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## CHRIS S. WILLIAMS, Ph.D.

Assistant Professor, Engineering  
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### EDUCATION

- 2012 – 2015    **Doctor of Philosophy**  
Department of Civil, Envir. and Arch. Engineering, The University of Texas at Austin  
Thesis: *Behavior of the Cast-in-Place Splice Regions of Spliced I-Girder Bridges*
- 2009 – 2011    **Master of Science in Engineering**  
Department of Civil, Envir. and Arch. Engineering, The University of Texas at Austin  
Thesis: *Strut-and-Tie Model Design Examples for Bridges*
- 2005 – 2009    **Bachelor of Science in Civil Engineering**  
Department of Civil and Envir. Engineering, Southern Illinois University Carbondale  
Minor in Mathematics  
Summa Cum Laude  
Honors Degree

### PROFESSIONAL APPOINTMENTS

- 2023 – Present    **Assistant Professor of Civil Engineering**  
Division of Mathematics, Engineering, and Computer Sciences, Indiana Wesleyan University
- 2015 – 2023    **Assistant Professor of Civil Engineering**  
Lyles School of Civil Engineering, Purdue University
- 2009 – 2015    **Graduate Research Assistant**  
Department of Civil, Envir. and Arch. Engineering, The University of Texas at Austin
- Spring 2015    **Teaching Assistant**  
Department of Civil, Envir. and Arch. Engineering, The University of Texas at Austin
- Fall 2013    **Grader**  
Department of Civil, Envir. and Arch. Engineering, The University of Texas at Austin
- 2006 – 2009    **Undergraduate Researcher**  
Materials Technology Center, Southern Illinois University Carbondale

### AWARDS AND SCHOLARSHIPS

- 2022    American Association of State Highway and Transportation Officials (AASHTO) Supplemental Research Award for project entitled “Repair and Strengthening of Bridges in Indiana Using Fiber Reinforced Polymer (FRP) Systems”
- 2016    ASCE ExCEED (Excellence in Civil Engineering Education) Fellowship
- 2013 – 2014    Phil M. Ferguson Endowed Presidential Graduate Scholarship in Civil Engineering (The University of Texas at Austin)
- 2009 – 2013    Burns/Fontaine (Thrust 2000) Endowed Graduate Fellowship in Engineering (The University of Texas at Austin)

- 2009 – 2010 Phi Kappa Phi Fellowship (The Honor Society of Phi Kappa Phi)
- 2009 College of Engineering Dean Kenneth E. Tempelmeyer Outstanding Student Leadership Award (Southern Illinois University Carbondale)
- 2009 College of Engineering Outstanding Senior Award (Southern Illinois University Carbondale)
- 2009 25 Most Distinguished Seniors Award (Southern Illinois University Carbondale)
- 2009 50 for the Future Award (Illinois Technology Foundation)
- 2007 Team Prize for Creativity of Technology Integration at the 8<sup>th</sup> International University Students Creativity-in-Action Contest (I-Shou University, Kaohsiung, Taiwan)
- 2007-2008 REACH (Research-Enriched Academic Challenge) Award and Research Grant (Southern Illinois University Carbondale)
- 2005-2009 Presidential Scholarship (Southern Illinois University Carbondale)
- 2005 Valedictorian Scholarship (Southern Illinois University Carbondale)

### **TEACHING EXPERIENCE**

#### Indiana Wesleyan University:

- EGR-211 Solid Mechanics
- MEE-321 Mechanics of Materials

#### Purdue University:

- CE 473 Reinforced Concrete Design
- CE 572 Prestressed Concrete Design
- CE 576 Advanced Reinforced Concrete Design
- CE 597 Anchorage to Lightweight Concrete (Independent Study)
- CE 597 Plasticity Theory and Strut-and-Tie I and II (Independent Study)

#### Other Teaching Experience:

##### **Structural Concrete Bridges** (graduate-level course) – Spring 2015

The University of Texas at Austin

Roles: Assisted with structural testing program of deep beam specimens as part of the students' term project; graded and assisted with the development of assignments

##### **Earthquake Engineering** (graduate-level course) – Fall 2013

The University of Texas at Austin

Roles: Graded assignments; assisted instructor with grading exams and term project

### **STUDENT ADVISING/MENTORING**

#### Supervisor of Undergraduate Research Students at Purdue University:

Served as supervisor of 20 undergraduate students who assisted with research projects within the period of May 2017 to May 2023

Advisor of Ph.D. Students at Purdue University:**Graduated:**

1. H.-C. Wang  
Graduation Date: Aug. 2020  
Thesis: Behavior and Design of Concrete Frame Corners: Strut-and-Tie Method Approach
2. R. Whelchel (co-advised)  
Graduation Date: Dec. 2019  
Thesis: Evaluation and Structural Behavior of Deteriorated Precast, Prestressed Concrete Box Beams

**In Progress:**

1. S. Bowlin (co-advised)  
Anticipated Graduation Date: Aug. 2024  
Thesis: Design and Construction of Bonded and Unbonded Post-Tensioned Concrete Bridge Elements (tentative title)
2. A. Alimran  
Anticipated Graduation Date: Dec. 2023  
Thesis: Shear-Friction with High-Strength Reinforcement (tentative title)

Advisor of M.S. Thesis Students at Purdue University:**Graduated:**

1. S. Grier  
Graduation Date: Aug. 2022  
Thesis: Large Culvert Inspection Procedures
2. D. Derks (co-advised)  
Graduation Date: May 2022  
Thesis: The Design, Construction, and Testing of Scaled Post-Tensioned Concrete Bridge Girders with Bonded and Unbonded Tendons
3. W. Rich  
Graduation Date: May 2021  
Thesis: Evaluation of Repair Techniques for Deteriorated End Regions of Prestressed Concrete Bridge Girders
4. R. Jacobs  
Graduation Date: Dec. 2020  
Thesis: Experimental Evaluation of Flexural Strengthening Methods for Existing Reinforced Concrete Members Using Fiber Reinforced Polymer (FRP) Systems
5. T.-W. Wang  
Graduation Date: Aug. 2019  
Thesis: Anchoring to Lightweight Concrete: Concrete Breakout Strength of Cast-In, Expansion, and Screw Anchors in Tension
6. A. Vicksman  
Graduation Date: Aug. 2019  
Thesis: Strut-and-Tie Evaluation Program (STEP) for the Design of Bridge Components

7. J. Pevey (co-advised)  
Graduation Date: May 2018  
Thesis: A Review of Fiber Reinforced Polymer (FRP) Repair and Strengthening Methods for Application to Indiana Bridges
8. R. Molley (co-advised)  
Graduation Date: May 2017  
Thesis: Evolution and Performance of Box Beam Bridges in Indiana

**In Progress:**

1. M. Khatri  
Anticipated Graduation Date: Dec. 2023  
Thesis: Evaluation of Optical Fiber Technology for Measuring Post-Tensioning Tendon Force (tentative title)
2. M. Rhodes (co-advised)  
Anticipated Graduation Date: Dec. 2023  
Thesis: Behavior of Bridge Girders with Unbonded Post-Tensioned Tendons (tentative title)

Advisor of M.S. Non-Thesis Students with Research Component at Purdue University:**Graduated:**

1. M. Walz  
Graduation Date: May 2020  
Project: Strength Reduction for Post-Installed Anchors in Lightweight Concrete
2. R. Whelchel  
Graduation Date: May 2017  
Project: Relaxation of Carbon and Stainless-Steel Threaded Bars for Post-Tensioning Applications

Advisor/Host of Visiting Scholar at Purdue University:

1. M. Eryilmaz Yildirim, Ph.D. student from Eskisehir Osmangazi University  
Dates: Mar. 2021 – Dec. 2021  
Projects: Design and Construction Specifications for Bonded and Unbonded Post-Tensioned Concrete Bridge Elements & Experimental and Analytical Investigation of Longitudinal Lap Splices of Columns under Seismic Loading

Service on Graduate Thesis Committees

1. M. J. Jung (in progress), Ph.D. CE, University at Buffalo, Thesis: Strength of Prestressed Girders with Bonded and Unbonded Strands
2. F. Rodriguez, Ph.D. CE, Purdue University, Graduation Date: May 2023, Thesis: Influence of the Fresh Properties, Printing Parameters and Reinforcing Alternatives on the Durability and Mechanical Performance of 3D-Printed Elements
3. Y. Jia, M.S. CE, Purdue University, Graduation Date: Aug. 2022, Thesis: Strength Reduction of Bridge Decks with Loss of Reinforcement Cross-Sectional Area
4. T.-C. Tseng, Ph.D. CE, Purdue University, Graduation Date: Dec. 2021, Thesis: Post-Fire Assessment of Prestressed Concrete Bridges

5. F. Ravazdezh, Ph.D. CE, Purdue University, Graduation Date: May 2021, Thesis: Improved Live Load Distribution Factors for Use in Load Rating of Slab and T-Beam Reinforced Concrete Bridges
6. A. U. Rehman, M.S. CE, Purdue University, Graduation Date: Aug. 2020, Thesis: Tension Strength of Embed Plates with Welded Deformed Bars as Governed by Concrete Breakout
7. S. Agrawal, M.S. CE, Purdue University, Graduation Date: May 2020, Thesis: Seismic Design Coefficients for Composite Plate Shear Walls - Concrete Filled (C-PSW/CF)
8. S. Wang, M.S. CE, Purdue University, Graduation Date: Aug. 2019, Thesis: Post-Fire Assessment of Concrete in Bridge Decks
9. F. Mahmud, M.S. CE, Purdue University, Graduation Date: Aug. 2019, Thesis: Simplified Assessment Procedure to Determine the Seismic Vulnerability of Reinforced Concrete Bridges in Indiana
10. E. Fleet, M.S. CE, Purdue University, Graduation Date: May 2019, Thesis: Effective Confinement and Bond Strength of Grade 100 Reinforcement
11. R. Glucksman, M.S. CE, Purdue University, Graduation Date: Dec. 2018, Thesis: Development and Splice Lengths for High-Strength Reinforcement
12. H. Anwar, M.S. CE, Purdue University, Graduation Date: Aug. 2018, Thesis: Numerical Investigations of the In-Plane Behavior of Reinforced-Concrete (RC) Walls: Cyclic and Accident Thermal Loadings
13. E. Byl, M.S. CE, Purdue University, Graduation Date: Aug. 2016, Thesis: The Long-Term Performance of Concrete Crack and Deck Surface Sealers

Advisor of Student Organization:

2016 – 2018     **Faculty advisor**  
ASCE Student Chapter at Purdue University  
Roles: Provided guidance to student officers and advised concrete canoe team

**RESEARCH INTERESTS**

- Behavior and design of reinforced concrete and prestressed concrete structures
- Assessment, repair, and rehabilitation of concrete structures
- Enhancement of the sustainability, resiliency, and economy of new concrete structures
- Highway bridge engineering
- Post-tensioned structures
- Design codes for structural concrete
- Disturbed-region behavior and the strut-and-tie method
- 3D-printed concrete structures

**PUBLICATIONS**

Journal Papers:

1. Rich, W. B., Williams, C. S., and Frosch, R. J., “Investigation of Repair Techniques for Deteriorated End Regions of Prestressed Concrete Bridge Girders,” *PCI Journal*, Vol. 68, No. 2, Mar.-Apr. 2023, pp. 52-70. DOI: 10.15554/pcij68.2-02

2. Jacobs, R. R., and Williams, C. S., “Evaluation of Flexural Strengthening Methods for Beams with Simulated Deterioration Using Spike-Anchored Fiber Reinforced Polymer (FRP) Externally Bonded Sheets and Near-Surface-Mounted Strips,” *Composite Structures*, Vol. 305, Feb. 2023, 116463. DOI: 10.1016/j.compstruct.2022.116463
3. Wang, H.-C., Williams, C. S., and Klein, G. J. (2022), “Effect of the Bar Bend Radius on the Performance of Knee Joints with Common Details,” *Concrete International*, Vol. 44, No. 10, Oct. 2022, pp. 49-56.
4. Wang, H.-C., Williams, C. S., and Klein, G. J. (2022), “Effect of Reinforcement Layers, Side Cover, and Bond Stress on Curved-Bar Nodes,” *ACI Structural Journal*, Vol. 119, No. 3, May 2022, pp. 277-290. DOI: 10.14359/51734490
5. Huang, D., Bradt, T., Tseng, T.-C., Wang, S., Olek, J., Varma, A. H., Williams, C. S., and Nantung, T. (2022), “Influence of Bridge Fires on the Properties of Concrete and Steel Components,” *Transportation Research Record*, Vol. 2676, No. 1, Jan. 2022, pp. 181-191. DOI: 10.1177/03611981211036343
6. Whelchel, R. T., Williams, C. S., and Frosch, R. J. (2021), “Live-Load Distribution of an Adjacent Box-Beam Bridge: Influence of Bridge Deck,” *PCI Journal*, Vol. 66, No. 6, Nov.-Dec. 2021, pp. 51-71. DOI: 10.15554/pcij66.6-03
7. Whelchel, R. T., Molley, R. T., Williams, C. S., Frosch, R. J., Anderson, N. S., and Brewe, J. E. (2021), “Relaxation of Carbon and Stainless-Steel Threaded Bars for Posttensioning Applications,” *ASCE Journal of Structural Engineering*, Vol. 147, No. 7, July 2021, 13 pp. DOI: 10.1061/(ASCE)ST.1943-541X.0003053
8. Wang, H.-C., Williams, C. S., and Klein, G. J. (2020), “Effect of Bend Radius of Reinforcing Bars on Knee Joints under Closing Moments,” *ACI Structural Journal*, Vol. 117, No. 5, Sept. 2020, pp. 315-326. DOI: 10.14359/51725847
9. Williams, C. S., Moore, A. M., Al-Tarafany, D., Massey, J. B., Bayrak, O., Jirsa, J. O., and Ghannoum, W. M. (2019), “Evaluation of Cast-in-Place Splice Regions of Spliced I-Girder Bridges,” *ACI Structural Journal*, Vol. 116, No. 6, Nov. 2019, pp. 181-193. DOI: 10.14359/51716804
10. Moore, A. M., Williams, C. S., Massey, J. B., Bayrak, O., Ghannoum, W. M., and Jirsa, J. O. (2017), “Shear Behavior of Post-Tensioned Girders,” *ACI Structural Journal*, Vol. 114, No. 6, Nov.-Dec. 2017, pp. 1615-1625. DOI: 10.14359/51700835
11. Williams, C. S., Massey, J. B., Bayrak, O., and Jirsa, J. O. (2017), “Investigation of Interface Shear Transfer Using Push-Through Tests,” *ACI Structural Journal*, Vol. 114, No. 1, Jan.-Feb. 2017, pp. 173-185. DOI: 10.14359/51689162
12. Tuchscherer, R. G., Birrcher, D. B., Williams, C. S., Deschenes, D. J., and Bayrak, O. (2014), “Evaluation of Existing Strut-and-Tie Methods and Recommended Improvements,” *ACI Structural Journal*, Vol. 111, No. 6, Nov.-Dec. 2014, pp. 1451-1460. DOI: 10.14359/51686926

#### Conference/Symposium Papers:

1. Williams, C. S., Khatri, M., Okumus, P., and Holt, R. (2023), “Post-tensioning Force Measurement Using Optical Fiber Sensor-Embedded Strand for Prestressed Concrete,” *Building for the Future: Durable, Sustainable, Resilient*, Ed. Ilki, A., Çavunt, D., and Çavunt, Y. S., Proceedings of the fib Symposium 2023, Lecture Notes in Civil Engineering, Vol. 350, Springer, Cham, pp. 622-633. DOI: 10.1007/978-3-031-32511-3\_65

2. Molley, R. T., Whelchel, R. T., Williams, C. S., and Frosch, R. J. (2019), “Evolution and Performance of Box Beam Bridges in Indiana,” Proceedings of the 2019 PCI Committee Days and Technical Conference Featuring the National Bridge Conference, Rosemont, Illinois, Sept. 25-28, 2019, 29 pp.
3. Williams, C. S., Moore, A. M., Massey, J. B., Bayrak, O., and Jirsa, J. O. (2017), “An Investigation of the Details at the Splice Regions of Spliced Girder Bridges,” Proceedings of the 2017 PCI Convention and National Bridge Conference, Cleveland, Ohio, Feb. 28-Mar. 4, 2017, 18 pp.
4. Williams, C. S., Deschenes, D. J., and Bayrak, O. (2014), “A Pragmatic Approach to Strut-and-Tie Modeling,” Proceedings of the 2014 PCI Convention and National Bridge Conference, Washington, DC, Sept. 6-9, 2014, 17 pp.
5. Moore, A. M., Williams, C. S., Al-Tarafany, D., Massey, J. B., Bayrak, O., Jirsa, J. O., and Ghannoum, W. M. (2014), “Shear Performance of Post-Tensioned Bulb-Tee Girders,” Proceedings of the 2014 PCI Convention and National Bridge Conference, Washington, DC, Sept. 6-9, 2014, 20 pp.
6. Williams, C. S., Brown, M. D., and Bayrak, O. (2010), “Example 2: Four-Column Bent Cap,” *SP-273 Further Examples for the Design of Structural Concrete with Strut-and-Tie Models*, Ed. Karl-Heinz Reineck and Lawrence C. Novak, Special Publication, American Concrete Institute, Farmington Hills, Michigan, pp. 2-1 to 2-18. DOI: 10.14359/51682290

## TECHNICAL REPORTS

1. Jia, Y., Williams, C. S., Baah, P., Bowman, M. D. (2022), *Long-Term Project and Network-Level NDT Implementation Plan for Indiana*, Report No. FHWA/IN/JTRP-2022/31, Joint Transportation Research Program, Purdue University, 239 pp. DOI: 10.5703/1288284317582
2. Grier, S. M., Williams, C. S. (2022), *Large Culvert Inspection Procedures: Guidelines for INDOT*, Report No. FHWA/IN/JTRP-2022/27, Joint Transportation Research Program, Purdue University, 139 pp. DOI: 10.5703/1288284317578
3. Varma, A. H., Olek, J., Williams, C. S., Tseng, T.-C., Wang, S., Huang, D., and Bradt T. (2021), *Post-Fire Assessment of Prestressed Concrete Bridges in Indiana*, Report No. FHWA/IN/JTRP-2021/05, Joint Transportation Research Program, Purdue University, 87 pp. DOI: 10.5703/1288284317290
4. Pevey, J. M., Rich, W. B., Williams, C. S., and Frosch, R. J. (2021), *Repair and Strengthening of Bridges in Indiana Using Fiber Reinforced Polymer (FRP) Systems: Volume 1 – Review of Current FRP Repair Systems and Application Methodologies*, Report No. FHWA/IN/JTRP-2021/09, Joint Transportation Research Program, Purdue University, 171 pp. DOI: 10.5703/1288284317309
5. Rich, W. B., Jacobs, R. R., Williams, C. S., and Frosch, R. J. (2021), *Repair and Strengthening of Bridges in Indiana Using Fiber Reinforced Polymer (FRP) Systems: Volume 2 – FRP Flexural Strengthening and End Region Repair Experimental Programs*, Report No. FHWA/IN/JTRP-2021/10, Joint Transportation Research Program, Purdue University, 141 pp. DOI: 10.5703/1288284317310
6. Frosch, R. J., Williams, C. S., Molley, R. T., and Whelchel, R. T. (2020), *Concrete Box Beam Risk Assessment and Mitigation: Volume 1 – Evolution and Performance*, Report No. FHWA/IN/JTRP-2019/06, Joint Transportation Research Program, Purdue University, 217 pp. DOI: 10.5703/1288284317117

7. Frosch, R. J., Williams, C. S., Molley, R. T., and Whelchel, R. T. (2020), *Concrete Box Beam Risk Assessment and Mitigation: Volume 2 – Evaluation and Structural Behavior*, Report No. FHWA/IN/JTRP-2020/07, Joint Transportation Research Program, Purdue University, 719 pp. DOI: 10.5703/1288284317118
8. Vicksman, A. S., Williams, C. S., and Howarth, M. A. (2019), *Implementing the Strut-and-Tie Method for the Design of Bridge Components*, Report No. FHWA/IN/JTRP-2020/01, Joint Transportation Research Program, Purdue University, 185 pp. DOI: 10.5703/1288284317112
9. Moore, A. M., Williams, C. S., Al-Tarafany, D., Felan, J. O., Massey, J. B., Nguyen, T., Schmidt, K. A., Wald, D. M., Bayrak, O., Jirsa, J. O., and Ghannoum, W. M. (2015), *Shear Behavior of Spliced Post-Tensioned Girders*, Report No. FHWA/TX-14/0-6652-1, Center for Transportation Research, The University of Texas at Austin, 219 pp.
10. Williams, C. S., Moore, A. M., Al-Tarafany, D., Massey, J. B., Bayrak, O., Jirsa, J. O., and Ghannoum, W. M. (2015), *Behavior of the Splice Regions of Spliced I-Girder Bridges*, Report No. FHWA/TX-15/0-6652-2, Center for Transportation Research, The University of Texas at Austin, 265 pp.
11. Williams, C. S., Deschenes, D. J., and Bayrak, O. (2012), *Strut-and-Tie Model Design Examples for Bridges*, Report No. FHWA/TX-12/5-5253-01-1, Center for Transportation Research, The University of Texas at Austin, 276 pp.

## PRESENTATIONS

\* = presenter

### Invited Presentations:

1. \*Bowman, M. D., and \*Williams, C. S., “Long-Term Project and Network Level Non-Destructive Testing (NDT) Implementation Plan for Indiana,” Civil Engineering Professional Development Seminar (CEPDS), West Lafayette, Indiana, Nov. 17, 2022.
2. \*Williams, C. S., “Post-Tensioning Strand with Fiber Optic Technology,” Post-Tensioning Technology Exchange, Austin, Texas, Nov. 3, 2022.
3. \*Williams, C. S., “Fiber Wrap for Beam End Repair,” Indiana Department of Transportation (INDOT) Bridge Design Conference, Indianapolis, Indiana, Feb. 22, 2022.
4. \*Williams, C. S., and Wang, H.-C., “Design of Knee Joints with Curved-Bar Nodes Using ACI 318-19,” ACI Fall 2021 Virtual Convention, Oct. 17-21, 2021.
5. \*Williams, C. S., and \*Rich, W. B., “Repair and Strengthening of Bridge in Indiana Using Fiber Reinforced Polymer Systems,” Indiana Department of Transportation (INDOT) Bridge Design Conference (Virtual), Feb. 16-18, 2021.
6. \*Wang, H.-C., and Williams, C. S., “Investigation of Curved-Bar Nodes – Closing Knee Joints,” Presented to ACI Subcommittee 445-A Shear and Torsion – Strut & Tie, ACI Fall 2020 Virtual Convention, Oct. 25-29, 2020.
7. \*Williams, C. S., “Designing with the Strut-and-Tie Method,” Indiana Department of Transportation (INDOT) Bridge Design Conference, Indianapolis, Indiana, Jan. 21, 2020.
8. \*Whelchel, R. T., Frosch, R. J., Williams, C. S., and Urrego Rincon, L. F., “Live-Load Distribution Rehabilitation for Adjacent Box Beam Bridges,” 2019 County Bridge Conference, West Lafayette, Indiana, Oct. 29-30, 2019.
9. \*Whelchel, R. T., Molley, R. T., Urrego Rincon, L. F., Williams, C. S., and Frosch, R. J., “Adjacent Prestressed, Precast Box Beam Bridges,” Indiana Department of Transportation (INDOT) Bridge Design Conference, Indianapolis, Indiana, Feb. 14, 2019.



10. \*Williams, C. S., “Structural Performance of Post-Tensioned Spliced Girder Bridges,” Structural Engineering Seminar, University at Buffalo, Buffalo, New York, Dec. 7, 2018.
11. \*Whelchel, R. T., Molley, R. T., Urrego Rincon, L. F., Williams, C. S., and Frosch, R. J., “Deteriorated Adjacent Box Beam Bridges – Improving Load Rating and Performance,” 2018 County Bridge Conference, West Lafayette, Indiana, Oct. 16-17, 2018.
12. \*Williams, C. S., “Spliced I-Girder Bridges: An Experimental Investigation,” CEE 598PT Post-Tensioned Concrete Structures course, University of Illinois, Urbana, Illinois, July 26, 2017.
13. \*Williams, C. S., “Strut-and-Tie Modeling of Anchorage Zones,” CEE 598PT Post-Tensioned Concrete Structures course, University of Illinois, Urbana, Illinois, July 26, 2017.
14. \*Williams, C. S., “Civil Engineering: Society’s Engine,” ASCE Student Chapter Bridge Bust, Purdue University, Feb. 24, 2017.
15. \*Williams, C. S., “Spliced I-Girder Bridges: An Experimental Investigation,” CEE 598PT Post-Tensioned Concrete Structures course, University of Illinois, Urbana, Illinois, Nov. 30, 2016.
16. \*Williams, C. S., “Strut-and-Tie Model Design Examples for Bridges: An Introduction to Strut-and-Tie Modeling,” Structural Engineering Research Seminar, The University of Texas at Austin, Austin, Texas, Sept. 12, 2012.

#### Conference and Other Presentations:

1. \*Olek, J., Rodrigues, F. B., Varma, A. H., Williams, C. S., Zavattieri, P. D., and Youngblood, J. P., “Development of Cement-Based Materials and Use of Controlled Architectures for 3D-Printing at Different Size Scales,” International Conference on 3D Printing Concrete Materials and Structures (3DPCMS-2021), Nanjing, China, May 14-16, 2021.
2. \*Olek, J., Rodrigues, F. B., Wang, Y., Varma, A. H., Williams, C. S., Zavattieri, P. D., and Youngblood, J. P., “3D Printed Structures: Vision and Opportunities,” 2021 Oklahoma Structural Engineers Association Virtual Conference, May 13, 2021.
3. \*Rich, W. B., Jacobs, R. R., Williams, C. S., and Frosch, R. J., “Externally Bonded Fiber Reinforced Polymer (FRP) Systems Used for the Repair and Strengthening of Bridge Beams,” ACI Spring 2021 Virtual Convention, Mar. 27-Apr. 1, 2021.
4. \*Tseng, T.-C., Huang, D., Varma, A. H., Olek J., and Williams, C. S., “Assessment of Prestressed Concrete Elements Exposed to High Temperature,” ACI Fall 2020 Virtual Convention, Oct. 25-29, 2020.
5. \*Wang, H.-C., and Williams, C. S., “The Impact of Reinforcement Layers, Side Cover, and Bond Stress on Knee Joints Under Closing Moments,” ACI Convention’s Virtual Technical Presentations, June 1-3, 2020.
6. \*Williams, C. S., Vicksman, A. S., and Howarth, M. A., “Designing with a Strut-and-Tie Method Computer Program,” Purdue Road School, West Lafayette, Indiana, Mar. 9-12, 2020.
7. \*Wang, H.-C., and Williams, C. S., “Experimental Evaluation of Curved-Bar Node Design Provisions in ACI 318-19,” Presented to Joint ACI-ASCE Committee 445 Shear and Torsion, ACI Fall 2019 Convention, Cincinnati, Ohio, Oct. 20-24, 2019.
8. \*Wang, H.-C., and Williams, C. S., “Experimental Evaluation of Curved-Bar Node Design Provisions in ACI 318-19,” Presented to ACI Subcommittee 318-E Section and Member Strength, ACI Fall 2019 Convention, Cincinnati, Ohio, Oct. 20-24, 2019.
9. \*Alimran, A. A., and Williams C. S., “Experimental Investigation of High-Strength Reinforcing Bars in Shear-Friction Applications,” ACI Fall 2019 Convention, Cincinnati, Ohio, Oct. 20-24, 2019.

10. \*Tseng, T.-C., Wang, S., Tokpatayeva, R., Olek, J., Varma, A. H., Williams, C. S., and Huang, D., “Post-Fire Assessment of Reinforced and Prestressed Concrete Bridge Elements,” ACI Fall 2019 Convention, Cincinnati, Ohio, Oct. 20-24, 2019.
11. \*Wang, H.-C., and Williams, C. S., “Design and Detailing of Curved-Bar Nodes in the Strut-and-Tie Method: Knee Joint Tests,” ACI Spring 2019 Convention, Québec City, Canada, Mar. 24-28, 2019.
12. \*Whelchel, R. T., Molley, R. T., \*Frosch, R. J., and Williams, C. S., “Condition Assessment of Deteriorated Adjacent Box Beam Bridges,” Purdue Road School, West Lafayette, Indiana, Mar. 4-7, 2019.
13. \*Jacobs, R. R., Rich, W. B., Pevey, J. M., Williams, C. S., Frosch, R. J., Hunter, J., Baah, P., Hart, J., Klevitsky, G., Wagner, S., White, P., Ortiz, J., Poster: “Evaluation of Repair Methods Using Fiber Reinforced Polymer (FRP) Sheets and Near-Surface-Mounted Reinforcement,” Purdue Road School, West Lafayette, Indiana, Mar. 4-7, 2019.
14. \*Vicksman, A. S., Howarth, M. A., Williams, C. S., Hunter, J., Baah, P., Hailat, M., Shaw, D., White, P., Wells, T., and Wolf, T., Poster: “Implementing the Strut-and-Tie Method for the Design of Bridge Components,” Purdue Road School, West Lafayette, Indiana, Mar. 4-7, 2019.
15. \*Whelchel, R. T., Molley, R. T., Williams, C. S., and Frosch, R. J., “Assessment of Deteriorated Precast Prestressed Concrete Adjacent Box Beam Bridges,” ACI Spring 2018 Convention, Salt Lake City, Utah, Mar. 25-29, 2018.
16. \*Williams C. S., Moore, A. M., Massey, J. B., Bayrak, O., and Jirsa, J. O., “The Behavior of the Cast-in-Place Splice Regions of Post-Tensioned Spliced Girder Bridges: An Experimental Investigation,” ACI Spring 2017 Convention, Detroit, Michigan, Mar. 26-30, 2017.
17. \*Williams, C. S., “Strut-and-Tie Modeling Provisions: What, When, and How,” Purdue Road School, West Lafayette, Indiana, Mar. 8-10, 2016.
18. \*Williams, C. S., “The Design and Behavior of Spliced Girder Bridges,” Purdue Road School, West Lafayette, Indiana, Mar. 8-10, 2016.
19. \*Williams, C. S., Moore, A. M., Bayrak, O., Jirsa, J. O., and Ghannoum, W. M., “Behavior of the Splice Regions of Spliced I-Girder Bridges,” ACI Fall 2014 Convention, Washington, DC, Oct. 26-30, 2014.
20. \*Williams, C. S., Bayrak, O., Jirsa, J. O., and Ghannoum, W. M., Poster: “Spliced Prestressed/Post-Tensioned Concrete TxDGirders,” Purdue Prospective Faculty Workshop, West Lafayette, Indiana, Mar. 10, 2014.
21. \*Williams, C. S., Poster: “Development of a Prototype of an Intelligent System,” Undergraduate Research Forum, Southern Illinois University Carbondale, Carbondale, Illinois, Mar. 31, 2008.
22. \*Yang, C. C., \*Williams, C. S., and \*Miller, A., Poster: “Internet-Based, Wireless, Remote Sensing System and Its Practical Impacts,” 8th International University Students Creativity-in-Action Contest, I-Shou University, Kaohsiung, Taiwan, Dec. 15, 2007.

#### Workshop Presentations:

1. Workshop Title: Non-Destructive Testing (NDT) Methods to Inspect and Evaluate Concrete Bridge Decks  
Presenters: Bowman, M. D., Olson, L., Washer, G., Baah, P., Williams, C. S., and Rearick, A.  
Date: Sept. 27, 2022  
Details: Offered to bridge inspectors, asset management engineers, and other state employees as part of a project sponsored by the Indiana Department of Transportation

2. Workshop Title: Implementation of the Strut-and-Tie Method for Bridge Design  
Presenters: Vicksman, A. S., and Williams, C. S.  
Dates: July 18, 2019 (two sessions), and July 24, 2019 (one session)  
Details: Three workshop sessions offered to practicing bridge engineers in Indiana as part of a project sponsored by the Indiana Department of Transportation

## RESEARCH GRANTS

1. Title: Measurement of Post-Tensioning Tendon Force Using Optical Fiber Technology  
Funding Agency/Entity: Federal Highway Administration (FHWA)  
Role: Principal Investigator  
Duration: Jan. 2022 – Ongoing
2. Title: Culvert Inspection Frequency Determination – Guidelines for INDOT  
Funding Agency/Entity: Indiana Department of Transportation (INDOT)  
Role: Principal Investigator  
Duration: Aug. 2020 – Aug. 2022
3. Title: Investigation of Cracking in Post-Tensioned Bent Cap and Girder Ends  
Funding Agency/Entity: Indiana Department of Transportation (INDOT)  
Role: Co-Principal Investigator  
Duration: July 2020 – Oct. 2020
4. Title: Long Term Project and Network Level Non-Destructive Testing (NDT) Implementation Plan for Indiana  
Funding Agency/Entity: Indiana Department of Transportation (INDOT)  
Role: Co-Principal Investigator  
Duration: Jan. 2020 – June 2023
5. Title: Investigation of Cracking in Post-Tensioned Straddle Bent Cap  
Funding Agency/Entity: Indiana Department of Transportation (INDOT)  
Role: Co-Principal Investigator  
Duration: Oct. 2019 – Jan. 2020
6. Title: Design and Construction Specifications for Bonded and Unbonded Post-Tensioned Concrete Bridge Elements  
Funding Agency/Entity: National Cooperative Highway Research Program (NCHRP)  
Role: Co-Principal Investigator  
Duration: Sept. 2019 – Ongoing
7. Title: Anchoring to Lightweight Concrete: Strength Reduction for Post-Installed Anchors  
Funding Agency/Entity: Precast/Prestressed Concrete Institute (PCI) (Daniel P. Jenny Research Fellowship)  
Role: Principal Investigator  
Date: July 2018
8. Title: Implementing the Strut-and-Tie Method for the Design of Bridge Components  
Funding Agency/Entity: Indiana Department of Transportation (INDOT)  
Role: Principal Investigator  
Duration: Mar. 2018 – Dec. 2019
9. Title: Relaxation Testing – Final Production Heat  
Funding Agency/Entity: DYWIDAG-Systems International USA Inc.  
Role: Co-Principal Investigator  
Duration: Mar. 2018 – Aug. 2018

10. Title: Post-Fire Assessment of Prestressed Concrete Bridges in Indiana (Phase I)  
Funding Agency/Entity: Indiana Department of Transportation (INDOT)  
Role: Co-Principal Investigator  
Duration: Jan. 2018 – Dec. 2020
11. Title: Repair and Strengthening of Bridges in Indiana Using Fiber Reinforced Polymer (FRP) Systems  
Funding Agency/Entity: Indiana Department of Transportation (INDOT)  
Role: Principal Investigator  
Duration: Jan. 2017 – Feb. 2021
12. Title: Testing of Carbon Steel and Stainless-Steel Nuts  
Funding Agency/Entity: Simpson Gumpertz & Heger Inc. (SGH)  
Role: Principal Investigator  
Duration: Nov. 2016 – June 2017
13. Title: Design and Detailing of Curved-Bar Nodes in the Strut-and-Tie Method  
Funding Agency/Entity: Purdue Research Foundation (PRF) and Wiss, Janney, Elstner Associates, Inc. (WJE)  
Role: Principal Investigator  
Duration: Aug. 2016 – May 2017
14. Title: Relaxation Testing of Steel Rods  
Funding Agency/Entity: Simpson Gumpertz & Heger Inc. (SGH)  
Role: Co-Principal Investigator  
Duration: Aug. 2016 – June 2017
15. Title: Development and Implementation of Concrete Box Beam Risk Assessment and Mitigation Program  
Funding Agency/Entity: Indiana Department of Transportation (INDOT) and Indiana Local Technical Assistance Program (LTAP)  
Role: Co-Principal Investigator  
Duration: Jan. 2016 – Apr. 2020

## **SERVICE/ENGAGEMENT**

### Committees of Professional Organizations:

- American Concrete Institute (ACI)
  - Joint ACI-ASCE Committee 445, Shear and Torsion  
2016 – 2020 Associate Member  
2020 – Present Voting Member
  - ACI Subcommittee 445-D, Shear Databases  
2016 – 2020 Voting Member  
2020 – Present Vice-Chair
- Precast/Prestressed Concrete Institute (PCI)
  - Committee on Bridges (COB)  
2017 – Present Consulting Member
  - COB Precast Post-Tensioned Bridges Subcommittee  
2017 – Present Consulting Member

Membership in Professional Organizations and Honor Societies:

- American Concrete Institute (ACI), 2010 – Present
- American Institute of Steel Construction (AISC), 2010 – 2014, 2016 – Present
- American Society of Civil Engineers (ASCE), 2006 – Present
- Precast/Prestressed Concrete Institute (PCI), 2011 – Present
- Structural Engineering Institute (SEI), 2010 – Present
- Chi Epsilon (National Civil Engineering Honor Society), Inducted in 2016
- Tau Beta Pi (National Engineering Honor Society), Inducted in 2007