1992)

ATC-26-5 Report, *United States Postal Service Guidelines for Building and Site Selection in Seismic Areas (Interim)* (Completed 1992)

ATC-28: The report, *Development of Recommended Guidelines for Seismic Strengthening of Existing Buildings, Phase I: Issues Identification and Resolution*, was developed under a contract with FEMA. Available through ATC. (Published 1992, 150 pages)

ATC-29: The report, *Proceedings of a Seminar and Workshop on Seismic Design and Performance of Equipment and Nonstructural Elements in Buildings and Industrial Structures*, was developed under a grant from NCEER and NSF. It includes papers describing current practice, codes and regulations; earthquake performance; analytical and experimental investigations; development of new seismic qualification methods; and research, practice, and code development needs for nonstructural elements and systems. Available through ATC. (Published 1992, 470 pages)

ATC-29-1: The report, *Proceedings of a Seminar on Seismic Design, Retrofit, and Performance of Nonstructural Components*, was developed under a grant from NCEER and NSF. It includes papers on observed performance in recent earthquakes; seismic design codes, standards, and procedures for commercial and institutional buildings; design issues relating to industrial and hazardous material facilities; and seismic evaluation and rehabilitation of components in conventional and essential facilities. Available through ATC. (Published 1998, 518 pages)

ATC-29-2: The report, *Proceedings of Seminar on Seismic Design, Performance, and Retrofit of*

Nonstructural Components in Critical Facilities, was developed under a grant from MCEER (formerly NCEER) and NSF. It includes papers on seismic design, performance, and retrofit of nonstructural components in critical facilities including current practices and emerging codes; seismic design and retrofit; risk and performance evaluation; system qualification and testing; and advanced technologies. Available through ATC. (Published 2003, 574 pages)

ATC-30: The report, *Proceedings of Workshop for Utilization of Research on Engineering and Socioeconomic Aspects of 1985 Chile and Mexico Earthquakes*, was developed under a grant from the NSF. Available through ATC. (Published 1991, 113 pages)

ATC-31: The report, *Evaluation of the Performance of Seismically Retrofitted Buildings*, was developed under a contract with the National Institute of Standards and Technology (NIST, formerly NBS) and funded by the USGS. Available through ATC. (Published 1992, 75 pages)

ATC-32: The report, *Improved Seismic Design Criteria for California Bridges: Provisional Recommendations*, was funded by the California Department of Transportation (Caltrans). Available through ATC. (Published 1996, 215 pages)

ATC-32-1: The report, *Improved Seismic Design Criteria for California Bridges: Resource Document*, was funded by Caltrans. Available through ATC. (Published 1996, 365 pages; also available on CD)

ATC-33: The project, funded under a contract with the Building Seismic Safety Council, was initiated by FEMA to develop nationally applicable, state-of-the-art guidance for performance-based seismic rehabilitation of buildings. Work resulted in the publication of:

FEMA 273, *NEHRP Guidelines for the Seismic Rehabilitation of Buildings* (Published 1997, 440 pages). Revised by ASCE and published as the FEMA 356 report, *Prestandard and Commentary for the Seismic Rehabilitation of Buildings* in 2000. Currently available through the American Society of Civil Engineers as the ASCE 41 Standard, *Seismic Rehabilitation of Existing Buildings*.

FEMA 274, *NEHRP Commentary on the Guidelines for the Seismic Rehabilitation of*

Buildings. Available through ATC and FEMA. (Published 1997, 492 pages)

FEMA 276, *Example Applications of the NEHRP Guidelines for the Seismic Rehabilitation of Buildings*. Available through ATC and FEMA. (Published 1997, 295 pages)

ATC-34: The report, *A Critical Review of Current Approaches to Earthquake Resistant Design*, was developed under a grant from NCEER and NSF. Available through ATC. (Published, 1995, 94 pages)

ATC-35: The report, *Enhancing the Transfer of U.S. Geological Survey Research Results into Engineering Practice* was developed under a cooperative agreement with the USGS. Available through ATC. (Published 1994, 120 pages)

ATC-35-1: The report, *Proceedings of Seminar on New Developments in Earthquake Ground Motion Estimation and Implications for Engineering Design Practice*, was developed under a cooperative agreement with USGS. It includes papers describing state-of-the-art information on regional earthquake risk; new techniques for estimating strong ground motions as a function of earthquake source, travel path, and site parameters; and new developments applicable to geotechnical engineering. Available through ATC. (Published 1994, 478 pages)

ATC-35-2: The report, *Proceedings: National Earthquake Ground Motion Mapping Workshop*, was developed under a cooperative agreement with USGS. It includes papers on ground motion parameters; reference site conditions; probabilistic versus deterministic basis; and the treatment of uncertainty in seismic source characterization and ground motion attenuation. Available through ATC. (Published 1997, 154 pages)

ATC-35-3: The report, *Proceedings: Workshop on Improved Characterization of Strong Ground Shaking for Seismic Design*, was developed under a cooperative agreement with USGS. It includes papers on identifying needs and developing improved representations of earthquake ground motion for use in seismic design practice and building codes. Available through ATC. (Published 1999, 75 pages)

ATC-37: The report, *Review of Seismic Research Results on Existing Buildings*, was developed in conjunction with the Structural Engineers Association of California (SEAOC) and California Universities for Research in Earthquake

Engineering (CUREe) under a contract with the California Seismic Safety Commission (SSC). Available through the Seismic Safety Commission as Report SSC 94-03. (Published, 1994, 492 pages)

ATC-38: The report, *Database on the Performance of Structures near Strong-Motion Recordings: 1994 Northridge, California, Earthquake*, was developed with funding from the USGS, the Southern California Earthquake Center (SCEC), OES, and the Institute for Business and Home Safety (IBHS). Available through ATC. (Published 2000, 260 pages, with CD containing complete database).

ATC-40: The report, *Seismic Evaluation and Retrofit of Concrete Buildings*, was developed under a contract with the California Seismic Safety Commission. It provides guidance on performance objectives, hazard characterization, identification of deficiencies, retrofit strategies, nonlinear static analysis procedures, modeling rules, foundation effects, and response limits for seismic evaluation and retrofit of concrete buildings. Available through ATC. (Published, 1996, 612 pages in two volumes)

ATC-41 (SAC Joint Venture, Phase 1): The project, "Program to Reduce the Earthquake Hazards of Steel Moment-Resisting Frame Structures, Phase 1," was funded by FEMA and OES and conducted by a Joint Venture partnership of SEAOC, ATC, and CUREe. Under Phase 1 the following documents were prepared:

SAC-94-01, *Proceedings of the Invitational Workshop on Steel Seismic Issues, Los Angeles, September 1994*. Available through ATC. (Published 1994, 155 pages)

SAC-95-01, *Steel Moment-Frame Connection Advisory No. 3*. Available through ATC. (Published 1995, 310 pages)

SAC-95-02, *Interim Guidelines: Evaluation, Repair, Modification and Design of Welded Steel Moment-Frame Structures* (FEMA 267 report) (Published 1995, 215 pages; superseded by FEMA 350 to 353)

SAC-95-03, *Characterization of Ground Motions During the Northridge Earthquake of January 17, 1994*. Available through ATC. (Published 1995, 179 pages)

SAC-95-04, *Analytical and Field Investigations of Buildings Affected by the Northridge Earthquake of January 17, 1994*.

Available through ATC. (Published 1995, 900 pages in two volumes)

SAC-95-05, *Parametric Analytical Investigations of Ground Motion and Structural Response, Northridge Earthquake of January 17, 1994*. Available through ATC. (Published 1995, 274 pages)

SAC-95-06, *Surveys and Assessment of Damage to Buildings Affected by the Northridge Earthquake of January 17, 1994*. Available through ATC. (Published 1995, 315 pages)

SAC-95-07, *Case Studies of Steel Moment Frame Building Performance in the Northridge Earthquake of January 17, 1994* (Published 1995, 260 pages, Available through ATC)

SAC-95-08, *Experimental Investigations of Materials, Weldments and Nondestructive Examination Techniques*. Available through ATC. (Published 1995, 144 pages)

SAC-95-09, *Background Reports: Metallurgy, Fracture Mechanics, Welding, Moment Connections and Frame systems, Behavior* (FEMA 288 report). Available through ATC and FEMA. (Published 1995, 361 pages)

SAC-96-01, *Experimental Investigations of Beam-Column Subassemblages, Part 1 and 2*. Available through ATC. (Published 1996, 924 pages, in two volumes)

SAC-96-02, *Connection Test Summaries* (FEMA 289 report). Available through ATC and FEMA. (Published 1996, 144 pages)

ATC-41-1 (SAC Joint Venture, Phase 2): The project, "Program to Reduce the Earthquake Hazards of Steel Moment-Resisting Frame Structures, Phase 2," was funded by FEMA and conducted by a Joint Venture partnership of SEAOC, ATC, and CUREe. Under Phase 2 the following documents were prepared:

SAC-96-03, *Interim Guidelines Advisory No. 1 Supplement to FEMA 267 Interim Guidelines* (FEMA 267A report) (Published 1997, 100 pages; superseded by FEMA 350 to 353)

SAC-99-01, *Interim Guidelines Advisory No. 2 Supplement to FEMA 267 Interim Guidelines* (FEMA 267B report, superseding

FEMA 267A). (Published 1999, 150 pages; superseded by FEMA 350 to 353)

FEMA 350, *Recommended Seismic Design Criteria for New Steel Moment-Frame Buildings*. Available through ATC and FEMA. (Published 2000, 190 pages)

FEMA 351, *Recommended Seismic Evaluation and Upgrade Criteria for Existing Welded Steel Moment-Frame Buildings*. Available through ATC and FEMA. (Published 2000, 210 pages)

FEMA 352, *Recommended Postearthquake Evaluation and Repair Criteria for Welded Steel Moment-Frame Buildings*. Available through ATC and FEMA. (Published 2000, 180 pages)

FEMA 353, *Recommended Specifications and Quality Assurance Guidelines for Steel Moment-Frame Construction for Seismic Applications*. Available through ATC and FEMA. (Published 2000, 180 pages)

FEMA 354, *A Policy Guide to Steel Moment-Frame Construction*. Available through ATC and FEMA. (Published 2000, 27 pages)

FEMA 355A, *State of the Art Report on Base Materials and Fracture*. Available through ATC and FEMA. (Published 2000, 107 pages; in print and on CD).

FEMA 355B, *State of the Art Report on Welding and Inspection*. Available through ATC and FEMA. (Published 2000, 185 pages; in print and on CD).

FEMA 355C, *State of the Art Report on Systems Performance of Steel Moment Frames Subject to Earthquake Ground Shaking*. Available through ATC and FEMA. (Published 2000, 322 pages; in print and on CD).

FEMA 355D, *State of the Art Report on Connection Performance*. Available through ATC and FEMA. (Published 2000, 292 pages; in print and on CD).

FEMA 355E, *State of the Art Report on Past Performance of Steel Moment-Frame Buildings in Earthquakes*. Available through ATC and FEMA. (Published 2000, 190 pages; in print and on CD).

FEMA 355F, *State of the Art Report on Performance Prediction and Evaluation of Steel Moment-Frame Structures*. Available

through ATC and FEMA. (Published 2000, 347 pages; in print and on CD).

ATC-43: The reports, *Evaluation of Earthquake-Damaged Concrete and Masonry Wall Buildings, Basic Procedures Manual* (FEMA 306), *Evaluation of Earthquake-Damaged Concrete and Masonry Wall Buildings, Technical Resources* (FEMA 307), and *The Repair of Earthquake Damaged Concrete and Masonry Wall Buildings* (FEMA 308), were developed for FEMA under a contract with the Partnership for Response and Recovery, a Joint Venture of Dewberry & Davis and Woodward-Clyde. Available through ATC and FEMA. (Published, 1998 in print and on CD; *Basic Procedures Manual*, 270 pages; *Technical Resources*, 271 pages; *Repair Manual*, 81 pages)

ATC-44: The report, *Hurricane Fran, North Carolina, September 5, 1996: Reconnaissance Report*, was funded by the Applied Technology Council. Available through ATC. (Published 1997, 36 pages)

ATC-45: The report, *Field Manual, Safety Evaluation of Buildings After Wind Storms and Floods*, was developed with funding from the ATC Endowment Fund and the Institute for Business and Home Safety (IBHS). It provides rapid and detailed evaluation procedures for inspecting buildings that have been damaged in wind storms and floods, and making decisions regarding their continued use and occupancy. Presented in a concise format designed for ease of use in the field, it is intended for use by volunteer structural engineers and building inspectors in posting buildings as “inspected” (apparently safe, green placard), “restricted use” (yellow) or “unsafe” (red). Available through ATC. (Published 2004, 132 pages)

ATC-48 (ATC/SEAOC Joint Venture Training Curriculum): The training curriculum, *Built to Resist Earthquakes, The Path to Quality Seismic Design and Construction for Architects, Engineers, and Inspectors*, was developed under a contract with the California Seismic Safety Commission and prepared by a Joint Venture partnership between ATC and SEAOC. Available through ATC. (Published 1999, 314 pages)

ATC-49: The 2-volume report, *Recommended LRFD Guidelines for the Seismic Design of Highway Bridges; Part I: Specifications and Part II: Commentary and Appendices*, were developed under the ATC/MCEER Joint Venture partnership with funding from the Federal Highway Administration. Available through ATC.

(Published 2003, *Part I*, 164 pages and *Part II*, 294 pages)

ATC-49-1: The document, *Liquefaction Study Report, Recommended LRFD Guidelines for the Seismic Design of Highway Bridges*, was developed under the ATC/MCEER Joint Venture partnership with funding from the Federal Highway Administration. Available through ATC. (Published 2003, 208 pages)

ATC-49-2: The report, *Design Examples, Recommended LRFD Guidelines for the Seismic Design of Highway Bridges*, was developed under the ATC/MCEER Joint Venture partnership with funding from the Federal Highway Administration. Available through ATC. (Published 2003, 316 pages)

ATC-51: The report, *U.S.-Italy Collaborative Recommendations for Improved Seismic Safety of Hospitals in Italy*, was developed under a contract with Servizio Sismico Nazionale of Italy (Italian National Seismic Survey). Available through ATC. (Published 2000, 154 pages)

ATC-51-1: The report, *Recommended U.S.-Italy Collaborative Procedures for Earthquake Emergency Response Planning for Hospitals in Italy*, was developed under a contract with Servizio Sismico Nazionale of Italy (Italian National Seismic Survey, NSS). Available in English and Italian through ATC. (Published 2002, 120 pages)

ATC-51-2: The report, *Recommended U.S.-Italy Collaborative Guidelines for Bracing and Anchoring Nonstructural Components in Italian Hospitals*, was developed under a contract with the Department of Civil Protection, Italy. Available in English and Italian through ATC. (Published 2003, 164 pages)

ATC-52: The project, “Development of a Community Action Plan for Seismic Safety (CAPSS), City and County of San Francisco”, was conducted under a contract with the San Francisco Department of Building Inspection. The following reports were prepared:

ATC-52-1, *Here Today—Here Tomorrow: The Road to Earthquake Resilience in San Francisco: Potential Earthquake Impacts*. Available through ATC. (Published 2010, 78 pages)

ATC-52-1A, *Here Today—Here Tomorrow: The Road to Earthquake Resilience in San Francisco: Potential Earthquake Impacts*

Technical Documentation. Available through ATC. (Published 2010, 160 pages)

ATC-52-2, *Here Today—Here Tomorrow: The Road to Earthquake Resilience in San Francisco: A Community Action Plan for Seismic Safety*. Available through ATC. (Published 2010, 92 pages)

ATC-52-3, *Here Today—Here Tomorrow: The Road to Earthquake Resilience in San Francisco: Earthquake Safety for Soft-Story Buildings*. Available through ATC. (Published 2009, 60 pages)

ATC-52-3A, *Here Today—Here Tomorrow: The Road to Earthquake Resilience in San Francisco: Earthquake Safety for Soft-Story Buildings Documentation Appendices*. Available through ATC. (Published 2009, 206 pages)

ATC-52-4, *Here Today—Here Tomorrow: The Road to Earthquake Resilience in San Francisco: Post-Earthquake Repair and Retrofit Requirements*. Available through ATC. (Published 2010, 130 pages)

ATC-53: The report, *Assessment of the NIST 12-Million-Pound (53 MN) Large-Scale Testing Facility*, was developed under a contract with NIST. Available through ATC. (Published 2000, 44 pages)

ATC-54: The report, *Guidelines for Using Strong-Motion Data and ShakeMaps in Postearthquake Response*, was developed under a contract with the California Geological Survey. Available through ATC. (Published 2005, 222 pages)

ATC-55: The FEMA 440 report, *Improvement of Nonlinear Static Seismic Analysis Procedures*, was developed under a contract with FEMA. Available through ATC and FEMA. (Published 2005, 152 pages)

ATC-56: The report, FEMA 389, *Primer for Design Professionals: Communicating with Owners and Managers of New Buildings on Earthquake Risk*, was developed under a contract with FEMA. Available through ATC and FEMA. (Published 2004, 194 pages)

ATC-56-1: The report, FEMA 427, *Primer for Design of Commercial Buildings to Mitigate Terrorist Attacks – Providing Protection to People and Buildings*, was developed under a contract with FEMA. Available through ATC and FEMA. (Published 2003, 106 pages)

ATC-57: The report, *The Missing Piece: Improving Seismic Design and Construction Practices*, was developed under a contract with NIST. It provides a framework for eliminating the technology transfer gap that has emerged within the National Earthquake Hazards Reduction Program (NEHRP) that limits the adaptation of basic research knowledge into practice. Available through ATC. (Published 2003, 102 pages)

ATC-58: The ATC-58/ATC-58-1/ATC-58-2 series of projects, “Development of Next-Generation Performance-Based Seismic Design Guidelines for New and Existing Buildings,” was a multi-year, multi-phase effort funded by FEMA that resulted in the publication of the following:

ATC-58-1, *Proceedings of a FEMA-Sponsored Workshop on Communicating Earthquake Risk*. Available through ATC. (Published 2002, 87 pages).

ATC-58-2, *Preliminary Evaluation of Methods for Defining Performance*. Available through ATC. (Published 2003, 99 pages).

ATC-58-3, *Proceedings of a FEMA-Sponsored Workshop on Performance-Based Design*. Available through ATC. (Published 2003, 146 pages).

ATC-58-4, *Proceedings of a FEMA-Sponsored Workshop on Communicating Seismic Performance Metrics in Design Decision-Making*. Available through ATC. (Published 2014, 73 pages).

FEMA 445, *Next-Generation Performance-Based Seismic Design Guidelines, Program Plan for New and Existing Buildings*. Available through ATC and FEMA. (Published 2006, 131 pages).

FEMA 461, *Interim Testing Protocols for Determining the Seismic Performance Characteristics of Structural and Nonstructural Components*. Available through ATC and FEMA. (Published 2007, 113 pages).

FEMA P-58-1, *Seismic Performance Assessment of Buildings, Volume 1 – Methodology*. Available through ATC and FEMA. (Published 2012, 319 pages).

FEMA P-58-2, *Seismic Performance Assessment of Buildings, Volume 2 – Implementation Guide*. Available through ATC and FEMA. (Published 2012, 365 pages).

FEMA P-58-3, *Seismic Performance Assessment of Buildings, Volume 3 – Supporting Electronic Materials and Background Documentation*. Available through ATC and FEMA. (Published 2012, on CD).

FEMA P-58-4, *Seismic Performance Assessment of Buildings, Volume 4 – Methodology for Assessing Environmental Impacts*. Available through ATC and FEMA. (Published 2012, 120 pages)

ATC-60: The 2-volume report, *SEAW Commentary on Wind Code Provisions, Volume 1 and Volume 2 - Example Problems*, was developed by the Structural Engineers Association of Washington (SEAW) in cooperation with ATC. Available through ATC. (Published 2004; *Volume 1*, 238 pages; *Volume 2*, 245 pages)

ATC-61: The 2-volume report, *Natural Hazard Mitigation Saves: An Independent Study to Assess the Future Savings from Mitigation Activities, Volume 1 – Findings, Conclusions, and Recommendations*, and *Volume 2 – Study Documentation*, was prepared for the Multihazard Mitigation Council (MMC) of the National Institute of Building Sciences, with funding provided by FEMA. Available through ATC and the MMC. (Published 2005; *Volume 1*, 11 pages; *Volume 2*, 366 pages)

ATC-62: The report, FEMA P-440A, *Effects of Strength and Stiffness Degradation on Seismic Response*, was developed under a contract with FEMA. Developed as a supplement to the FEMA 440 report, it provides additional guidance on modeling of nonlinear degrading response. Available through ATC and FEMA. (Published 2009, 310 pages)

ATC-63: The report, FEMA P-695, *Quantification of Building Seismic Performance Factors*, was developed under a contract with FEMA. It describes a methodology for establishing seismic performance factors (R , Ω_0 , and C_d) that involves the development of detailed system design information and probabilistic assessment of collapse risk. Available through ATC and FEMA. (Published 2009, 420 pages)

ATC-63-1: The report, FEMA P-795, *Quantification of Building Seismic Performance Factors: Component Equivalency Methodology*, was developed under a contract with FEMA. Available through ATC and FEMA. (Published 2011, 264 pages)

ATC-64: The reports, *Guidelines for Design of Structures for Vertical Evacuation from Tsunamis* (FEMA P-646), and *Vertical Evacuation from Tsunamis: A Guide for Community Officials* (FEMA P-646A), were developed under a contract with FEMA. Available through ATC and FEMA. (*Design Guidelines*, Published 2008, 174 pages; *Guide for Community Officials*, Published 2009, 62 pages)

ATC-65: The FEMA P-455 report, *Handbook for Rapid Visual Screening of Buildings to Evaluate Terrorism Risks*, was developed under a contract with FEMA. Available through ATC and FEMA. (Published 2009, 174 pages)

ATC-66: The FEMA P-774 report, *Unreinforced Masonry Buildings and Earthquakes, Developing Successful Risk Reduction Programs*, was developed under a contract with FEMA. Available through ATC and FEMA. (Published 2009, 194 pages)

ATC-67: The *Rapid Observation of Vulnerability and Estimation of Risk* (ROVER) smartphone application was developed in collaboration with specialists from SPA Risk LLC, and Instrumental Software Technologies Inc. under a contract with FEMA. It is intended for use by building professionals (engineers, architects, firefighters, building officials, and others) to do pre-earthquake screening and post-earthquake safety evaluation of buildings in an electronic format. Available through ATC and FEMA. (Published 2014, online and on CD)

ATC-68: The FEMA P-420 report, *Engineering Guideline for Incremental Seismic Rehabilitation*, was developed under a contract with FEMA. Available through ATC and FEMA. (Published 2009, 94 pages)

ATC-69: The report, *Reducing the Risks of Nonstructural Earthquake Damage, State-of-the-Art and Practice Report*, was developed under a contract with FEMA. Available through ATC and FEMA. (Published 2008, 144 pages)

ATC-69-1: The electronic document, FEMA E-74, *Reducing the Risks of Nonstructural Earthquake Damage, A Practical Guide*, was developed under a contract with FEMA. Available through ATC and FEMA. (Published 2011, 750 pages)

ATC-70: The report, NIST Technical Note 1476, *Performance of Physical Structures in Hurricane Katrina and Hurricane Rita: A Reconnaissance Report*, was developed under a contract with

NIST. Available through NIST. (Published 2006, 222 pages)

ATC-71: The reports, *Workshop on Meeting the Challenges of Existing Buildings, Part 1 Workshop Proceedings; Part 2: Status Report on Seismic Evaluation and Rehabilitation of Existing Buildings; and Part 3: Action Plan for the FEMA Existing Buildings Program*, were developed under a contract with FEMA. Available through ATC and FEMA. (*Part 1*, Published 2008, 142 pages; *Part 2*, Published 2009, 140 pages; *Part 3*, Published 2009, 118 pages)

ATC-71-1: The FEMA P-807 report, *Seismic Evaluation and Retrofit of Multi-Unit Wood-Frame Buildings with Weak First Stories*, was developed under a contract with FEMA. Available through ATC and FEMA. (Published 2012, 230 pages, including the *Weak Story Tool* on CD)

ATC-71-2: The report, *Proceedings: Workshop on a Rating System for the Earthquake Performance of Buildings*, was developed under a contract with FEMA. Available through ATC. (Published 2011, 102 pages)

ATC-71-4/ATC-71-5/ATC-71-6: The FEMA P-154 report, *Rapid Visual Screening of Buildings for Potential Seismic Hazards: A Handbook, Third Edition*, and the FEMA P-155 Report, *Rapid Visual Screening of Buildings for Potential Seismic Hazards: Supporting Documentation, Third Edition*, were developed under a series of contracts with FEMA. Available through ATC and FEMA. (Published, 2014; *Handbook*, 388 pages; *Supporting Documentation*, 206 pages)

ATC-72: The report, *Proceedings of Workshop on Tall Building Seismic Design and Analysis Issues* (ATC-72) was prepared for the Building Seismic Safety Council of the National Institute of Building Sciences, with funding provided by FEMA. The report, *Modeling and Acceptance Criteria for Seismic Design and Analysis of Tall Buildings* (PEER/ATC-72-1) was prepared for the Pacific Earthquake Engineering Research Center. Available through ATC and PEER. (*Proceedings*, Published 2007, 84 pages; *Modeling and Acceptance Criteria*, Published 2010, 242 pages)

ATC-73: The report, *NEHRP Workshop on Meeting the Challenges of Existing Buildings, Prioritized Research for Reducing the Seismic Hazards of Existing Buildings*, was developed under a grant from NSF. Available through ATC. (Published 2007, 22 pages)

ATC-74: The report, *Collaborative Recommended Requirements for Automatic Natural Gas Shutoff Valves in Italy*, was funded by the Department of Civil Protection, Italy. Available through ATC. (Published 2007, 76 pages)

ATC-75: The report, *Improvements to BIM Structural Software Interoperability*, was developed under a contract with the Charles Pankow Foundation. Available through ATC and CPF. (Published 2013, 155 pages)

ATC-76-1/ATC-76-4: The report, *Evaluation of the FEMA P-695 Methodology for the Quantification of Building Seismic Performance Factors*, was developed under a contract with NIST and prepared by a Joint Venture partnership between ATC and CUREE. Available through ATC, CUREE, and NIST as GCR 10-917-8. (Published 2010, 240 pages)

ATC-76-2: The report, *Program Plan for the Development of Seismic Design Guidelines for Port Container, Wharf, and Cargo Systems*, was developed under a contract with NIST and prepared by a Joint Venture partnership between ATC and CUREE. Available through ATC, CUREE, and NIST as GCR 12-917-19. (Published 2012, 134 pages)

ATC-76-3: The reports, *NEHRP Technical Brief No. 1, Seismic Design of Reinforced Concrete Special Moment Frames: A Guide for Practicing Engineers* and *NEHRP Technical Brief No. 2, Seismic Design of Steel Special Moment Frames: A Guide for Practicing Engineers*, were developed under a contract with NIST and prepared by a Joint Venture partnership between ATC and CUREE. Available through ATC, CUREE, and NIST (*Technical Brief No. 1*, Report GCR 08-917-1. Published 2008, 32 pages; *Technical Brief No. 2*, Report GCR 09-917-3, Published 2009, 38 pages)

ATC-76-5: The report, *Program Plan for the Development of Collapse Assessment and Mitigation Strategies for Existing Reinforced Concrete Buildings*, was developed under a contract with NIST and prepared by a Joint Venture partnership between ATC and CUREE. Available through ATC, CUREE, and NIST as GCR 10-917-7. (Published 2010, 80 pages)

ATC-76-6: The report, *Applicability of Nonlinear Multiple-Degree-of-Freedom Modeling for Design*, was developed under a contract with NIST and prepared by a Joint Venture partnership

between ATC and CUREE. Available through ATC, CUREE, and NIST as GCR 10-917-9. (Published 2010, 196 pages plus CD)

ATC-76-7: The report, *NEHRP Technical Brief No. 3, Seismic Design of Cast-in-Place Concrete Diaphragms, Chords, and Collectors: A Guide for Practicing Engineers*, was developed under a contract with NIST and prepared by a Joint Venture partnership between ATC and CUREE. Available through ATC, CUREE, and NIST as GCR 10-917-4. (Published 2010, 30 pages)

ATC-76-8: The report, *NEHRP Technical Brief No. 4, Nonlinear Structural Analysis for Seismic Design: A Guide for Practicing Engineers*, was developed under a contract with NIST and prepared by a Joint Venture partnership between ATC and CUREE. Available through ATC, CUREE, and NIST as GCR 10-917-5. (Published 2010, 32 pages)

ATC-76-9: The project, "Performance of Two Full Scale Reinforced Concrete Subassembly Tests," was funded by NIST to perform tests in support of an internal research program to develop computer models for predicting the collapse potential of reinforced concrete structures. Work was conducted under a Joint Venture partnership between ATC and CUREE.

ATC-78: The report, *Identification and Mitigation of Seismically Hazardous Older Concrete Buildings: Interim Methodology Evaluation* (ATC-78), and its successor report, *Evaluation of the Methodology to Select and Prioritize Collapse Indicators in Older Concrete Buildings* (ATC-78-1), were developed under a contract with FEMA. ATC-78-1 is currently available through ATC. (Published 2012, 153 pages)

ATC-79: The FEMA P-646 report, *Guidelines for Design of Structures for Vertical Evacuation from Tsunamis, Second Edition*, was developed under a contract with FEMA. The original version of the report was developed under the ATC-64 Project. Available through ATC and FEMA. (Published 2012, 194 pages)

ATC-82: The report, *Selecting and Scaling Earthquake Ground Motions for Performing Response-History Analyses*, was developed under a contract with NIST and prepared by a Joint Venture partnership between ATC and CUREE. Available through ATC, CUREE, and NIST as GCR 11-917-5. (Published 2011, 234 pages)

ATC-83: The report, *Soil-Structure Interaction for Building Structures*, was developed under a contract with NIST and prepared by a Joint Venture partnership between ATC and CUREE. Available through ATC, CUREE, and NIST as GCR 12-917-21. (Published 2012, 292 pages)

ATC-84: The report, *Tentative Framework for Development of Advanced Seismic Design Criteria for New Buildings*, was developed under a contract with NIST and prepared by a Joint Venture partnership between ATC and CUREE. Available through ATC, CUREE, and NIST as GCR 12-917-20. (Published 2012, 302 pages)

ATC-85: The project, “Assessment of ASCE 41 First Generation Performance-Based Seismic Design Methods for new Buildings in High-Seismic Regions: Phases I-III,” was funded by NIST to obtain technical assistance on the initiation of an internal research project benchmarking ASCE 41 performance-based seismic design procedures as applied to new buildings designed in accordance with ASCE 7. Work was conducted under a Joint Venture partnership between ATC and CUREE.

ATC-86: The report, FEMA P-58-4, *Seismic Performance Assessment of Buildings, Volume 4 – Methodology for Assessing Environmental Impacts*, was developed under a contract with FEMA in support of the ATC-58 Project. Available through ATC and FEMA. (Published 2012, 120 pages)

ATC-87: The report, *NEHRP Technical Brief No. 5, Seismic Design of Composite Steel Deck and Concrete-filled Diaphragms: A Guide for Practicing Engineers*, was developed under a contract with NIST and prepared by a Joint Venture partnership between ATC and CUREE. Available through ATC, CUREE, and NIST as GCR 11-917-4. (Published 2011, 34 pages)

ATC-88: The report, *NEHRP Technical Brief No. 6, Seismic Design of Cast-in-Place Concrete Special Structural Walls and Coupling Beams: A Guide for Practicing Engineers*, was developed under a contract with NIST and prepared by a Joint Venture partnership between ATC and CUREE. Available through ATC, CUREE, and NIST as GCR 11-917-11. (Published 2011, 38 pages)

ATC-89: The report, *Cost Analyses and Benefit Studies for Earthquake-Resistant Construction in Memphis, Tennessee*, was developed under a contract with NIST and prepared by a Joint

Venture partnership between ATC and CUREE. Available through ATC, CUREE, and NIST as GCR 14-917-26. (Published 2014, 227 pages)

ATC-90: The report, *Research Plan for the Study of Seismic Behavior and Design of Deep, Slender Wide Flange Structural Steel Beam-Column Members*, was developed under a contract with NIST and prepared by a Joint Venture partnership between ATC and CUREE. Available through ATC, CUREE, and NIST as GCR 11-917-13. (Published 2011, 148 pages)

ATC-91: The project, “Assessment of Nonlinear Seismic Analysis of Structures Based on Modal Superposition,” was funded by NIST to obtain technical support for an internal research program investigating the use of a new approach to nonlinear analysis. Work was conducted under a Joint Venture partnership between ATC and CUREE.

ATC-92: The report, *Comparison of U.S. and Chilean Building Code Requirements and Seismic Design Practice 1985–2010*, was developed under a contract with NIST and prepared by a Joint Venture partnership between ATC and CUREE. Available through ATC, CUREE, and NIST as GCR 12-917-18. (Published 2012, 110 pages)

ATC-93: The project, “Ground Motion and Building Performance Data From the 2010 Chile Earthquake,” was funded by NIST to develop a prototypical web-based repository for post-event data in support of the NIST Disaster and Failure Events Database initiative. Work was conducted under a Joint Venture partnership between ATC and CUREE.

ATC-94: The report, *Recommendations for Seismic Design of Reinforced Concrete Wall Buildings Based on Studies of the 2010 Maule, Chile Earthquake*, was developed under a contract with NIST and prepared by a Joint Venture partnership between ATC and CUREE. Available through ATC, CUREE, and NIST as GCR 14-917-25. (Published 2014, 321 pages)

ATC-95: The report, *Review of Past Performance and Further Development of Modeling Techniques for Collapse Assessment of Existing Reinforced Concrete Buildings*, was developed under a contract with NIST and prepared by a Joint Venture partnership between ATC and CUREE. Available through ATC, CUREE, and NIST as GCR 14-917-28. (Published 2014, 201 pages)

ATC-96: The report, *Nonlinear Analysis Research and Development Program for Performance-Based Seismic Engineering*, was developed under a contract with NIST and prepared by a Joint Venture partnership between ATC and CUREE. Available through ATC, CUREE, and NIST as GCR 14-917-27. (Published 2014, 147 pages)

ATC-97: The report, *NEHRP Technical Brief No. 7, Seismic Design of Reinforced Concrete Mat Foundations: A Guide for Practicing Engineers*, was developed under a contract with NIST and prepared by a Joint Venture partnership between ATC and CUREE. Available through ATC, CUREE, and NIST as GCR 12-917-22. (Published 2012, 34 pages)

ATC-98: The report, *Use of High-Strength Reinforcement in Earthquake-Resistant Concrete Structures*, was developed under a contract with NIST and prepared by a Joint Venture partnership between ATC and CUREE. Available through ATC, CUREE, and NIST as GCR 14-917-30. (Published 2014, 231 pages)

ATC-99: The project, “Methodology to Assess and Verify the Seismic Capacity of Low-Rise Buildings,” was funded by FEMA to study an alternative seismic design approach for low-rise construction in the United States.

ATC-100: The report, *Measurement Science R&D Roadmap for Windstorm and Coastal Inundation Impact Reduction*, was developed under a contract with NIST and prepared by a Joint Venture partnership between ATC and CUREE. Available through ATC, CUREE, and NIST as GCR 14-973-13. (Published 2014, 130 pages)

ATC-101: The report, *A Framework to Update the Plan to Coordinate NEHRP Post-Earthquake Investigations*, was developed under a contract with NIST and prepared by a Joint Venture partnership between ATC and CUREE. Available through ATC, CUREE, and NIST as GCR 14-917-29. (Published 2014, 103 pages)

ATC-102: The report, *Earthquake-Resilient Lifelines: NEHRP Research, Development and Implementation Roadmap*, was developed under a contract with NIST and prepared by a Joint Venture partnership between ATC and CUREE. Available through ATC, CUREE, and NIST as GCR 14-917-33. (Published 2014, 163 pages)

ATC-103: The report, *NEHRP Technical Brief No. 8, Seismic Design of Steel Special Concentrically Braced Frame Systems: A Guide for Practicing Engineers*, was developed under a contract with NIST and prepared by a Joint Venture partnership between ATC and CUREE. Available through ATC, CUREE, and NIST as GCR 13-917-24. (Published 2013, 36 pages)

ATC-104: The project, “Assessment of the Performance of Slender Reinforced Concrete Walls under Significant Lateral Loads,” was funded by NIST to obtain technical support for an internal research project investigating the behavior of reinforced concrete shear walls. Work was conducted under a Joint Venture partnership between ATC and CUREE.

ATC-105: The project, “Development of Annual Report for National Earthquake Hazards Reduction Program Covering Fiscal Year 2012,” was funded by NIST to obtain assistance in the development of the NEHRP Annual Report in 2013. Work was conducted under a Joint Venture partnership between ATC and CUREE.

ATC-106: The project, “Seismic Behavior and Design of Deep, Slender Wide-Flange Structural Steel Beam-Column Members: Phase 2 Experimental Evaluation,” was funded by NIST to perform testing in support of an internal research program investigating the behavior of steel beam-column members. Work was conducted under a Joint Venture partnership between ATC and CUREE.

ATC-107: The project, “Wind Speed Mapping,” was funded by NIST to obtain technical assistance in the development of revised wind speed maps incorporating NIST non-tropical wind analysis at different return periods. Work was conducted under a Joint Venture partnership between ATC and CUREE.

ATC-108: The project, “Assessment of ASCE 41 First Generation Performance-Based Seismic Design Methods for new Buildings in High-Seismic Regions” was funded by NIST to obtain technical assistance on the completion of an internal research project benchmarking ASCE 41 performance-based seismic design procedures as applied to new buildings designed in accordance with ASCE 7. Work was conducted under a Joint Venture partnership between ATC and CUREE.

ATC-110: The report, *Plan for Development of a Prestandard for Evaluation and Retrofit of Wood Light-Frame Dwellings*, was developed under a contract with the California Earthquake Authority (CEA) in collaboration with FEMA. Available through ATC and CEA. (Published 2014, 85 pages)

ATC-111: The report, *NEHRP Technical Brief No. 9, Seismic Design of Special Reinforced Masonry Shear Walls: A Guide for Practicing Engineers*, was developed under a contract with NIST, and prepared in collaboration with CUREE. Available through ATC and NIST as GCR 14-917-31. (Published 2014, 42 pages)

ATC-112: The report, *NEHRP Technical Brief No. 10, Seismic Design of Wood Light-Frame Structural Diaphragm Systems: A Guide for Practicing Engineers*, was developed under a contract with NIST, and prepared in collaboration with CUREE. Available through ATC and NIST as GCR 14-917-32. (Published 2014, 47 pages)

ATC-113: The project, “Development of Annual Report for National Earthquake Hazards Reduction Program Covering Fiscal Year 2013,” was funded by NIST to obtain assistance in the development of the NEHRP Annual Report in 2014.

ATC-118: The FEMA P-1019 report, *Emergency Power Systems for Critical Facilities: A Best Practices Approach to Improving Reliability*, was developed under a contract with FEMA. Available through ATC and FEMA. (Published 2014, 170 pages)

ATC-R-1: The report, *Cyclic Testing of Narrow Plywood Shear Walls*, was developed with funding from the ATC Endowment Fund. Available through ATC (Published 1995, 64 pages)

ATC Design Guide 1: The report, *Minimizing Floor Vibration*, was developed with funding from the ATC Endowment Fund. Available through ATC. (Published, 1999, 64 pages)

ATC Design Guide 2: The report, *Basic Wind Engineering for Low-Rise Buildings*, was developed with funding from the ATC Endowment Fund. Available through ATC. (Published, 2009, 114 pages)

ATC TechBrief 1: The ATC TechBrief 1, *Liquefaction Maps*, was developed under a contract with the United States Geological Survey. Available through ATC. (Published 1996, 12 pages)

ATC TechBrief 2: The ATC TechBrief 2, *Earthquake Aftershocks – Entering Damaged Buildings*, was developed under a contract with the United States Geological Survey. Available through ATC. (Published 1996, 12 pages)