Exponent®
Engineering & Scientific Consulting

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Professional Profile

Dr. McDonald is a California licensed Civil and Structural engineer who specializes in the design and construction of critical structures. He has extensive experience in structural damage assessment and quantitative risk assessment of structures exposed to earthquakes as well as extreme winds, flooding and wildfires in the context of a changing climate. During his more than 35 years at Exponent, Dr. McDonald has evaluated industrial, nuclear, transportation, residential and commercial structures constructed of wood, concrete, masonry and steel.

Dr. McDonald provides quantitative risk assessments for electrical transmission structures, power plants, nuclear structures at national laboratories, and industrial facilities. This work included the evaluation of loss estimates and retrofit strategies for California residential structures subject to intense earthquake ground shaking. Dr. McDonald also provides design peer review services for the design of complex structures, including safety-critical nuclear power plant structures, applying state-of-the-art Risk-Informed, Performance-Based (RIPB) engineering principles. He has specialized expertise in engineering-based assessment and mitigation of the wildfire ignition risk posed by overhead power lines. He has worked closely with several utilities to evaluate their asset portfolios and construct frameworks for risk-informed decisions regarding the management and operation of overhear power line assets.

Forensic investigations led by Dr. McDonald include structures damaged by wind, snow, explosion, fire, construction errors, design defects, decay and corrosion. He has assessed hundreds of structures damaged by earthquakes including Loma Prieta, Northridge, San Simeon, and Hawaii. Dr. McDonald's work often includes nonlinear and dynamic structural simulations, fracture and plasticity analyses, and laboratory material testing.

Dr. McDonald has held several positions in the fields of structural engineering and software design including line designer and risk analyst at Wisconsin Power and Light, and later as Chief Analyst at Krawinkler, Luth, and Associates, a leading structural design firm. He has taught a graduate level course in Finite Element Analysis at Stanford University, where he is currently an Adjunct Lecturer teaching a graduate course on the performance of structures. Dr. McDonald chairs the American Society of Civil Engineers committee that develops and maintains design standards for nuclear structures, and is an invited member of the Nuclear Standards Committee. He previously sat on the Boad of Directors for the Structural Engineers Association of Northern California, where he is an active member where he has contributed to the ongoing development of structural codes and standards for existing structures.

Academic Credentials & Professional Honors

M.S., Engineering Mechanics, University of Wisconsin, Madison, 1989

Ph.D., Civil Engineering, University of Wisconsin, Madison, 1988

M.S., Civil Engineering, University of Wisconsin, Madison, 1984

B.S., Civil Engineering, University of Wisconsin, Madison, 1982

Chair of the Nonductile Concrete Subcommittee for the Structural Engineers Association of California

Licenses and Certifications

Professional Engineer Civil, California, #47585

Professional Engineer Structural, California, #4330

Professional Engineer, Georgia, #PE039137

Professional Engineer Structural, Georgia, #SE001832

Professional Engineer, Hawaii, #PE-12310

Professional Engineer Structural, Nevada, #21563

Professional Engineer, Oregon, #81321PE

Professional Engineer Structural, Oregon, #81321PE

Professional Engineer Civil and Structural, Washington, #37689

Professional Engineer, Wisconsin, #35893-6

Academic Appointments

Former Adjunct Professor and current Adjunct Lecturer, Stanford University

Professional Affiliations

Fellow of the Structural Engineering Institute of the American Society of Civil Engineers

Fellow of the American Society of Civil Engineers (member #270581)

Structural Engineers Association of Northern California (Member SE, past Chair of the Existing Buildings Committee, past Chair of the Research Committee, past Chair of Nonductile Concrete Subcommittee)

American Concrete Institute (member #00121237)

American Institute of Steel Construction (member #064972)

Earthquake Engineering Research Institute (member ID 8096)

Publications

Jampole, E. and McDonald, B. Fragility curves for quantifying physical climate risk in the electric power sector. Electric Power Research Institute Climate READi Technical Report. April 2025. https://www.epri.com/research/sectors/readi/research-results/3002031792

McDonald, B., Griffith, M., Bhattacharjee, G. and Jampole, E., 2025. A quantitative risk-based framework for asset health assessment of overhead lines. Chapter 3 of The Sustainable Power Grid (pp. 59-83).

Elsevier.

Kytömaa, H., Jampole, E., & McDonald, B. (2024). Proactive risk-informed hardening for cold weather grid reliability. WE Magazine of the Western Energy Institute, 20–23.

Jampole E, Amoroso, S, Morgan, T, and McDonald, B. Themes in design/build disputes, from a technical expert witness perspective. Construction Law International, Volume 17 Issue 1, March 2022.

Bliss, R., DeQuoy, B., McDonald, B., & Birch, J. (2022). Does compliance with minimum regulatory standards adequately mitigate wildfire risk? Electrical Transmission and Substation Structures 2022: Innovating for Critical Global Infrastructure.

McDonald, B. (2018). Revisiting earthquake lessons – Masonry chimneys and fireplace surrounds. Structural Engineers Association of California Newsletter, December 20.

Maison, B., & McDonald, B. (2018). Fragility curves for residential masonry chimneys. Earthquake Spectra, 34(3), 1001–1023.

Example application guide for ASCE/SEI 41-13 seismic evaluation and retrofit of existing buildings; with additional commentary for ASCE/SEI 41-17 (Chapter 7). FEMA P-2006.

Vulnerability-based seismic assessment and retrofit of one- and two-family dwellings (Chapter 7). FEMA P-1100.

Blaney, C., McDonald, B., et al. (2018). Prestandard for seismic assessment and retrofit of one- and two-family dwellings (FEMA P-1100, ATC-110 Project). Structural Engineers Association of California 2018 Convention Proceedings.

Lizundia, B., McDonald, B., et al. (2018). Example application guide for ASCE/SEI 41-13: Selected design examples. Structural Engineers Association of California 2018 Convention Proceedings.

Haselton, C., McDonald, B., et al. (2015). U.S. Resiliency Council® – FEMA P58 evaluation methodology. Proceedings of the 2015 ATC&SEI Conference on Improving the Seismic Performance of Existing Buildings and Other Structures, San Francisco, December.

McDonald, B., Morgan, T., & Swensen, S. (2016). Use of Bayesian updating to improve fragility estimates for single-family houses in San Francisco. Structural Engineers Association of California 2016 Convention, Maui, HI, October 12–15.

Bishop, C. D., Griffith, M., & McDonald, B. (2016). Instability of solar power tower structures during construction. Proceedings, Annual Stability Conference, Structural Stability Research Council, Orlando, FL, April 12–15.

Bishop, C. D., Uriz, P., & McDonald, B. (2015). Stability of column rebar cages for buildings under construction. Proceedings, Annual Stability Conference, Structural Stability Research Council, Nashville, TN, March 24–27.

Maison, B., McDonald, B., McCormick, D., Schotanus, M., & Buckalew, J. (2015). Discussion of FEMA P-807 for the retrofit of soft-story buildings. Proceedings of the 2015 ATC&SEI Conference on Improving the Seismic Performance of Existing Buildings and Other Structures, December, 497–508.

Schotanus, M., Maison, B., & McDonald, B. (2015). Pounding of San Francisco-type “soft story” midblock buildings. Proceedings of the 2015 ATC&SEI Conference on Improving the Seismic Performance of Existing Buildings and Other Structures, December, 535–547.

Buckalew, J., McDonald, B., McCormick, D., Schotanus, M., & Maison, B. (2015). Example case studies

of soft-story retrofits using the San Francisco ordinance. Improving the Seismic Performance of Existing Buildings and Other Structures, December, 548–559.

Whittaker, A., Goen, L., Kennedy, R., McDonald, B., Morgan, T., & Wyllie, L. (2015). Independent review of seismic performance assessments for the plutonium facility PF-4. Los Alamos National Laboratory Report Number: LA-UR-15-29138, November.

Lizundia, B., McDonald, B., et al. (2015). Development of design guidance and example applications for ASCE/SEI 41-13, seismic evaluation and retrofit of existing buildings, the ATC-124 Project. Structural Engineers Association of California 2015 Convention, Bellevue, WA, September 9–12.

Maison, B., McDonald, B., McCormick, D., Schotanus, M., & Buckalew, J. (2014). Commentary on FEMA P-807 for retrofit of wood-frame soft-story buildings. Earthquake Spectra, 30(4), 1359–1380.

Maison, B., McDonald, B., McCormick, D., Schotanus, M., & Buckalew, J. (2014). Commentary on FEMA P-807: Seismic evaluation and retrofit of multi-unit wood-frame buildings with weak first stories. Structural Engineers Association of Northern California Existing Buildings Committee Report, January.

Maison, B., McDonald, B., & Schotanus, M. (2013). Pounding of San Francisco-type soft-story midblock buildings. Earthquake Spectra, 29(3), 1069–1089.

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

Morgan, T. A., & McDonald, B. (2013). Design for uniform risk to standardized nuclear power plants using seismic isolation. Proceedings, 10th CUEE Conference, Tokyo, Japan.

McDonald, B., & Hunt, J. (2012). Thermal load-induced failure of steel space frame structure. Proceedings, 6th Congress on Forensic Engineering, San Francisco, CA, October 31–November 3.

Uriz, P., Osteraas, J., & McDonald, B. (2012). Using ASTM E1155 to determine finished floor quality: Background and areas for consideration. Proceedings, 6th Congress on Forensic Engineering, San Francisco, CA, October 31.

Krawinkler, H., Osteraas, J., McDonald, B., & Hunt, J. (2012). Development of damage fragility functions for URM chimneys and parapets. Proceedings, 15th World Conference on Earthquake Engineering, Lisbon, Portugal, September 23–28.

Maison, B., McDonald, B., & Schotanus, M. (2012). Pounding of San Francisco-type soft-story midblock buildings. Structural Engineers Association of Northern California Existing Buildings Committee Report, September.

Osteraas, J., Krawinkler, H., McDonald, B., & Hunt, J. (2011). ATC-58 fragility of masonry chimneys. Applied Technology Council, Redwood City, CA, March.

McDonald, B., Hunt, J., Krawinkler, H., & Osteraas, J. (2011). ATC-58 fragility of masonry parapets. Applied Technology Council, Redwood City, CA, March.

McDonald, B., Ross, B., & Carnahan, R. A. (2011). The Bellevue crane disaster. Engineering Failure Analysis, 18(7), 1621–1636.

McCann, D. J., Corr, D., & McDonald, B. (2009). Lessons learned from Marcy Bridge collapse. ASCE 5th Congress on Forensic Engineering, Washington, DC, November 11–14.

McDonald, B. (2009). The art and science of designing structures to resist earthquakes. Silicon Valley

Engineering Council Journal, 1.

Gupta, A., & McDonald, B. (2008). Performance of building structures during the October 15, 2006 Hawaii earthquake. 14th World Conference on Earthquake Engineering, Beijing, China, October 12–17.

Luth, G., Supriya, S., Krawinkler, H., & McDonald, B. (2008). USC School of Cinema: An example of reparable performance-based design. Proceedings, 77th SEAOC Convention, Hawaii.

Osteraas, J., Gupta, A., Griffith, M., & McDonald, B. (2008). Woodframe seismic response analysis—Benchmarking with buildings damaged during the Northridge Earthquake. ASCE Structures Conference, Vancouver, BC, April 24–26.

Ross, B., McDonald, B., & Saraf, V. (2007). Big blue goes down: The Miller Park crane accident. Engineering Failure Analysis, 14(6), 942–961.

McDonald, B., Gupta, A., Alavi, B., & Osteraas, J. (2006). Rational seismic evaluation and retrofit of a multistory RC shear wall structure. 100th Anniversary Earthquake Conference, San Francisco, CA, April 18–22.

Gupta, A., McDonald, B., Griffith, M., & Osteraas, J. (2006). Displacement coefficients for conventional residential wood-frame structures. 100th Anniversary Earthquake Conference, San Francisco, CA, April 18–22.

Meldrum, J., Gupta, A., & McDonald, B. (2004). Investigation of structural damage in a corrosive environment. 5th International Conference on Case Histories in Geotechnical Engineering, New York, NY, April.

McDonald, B., Luth, G., & Osteraas, J. (2004). Review of safety factors for assessing column stability in existing braced frame buildings. 2004 Structures Congress, ASCE, Nashville, TN, May 22–26.

Osteraas, J., Bonowitz, D., Gupta, A., & McDonald, B. (2004). Development of guidelines for assessment and repair of earthquake damage in woodframe construction. 13th World Conference on Earthquake Engineering, Vancouver, BC, August 1–6.

Ross, B., McDonald, B., & Saraf, V. (2004). Big Blue goes down: The Miller Park crane accident. 6th International Symposium on Risk, Economy and Safety, Cape Town, South Africa, March 8–12.

McDonald, B., Saraf, V., & Ross, B. (2003). A spectacular collapse: The Koror-Babeldaob (Palau) balanced cantilever prestressed post-tensioned bridge. Indian Concrete Journal, 77(3). Also in Proceedings, 27th Conference on Our World in Concrete and Structures, August 29–30.

Osteraas, J., Shusto, L., & McDonald, B. (2000). Forensic aspects of earthquake engineering: Protocols for earthquake damage assessment and repair. 2nd Forensic Engineering Congress, ASCE, San Juan, Puerto Rico, May 19–23.

Rau, G., Meldrum, J., Medley, E., & McDonald, B. (2000). Forensic investigations of the soil-structure kind (wind & settlement failures). 2nd Forensic Engineering Congress, ASCE, San Juan, Puerto Rico, May 19–23.

McDonald, B., Bozorgnia, Y., & Osteraas, J. (2000). Structural damage claims attributed to aftershocks. 2nd Forensic Engineering Congress, ASCE, San Juan, Puerto Rico, May 19–23.

Osteraas, J., Shusto, L., & McDonald, B. (2000). Engineering involvement in post-Northridge damage assessment and repair of wood-frame dwellings. 12th World Conference on Earthquake Engineering, Auckland, New Zealand, February.

Moncarz, P. D., McDonald, B., & Caligiuri, R. D. (1999). Earthquake failures of welded building connections. 6th Pan American Congress of Applied Mechanics, Rio de Janeiro, Brazil, January 4–8.

Moncarz, P. D., Caligiuri, R. D., McDonald, B., Sire, R. A., & Borduin, W. P. (1998). Ultimate moment capacity of many steel connections: Failure in design, materials or workmanship? EUROMAT '98 Conference, Lisbon, Portugal, July 22–24.

McDonald, B., Sire, R. A., & Caligiuri, R. D. (1998). Ductile initiation of cleavage fractures in welded moment frame connections. 12th Engineering Mechanics Conference, ASCE, La Jolla, CA, May 17–20.

Moncarz, P. D., Caligiuri, R. D., McDonald, B., & Sire, R. A. (1998). Failures in steel frame building connections—A multi-billion dollar example of professional wishful thinking. 8th IFIP Working Conference, Krakow, Poland, May 11–13.

Johnston, P., Shusto, L., & McDonald, B. (1993). Correlating torsional response to engine performance parameters. International Off-Highway and Power Plant Congress, SAE, Milwaukee, WI, September.

Luth, G. P., McDonald, B., & Jain, D. (1993). Qualitative formulation of load paths through a functional description of structures. 5th International Conference on Computing in Civil and Building Engineering, Anaheim, CA.

McDonald, B., Burke, M., & Moncarz, P. D. (1991). The effects of natural aging on a polymer modified glass fiber reinforced concrete. 8th Biennial Congress of the Glassfibre Reinforced Cement Association, Maastricht, Netherlands, October.

McDonald, B., & Peyrot, A. (1990). Generalized sag-tension calculations valid for any line geometry. Journal of Structural Division, ASCE, 116(9).

McDonald, B., & Peyrot, A. (1988). Analysis of cable suspended in sheaves. Journal of Structural Division, ASCE, 114(3).

McDonald, B. (1988). Analysis of cables suspended by sheaves (Doctoral dissertation). University of Wisconsin, Madison, WI.

Peyrot, A. H., Dagher, H. J., & McDonald, B. (1986). Reliability based design of transmission line structures—Theoretical user's manual for DESCAL. EPRI Report for Project 1352-2, January.

Saul, W., & McDonald, B. (1985). Microcomputer-aided structural analysis. In G. Beakley & C. Haden (Eds.), Computer-Aided Processes in Instruction and Research. Academic Press Inc., Orlando, FL.

Saul, W., Tuan, C. Y.-B., & McDonald, B. (1985). Loads due to human movement. In J. T. P. Yao, R. Corotis, C. B. Brown, & F. Moses (Eds.), Structural Safety Studies. ASCE, New York, NY.

McDonald, B. (1984). The dynamic loading due to stadium crowds: A statistical measure of the coherency of crowd movements (Master’s thesis). University of Wisconsin, Madison, WI.

Advisory Appointments

Nuclear Standards Committee of the American Society of Civil Engineers