Dear 2024 Symposium Attendee,

Welcome to Champaign-Urbana, Illinois and the Department of Civil and Environmental Engineering (CEE) at the University of Illinois Urbana-Champaign. CEE at Illinois is home to the Rail Transportation and Engineering Center (RailTEC), and we look forward to you meeting the students, staff, and faculty that work within RailTEC and CEE.

We are pleased that you have chosen to attend the 2024 International Crosstie and Fastening System Symposium and hope you will actively participate in discussions and engage your fellow attendees throughout the event. Our objective is to facilitate the transfer of technology and knowledge as well as to further domestic and international communication and collaboration on the design and performance challenges and solutions for crossties and fastening systems. We are hopeful that you will enjoy the technical presentations, research discussions, Rail Transit and Class I keynote addresses, and your time in and around Champaign-Urbana.

We would like to thank the Federal Railroad Administration (FRA), Federal Transit Administration (FTA), Engineer Research and Development Center (ERDC), Applied Research Associates (ARA), and BNSF Railway for their ongoing sponsorship of rail infrastructure research at RailTEC at Illinois. Without these organizations and the many other individuals and organizations that frequently provide input and guidance for our research, we would not be able to conduct research and host an event such as this.

If there is anything that our team can do to make your stay in Champaign-Urbana more enjoyable, please do not hesitate to contact one of the faculty, staff, or students within RailTEC. Have a wonderful week!

Sincerely,

Marcus S. Dersch     J. Riley Edwards     Arthur de O. Lima

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**RailTEC Infrastructure Research Sponsors**

- U.S. Department of Transportation (Federal Railroad Administration)
- U.S. Department of Transportation (Federal Transit Administration)
- ERDC
- ARA
- BNSF Railway
## 2024 Symposium Overview

### Monday 3 June
Informal Welcome Reception (Hounds Court Brewery)  5:00pm

### Tuesday 4 June
Registration (Yeh Center Atrium, 1st Floor)  7:00am - 5:00pm
Light Breakfast  7:00am - 8:00am
Opening Remarks  8:00am - 8:20am
Session 1 - Concrete I  8:20am - 9:40am
Break  9:40am - 10:05am
Session 2 - Timber  10:05am - 11:45am
Lunch (ECE Building, Room 3002)  11:45am - 1:30pm

**Rail Transit Keynote Address:** Carrie Wagener - Chicago Transit Authority
Session 3 - Fasteners  1:40pm - 3:20pm
Break  3:20pm - 3:55pm
Session 4 - Track Inspection & Component Monitoring I  3:55pm - 5:15pm
Dinner (Memorial Stadium)  6:00pm - 8:00pm

### Wednesday 5 June
Registration (Yeh Center Atrium, 1st Floor)  7:30am - 5:00pm
Light Breakfast  7:30am - 8:20am
Session 5 - Concrete II  8:20am - 9:40am
Break  9:40am - 10:10am
Session 6 - Crosstie Performance  10:10am - 11:50am
Lunch (ECE Building, Room 3002)  11:50am - 1:30pm

**Class I Railroad Keynote Address:** Brent Laing - CN Railway
Session 7 - Crosstie Support Investigations  1:40pm - 3:20pm
Break  3:20pm - 3:50pm
Session 8 - Track Inspection & Component Monitoring II  3:50pm - 5:10pm
Dinner (Engineering Hall Patio)  5:15pm - 6:30pm

### Thursday 6 June
AREMA Committee 30  8:00am - 4:00pm

## Symposium Locations

**Hounds Court Brewery (formerly Blind Pig Brewery)** | Monday Informal Reception
120 N. Neil St., Champaign, IL 61822

**Electrical and Computer Engineering (ECE) Building** | Lunches
306 N. Wright St., Urbana, IL 61801

**Memorial Stadium** | Tuesday Dinner
1401 S. 1st St., Champaign, IL 61820

**Engineering Hall Patio** | Wednesday Dinner
1308 W. Green St., Urbana, IL 61801 (North side of building)
Newmark Civil Engineering Laboratory
Yeh Center - All Technical Sessions will be held in 1310 Yeh Center.
Tuesday Spoken Presentations

8:00  Symposium Welcome
      *Riley Edwards - University of Illinois Urbana-Champaign*

Safety Briefing
RailTEC Updates
Special Acknowledgments

8:20  Session 1 - Concrete I
      *Moderator: Ricardo Quiros-Orozco - voestaline Railway Systems Nortrak*

- Transfer and Development Length of Different-Size Indented Prestressing Wires Used in Pretensioned Concrete Railroad Ties
  *Bob Peterman - Kansas State University*

- Analyzing Aggregate Morphology in Cement-based Materials Using 3D Structured Light Scanning
  *Moochul Shin - Western New England University*

- Tie Inspection, Performance, and Life Estimation
  *Adam Bankston - BNSF Railway*
  *Yin Gao - MxV Rail*

- Study of Concrete Crossties Design Optimization
  *Patrick Macedo - Vale*

9:40  Break

10:05 Session 2 - Timber
      *Moderator: Nate Irby - Railway Tie Association*

- Market Talk
  *Nate Irby - Railway Tie Association*

- Tree to Track
  *Brad Crawford - Stella-Jones Corporation*

- Next Generation Wood Preservative for Ties and Timbers
  *Bob Baeppler - Viance*

- Extending Tie Life with a Weatherproof Asphalt Coating
  *Marvin Exline - Asphalt Materials, Inc*

- Laboratory Comparison Tests of Tie Plugging Materials
  *Yin Gao - MxV Rail*
Tuesday Spoken Presentations

11:45  Lunch - ECE Building - Room 3002

**Rail Transit Keynote:** CTA’s Red and Purple Modernization Phase One Project: Overcoming Challenging Constraints  
*Carríe Wagener - Chicago Transit Authority (CTA)*

1:40  Session 3 - Fasteners  
*Moderator: Tim Austin - Lewis Bolt & Nut Company*

Analytic Study of Variation Coefficient Applied to Calculating Design Forces for Rail Fastening Systems  
*Tadashi Deshimaru - Railway Technical Research Institute*

Class I Perspective - BNSF’s Fastening System Design and Performance Experience and Future Trends  
*Adam Bankston - BNSF Railway*

Spike Failure Mitigation: Design & Laboratory Evaluation of Spring Washer for Tieplate Hold-down  
*Rahat Khan - University of Illinois Urbana-Champaign*

Lowering Fastener Stresses: Buffer Cars, Rail Stress Management, and an Ugly Solution  
*Marcus Dersch - University of Illinois Urbana-Champaign*

Track Superstructure Design Considerations to Increase Buckling Resistance  
*Brandon Van Dyk - Vossloh*

3:20  Break

3:55  Session 4 - Track Inspection & Component Monitoring I  
*Moderator: Cam Stuart - Federal Railroad Administration*

Overview of CSX Track Inspection Program  
*Brad Spencer - CSX Transportation*

Use of 3D Laser Triangulation and AI for Automated Switch and Crossing Inspection  
*Richard Fox-Ivey - Railmetrics*

Track Component Health vs Geometry Degradation: An Investigation Leveraging Machine Vision Inspection Data  
*Jose Augusto Ramos - University of Illinois Urbana-Champaign*

Crosstie Modeling for Capital Planning Optimization  
*Bryan Palsat - Tetra Tech*

5:15  Adjourn Technical Sessions

6:00  Dinner at Memorial Stadium - see map on page 11
Wednesday Spoken Presentations

8:20  Session 5 - Concrete II
Moderator: David Lilley - Metrolinx

Non-Destructive Testing to Assess the Degradation of Prestressed Concrete Sleepers
Laisy Meurer Perin - Federal University of Uberlandia

Selection and Verification of Indented Prestressing Wire and Concrete Properties for Use in Pretensioned Concrete Railroad Ties
Bob Peterman - Kansas State University

Diagnostic Assessment of Concrete Crossties Damage on Brazil’s Railways by Microstructural Analysis
Eliane Betânia Carvalho Costa - Federal University of Uberlandia

Management of the Supply of Concrete Sleepers for a Track Renewal Project
Paulo Gonzaga Ferreira - MRS Logistica

9:40  Break

10:10  Session 6 - Crosstie Performance
Moderator: John Bosshart - Bosshart Consulting

Union Pacific Tie Strategy Update
Mike Gilliam - Union Pacific Railroad

DoD Crosstie Maintenance and Research Updates
Jeremy Beasley - U.S. Army Engineering Research & Development Center

Effect of Failing Adjacent Crossties on Tie-Life: A Machine Learning Model
Kenza Soufiane - Loram Technologies

Exploring the Fatigue Performance of Recycled Plastics Railroad Ties Using Penn State Ballast Box Facility
Jubair Ahmad Musazay - Pennsylvania State University

Mechanics of Composite Crossties
Vít Lojda - Lankhorst Engineered Products

11:50  Lunch - ECE Building - Room 3002

Class I Railroad Keynote: Railroad Basics – Back to the Future
Brent Laing - CN Railway
Wednesday Spoken Presentations

1:40  **Session 7 - Crosstie Support Investigations**  
*Moderator: Yin Gao - MxV Rail*

Rail Mounted Optical Fiber Sensors for Tie Support and Track Substructure Condition Assessments  
*Mahsa Gharizadehvarnosefaderani & Md. Fazle Rabbi - Oklahoma State University*

Under Tie Pad Performance in U.S. High-Speed Rail  
*Todd Finley, Tamara Nazhmudinova & Keith Keene - Amtrak*

Turnout Performance Improvement through Geometry and Stiffness Optimization  
*Jaeik Lee - University of Illinois Urbana-Champaign*

Transition Direction Effects on Dynamic Load Factor in Diverse Subgrade Track Conditions  
*Danial Behnia & Michael Hendry - University of Alberta*

Pads and Mats: Opportunities to Tune Track Stiffness for Optimum Performance  
*Shushu Liu & Ted Sussmann - VOLPE*

3:20  Break

3:50  **Session 8 - Track Inspection & Component Monitoring II**  
*Moderator: Arthur Bilheri - BNSF Railway*

Toward Large-Scale Simulation of Railroad Dynamics: 30-Tie Coupled Train-Track-DEM Model  
*Zhongyi Liu - University of Illinois Urbana-Champaign*

Rail Track Monitoring with Distributed Acoustic Sensing (DAS) Systems  
*Mahsa Gharizadehvarnosefaderani & Md. Fazle Rabbi - Oklahoma State University*  
*Rakan Alturk & Radim Bruzek - ENSCO*

Remote Sensing for Railway Geo-Hazards  
*Tim Stark - University of Illinois Urbana-Champaign*

Handheld Railroad Spike Inspector for Track Safety  
*Banibrata Poddar - Blue Halo*

5:10  Adjourn Technical Sessions

5:15  Dinner at Engineering Hall Patio - see map on page 5
Carrie Wagener
Chicago Transit Authority (CTA)
First Deputy Chief Engineer

Carrie Wagener, PE, is First Deputy Chief Engineer at the nation’s second largest public transit agency, the Chicago Transit Authority (CTA), where she oversees civil/track, structures, signal, and traction power design and construction within the Infrastructure Engineering department. She additionally directs the owner’s multi-disciplinary engineering team for the $2.1B Red and Purple Modernization (RPM) Phase One project, CTA’s largest-ever capital improvement project to renew heavy rail infrastructure along its busiest rail lines.

A 16-year CTA veteran, Carrie has worked in various departments including track maintenance, power & way maintenance, safety, and quality assurance. Carrie is an alumnus of the University of Illinois Urbana-Champaign, where she earned both bachelor’s and master’s degrees in Civil Engineering.

Brent Laing
CN Railway
Vice President, Engineering

Brent is a professional engineer with extensive Class 1 heavy haul freight railway technical and management experience.

Brent is the Vice President Engineering at CN, being appointed to that position in June 2022. He has the overall accountability of all engineering functions at CN, including track maintenance, production, work equipment, signals & communications, bridges and structures, infrastructure design, and construction.

Prior to coming to CN, Brent was President of a small engineering consulting firm, focused on working with select clients in the mining, light and heavy rail areas on railway-related projects.

A career railroader, Brent also held various positions at Canadian Pacific Railway. As well as Vice President Engineering, he also led corporate environmental teams as Director Environmental Affairs, and locomotive and freight car repair teams as General Manager Mechanical Operations.

He has been a longtime member of American Railway Engineering and Maintenance of Way Association and has been recently nominated to the AREMA Board of Governors. Brent has been a professional engineer for over 39 years.
Yeh Student Center - Newmark Civil Engineering Laboratory, 205 N. Mathews Ave, Urbana, IL 61801

Memorial Stadium - (Dinner in the 77 Club on 6th Floor - Enter Stadium at Gate 16 on the West side) - 1402 South 1st Street, Champaign, IL 61820

Transportation will be provided from the Yeh Student Center. If you wish to drive, there are 2 parking options:

Parking Option 1 - Campus Recreation (metered spots, requires payment)
201 East Peabody Drive, Champaign, IL 61820

Parking Option 2 - Assembly Hall
1800 South 1st Street, Champaign, IL 61820
**Wireless Internet Connection:**

Choose the “IllinoisNet_Guest” wireless network. Open an internet browser and the UI Wireless page should load. Select the “Register a temporary guest account” link below the Log In. Fill out the form, accept the terms of use, and click Register. The University is legally required to collect your information before providing you with network access. Click the Log In button at the bottom of your confirmation page.

For help with the Illinois wireless network, please contact the Help Desk at 217-244-7000.

Note: WiFi Registration forms are valid for a 24-hour period. A new registration form will need to be completed to gain access after 24 hours.

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