2nd ATC-SEI Conference on Improving the Seismic Performance of Existing Buildings and Other Structures

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Sponsored by the Applied Technology Council (ATC) and the Structural Engineering Institute (SEI) of the American Society of Civil Engineers

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ATC & SEI ANNOUNCE WINNERS OF THE 2015 CHAMPIONS OF EARTHQUAKE RESILIENCE AWARDS

(SAN FRANCISCO)—The Applied Technology Council (ATC) and the Structural Engineering Institute (SEI) of the American Society of Civil Engineers announced today in a press conference the following winners of the 2015 Champions of Earthquake Resilience Awards:

Category: Extraordinary Innovation in Development of a Community Earthquake Safety Program

- Award to the City of Los Angeles for the LOS ANGELES RESILIENCE BY DESIGN PROGRAM
- Award to the City of San Francisco for the SAN FRANCISCO EARTHQUAKE SAFETY IMPLEMENTATION PROGRAM

Category: Extraordinary Innovation in Seismic Protection of Buildings and Lifelines

- Award to the Association of Professional Engineers and Geoscientists of British Columbia, University of British Columbia's Earthquake Engineering Research Facility, and the British Columbia Ministry of Education for DEVELOPMENT OF PERFORMANCE-BASED SEISMIC RETROFIT GUIDELINES FOR SCHOOLS
- Award to the Transbay Joint Powers Authority and the Design and Construction Team for the TRANSBAY TRANSIT CENTER, SAN FRANCISCO
- Award to the San Francisco Public Utilities Commission for the SAN FRANCISCO WATER SYSTEM IMPROVEMENT PROGRAM

Category: Exceptional Public- and Private-Sector Research and Development (R&D) Programs

- Joint Award to the Pacific Earthquake Engineering Research (PEER) Center and the Los Angeles Tall Buildings Structural Design Council for DEVELOPMENT OF GUIDANCE AND PROCEDURES FOR THE SEISMIC DESIGN OF TALL BUILDINGS
- Award to the Federal Emergency Management Agency (FEMA) for DEVELOPMENT OF FEMA P-58 SEISMIC PERFORMANCE ASSESSMENT OF BUILDINGS METHODOLOGY and COMPANION PERFORMANCE ASSESSMENT CALCULATION TOOL (PACT)

"We are honored to be able to publicly recognize these community, regional, and national programs and projects, and the organizations and agencies that created them, for the extraordinary contributions they will make in saving lives and property from the devastating effects of earthquakes" said Christopher Rojahn, Director Emeritus of the Applied Technology Council, who announced the awards.

The awards recognize and publicize innovative earthquake engineering programs and projects that have (or will have) substantial impact on public safety and property loss reduction. Winners were selected by a jury commissioned by ATC and SEI following a call for nominations distributed to more than 50,000 structural engineering and earthquake hazard reduction professionals in the United States, Canada and other countries.

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CHAMPIONS OF EARTHQUAKE RESILIENCE AWARDS

Organized by
the Applied Technology Council (ATC) and the Structural Engineering Institute (SEI)
of the American Society of Civil Engineers (ASCE)

Applied Technology Council (ATC)

Founded in 1973, the Applied Technology Council aims to develop and promote state-of-the-art, user-friendly engineering resources and applications for use in mitigating the effects of natural and other hazards on the built environment. The corporate headquarters for ATC is located in Redwood City, California, with satellite offices in Atlanta, Georgia and in Arlington, Virginia. For more information, visit http://www.atcouncil.org

Structural Engineering Institute (SEI) of the American Society of Civil Engineers (ASCE)

Established in 1996, SEI advances our members' careers, stimulates technological advancement, and improves professional practice. SEI drives the practical application of cutting edge research by improving coordination and understanding between academia and practicing engineers. The mission of the Structural Engineering Institute (SEI) is to advance and serve the structural engineering profession. For more information, visit http://www.seinstitute.org

Downloadable press kit: https://www.atcouncil.org/atc-press-kit-120815

ATC&SEI

2nd Conference on Improving the Seismic Performance of Existing Buildings and Other Structures

Category:

Extraordinary Innovation in Development of a Community Earthquake Safety Program

Awarded to: City of San Francisco

for: Earthquake Safety Implementation Program

Award Citation:

San Francisco's *Earthquake Safety Implementation Program* (ESIP) which began in early 2012, evolved out of the key recommendations of the Community Action Plan for Seismic Safety (CAPSS), a ten-year-long study evaluating future earthquake impacts on San Francisco. The CAPSS findings, developed through the efforts of a broad range of community leaders, earth scientists, social scientists, economists, tenants, building owners, and engineers, are presented in the report series, *Here Today—Here Tomorrow: The Road to Earthquake Resilience in San Francisco*, which present and address *Potential Earthquake Impacts*, *A Community Action Plan for Seismic Safety*, *Earthquake Safety for Soft-Story Buildings*, and *Post-earthquake Repair and Retrofit Requirements* (available online at www.sfgov.org/esip). The *Action Plan* was turned into the 50 tasks that the *Earthquake Safety Implementation Program* will be implementing over the next few decades. Since ESIP's inception, 14 pieces of earthquake safety legislation have been approved unanimously by the San Francisco Board of Supervisors. Task-related actions already completed include:

- The **soft-story mandatory retrofit ordinance**, which was signed into law by Mayor Lee on April 18, 2013, requiring (by the year 2020) the retrofit of 5,054 pre-1978 San Francisco wood-frame structures containing five or more residential units. having two or more stories over a "soft" or "weak" story, and housing approximately 15% of San Francisco's total population (and representing a significant percentage of the rent-controlled housing stock); related activities included an **earthquake retrofit fair** (attended by over 3,000 citizens and 160 vendors) to provide information about the mandatory retrofit program; and the passage of additional legislation to create a city-backed finance program and strengthen tenant protections for vulnerable populations.
- The **private school earthquake safety ordinance**, which was signed into law by Mayor Lee on October 1, 2014, to initiate the earthquake safety of 24,000 students, or one third of San Francisco's school age children, by requiring the seismic evaluation of all private school

buildings used primarily for the education and care of K-12 students or school administration that meet the building code definition of Educational "E" occupancy;

- Recommendations for **mitigation of chimney hazards**, which were completed in 2015; and
- A **building façade maintenance program** to protect passersby from earthquake-caused falling debris, which is currently undergoing the approval process.

San Francisco's *Earthquake Safety Implementation Program*, led by Patrick Otellini, is creating a broad range of earthquake safety programs that will not only greatly improve the earthquake resilience of San Francisco, but also serve as examples for other communities.

Individual Accepting the Award on Behalf of the City of San Francisco:

Patrick Otellini, Director, Earthquake Safety Implementation Program, City of San Francisco

Patrick Otellini is the Chief Resilience Officer (CRO) for the City and County of San Francisco tasked with developing the city's resiliency strategy in conjunction with the 100 Resilient Cities initiative pioneered by the Rockefeller Foundation. Mr. Otellini was originally appointed by Mayor Ed Lee in October of 2012 as the Director of San Francisco's Earthquake Safety Implementation Program. This public policy-driven group has recently passed unanimously approved pieces of legislation that range from mandatory retrofits of soft-story buildings to postearthquake repair standards with the goal of making San Francisco more resilient in the face of disaster. Prior to his appointment, Mr. Otellini was a Senior Associate with A.R. Sanchez-Corea & Associates, San Francisco's premier permit and code consulting firm. His work there included the management of the permit and inspection process for over $2 billion worth of construction in San Francisco. He is a Certified Building Inspector through the International Code Council (ICC) and a Certified Fire Protection Specialist through the National Fire Protection Association (NFPA). Patrick lives in San Francisco with his wife and two children. He received his Bachelor's Degree in Political Science from Westmont College.

Category:

Extraordinary Innovation in Development of a Community Earthquake Safety Program

Awarded to: City of Los Angeles

for: Los Angeles *Resilience by Design* Program

Award Citation:

In December 2014, Los Angeles (LA) Mayor Eric Garcetti announced the release of the *City of Los Angeles Resilience by Design* report, which presented the recommendations of an ad-hoc Mayoral Seismic Safety Task Force to increase the City's resilience to future earthquakes. The goals of the project were to protect the lives of LA citizens during earthquakes, improve the capacity of the City to respond to the earthquake, prepare the City to recover quickly after an earthquake, and protect the economy of the City and all of Southern California.

Recommendations presented in the *City of Los Angeles Resilience by Design* report and resulting actions already undertaken include:

- An historic **mandatory building retrofit ordinance**, unanimously approved by the LA City Council and signed into law by Mayor Garcetti on October 9, 2015, to ensure that approximately 13,500 pre-1980 soft first-story wood-frame buildings and an estimated 1,500 pre-1980 non-ductile concrete buildings are strengthened to prevent loss of life in the event of a major earthquake;
- Recommendations to **promote the use and understanding of seismic rating systems**, by rating and publicly displaying the ratings of all City-owned buildings, and to create a "Back to Business" program to expedite building inspections after earthquakes;
- A recommendation to **improve the resiliency of the LA water supply system**, including fortification of the aqueduct infrastructure and Department of Water & Power dams, replacement of older vulnerable pipelines with seismic-resilient pipelines; creation of alternatives to the use of the current water supply system for firefighting, and the creation of a Statewide Resilience Bond Measure to provide funds to invest in infrastructure resiliency; and
- A recommendation to **enhance the reliability of telecommunications**, including cell tower strengthening, installation of a city-wide solar powered Wi-Fi system to enhance communications following a disaster, protecting the electric power transmission system at

fault crossings to avoid cascading failures, and supporting the development and deployment of an advanced earthquake warning system in southern California.

The *City of Los Angeles Resilience by Design* report and the Program it created was developed by dozens of people under the direction of Lucy Jones of the USGS, who served as Science Advisor for Seismic Safety. Dr. Jones and the Mayor's Office held over 130 meetings with City Department staff, community members, private sector partners, and industry stakeholders, as well as subject matter and technical experts in the fields of building, engineering, and seismic resilience to inform the recommendations that would ultimately form the body of the report.

Individual Accepting the Award on Behalf of the City of Los Angeles:

Lucy Jones, Science Advisor for Seismic Safety

Dr. Lucy Jones has been a seismologist with the US Geological Survey and a Visiting Research Associate at the Seismological Laboratory of Caltech since 1983. She currently serves as Science Advisor for Risk Reduction in the Natural Hazards Mission of the US Geological Survey, leading long-term science planning for natural hazards research, and the SAFRR Project: Science Application for Risk Reduction to apply USGS science to reduce risk in communities across the Nation. She led a partnership between the USGS and the City of Los Angeles to create solutions to four of the most significant seismic vulnerabilities in the City. Dr. Jones has authored over 100 papers on research seismology with primary interest in earthquake statistics and integrated disaster scenarios, especially in southern California, including leading the science projects that created the ShakeOut Earthquake Scenario, the Great ShakeOut Drill and the ARkStorm Scenario. Dr. Jones received a Bachelor of Arts degree in Chinese Language and Literature, Magna Cum Laude, from Brown University in 1976 and a Ph.D. in geophysics from the Massachusetts Institute of Technology in 1981.

Category:

Extraordinary Innovation in Seismic Protection of Buildings and Lifelines

Awarded to: Association of Professional Engineers and Geoscientists of British Columbia, University of British Columbia's Earthquake Engineering Research Facility, and the British Columbia Ministry of Education

for: Development of Performance-Based Seismic Retrofit Guidelines for Schools

Award Citation:

Recently developed performance-based *Seismic Retrofit Guidelines* and a unique state-of-the-art web-based *Seismic Performance Analyzer* enable structural engineers to rapidly and consistently determine the seismic risk of existing buildings and optimize retrofits to achieve "life-safety" seismic performance. These *Guidelines* and companion *Analyzer* are now being used by the British Columbia Ministry of Education in a billion-dollar-plus seismic mitigation program for school buildings that has been designed to achieve a life-safety standard for schools by minimizing the probability of local structural collapse during a seismic event.

Developed by the Association of Professional Engineers and Geoscientists of British Columbia (APEGBC) and the University of British Columbia's Earthquake Engineering Research Facility, and documented in a nine-volume, 300+ page manual, these innovative *Guidelines* are being used to significantly minimize the risk of fatalities and serious injuries for the occupants of approximately 320 British Columbia schools. This translates to increased life-safety for approximately 150,000 school children, as well as approximately 7,500 teachers and school staff in British Columbia's high-risk seismic zones.

The companion *Seismic Performance Analyzer* accesses the program-developed database containing millions of non-linear incremental dynamic analyses for different structural systems and types of high-risk partition walls, for different site soil conditions, evaluated for three different types of earthquakes expected to occur in British Columbia. Users can rapidly and with province-wide consistency determine the seismic risk of an existing building, and optimize the extent and cost of new structural components required to achieve a life-safety seismic performance.

The use of the *Guidelines* by the structural community has proven to: relieve structural engineers from selecting earthquake ground motion records or carrying out non-linear analyses; offer the capability of mixing different new structural systems in combination with existing systems; be an effective way to utilize all available information on an existing building in the risk assessment; and be effective in selecting a very efficient, cost-effective retrofit scheme for a building.

The reduced cost of seismic retrofits compared to previous approaches; enables more school buildings to be upgraded, and made safer, within the available Ministry budget.

The British Columbia performance-based *Seismic Retrofit Guidelines* and companion *Seismic Performance Analyzer* began with planning, engineering design and research and resulted in cost-effective seismic assessment and retrofit strategies, followed by implementation across a large inventory of schools. The benefits achieved by this research and development effort are not limited to British Columbia, as the resulting methodologies and techniques can have tremendous positive impact on earthquake safety and retrofit worldwide.

Individual Accepting the Award on Behalf of the Above Cited Organizations:

Peter Mitchell, Director, APEGBC

Peter Mitchell, P.Eng., FEC is the Director of Professional Practice, Standards and Development at the Association of Professional Engineers and Geoscientists of BC (APEGBC). He is responsible for developing and directing proactive quality assurance programs covering member's practices. Three key components of these programs are the APEGBC Organizational Quality Management (OQM) Program, APEGBC Practice Review Program and the development of professional practice guidelines and quality management guidelines. Twelve of these professional practice guidelines have involved contracts with ten different government agencies /ministries, with some receiving national and international recognition. Peter also oversees staff support to over a dozen committees, task forces, boards and divisions dealing with professional practice issues and directs APEGBC's response to various government legislation impacting the practice of professional engineering and professional geoscience in BC.

Category:

Extraordinary Innovation in Seismic Protection of Buildings and Lifelines

Awarded to: Transbay Joint Powers Authority and Design and Construction Team

for: Transbay Transit Center, San Francisco

Award Citation:

The multi-billion Transbay Transit Center in downtown San Francisco is a landmark project. This innovative facility will be the centerpiece of a major urban development plan that embraces modern transportation solutions (including future high-speed rail) to create a sustainable and resilient community. The new Transit Center is the heart of this new neighborhood, which will include new tall office and residential buildings and will reshape San Francisco for the next century. The Transbay Joint Powers Authority, which is responsible for the financing, design, development, construction, and operation of the Transbay Program, is also engaged with the city to promote earthquake resilience of the Transit Center itself and buildings in the surrounding neighborhood.

The Transbay Transit Center building consists of six levels: (1) Train Passenger Platform Level, (2) Lower Concourse Level, (3) Ground Level, (4) Second Level, (5) Bus Deck Level (elevated), and (6) Roof Park Level. The Train Passenger Platform Level and Lower Concourse Level are the below grade levels referred to as the Train Box, which is concrete construction. The above grade structure is a steel framed building, consisting of steel Special Moment Frames (SMF) in the transverse direction (north-south) and Eccentrically Braced Frames (EBF) in the longitudinal direction (east-west) created by inclined exterior pipe columns (and an edge girder) to allow space for bus lanes on the ground level. Typically, the interior columns for the superstructure are transferred at the Ground Level by steel transfer girders that are 6 feet or deeper.

The design of the Transbay Transit Center building employed a performance-based approach using non-linear analysis tools and accommodated unique architectural features while meeting a tailored seismic performance target. Innovative aspects of the design process included:

- Consideration of three ground motion performance levels—motions having a 50-year (frequent earthquake), 975-year (rare earthquake), and 2476-year (very rare earthquake) return period;
- State-of-art nonlinear soil/structural interaction analyses to determine the seismic input to the structure, a finite element geotechnical analysis of the site to simulate site mitigation

measures to prevent undermining of neighboring buildings, and an unprecedented real-time geotechnical instrumentation network;

- The establishment of acceptance criteria for deformation-controlled actions based on fragility studies and verified with full-scale cyclic tests; and
- The confirmation of plastic hinge (fuse) performance of the steel moment frame connections and EBF link beams (which are larger than those tested in the past) through full scale cyclic testing at the University of California, San Diego.

Stringent requirements set forth by the Transit Joint Powers Authority governed the design of this landmark building. Photos are available at http://www.transbaycenter.org/media-gallery/image-gallery.

Individuals Accepting the Award on Behalf of the Above Cited Organizations:

Maria Ayerdi-Kaplan, Executive Director, Transbay Joint Powers Authority

Maria Ayerdi-Kaplan is the Executive Director of the Transbay Joint Powers Authority and is responsible for every aspect of the design, funding, and construction of the Transbay Project. In 2003, Ms. Ayerdi-Kaplan engineered and negotiated an historic agreement among the California Department of Transportation (Caltrans), the City and County of San Francisco, and the TJPA under which Caltrans agreed to transfer the obsolete and seismically unsafe Transbay Terminal and 12 additional acres of Caltrans land previously used for the Embarcadero Freeway system, without charge, to the TJPA and the City for the construction of the new Transit Center and bus ramp, with the remainder of the property to be sold to developers to fund construction of the Transbay Program. To implement this innovative program, she brought the Transbay Program from the theoretical and conceptual stage through design, public review, and funding, to the start of construction in August 2010. To bring the Program to this point, Ms. Ayerdi-Kaplan, assisted by hundreds of engineers, architects, and other professionals under her supervision, obtained all regulatory approvals from the state and federal government, raised more than $2 billion, including a $171 million loan from the U. S. Department of Transportation, and secured a federal high speed rail stimulus grant of $400 million from President Obama and the United States Secretary of Transportation Ray LaHood. Ms. Ayerdi-Kaplan is a graduate of the University of California, Berkeley and University of California, Hastings College of Law. She is a Member of the State Bar of California and has served on numerous Boards and Commissions. She has also been recognized by numerous organizations for her work, including:

Albert Chen, Associate Principal, Thornton Tomasetti

Albert Chen has more than 30 years of experience in the design of more than 20 million square feet of structures for diverse building types, including commercial, education, healthcare, hospitality, mixed-use, parking and retail projects. His portfolio includes the design of new buildings as well as structural tenant improvements, investigations and seismic upgrades for existing structures. His responsibilities include project management, with technical involvement from concept design through construction, quality control and quality assurance, and business development. His recent work includes project management for the Transbay Transit Center in San Francisco and the National Palace Museum in Taiwan as well as quality assurance and quality control for Shanghai Tower, which will be China's tallest building when it's completed in 2015.

Category:

Extraordinary Innovation in Seismic Protection of Buildings and Lifelines

Awarded to: San Francisco Public Utilities Commission (SFPUC)

for: SFPUC's Water System Improvement Program

Award Citation:

Initiated in 2002, the San Francisco Water System Improvement Program (WSIP) is a $4.8 billion dollar, multi-year capital program to upgrade the San Francisco Public Utilities Commission's regional and local water system, which extends 167 miles from the Hetch Hetchy Reservoir to San Francisco and crosses the Calaveras, Hayward, and San Andreas Faults. Financed by a San Francisco voter-approved bond measure and supported by the 26 wholesale customer agencies represented by the Bay Area Water Supply and Conservation Agency (BAWSCA), the program will deliver capital improvements that enhance the Commission's ability to provide reliable, affordable, high quality drinking water in an environmentally sustainable manner to 2.6 million people in the greater San Francisco Bay Area. The program consists of 83 projects to repair, replace and/or upgrade major portions of the water system, including treatment facilities, pipelines, tunnels, dams, reservoirs and tanks—35 local projects located within San Francisco and 48 regional projects, spread over seven counties from the Sierra foothills to San Francisco. Currently, the Program is approximately 90% complete. Examples of key seismic projects* within the program include

- the replacement of the 220-ft high Calaveras Dam to address seismic deficiencies with the existing dam;
- the construction of several new water tunnels, including the 3.5-mile-long New Irvington Tunnel and the new 5-mile-long Bay Tunnel (first tunnel under San Francisco Bay) to provide system redundancy to increase seismic and delivery reliability;
- seismic and other upgrades to both the Sunol Valley Water Treatment Plant and the Harry Tracy Water Treatment Plant to increase the maximum delivery rate of these plants for up to 60 days after a major earthquake; and
- several projects to increase reliability of water transmission across major fault crossings, including a unique project where two of SFPUC's large-diameter regional pipelines cross the Hayward fault – the project utilizes an articulated concrete vault and secant pile walls to

absorb energy, and ball/slip joints and pipe supports with sliding mechanisms to release energy during large fault displacements.

The program also included the development of performance criteria for system-wide service after earthquakes, with short-term (24 hour) and long-term (30 day) levels of service goals for seismic reliability. Short-term service goals are based on delivering basic service (average winter month delivery) of 215 million gallons per day within 24 hours after a major earthquake, assuming that no significant repairs are performed during that period. The long-term performance criteria are based on making temporary repairs to restore average day delivery of 300 million gallons per day to customers. Photos are available at https://drive.google.com /folderview?id=0B9xlqjpm2PBLak5taGdEeVJhR0k&usp=sharing.

Individual Accepting the Award on Behalf of the SFPUC:

Daniel L. Wade, Director, SFPUC Water System Improvement Program

Daniel L. Wade, P.E., G.E., is the Director of SFPUC,s $4.8 billion Water System Improvement Program (WSIP). At over 90 percent complete, the WSIP is one of the largest water infrastructure programs in the country, and will enable the SFPUC to provide reliable, affordable, high quality water in an environmentally sustainable manner to its 26 wholesale customers located throughout the Bay Area and to retail customers in San Francisco. The WSIP includes 83 water infrastructure projects, including the construction of a new dam, three tunnels, an ultraviolet treatment facility and large-diameter pipelines, as well as the rehabilitation and upgrades of existing storage, treatment and transmission facilities. The WSIP has received extensive industry awards and recognition, and Mr. Wade was recently named one of the 25 Top Newsmakers by Engineering News Record (ENR) magazine. Mr. Wade earned his B.S. Degree in Civil Engineering from the University of California at Berkeley, and his M.S. Degree in Civil/Geotechnical Engineering from Virginia Polytechnic Institute and State University. Prior to joining the SFPUC in 2007, he worked as a consultant for 18 years in the water infrastructure industry as Principal Engineer and Vice President with MWH Americas.

Category:

Exceptional Public- and Private-Sector Research and Development Programs

Awarded to: Pacific Earthquake Engineering Research (PEER) Center and Los Angeles Tall Buildings Structural Design Council

for: Development of Guidance and Procedures for the Seismic Design of Tall Buildings

Award Citation:

The Pacific Earthquake Engineering Research (PEER) Center's *Guidelines for Performance-Based Seismic Design of Tall Buildings* (2010) and the Los Angeles Tall Buildings Structural Design Council's *Alternate Procedure for Seismic Analysis and Design of Tall Buildings Located in the Los Angeles Region, A Consensus Document* (2005) were developed to address the design of many buildings that were taller than what was covered in the provisions of the prescriptive building code - because these taller buildings fell beyond the provisions of the code, they were each being designed with their own criteria.

These two guidelines were developed considering the seismic response characteristics of tall buildings, including relatively long fundamental vibration periods, significant mass participation and lateral response in higher modes of vibration, and a relatively slender profile. Following their publication, these landmark documents have been used for the seismic design of all major tall buildings in San Francisco, Los Angeles, Seattle and other west coast cities. The documents incorporate many new and innovative state-of-the-art features and have substantially advanced the practice of building seismic design. For example:

- The methods they prescribe have facilitated the development and implementation of new innovations in tall buildings, including capacity design of coupled core-wall buildings, buckling-restrained brace (BRB) damped outrigger systems for concrete core walls, and innovative mega-bracing systems that employ viscous dampers with inelastic BRB fuses;
- The provisions for peer review and building instrumentation, as required by Los Angeles, have served to advance the professional practice of earthquake engineering and risk mitigation.

- The documents have provided a framework that employs nonlinear dynamic analysis to evaluate the structural performance for service-level and maximum-considered-earthquake (MCE) level earthquakes, helping to formalize the latest thinking on how to characterize earthquake ground motions, systematically conduct nonlinear dynamic analyses, and evaluate design acceptance criteria.
- Methods that were formalized in these documents serve as a model for new procedures for nonlinear dynamic analyses in the FEMA-funded 2014 *NEHRP Recommended Seismic Provisions for New Buildings and Other Structures* that have been adopted for the forthcoming update to ASCE 7, *Minimum Design Loads for Buildings and Other Structures* (2016 edition).

More than 50 new tall buildings in Los Angeles, San Francisco, San Diego, and Seattle have been analyzed designed using these state-of-the-art guidelines, enhancing the response predictability and resilience of these important structures.

Individuals Accepting the Award on Behalf of the Above Cited Organizations:

Grace Kang, Director of Communications, PEER

Grace Kang is Director of Communications at PEER - Pacific Earthquake Engineering Research Center, where she works in the interface between research and its applicability to industry and the community. Grace is a licensed structural engineer in the state of California with over 30 years experience with seismic design and retrofit of buildings and non-structural elements. She is former President of the Structural Engineers Association of Northern California (SEAONC), and is a Fellow at the state level Structural Engineers Association of California (SEAOC). Her interest has evolved from the micro / individual facility to the macro / systems and their interdependencies and their impact on community resilience.

Farzad Naeim, Chairman of Guideline Development Committee, Los Angeles Tall Buildings Structural Design Council

Dr. Farzad Naeim is the President of Farzad Naeim, Inc. and CEO of Mehrain Naeim International. He received his Ph.D. in Civil Engineering in 1982 and his J.D. with highest honors in 2002. In 2007, he received the Fazlur Khan Medal for lifetime achievements in seismic design of tall buildings from the Council on Tall Buildings and Urban Habitat. He has served two terms as the President of the Los Angeles Tall Buildings Structural Design Council. Dr. Naeim is a Past-President and an honorary member of the Earthquake Engineering Research Institute (EERI). He is currently Chair of California's Strong Motion Instrumentation Advisory Committee and serves on the Seismic Advisory Board of Caltrans, Board of Expert Consultants of the Los Angeles Department of Water and Power (LADWP), and Advisory Council of the Southern California Earthquake Center (SCEC). Farzad has published four textbooks, more than 160 peer-reviewed papers, and has developed 45 different software systems for earthquake engineering design and education. Dr. Naeim has served as Technical Director for many landmark structures in California and across the United States and has collaborated with researchers from Stanford, UCB, UCLA, USC, UCSD, UCI and University of British Columbia on various research projects.

Category:

Exceptional Public- and Private-Sector Research and Development Programs

Awarded to: Federal Emergency Management Agency (FEMA)

for: Development of FEMA P-58 *Seismic Performance Assessment of Buildings Methodology* and companion *Performance Assessment Calculation Tool* (PACT)

Award Citation:

In 2012, the Federal Emergency Management Agency (FEMA) published the FEMA P-58 documents, *Seismic Performance Assessment of Buildings, Volume 1 – Methodology*, *Volume 2 – Implementation Guide*, and *Volume 3 – Supporting Electronic Materials and Background Documentation*, along with a companion electronic *Performance Assessment Calculation Tool* (PACT). Prepared by the Applied Technology Council and based on the framework for performance-based seismic engineering developed by the Pacific Earthquake Engineering Research (PEER) Center, the methodology has been developed for use in performance-based seismic design of new buildings and the retrofit of existing buildings. Results are expressed as probability distributions for potential casualties, repair costs, repair time, and posting of unsafe placards. Assessments can be conducted for shaking of a specified intensity; a specified earthquake scenario (i.e., magnitude-distance pair); or considering all earthquakes that may occur over a specified interval of time along with the probability of their occurrence.

The companion *Performance Assessment Calculation Tool* (PACT) can calculate and parse results by structural and nonstructural performance groups, direction, story level, and realization for each performance measure, including repair cost, repair time, casualties, and unsafe placarding. PACT also provides a range of options for viewing assessment results, and printing hard-copy reports.

In contrast to the current design approach of simply providing a code-compliant design, which most engineers expect to perform well for safety, but poorly for losses and downtime, the FEMA P-58 methodology is a game-changer because it will completely transform the way that structural engineers design buildings, because it can predict the important performance metrics (loss, downtime, and safety), and because the building design can be tuned specifically to meet those metrics. FEMA's foresight in identifying the need for the methodology and in promoting, funding, and overseeing its development over a 10-year period, at a cost of more than $12 million, are a remarkable testimony to FEMA's dedication to and perseverance in seismic hazard reduction.

Individual Accepting the Award on Behalf of the Above Cited Organizations:

Michael Mahoney, Senior Geophysicist, Federal Emergency Management Agency

Michael Mahoney has been a Senior Geophysicist with the Federal Emergency Management Agency for over 30 years. He currently leads FEMA's seismic problem-focused studies, and has investigated a variety of earthquake-related issues to develop design and construction guidance under the National Earthquake Hazards Reduction Program (NEHRP). This work currently includes the development of the FEMA P-58 Performance-Based Seismic Design Guidelines, the FEMA P-695, *Quantification of Building Seismic Performance Factors*, and the FEMA P-232 *Home Builder's Guide for Earthquake Resistant Construction*. Mr. Mahoney is also responsible for FEMA's earthquake-related work with the *International Building Code*.