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Dear 2016 Symposium Attendee,

Welcome to Champaign-Urbana, Illinois and the Department of Civil and Environmental Engineering (CEE) at the University of Illinois at Urbana-Champaign (UIUC). UIUC 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.

We are pleased that you have chosen to attend the 2016 International Crosstie and Fastening System Symposium and hope you will actively participate in discussions and engage your fellow attendees throughout the event. Our primary objective in organizing the 2016 Symposium 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. Significant research progress has taken place since RailTEC first hosted this event four years ago in 2012. We are hopeful that you will enjoy the technical presentations, research discussions, keynote dinner and presentation at Allerton Park, and technical tour of RailTEC’s Research and Innovation Laboratory (RAIL) here at UIUC.

We would like to thank the Federal Railroad Administration (FRA) for their ongoing sponsorship of concrete crosstie and fastening system research at UIUC under their Broad Agency Announcement (BAA) program. Additionally, we sincerely appreciate the ongoing research support from the Federal Transit Administration (FTA), Progress Rail Services, Vossloh Fastening Systems, PB / New York City Transit (NYCT), NURail Center, Union Pacific Railroad, GIC, University of South Carolina, RAIL.ONE, NDT Corporation, and IntegriCo Composites. 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 at UIUC more enjoyable, please do not hesitate to contact one of the faculty, staff, or students within RailTEC.

Have a wonderful week!

Sincerely,

Bassem O. Andrawes
Christopher P.L. Barkan
Matthew Csenge
Marcus S. Dersch
J. Riley Edwards
David A. Lange
Yu Qian
Conrad Ruppert, Jr.
2016 Symposium Overview and Featured Events

**TUESDAY 14 JUNE**

- **Registration (Yeh Center Atrium, 1st Floor)** 7:00am - 5:00pm
- **Light Breakfast** 7:00am - 8:00am
- **Opening Remarks** 8:00am - 8:20am
- **Technical Session 1** 8:20am - 9:30am
- **Break** 9:30am - 10:00am
- **Technical Session 2** 10:00am - 12:00pm
- **Lunch (ECE Building, Room 3002)** 12:00pm - 1:15pm
- **Technical Session 3** 1:15pm - 3:15pm
- **Break** 3:15pm - 3:45pm
- **Technical Session 4** 3:45pm - 5:15pm
- **Social Hour (Murphy's Pub)** 5:30pm - 7:00pm

**WEDNESDAY 15 JUNE**

- **Registration (Yeh Center Atrium, 1st Floor)** 7:00am - 3:00pm
- **Light Breakfast** 7:00am - 8:00am
- **Technical Session 5** 8:00am - 9:45am
- **Break** 9:45am - 10:15am
- **Technical Session 6** 10:15am - 12:00pm
- **Lunch (ECE Building, Room 3002)** 12:00pm - 1:15pm
- **Technical Session 7** 1:15pm - 2:45pm
- **Technical Tour (see page 9)** 3:00pm - 4:45pm
- **Keynote Address (UIUC's Allerton Park)** 5:30pm - 6:00pm

  **David Connell** *(Union Pacific Railroad, Retired)*

- **Reception (Allerton Park)** 6:00pm - 7:00pm
- **Dinner (Allerton Park)** 7:15pm - 8:30pm

**THURSDAY 16 JUNE**

- **Registration (Yeh Center Atrium, 1st Floor)** 7:00am - 3:00pm
- **Light Breakfast** 7:00am - 8:00am
- **Technical Session 8** 8:00am - 9:45am
- **Break** 9:45am - 10:00am
- **Technical Session 9** 10:00am - 12:00pm
- **Start of AREMA Committee 30 Meeting** 1:00pm
- **Dinner (Engineering Quad)** 6:00pm

**Symposium Locations**

**Newmark Civil Engineering Laboratory**
Yeh Student Center - All Technical Sessions will be held in 1310 Yeh Center unless otherwise noted
205 N. Mathews Avenue - Urbana, IL 61801

**Electrical and Computer Engineering (ECE) Building**
306 N. Wright Street - Urbana, IL 61801

**Allerton Park**
515 Old Timber Road (County Road 575 E) - Monticello, IL 61856

**Murphy's Pub**
604 E Green Street - Champaign, IL 61820
Parking: Parking on campus is extremely limited. We do have a small number of parking passes for $25 daily, available through the registration website.

Attire: The recommended dress for the conference is “business casual”.

Conference Contacts:
Riley Edwards: 931-624-4623, jedward2@illinois.edu (conference director)
Marcus Dersch: 812-779-1750, mdersch2@illinois.edu (program developer)
Emma Ehrenhart: 217-244-4600, trapp3@illinois.edu (conference registrar)

Registration

Register Now!

Additional information on registration and the live link can be found at: http://railtec.illinois.edu/Crosstie/2016/registration_fees.php
Spoken Presentations

**Tuesday 14 June**

7:00  Registration/Continental Breakfast (Yeh Center Atrium, First Floor)

8:00  Welcome and Safety Briefing - Riley Edwards

UIUC Civil and Environmental Engineering (CEE) Department Welcome - CEE Associate Head for Graduate Students Jeffrey Roesler

UIUC RailTEC Welcome - Executive Director and Professor Chris Barkan

8:20  **Opening Plenary Session (Session 1)**

*Session Moderator: Conrad Ruppert, Jr. (University of Illinois at Urbana-Champaign)*

Class I Prospective - Crosstie and Fastening System Design and Performance Experience and Future Trends

*Antonio Buelna (Union Pacific Railroad)*

From Tree-to-Track – A Current Look at the Wood Tie Industry

*Jim Gauntt (RTA)*

Overview of FRA’s Crosstie and Fastening System Research Program

*Cam Stuart (FRA)*

9:30  Break

10:00  **Analysis of Concrete Crosstie Service Conditions and Review of Ongoing Research (Session 2)**

*Session Moderator: Ted Sussmann (Volpe National Transportation Center)*

FRA/Volpe Concrete Crosstie Research – An Overview

*David Jeong and Hailing Yu (Volpe National Transportation Center)*

Update on Tie and Fastener System Research and Testing at TTCI

*Mike McHenry (Transportation Technology Center, Inc. (TTCI))*

Investigation of Deteriorated Crossties and Support Conditions

*Alejandro Alvarez (University of Illinois at Urbana-Champaign)*

Field Measurements and Analysis of Concrete Crosstie Bending Moments

*Marcus Dersch (University of Illinois at Urbana-Champaign)*

Mechanistic Design of Concrete Crossties for Rail Transit Systems - Project Overview and Field Bending Moment Results

*Aaron Cook (University of Illinois at Urbana-Champaign)*

12:00  **Lunch** - ECE Building - Room 3002

306 N. Wright Street - Urbana, IL 61801
1:15  Design of Concrete Crossties (Session 3)
Session Moderator: Scott Tripple (Pandrol USA)

Cost Effective Tie Design: The Need for a Codified Loading Regime
Martin Murray (KCPM Consulting Pty Ltd)

Reducing the Stress State of Concrete Crossties Using a Pre Tensioned
Anchor Plate System
Ryan Kernes (GIC)

Design and Experimental Research on the Prestressed Sleeper for Heavy
Haul Railway
Ruilin You (China Academy of Railway Services)

Benefits of Adopting High-Strength High-Resilience Concrete in Pre-
stressed Crossties
Dimitris Rizos (University of South Carolina)

Survey About Deterioration of Concrete Ties Due to Abrasion Against Rail-
way Ballast
Shreya Vemuganti (University of New Mexico)

3:15  Break

3:45  Fastening System Analysis and End User Perspective
(Session 4)
Session Moderator: John Bosshart (BNSF, Retired)

The Impact of High-Frequency Vibration on the Performance of Railway
Fastening Systems
Max Steger (Technical University of Munich)

Research on the Parameters of Repeated Loading Test for Fastening System
Ziquan Yan (China Academy of Railway Services)

Class I View of Crosstie and Fastening System Performance
Erik Frohberg (BNSF)

Rail Transit Perspective on Concrete Crossties, Fastening Systems, and
Direct Fixation (Tentative)
Tony Cabrera (New York City Transit Authority)

5:15  Adjourn Technical Session

5:30  Social Hour - Murphy’s Pub
604 E Green St., Champaign, IL 61820

7:00  Dinner on your own (see page 14 for suggested restaurants)
**Wednesday 15 June**

7:00  Registration/Continental Breakfast (Yeh Center Atrium, 1st Floor)

8:00  **Fastening System Design (Session 5)**  
Session Moderator: Mike McHenry (Transportation Technology Center, Inc. (TTCI))

Innovation in Rail Fastening Systems Components and Application  
*Alberto Perez Ortola (Schwiag AG)*

Fastening System Stiffness Measurement and Influence on Railway Track  
*Brandon Van Dyk (Vossloh Fastening Systems)*

Quantification of Skl-Style Fastening System Performance under North American Heavy Haul Loads  
*Donovan Holder (University of Illinois at Urbana-Champaign)*

9:45  Break

10:15  **Field Inspection Technologies for Crossties and Fastening Systems (Session 6)**  
Session Moderator: Cam Stuart (FRA)

Next Generation Tie Program and Tie Gang Efficiencies with Automated Inspection Technology  
*Todd Euston (Georgetown Rail Equipment Co.)*

Concrete Crosstie Condition Testing Using Microphone Sensors  
*Paul Fisk (NDT Corporation)*

Consideration of Gage Restraint Measurements to Detect Weak Concrete Crosstie Track  
*Jacinda Clemenzi (ENSCO)*

Wireless Crosstie Sensors for Prognostic Health Monitoring  
*D. Mark Haines (Mnemonics Inc.)*

12:00  **Lunch**  
ECE Building - Room 3002  
306 N. Wright Street - Urbana, IL 61801

1:15  **Timber Crossties and Tie Treatment (Session 7)**  
Session Moderator: Jim Gauntt (Railway Tie Association (RTA))

Advances in Wood Treating Infrastructure  
*Bror Moldrup (IWT)*

Creosote – Sustainability & Supply Chain Considerations  
*Stacey McKinney (Koppers, Inc.)*

Reclaiming Creosote by Thermal Desorption in Used Wood Ties  
*Pyoungchung Kim (University of Tennessee)*

2:45  Adjourn Technical Sessions
The Rail Transportation and Engineering Center (RailTEC) would like to welcome you to the 2016 Symposium Technical Tour to the Research and Innovation Laboratory (RAIL). RailTEC would like to extend our appreciation to NDT Corp. and Paul Fisk for hosting a demonstration in conjunction with the technical tour at RAIL. After the technical tour, we will have our keynote address and dinner at the Allerton Mansion and Retreat Center in nearby Monticello, Illinois.

**Wednesday 15 June 2016**

3:00-3:30  Depart Yeh Center via Charter Bus to RailTEC Research and Innovation Laboratory (RAIL)

3:30-4:45  Tour RAIL (Exhibits Located Indoors and Outdoors. Refreshments Located Outdoors in Tent)

4:45-5:15  Travel from RAIL to Allerton Park and Retreat Center

5:30-6:00  Keynote Address given by Mr. David Connell (Vice President of Engineering at Union Pacific Railroad, Retired)

6:00-7:00  Reception (Games on Lawn)

7:15-8:30  Dinner (Inside Allerton Mansion)

8:30-9:00  Travel from Allerton Park back to Champaign

9:00-TBD  Drop off at Symposium Hotels

**Important Requirements for Tour:**

*Steel toed boots are required at RAIL.* Please plan accordingly when packing for this trip. Safety glasses will be provided to conference attendees on site.

**Non-US Citizens:**

A portion of the technical tour takes place on the US Army Corps of Engineers facility that houses the new RailTEC Research and Innovation Laboratory. **All non-US Citizens that submitted their passports by the requested deadline (1 May 2016) MUST bring their passport on the day of this tour (Wednesday 15 June 2016).**

Submit your passport now at: [https://illinois.edu/fb/sec/7002900](https://illinois.edu/fb/sec/7002900)

**US Citizens:**

You MUST bring a state ID (driver’s license) and **one additional form of photo ID** on the day of the tour in order to access RailTEC’s Research and Innovation Laboratory (Wednesday 15 June 2016).
Spoken Presentations

**THURSDAY 16 JUNE**

7:00  Registration/Continental Breakfast (Yeh Center Atrium, 1st Floor)

8:00  **Concrete Crosstie Materials Research and Laboratory Testing (Session 8)**

*Session Moderator: Dimitris Rizos (University of South Carolina)*

- Effects of Freeze-Thaw Testing Procedures for Prestressed Concrete Railroad Ties  
  *Kyle Riding (Kansas State University)*

- Control of Entrained Air and Vibration of Concrete for Production of Crossties  
  *David A. Lange (University of Illinois at Urbana-Champaign)*

- Importance of Cross-Sectional Shape Factor Parameter Resolution in Accurate Assessment of Transfer Length for Non-Prismatic Railroad Crossties  
  *B. Terry Beck (Kansas State University)*

- Development of ASTM A1096 Test Protocol and Use by Concrete Tie Producers  
  *Robert Peterman (Kansas State University)*

- Systematic Evaluation of Concrete Ties Removed From Track After Many Years of Service  
  *Robert Peterman (Kansas State University)*

9:45  Break

10:00  **Track Transitions, Crosstie Support, and Track Substructure (Session 9)**

*Session Moderator: David A. Lange (University of Illinois at Urbana-Champaign)*

- Managing Track Stiffness in Transition Zones and Turnouts  
  *Martin Quirchmair (Getzner USA, Inc.)*

- Dynamic Responses of Bridge Approach Concrete Ties after the Applications of Polyurethane Injection, Stone Blowing and Under-Tie Pad Remedial Measures  
  *Erol Tutumluer (University of Illinois at Urbana-Champaign)*

- Evaluating Track Substructure Moduli using Seismic Surface Waves  
  *Tim Stark (University of Illinois at Urbana-Champaign)*

- Track Substructure Influences on Track Support Conditions  
  *Ted Sussmann (Volpe National Transportation Center)*

- Use of Crosstie Bending Moment Data for the Development of a Support Condition Back-calculator  
  *Zhengboyang Gao (University of Illinois at Urbana-Champaign)*

12:00  Adjourn Symposium
David Connell
Vice President of Engineering, Retired
Union Pacific Railroad

David Connell recently retired after serving for 8 years as Vice President of Engineering for Union Pacific Railroad. In this role, he directed the design, construction and maintenance on the nation’s largest railway. David worked with Union Pacific and predecessor companies for over 33 years while holding various field maintenance and staff positions including Regional VP - Operations, AVP - Construction, Chief Engineer - Maintenance of Way. He has spent over 40 years in the rail industry starting as a summer employee of a shortline railroad in his native North Carolina in 1975. David spent nearly 10 years of his career directly involved with track research and materials development activities at UP.

David holds a BS degree in Civil Engineering from North Carolina State University and attended the Harvard Business School. He is a past chair of the American Association of Railroad’s Heavy Axle Load Committee and past vice-chair of the Railway Technology Working Committee at the Transportation Technology Center, Inc. He also served as a Governor of the American Railway Engineering and Maintenance Association (AREMA) along with service to numerous advisory boards.
Allerton Park

Built as a private residence in 1900, today Allerton Park & Retreat Center is a historical treasure owned by the University of Illinois Urbana-Champaign. The Mansion and Park are listed in the National Register of Historic Places, and one of the American Institute of Architects’ 150 Great Places in Illinois. The Park was designated a National Natural Landmark in 1970.

The property comprises 1,500 acres of woodland, riparian and prairie areas, a Georgian-inspired manor house and reflecting pond, several secondary lodging facilities, a 10-acre meadow, formal sculpture gardens, and interpretive and primitive hiking trails. One thousand acres of the property are designated a National Natural Landmark because of the quality of their upland and bottomland floodplain forests.

Yeh Student Center - Newmark Civil Engineering Laboratory, 205 N. Mathews Ave, Urbana, IL 61801

Allerton Park - Allerton Mansion, 515 Old Timber Rd (County Rd 575 E), Monticello, IL 61856

Bus Transportation will be provided from the hotels and the Yeh Student Center. If you wish to drive there is parking available near the Mansion.
Champaign-Urbana Recommended Restaurant List

301 Mongolia - Mongolian (stir fry)
301 N. Neil St., Champaign, IL
217-531-1153

Alexander’s Steakhouse
202 W. Anthony Dr., Champaign, IL
217-359-1789

Bacaro - Italian (fine dining)
113 N Walnut St., Champaign, IL
217-398-6982

Biaggi’s Ristorante Italiano
2235 S Neil St., Champaign, IL
217-356-4300

Black Dog Smoke & Ale House (casual bar)
320 N Chestnut St, Champaign, IL
(217) 954-0465

Courier Cafe
111 N Race St., Urbana, IL
(217) 328-1811

Destihl (gastrobrewpub)
301 North Neil St., Champaign, IL
217-356-0301

Dublin O’Neil’s - Irish Pub
301 N. Neil St., Champaign, IL
217-531-1152

Escobar - Native Latino
6 E Columbia Ave., Champaign, IL
217-352-7467

Kofusion - Asian (sushi)
1 E Main St., # 104, Champaign, IL
217-531-1166

Radio Maria - Spanish
119 N Walnut St., Champaign, IL
217-398-7729

Silvercreek (casual fine dining)
402 N Race St., Urbana, IL 61801
217-328-3402

Useful Businesses

FedEx Office Print and Ship
524 E Green St #101, Champaign, IL
217-344-2085

Walgreens
407 E Green St., Champaign, IL
217-344-0121

Starbucks
Illini Union Courtyard Cafe, Urbana, IL

Cocomero (frozen yogurt)
709 S Wright St., Champaign, IL
217-328-3888

Useful Telephone Numbers

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<tr>
<th>Business</th>
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<tbody>
<tr>
<td>Hampton Inn</td>
<td>217-337-1100</td>
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<tr>
<td>Hyatt Place</td>
<td>217-531-2800</td>
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<td>Illini Union Hotel</td>
<td>217-333-3030</td>
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<td>Towne Place Suites</td>
<td>217-344-1600</td>
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<td>Illini Taxi</td>
<td>217-384-5892</td>
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<td>Checker Cab</td>
<td>217-355-3553</td>
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<tr>
<td>U of I Golf Courses</td>
<td>217-359-5613</td>
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Course Benefits: Through interactive lectures, relevant case studies, and small group discussions lead by University of Illinois esteemed rail faculty and practitioners, you will learn about the practical aspects and the science behind:
- Track Systems and Infrastructure
- Track Structural Analysis and Design
- Locomotives, Rolling Stock, and Mechanical Components
- Railway Geometry, Project Design and Construction

PDHs: Earn 31.5 Professional Development Hours

Register Now:
http://railtec.illinois.edu/short-course/registration.php

Testimonials:
“RailTEC Short Course allowed me to review all the concepts related with railway engineering that are applied in the industry in a comprehensive analysis. It is a great opportunity to review current practices and understand the theory behind, in a convenient professional course format.”

“I highly recommend the class. It combines engineering principles with real life applications. The instructors provide a balanced mix with their railroad and design experiences.”

“The concepts and techniques are very useful.”