**Brad Davis, Ph.D., S.E., P.E.**

**Davis Structural Engineering, LLC**
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**Education**

Ph.D., Civil Engineering, 2008, Virginia Tech
Dissertation: "Finite Element Modeling for Prediction of Low Frequency Floor Vibrations Due to Walking"
M.S., Civil Engineering, 1996, Virginia Tech
B.S., Civil Engineering, 1994, Virginia Tech

**Professional Positions**

Owner; Davis Structural Engineering, LLC; 2017-Present
Assistant / Associate Professor of Civil Engineering, University of Kentucky, 2009-Present
Structural Design Engineer, Structural Design Group, Nashville, TN, 2000-2005
Structural Design Engineer, Stanley D. Lindsey and Associates, Nashville, TN, 1998-2000
Structural Engineer; Hayes, Seay, Mattern, and Mattern; Roanoke, VA, 1997-1998
Research Engineer, American Buildings Company, Eufaula, AL, 1996-1997

**Capabilities**

- Structural Vibrations. Visit **DavisStructures.com** for detailed information.
  - Vibration testing for sensitive equipment applications
  - Experimental modal analysis and analytical calculations
- Structural Forensics
- Advanced applications in structural dynamics, structural analysis, and stability
- Structural Design: all major building materials, including cold-formed steel
- Structural Steel Connection Design
- Design of Steel Stairs and Guardrail Systems
- Development of Software and Design Aids
- Continuing Education Courses, Seminars, and Technical Writing
- Destructive Experimental Evaluations of Strength and Stiffness

**Professional Licenses**

| State | Type | Number |
|---|---|---|
| Alabama | P.E. (Structural) | 38503 |
| District of Columbia | P.E. (Structural) | PE922574 |
| Florida | P.E. (Structural) | 88019 |
| Georgia | P.E. (Structural) | PE044957 |
| Illinois | S.E. | 081-006088 |
| Kentucky | P.E. (Structural) | 32008 |
| Massachusetts | P.E. (Structural) | 55810 |
| Mississippi | P.E. (Structural) | 30396 |
| North Carolina | P.E. (Structural) | 048445 |
| Ohio | P.E. (Structural) | PE.84820 |
| South Carolina | P.E. (Structural) | ELS.37394 |
| Tennessee | P.E. (Structural) | 105257 |
| Texas | P.E. (Structural) | 152777 |
| Virginia | P.E. (Structural) | 0402041235 |
| West Virginia | P.E. (Structural) | 23682 |

## Project Experience Highlights

**Vibration Site Surveys**

Measured and assessed vibrations of structures supporting sensitive equipment.

- Clayton Cataract and Eye Surgery, Morrow, GA – Sensitive Microscopes (2025)
- Vanderbilt TVC4 Fourth Floor Lab Survey – Sensitive Line Testing Equipment (2025)
- Delaney Radiology, Wilmington, NC – MRI (2024)
- Ogden Regional Medical Center, Ogden, UT – CT imagers (2023)
- Baptist Health Medical Center, Little Rock, AR – MRI and Cath Lab (2021)
- Shepherd Center, Atlanta, GA – MRI (2018)
- Redmond Regional Hospital, Rome, GA – MRI (2017)
- University of Kentucky Academic Sciences Building Laboratories – Sensitive equipment (2016)
- Rupp Arena, Lexington, KY – Balcony Vibrations Affecting Television Cameras (2015)
- Centennial Medical Center, Nashville, TN – Hybrid OR Equipment (2008)

**Vibration Design Assistance**

Provided vibration engineering during the design phase.

- Hyattsville Elementary School, MD – Gymnasium (2025)
- University of Wisconsin, Madison, Camp Randall Athletic Facility – Elevated Track (2024)
- Redeemers Church of Christ, Lanham, MD – Balcony Vibrations (2024)
- University of Kentucky Funkhouser Building Renovation – Sensitive Equipment (2024)
- Saint Thomas West Hospital, Nashville, TN – PET/CT (2021)
- Liberty University, Lynchburg, VA – Balcony Vibration (2014)
- St. Anthony Hospital, Denver, CO – MRI floor vibration (2009)
- WTC Transit Hub, NYC – Floor and Stair Vibrations (2008)
- Quest Community Church, Lexington, KY, balcony vibration (2008)

**Forensics and Vibration Reduction Projects**

Design vibration-reduction solution, expert for EOR's legal team, or expert for owner's legal team. Cannot disclose structure names.

- Office with vibrations due to walking – assessed (potential expert) for EOR's legal team (2024)
- Fine arts center with report vibrations due to walking – expert for the EOR's legal team (2024)
- Medical center rehab facility with barbell impacts – designed vibration-reduction solution (2023)
- Multi-story condo – investigated intermittent vibrations (2022)
- Monumental stair with uncomfortable vibrations – designed vibration-reduction solution (2021)
- Single family residence with uncomfortable vibrations – expert for owner's legal team (2018)
- Hospital lobby with vibrations due to walking – designed vibration reduction solution (2018)
- Office floor with vibrations due to walking – designed vibration-reduction solution (2017)
- Hospital with floor vibrations near CT scanner – designed vibration reduction solution (2010)

**Construction Vibrations**

Assisted contractor by measuring and assessing vibrations. Cannot disclose structure names.

- Historical facility with priceless irreplaceable artifacts with nearby demolition activities (2022)
- Fortune 500 corporate data center with servers very close to demolition activities (2018)

**Structural Design**

- Norfolk Naval Shipyard Heat and Power Plant: steel connections, 600 ton project (2022)
- StoneCrest Medical Center, Smyrna, TN: designed steel-framed structure while at Structural Design Group (2003)
- Vanderbilt Children's Hospital, Nashville, TN: designed post-tensioned and conventional concrete structure while at Structural Design Group (2002)
- Parrish Medical Center, Titusville, FL: designed replacement hospital with steel moment frames and composite framing while at Stanley D. Lindsey and Associates (1999)

**Awards**

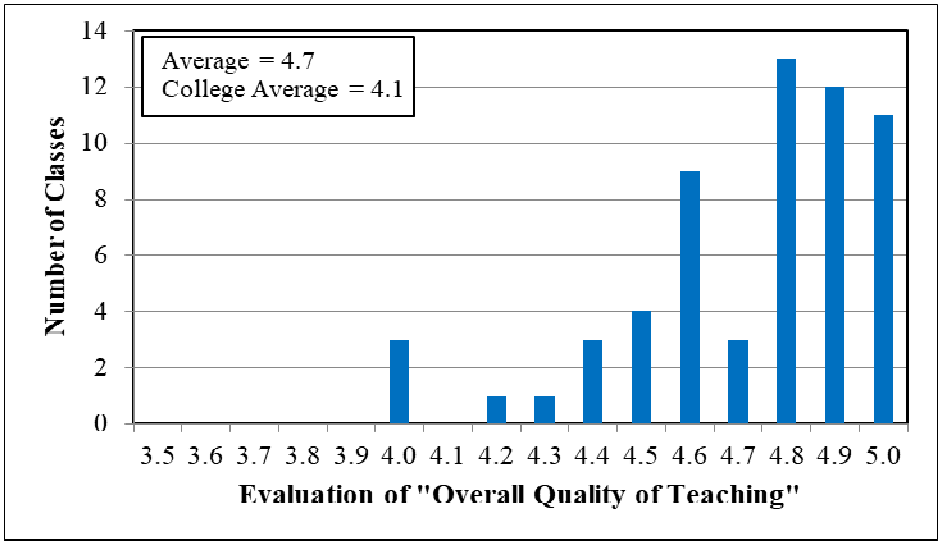
- 2009, 2013, 2021, and 2023 Outstanding Civil Engineering Teaching Award, University of Kentucky.
- 2016 Educator Special Achievement Award, American Institute of Steel Construction (AISC), for developing new vibration evaluation criteria for steel-framed floors supporting sensitive equipment.
- 2010 Outstanding Young Alumni Award, Virginia Tech Civil and Environmental Engineering Department.
- 2008 Best Overall Paper at the ASCE Architectural Engineering National Conference.
- 2005 Charles E. Via Fellowship, Virginia Tech.
- 2005 Walter P. Moore Structural Engineering Fellowship.

**Memberships**

- AISC Manuals Committee member, 2003-Present
- Steel Joist Institute
- Cold-Formed Steel Engineers Institute
- Steel Tube Institute
- AISC Solutions Center Consultant
- ASCE Structural Engineers Institute
- ASTM International: Structural Acoustics and Vibration

**University Teaching**

- *Structural Analysis and Design*
  - Basic topics in structural analysis, steel, concrete, and wood design.
- *Steel Structures*
  - Traditional course in structural steel, including frame stability and composite beams.
- *Advanced Steel Design*
  - Slender and unsymmetrical columns and plate girders, connections, and frame stability.
- *Design of Light Framing Systems*
  - Wood and cold-formed steel members and connections.
- *Design of Structural Systems*
  - ASCE 7 loads, floor vibrations, lateral force resisting systems including diaphragms, computerized analysis and design.
- *Intermediate Structural Analysis*
  - Indeterminate Structures, Loads of Unknown Locations, Matrix Structural Analysis.
- *Advanced Structural Analysis*
  - Matrix Structural Analysis, Geometric Nonlinear Analysis, Frame collapse.



**Publications**

Design Guides (Books)

- Murray, T.M., Ungar, E.E., Davis, B. (2019), *Facts for Steel Buildings No. 5, Vibrations*, AISC.
- Murray, T.M., Allen, D.A., Ungar, E.E., Davis, B. (2016), *Design Guide 11: Vibration of Steel-Framed Structural Systems Due to Human Activity*, AISC.
- Murray, T.M. and Davis, B. (2015), *Technical Digest No. 5 – Vibration of Steel Joist-Concrete Slab Floor*, Steel Joist Institute.

Peer-Reviewed Journal Articles (Total of 14. Eight in top quartile journals. Highlights below.)

- Royvaran M., Avci O., and Davis B. (2021), "Effect of Non-Structural Components on the Dynamic Response of Steel-Framed Floors: Tests Before and After Component Installations," *Front. Built Environ*. 7:725106.
- Abdeljaber, O., Hussein, M., Avci, O., Davis, B., and Reynolds, P. (2020), "A Novel Video-Vibration Monitoring System for Walking Pattern Identification on Floors," *Advances in Engineering Software*, 139(1), 102710.
- Royvaran, M., Avci, O., and Davis, B. (2020), "Analysis of Floor Vibration Evaluation Methods using a Large Database of Floors Framed with W-Shape Members Subjected to Walking Excitation," *Journal of Constructional Steel Research*, 164(1), 105764.
- Davis, B., and Liu, D. (2019), "Walking-Induced Vibration of Steel-Framed Floors Supporting Sensitive Equipment," *Engineering Journal*, 56(3), 159-172.
- Younis, A., Avci, O., Hussein, M., Davis, B., and Reynolds, P. (2017), "Dynamic Forces Induced on Building Floors by a Single Walking Pedestrian: A Literature Review," *Applied Mechanics Reviews*, 69(2).
- Davis, B. and Avci, O. (2015), "Simplified Vibration Serviceability Evaluation for Slender Monumental Stairs," *Journal of Structural Engineering*, ASCE, 141(11), 04015017-1 – 04015017-9.
- Liu, D. and Davis, B. (2015), "Walking Vibration Response of High Frequency Floors Supporting Sensitive Equipment," *Journal of Structural Engineering*, ASCE, 141(8), 04014199-1 – 04014199-10.
- Davis, B., Liu, D., and Murray, T.M. (2014), "Simplified Experimental Evaluation of Floors Subject to Walking Induced Vibrations," *Journal of Performance of Constructed Facilities*, ASCE, 28(5), 04014023-1 – 04014023-8.
- Davis, D.B., Barrett, A.R., and Murray, T.M. (2011), "Use of a Force Plate Versus Armature Accelerometer for Measuring Frequency Response Functions," *Experimental Techniques*, 35(1), 73-79.
- Davis, D.B. and Murray, T.M. (2009), "Slender Monumental Stair Vibration Serviceability," *Journal of Architectural Engineering*, ASCE, 15(4), 111-121.

Magazine Articles and White Papers

- Davis, B. and Fox, D. (2026), "Technical Note: Vibration of CFS Joist Framed Floors," Cold-Formed Steel Engineers Institute.
- Davis, B. (2026), "Natural Frequency Lower Limit for Floors," Steel Joist Institute.
- Davis, B. (2025), "Mindful of Movement," (Vibration of Sports and Recreational Facilities), *Modern Steel Construction*, November, 14-19.
- Samuelson, D., Davis, B., Murray, T.M. (2023), "Vibration of Steel Joists with Flush Frame End Connections," *STRUCTURE*, November, 48-52.
- Murray, T., Davis, B., Whiteman, J. (2021), "Examining the Relationship Between Vibration, Frequency and Steel Joists," White Paper, Steel Joist Institute, Florence, SC. (https://steeljoist.org/resources/examining-the-relationship-between-vibration-frequency-and-steel-joists/)
- Murray, T.M., Davis, B. (2020), "Vibration of Vulcraft Steel Joists with Flush Framed and Flush Bearing Seat Connections," White Paper, Vulcraft, Charlotte, NC. (https://vulcraft.com/files/Literature/Technical/Vibration_of_Vulcraft_Steel_Joists_with_Flush_Framed_Seats_1_28_2020.pdf)
- Davis, B., Salmon, J. (2019), "Steelwise: Structural Vibration Serviceability," *Modern Steel Construction*, December, 16-21. (https://www.aisc.org/globalassets/modern-

steel/archives/2019/december2019.pdf)

- Davis, B. (2017), "Sheer Improvement to Shear Design," Modern Steel Construction, August. https://www.aisc.org/globalassets/modern-steel/archives/2017/08/shearimprovementtosheardesign.pdf

Conference Papers (Total of 18. Highlights Below.)

- Royvaran, M., Donohue, K and Davis, B. (2020), "Localization of Stationary Source of Floor Vibration Using Steered Response Power Method," *Proceedings of the International Modal Analysis Conference*, Society for Experimental Mechanics.
- Davis, D.B. and Murray, T.M. (2009), "Comparisons of Measured and Predicted Modal Properties for Steel Framed Floors," *Proceedings of 2009 IMAC-XXVII*, The Society for Experimental Mechanics.

Invited Conference Presentations (Highlights Below)

- Davis, B. (2025), "Solving Vibration Problems in Structures," The Flash Steel Conference, AISC.
- Davis, B. (2025), "Vibration of Recreational and Sports Facilities," The North American Steel Conference, AISC.
- Davis, B. (2025), "Avoiding Vibration Problems in Steel Joist Concrete Floors," The North American Steel Conference, AISC.
- Davis, B. (2023), "Steel-Framed Floor Design for Vibration-Sensitive Equipment," The North American Steel Conference, AISC.
- Murray, T.M. and Davis, B. (2019), "Structural Vibration Serviceability – FAQ and More," North American Steel Construction Conference, AISC.
- Davis, B. (2016), "Steel Framed Floor Design for Vibration-Sensitive Equipment," North American Steel Construction Conference, AISC.
- Davis, B. (2010), "Simplified Finite Element Method for Predicting Low Frequency Floor Vibration Due to Walking," North American Steel Construction Conference, AISC.

**Invited Speaking Engagements**

- Over 35 engagements. Highlights below.
- AISC Live Webinar Series (2025), "Connections: Fundamentals and Shear Connections," four 90 minute sessions, 150 attendees per session.
- Cold-Formed Steel Engineers Institute (2025), "Vibration Serviceability of Floors with Cold-Formed Steel Framing," 90 minutes, 300 attendees.
- Steel Joist Institute (2025), "Vibration of Floors Supported by Open Web Steel Joists: Overview and Recent Innovations," 90 minutes, 150 attendees.
- SE University (2024), "Vibration Analysis of Steel Joist / Concrete Floors," 90 minutes, 2000 attendees.
- AISC Night School 35 (2024), "Fundamentals of Connection Design," six 90 minute sessions, attendance ranged from 475 to 775 per session.
- AISC Live Webinar Series (2022), "Vibration Serviceability: Overview of AISC Design Guide 11 and Q&A," 90 minutes, 300 attendees.
- NASA Marshall Space Flight Center (2019), "Steel Moment Connection Design," 24 hours.
- AISC Night School Webinar (2016), "Vibration of Steel Framed Structural Systems Due to Human Activity: Sensitive Equipment, Monumental Stairs, and Retrofitting," 90 minutes, 400 attendees.
- Structural Engineers Association of Arkansas Annual Conference Keynote Speaker (2015), "Structural Vibration Serviceability: Technical Background, Sensitive Equipment, and Monumental Stairs," four hours.
- NCSEA Webinar (2014), "Floor Vibration Serviceability, Technical Background, and AISC Design Guide 11, Parts 1 and 2," 180 attendees.