Exponent®
Engineering & Scientific Consulting

Troy Morgan, Ph.D., P.E.

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Professional Profile

Dr. Troy Morgan is a Principal Engineer and Director of the Civil & Structural Engineering practice, specializing in the analysis, design, investigation, and performance assessment of structures under extreme loading such as earthquakes, wind, flood, earth movement, and explosions. He has served as a consultant and expert witness (for mediation, domestic litigation, and international arbitration) on major projects, providing civil and structural engineering expertise for essential structures including healthcare facilities, laboratories, petrochemical buildings, power stations, highway bridges, metro rail (stations, viaducts, and tunnels), and other critical infrastructure requiring sophisticated analysis and evaluation techniques.

Dr. Morgan also has substantial consulting experience with the nuclear power generating industry, evaluating seismic risk to new and existing safety critical structures and equipment through ground motion selection/scaling and nonlinear structural analysis including soil-structure interaction.

As a recognized expert in the field of seismic isolation and passive energy dissipation systems, Dr. Morgan has performed extensive research on the numerical simulation and experimental behavior of innovative seismic protective devices and optimization of their use within performance-based engineering frameworks. He provides analysis, design, and expert peer review services for complex structures incorporating innovative structural systems, including those incorporating recently-developed modular construction techniques.

Prior to joining Exponent, Dr. Morgan was Assistant Professor at the Center for Urban Earthquake Engineering at the Tokyo Institute of Technology in Japan. He has also held positions as a post-doctoral researcher at the Pacific Earthquake Engineering Research Center and as a design engineer at Forell/Elsesser Engineers Inc.

Academic Credentials & Professional Honors

Ph.D., Civil and Environmental Engineering, University of California, Berkeley, 2007

M.E., Civil and Environmental Engineering, University of California, Berkeley, 2000

B.S., Civil and Environmental Engineering, University of California, Berkeley, 1998

EERI/FEMA NEHRP Graduate Fellowship in Earthquake Hazard Reduction, 2005

Outstanding Graduate Student Instructor Award, UC Berkeley, 2004

SEAONC Excellence in Structural Engineering Award 2004

ASCE Western Regional Outstanding Young Civil Engineer in the Private Sector, 2003

SEAONC Giles Scholarship, 2003

Best Paper Award: 5th World Congress on Joints, Bearings, and Seismic Systems, 2001

NSF Japan Summer Institute, 2000

Clement T. Wiskocil Award, 1998

Licenses and Certifications

Professional Engineer, Alabama, #PE35719

Professional Engineer Civil, California, #63245

Professional Engineer, Connecticut, #PEN.0029247

Professional Engineer, Georgia, #PE039236

Professional Engineer Civil and Structural, Maryland, #65142

Professional Engineer, Michigan, #6201315718

Professional Engineer, New Jersey, #24GE05060100

Professional Engineer, New York, #091488

Professional Engineer, North Carolina, #057926

Academic Appointments

Adjunct Professor, Dept. of Civil Engineering and Engineering Mechanics, Columbia University, 2022-present

Adjunct Professor, Dept. of Civil and Urban Engineering, New York University, 2013-2022

Prior Experience

Assistant Professor, Tokyo Institute of Technology, Japan, 2009-2012

Lecturer, SFSU, 2007; University of California, Berkeley, 2008-2009

Seismic Protective Systems Consultant, 2005-2009

Post-Doctoral Researcher, Pacific Earthquake Engineering Research Center, Richmond, 2008

Design Engineer, Forell/Elsesser Engineers, San Francisco, 2000-2004

Engineering Intern, Degenkolb Engineers, San Francisco, 1998

Professional Affiliations

American Society of Civil Engineers (member)

International Bar Association (member)

Structural Engineers Association of New York (member)

Professional Committees

Member, Board of Directors, Structural Engineers Association of New York 2023 - 2025

ASCE Dynamic Analysis of Nuclear Structures Committee, Associate Member, 2016-present

Member, Technical Advisory Board for the US Dept. of Energy sponsored project “Guidelines for implementing seismic isolation in advanced nuclear reactors to reduce risk and overnight capital cost”, led by Southern Nuclear Operating Company

Seismic Subcommittee of ASCE/SEI 7 standard "Minimum Design Loads for Buildings and Other Structures," Associate Member, 2012-2016

Task Force recommending updates to Seismic Provisions of New York City Building Code, Consulting Member, 2012-2014

NY-Northeast Chapter, EERI, External Liaison, 2012-2022

Protective Systems Subcommittee of SEAOC Seismology, Chair 2006-09, member 2009-present

SEAOC Annual Convention Technical Committee, member, 2004, 2008

Continuing Education Committee, SEAONC, Chair 2003-04, Member 2000-03

Publications

Jampole E, Amoroso S, Morgan, T, and McDonald B, Themes in Design/Build Disputes from a Technical Expert Witness Perspective, Construction Law International, International Bar Association, Vol 17 No 1, March 2022.

Amoroso, A, Jampole, E, and Morgan, T. Tornado effects on buildings: are target performance objectives consistent with recent damage observations? Structure Magazine, July 2022.

Jampole E, Martin A, Morgan T. Impact of Design Errors in an Isolated Bridge: Does the Bridge Still Meet Seismic Performance Objectives? Third European Conference on Earthquake Engineering and Seismology (3ECEES), Bucharest, Romania, 2022.

Morgan TA, Jampole E. Performance of base isolated structures in recent pacific rim earthquakes: Lessons learned and implications for US practice. Proceedings, 87th SEAOC Convention, Maui, HI, 2016.

McDonald BM, Morgan TA, Swensen SD. Use of Bayesian updating to improve fragility estimates for single-family houses in San Francisco. Proceedings, 87th SEAOC Convention, Maui, HI, 2016.

Morgan TA. Code-based design: Seismic isolation of buildings. Chapter in: Encyclopedia of Earthquake Engineering. Berlin: Springer, 2015.

Uriz P, Morgan T, Risk assessment of emergency diesel generator subject to design basis earthquake shaking. ASCE-ASME Journal of Risk and Uncertainty in Engineering Systems, Part B: Mechanical Engineering 2015; in press.

Morgan T, DeVore C, Peraza D. Collapse of crossed pendulum ceiling systems due to unstable equilibrium. Proceedings, ASCE Structures Congress 2015, pp. 1730-1740, Portland, OR, 2015.

Uriz P, Morgan TA. Risk assessment of emergency diesel generator subject to design basis earthquake shaking. Proceedings, ASME International Mechanical Engineering Congress & Exposition, Montreal, Canada, 2014.

Shrestha PL, James SC, Shaller PJ, Doroudian M, Peraza DB, Morgan TA. Estimating the storm surge recurrence interval for Hurricane Sandy. Proceedings, World Environmental and Water Resources Congress 2014: Water without Borders, Environmental Water Resources Institute of the American Society of Civil Engineers, pp. 1906-1915, Portland, OR, 2014.

Morgan TA, McDonald, BM. Design for uniform risk to standardized nuclear power plants using seismic isolation. Transactions, Structural Mechanics in Reactor Technology (SMiRT-22), San Francisco, CA, 2013.

Morgan TA. A reliability-based bounding analysis methodology for seismic isolated nuclear power plants. Proceedings, 11th International Conference on Structural Safety and Reliability, New York, NY, 2013.

Kasai K, Mita A, Kitamura H, Matsuda K, Morgan TA, Taylor AW. Performance of seismic protection technologies during the 2011 Tohoku-Oki earthquake. Earthquake Spectra 2013; 29(S1): S265-S293.

Morgan TA, McDonald, BM. Design for uniform risk to standardized nuclear power plants using seismic isolation. Proceedings, 10th CUEE Conference, Tokyo, Japan, 2013.

Morgan TA. Earthquake hazard, exposure, and risk in the Central and Eastern U.S. Structural Engineer, ZweigWhite, November 2012.

Chimamphant S, Kasai K, Morgan T. Continued functionality performance for base isolated structures subjected to earthquakes. Proceedings, 15th World Conference on Earthquake Engineering, Lisbon, Portugal, 2012.

Thiravechyan P, Kasai K, Morgan T. Response of base isolated structures considering inelastic behavior of superstructure. Paper in Proceedings, 15th World Conference on Earthquake Engineering, Lisbon, Portugal, 2012.

Morgan TA. A reliability-based bounding analysis methodology for seismic isolated buildings. Proceedings, 9th International Conference on Urban Earthquake Engineering / 4th Asia Conference on Earthquake Engineering, Tokyo, Japan, 2012.

Chimamphant S, Kasai K, Morgan TA. Continued functionality performance for base isolated structures subjected to earthquakes. Proceedings, 9th International Conference on Urban Earthquake Engineering / 4th Asia Conference on Earthquake Engineering, Tokyo, Japan, 2012.

Morgan TA, Mahin, SA. The use of base isolation systems to achieve complex seismic performance objectives. Technical Report PEER 2011/06, Pacific Earthquake Engineering Research Center, University of California, Berkeley, CA, 2011.

Morgan TA. Modern design procedures for seismic isolated buildings: An American perspective. Proceedings, 12th World Conference on Seismic Isolation, Energy Dissipation and Active Vibration Control of Structures, Sochi, Russia, 2011.

Morgan TA, Kasai K. Achieving enhanced seismic performance of tall buildings through base isolation. Proceedings, 3rd Asia-Pacific Young Researchers and Graduates Symposium, Taipei, Taiwan, 2011.

Morgan TA, Kasai K. Achieving enhanced seismic performance of tall buildings through base isolation. Proceedings, 8th CUEE Conference, Tokyo, Japan, 2011.

Thiravechyan P, Morgan TA, Kasai K. Pounding of base isolated structures considering inelastic behavior of superstructure. Proceedings, 8th CUEE Conference, Tokyo, Japan, 2011.

Thiravechyan P, Morgan TA, Kasai K. Studies on pounding of isolated buildings considering inelastic behavior of superstructure. Proceedings, 3rd Asia Conference on Earthquake Engineering, Bangkok, Thailand, 2010.

Morgan TA, Kasai K. Innovative Design approaches for base isolated high-rise buildings. Proceedings, 3rd Asia Conference on Earthquake Engineering, Bangkok, Thailand, 2010.

Ko E, Morgan TA, Bello M, Bailey R, Golesorkhi R, Lam L, Tong S. Base isolated structure—The New San Francisco General Hospital & Trauma Center. Proceedings, 9th U.S. National and 10th Canadian Conference on Earthquake Engineering, Toronto, Canada, 2010.

Morgan TA, Mahin SA. The use of seismic performance classifications in the optimization of base isolated buildings. Proceedings, 9th U.S. National and 10th Canadian Conference on Earthquake Engineering, Toronto, Canada, 2010.

Morgan TA, Kasai K. A methodology for the seismic design of tall buildings incorporating base isolation devices. Proceedings, 7th CUEE and 5th ICEE Joint Conference, Tokyo, Japan, 2010.

Morgan TA, Mahin SA. Achieving reliable seismic performance enhancement using multi-stage friction pendulum isolators. Earthquake Engineering and Structural Dynamics 2010; 39(13):1443-1461.

Morgan TA, Mahin SA. Achieving reliable performance enhancement using multi-stage friction pendulum bearings. Proceedings, JSSI 15th Anniversary International Symposium on Seismic Response Controlled Buildings for Sustainable Society, Tokyo, Japan, 2009.

Morgan TA, Mahin SA. Performance-based design of seismic isolated buildings considering multiple performance objectives. International Journal of Smart Structures and Systems 2008, 4(5):655-666.

Morgan TA, Mahin SA. The optimization of multi-stage friction pendulum isolators for loss mitigation considering a range of seismic hazard. Proceedings, 14th World Conference on Earthquake Engineering, Beijing, China, 2008.

Morgan TA, Mahin SA. Satisfying drift and acceleration criteria with multi-stage friction pendulum isolation systems. Proceedings, 18th Analysis and Computation Specialty Conference, ASCE Structural Engineering Institute, Vancouver, BC, 2008.

Prasad BK, Morgan TA, Wienskowski T. Near source fault effects on the performance of base-isolated hospital building vs. a BRBF hospital building. Proceedings, 79th SEAOC Convention, Kona, HI, 2008.

Sinclair KM, Wray G, Black CJ, Kelly JM, Mayes RL, Morgan TA, Ryan KR, Vignos R. Proposed reformulation of static lateral response procedure for simplified base isolation design. Proceedings, 78th SEAOC Convention, Lake Tahoe, CA, 2007.

Morgan TA, Prasad BK. Comparison of the seismic performance of a base-isolated hospital building versus BRBF hospital building considering near source effects. Proceedings, Structural Engineers World Congress, Bangalore, India, 2007.

Morgan TA, Mahin SA. Enhancing the performance capabilities of seismically isolated buildings using multi-stage friction pendulum sliding bearings. Proceedings, World Forum on Smart Materials and Smart Structures Technology, Chongquing and Nanjing, China, 2007.

Morgan TA, Mahin SA. Potential collaborative research on the design of seismic isolated buildings considering multiple performance objectives. Proceedings, US-Taiwan Workshop on Smart Structural

Technology for Seismic Hazard Mitigation, Taipei, Taiwan, 2006.

Morgan TA, Mahin SA. Development of a design methodology for seismic isolated buildings considering a range of performance objectives. Proceedings, 4th International Conference on Earthquake Engineering, NCREE, Taipei, Taiwan, 2006.

Ryan KL, Morgan TA, Sayani, P. Consistent performance comparison of seismic-isolated and fixed-base buildings. Proceedings, 8th National Conference on Earthquake Engineering, EERI, San Francisco, CA, 2006.

Naaseh S, Morgan TA, Walters MT. Future direction for base isolation design provisions. Proceedings, 75th SEAOC Convention, Monterey, CA, 2004.

Morgan TA, Walters MT. Innovative approaches to performance-based seismic rehabilitation of concrete buildings. Proceedings, 5th U.S.-Japan Workshop on Performance-Based Engineering for Reinforced Concrete Building Structures, Hakone, Japan, 2003.

Naaseh S, Morgan TA, Walters MT. A critical evaluation of current U.S. Building Code Provisions and FEMA Regulations for the Design of Seismically Isolated Structures. Proceedings, ATC 17-2 Seminar on Seismic Isolation, Passive Energy Dissipation and Active Control, Applied Technology Council, Los Angeles, CA, 2002.

Morgan TA, Whittaker AS. Cyclic behavior of high-damping rubber bearings. Proceedings, 5th World Congress on Joints, Bearings, and Seismic Systems for Concrete Structures, Rome, Italy, 2001.

Naaseh S, Morgan TA, Walters MT. A critical evaluation of current U.S. Building Code Provisions for the Design of Seismically Isolated Structures. Proceedings, 7th International Seminar on Seismic Isolation, Passive Energy Dissipation and Active Control of Vibrations of Structures, Assisi, Italy, 2001.

Project Experience

Dispute Resolution

Urban Metro Rail System: Lead a team evaluating allegations of design errors/omissions by architecture/engineering subcontractor related to a new urban metro system, including deep underground, at grade, and elevated stations and viaducts.

Highway Bridge Network: Acted as testifying expert as part of international arbitration related to design and construction of a series of seismic isolated highway bridges.

Nuclear Plant Equipment: Acted as a testifying expert in dispute resolution proceedings related to supply of major power generation equipment for a nuclear power plant.

Nuclear Plant Design and Construction: Managed a multi-expert team investigating allegations of design errors/omissions on a four-unit nuclear power plant as part of an international arbitration.

Vogtle Nuclear Plant: Managed entitlements expert team on US litigation related to the design and construction of two nuclear reactor units utilizing modular construction techniques that were newly-implemented in the US nuclear industry.

Failure Investigation

Concrete Rail Bridge: Performed investigation to determine the cause of cracking at post-tensioning anchorages of a concrete bridge used for rail transportation.

Steel Bridge Collapse: Performed investigation to determine the cause of failure of a primary steel component of a bridge that failed during a rehabilitation project.

Concrete Slab Collapse: Performed investigation to determine the cause of collapse of a concrete slab in a residential high rise building in Asia.

Steel Fabrication Plant Collapse: Performed investigation to determine the cause of collapse of a large, high-bay steel fabrication facility.

Adjacent Construction: Have been engaged to assess numerous instances of alleged damage to buildings and other infrastructure due to adjacent construction activities.

Concrete Parking Garages: Have performed several investigations to determine the causes of severe cracking and deterioration of multi-story concrete parking garages.

Steel Railing Collapse: Performed investigation to determine the cause of collapse of steel railing at a large outdoor amphitheater.

Post-Catastrophe Damage: Have been engaged to investigate damage to a variety of residential, commercial, and industrial facilities due to hurricanes, tornadoes, floods, earthquakes, impacts, ground settlement, and explosions.

Peer Review

UCSF Parnassus Heights: Member of peer review panel appointed by State of California to evaluate the analysis and design of a new 16-story, 955,000 square-foot hospital facility utilizing steel moment frames and supplemental viscous damping devices.

Plutonium Facility (PF-4): Expert peer review of nonlinear analysis approach, building component characterization, and seismic risk assessment methodology for US Dept. of Energy plutonium storage facility.

Churchill Hotel: Member of peer review panel appointed by City of San Diego to evaluate the analysis and design of a historic seismic upgrade using supplemental viscous damping devices.

Vallco Mall Redevelopment: Chair of peer review panel, appointed by owner, to provide expert analysis and design review for 2.2 million square foot, mixed-use retail, entertainment, commercial, and residential development incorporating seismic isolation and an innovative 50 acre undulating green roof.

High Performance Seismic Design

San Onofre Nuclear Plant: Risk assessment related to accidental shutoff of emergency diesel generator set during earthquake ground shaking.

Stanford Hospital: Analysis and design of 9-story triple-pendulum seismic isolated hospital building, including development of design criteria for OSHPD review.

UCSF Dolby Regeneration Medicine Building: Analysis, design, and specification of S-shaped space-truss structure and triple-pendulum seismic isolation system.

San Francisco General Hospital: Development of design and testing criteria for triple-pendulum seismic isolation system, including OSHPD review.

Tesla Gigafactory: Analysis and design of a steel rocking frame system with metallic energy dissipation devices, including static pushover and nonlinear response history analysis.

Washington Hospital: Analysis and design of 4-story base isolated hospital on triple- pendulum seismic isolation bearings, development of design and testing criteria document for OSHPD.

Utah State Capitol: Analysis and design of historic Utah State Capitol building retrofit considering lead-rubber, high-damping rubber, and friction pendulum seismic isolation systems (lead-rubber chosen through competitive bidding process).

Mokelumne Aqueduct: Retrofit of major aqueduct using lead-rubber seismic isolation.

Genentech B7: Design of new 4-story laboratory facility with special moment frames and supplemental viscous dampers.

Peer Reviews

EERI SpectraASCE Journal of Structural Engineering

Engineering Structures

Journal of Constructional Steel Research

Earthquake Engineering and Structural Dynamics

Journal of Earthquake Engineering

Bulletin of Earthquake Engineering

Journal of Shock and Vibration

ASCE Journal of Bridge Engineering

Journal of the Performance of Constructed Facilities