



National University Rail Center - NURail
US DOT OST-R Tier 1 University Transportation Center

NURail Project ID: NURail2012-RHIT-E01

**Development of Interdisciplinary Undergraduate Railroad Engineering Course
and Rail Program**

Rose-Hulman Institute of Technology

By

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DISCLAIMER

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US DOT OST-R Tier 1 University Transportation Center

TECHNICAL SUMMARY

Title

Development of a Railroad Engineering Course and Rail Program Rose-Hulman Institute of Technology

Introduction

Professor James McKinney was a participant in the AREMA 2008 Railroad Engineering Education Symposium (REES) held at the University of Illinois at Urbana-Champaign, as well as the AREMA 2010 Railroad Engineering Education Symposium (REES) held at the Johnson County Community College/BNSF's Training Facility in Overland Park, Kansas. Materials and information garnered from the Symposiums was incorporated in CE 481 Transportation Engineering, an undergraduate introductory transportation course for civil engineering students. The 10 week course was offered in the spring quarter of 2010, 2011, and 2012, and contained two weeks of railroad engineering.

As a result of the collaboration with the National University Rail Center (NURail) railroad engineering has been greatly expanded on the Rose-Hulman campus. A new multi-discipline railroad engineering course was developed and vetted by Civil, Mechanical and Electrical Engineering faculty. An active AREMA student chapter was organized and conducts a technical meeting each month, as well as a site visit each month. The Indiana Rail Road has been an active participant in railroad engineering on the Rose-Hulman campus sponsoring activities to introduce engineering student to railroad activities, operations and potential career paths.

Description of Activities

- **CE 490/CE 483 Railroad Engineering**

A new, multi-discipline railroad engineering course that attracted civil, mechanical and electrical engineering students was taught during the of 2013, 2014, and 2015 spring quarters. Sixty PowerPoint class modules were developed for the course. Dr. William Eccles of the Electrical Engineering Department reviewed the pertinent signaling course materials and developed several modules. Dr. Michael Moorhead of the Mechanical Engineering Department reviewed the pertinent mechanical related modules.

- **AREMA Student Chapter**

Rose-Hulman AREMA Student chapter was founded in 2012 as the 11th national student chapter. RHIT AREMA has been active in bringing guest speakers to campus each month to talk about the rail industry, internship and permanent employment opportunities, as well as rail related projects. Site visits were conducted monthly to tour rail operations and rail projects of many Class I and Regional railroads.

- **Out Reach Program Participation**

Rose-Hulman students and faculty participated in national rail related conferences and national meetings including: Railroad Engineering Education Symposium (REES), Joint Rail Conference (JRC), ASME Rail Transportation Davison (ASME/RTD), and AREMA National Conference and Exposition.

- **Hands-On Rail Project**

CE 483 students worked with the Wabash Valley Railroaders Museum (WBRM) to design and build a 60 foot long track section for the display of a WW II Troop Car. Rail materials were obtained from the WVRM and the Indiana Rail Road, while Rose-Hulman facilities provided excavation and ballast equipment.

Outcomes

- CE 490/CE 483 has been offered each year during the spring quarter from 2013 to 2015. Enrollment for the course has varied between 10 to 19 with a mixture of junior and senior civil, mechanical and Brazilian exchange students. The syllabus for the 10 week, 40 class period class is located in the appendix. The list of the sixty PowerPoint modules is also found in the appendix. Student evaluations of the course have been favorable. See the appendix for a sampling of student comments.
- The Rose Hulman AREMA Student Chapter has been the catalyst to the success of our campus rail related activities. From 2012 we have conducted 28 chapter meetings and 21 site visits. Attendance at meetings has varied from 10 to 40+ students. Site visits to rail operations/facility and capital expansion projects in Indiana and Illinois has averaged 10 students. See the appendix for a tabulation of AREMA Meetings and AREMA Site Visits.
- Rose-Hulman students attended the AREMA National Conference: 2012 (Chicago), 2013 (Indianapolis) and 2014 (Chicago). The highlight of the conference for the students was the *Meet the Next Generation* panel discussion and recruiting session. Students also participated in JRC- Knoxville; ASME/RTD- Altoona; REES- Overland Park. See appendix for student partition.
- The students in CE 490 Railroad Engineering designed and constructed a 60 foot section of track for the Wabash Valley Railroaders Museum. The Museum acquired a rare WW II Troop Car - a modified Pullman car - that will be displayed at museum on the constructed track. The track was designed to comply with Federal Railroad Administration and CSX Railroad specifications. Students set out the ties, located the tie plates and spiked the rail in place. Due to the use of reclaimed ties and bent rail meeting specifications for horizontal and vertical alignment was a major challenge. The WVRM supplied rail and joint bars. The Indiana Rail Road supplied ties, tie plates, plugs, and spikes. RHIT Facilities provided assistance with the excavation of the subgrade and placement of the sub-ballast and ballast.

Conclusions/Recommendations

- CE 483 will continued to be offered as a multi-discipline railroad engineering course. Course content will be continuously updated. The 2016 course will have a new Railroad Bridge module added. Enrollment for 2016 is 11 – a mix of senior CE, ME and Brazilian exchange students.
- Working with The Wabash Valley Railroaders Museum a *Hands On* program will be developed to allow CE 483 students and AREMA members the opportunity to:
 - Construction of temporary track: ties, tie plates, spikes, rail gauge, joint bar
 - Rolling stock mechanical components: coupler operation, air hose, brake shoes
 - Turnouts and switches: mechanical switch, electrical switch; interlocking operation

- The AREMA Student Chapter is developing a railroad program for middle school students. The program will introduce the rail industry, routine railroad activities, rail/public safety, and rail education and career paths in the rail industry. The program will also encourage students to consider STEM opportunities. The program will involve the operation of a locomotive simulator, track configuration scenarios and classification yard operation.

Publications/Examples

- See Appendix

Primary Contact

Principal Investigator

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NURail Center

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<http://www.nurailcenter.org/>

APPENDIX

- **Class and Educational Programs**
- **CE 483 Railroad Engineering Syllabus**
- **CE 483 Railroad Engineering Course Description**
- **CE 483 Railroad Engineering Powerpoint Modules**
- **CE 483 Railroad Engineering Student Comments**
- **RHIT AREMA Student Chapter Meetings**
- **RHIT AREMA Student Chapter Site Visits**
- **RHIT Internships and Full Employment**
- **Industry Participation**
- **CE 490 Railroad Engineering Class Project**
- **RHIT AREMA 2012-2013**
- **RHIT AREMA 2013-2014**
- **RHIT AREMA 2014-2015**
- **Indiana Rail Road – RHIT Partnership**

CLASS and EDUCATIONAL PROGRAMS

Full Courses Offered						
Year	Name	Department	Enrollment	Traditional	Online	Comments
2012	CE 481 Transportation Engineering	Civil Engineering	12 - CE Students	x		Rail comprised 35% of Course
2013	CE 490 Railroad Engineering	Civil Engineering	10 -CE/ME Students	x		Interdisciplinary Course
2014	CE 490 Railroad Engineering	Civil Engineering	11-CE/ME Students	x		Interdisciplinary Course
2015	CE 483 Railroad Engineering	Civil Engineering	19 -CE/ME/Brazilian Exchange	x		Interdisciplinary Course
2016	CE 483 Railroad Engineering	Civil Engineering	11 -CE/ME/Brazilian Exchange	x		Interdisciplinary Course

Outreach Programs							
Year	Name	Department	Precollege	College	Faculty	Industry	Comments
2012 June	REES				X	X	Railway Engineering Education Symposium
2012 Sept	AREMA-Chicago, IL			x	x		18 Students; 1 Faculty
2013 Apr	JRC-Knoxville, TN			x	x		3 Students; 1 Faculty
2013 Sept	AREMA-Indianapolis, IN			x	x		10 Students, 1 Faculty
2013 Oct	ASME/RTD-Altoona, PA			x			1 Student
6/1/2014	REES			x	X	X	Railway Engineering Education Symposium
2014 Sept	AREMA-Chicago, IL			x	x		16 Students; 1 Faculty

CE 483
RAILROAD ENGINEERING
SYLLABUS
SPRING 2015

TEXT *The Railroad: What it is, What it Does* 5th ed. Armstrong

SUPPLEMENTAL REFERENCES

<u><i>Practical Guide to Railway Engineering</i></u>		AREMA
<u><i>Manual for Railroad Engineering</i></u>	4 volumes	AREMA
<i>Railway Track & Structures</i>	monthly	http://www.rtands.com/
<i>Railway Age</i>	monthly	http://www.railwayage.com/
<i>Progressive Railroading</i>	monthly	http://www.progressiverailroading.com/
<i>Trains Magazine</i>	monthly	http://trn.trains.com/

EXAMS Two - midterm & final exam

OTHER Periodic homework

GRADES

Exams (2)	60%
Quizzes	15%
Homework	25%

MISC Homework must be turned in on time - no points for late work
All homework must be submitted to successfully complete the course

MISC Homework must be turned in on time - no points for late work
All homework must be submitted to successfully complete the course

ATTENDANCE

Regular attendance is necessary
Penalties will be assessed for absences
<http://www.rose-hulman.edu/academicpolicies/#attendance>

ACADEMIC HONESTY

<http://www.rose-hulman.edu/StudentHandbook/>

MISC Use of electronic texting and web browsing will not be permitted in class.
PowerPoint class notes need to be printed before/after class.

CE 483

RAILROAD ENGINEERING

SPRING 2015

COURSE DESCRIPTION

Provides an overview of rail transportation: history, organizations, economics, safety, freight operations, track-train dynamics, signals and communications, motive power and equipment, track components, construction and maintenance. The basic objective of the course is to gain an understanding of railroads as a transportation industry that merges a number of engineering fields as well as other disciplines that contribute to the success of a complex, growth-oriented industry.

GOALS

Successful completion of the course will provide the student with an overview of the North American railroad system operation, engineering, and expansion. The student will become familiar with American Railway Engineering & Maintenance of Way Association - AREMA - *Practical Guide to Railway Engineering* as well as AREMA's Manual *for Railroad Engineering*. The student will become familiar with the Federal Railroad Administration - FRA's safety regulations as well as the Association of American Railroads - AAR's safety, efficiency, economic and environmental standards.

COURSE OUTLINE:

- Introduction to Rail Transportation
- North American Railroads
- Freight Rail
- Rolling Stock
- Locomotives
- Railway Safety
- Track Structure & Geometry
- Maintenance of Way
- Turnouts & Switches
- FRA Regulations
- Rail Power
- Grade Crossings
- Intermodal
- Terminals & Yards
- Passenger Rail
- High Speed Rail
- Railroad Control
- Railroad Signals
- Communications
- PTC
- Railroad Engineering Future

CE 483

RAILROAD ENGINEERING POWERPOINT MODULES

SPRING 2015

<u>Syllabus</u>	<u>Module</u>	<u>Syllabus</u>	<u>Module</u>
Intro Rail Transportation	1-1-1	Track Structure	2-1-1
Ton-Miles per Gallon	1-1-2	Track Gage	2-1-2
RR History	1-2-1	Ballast	2-1-3
Staggers Rail Act	1-2-2	Ties	2-1-4
North American Railroad	1-3-1	Rail	2-1-5
CBR - Crude By Rail	1-3-2	Rail Accessories	2-1-6
Rail Customers & Traffic	1-4-1	Haley MOW 2011	2-1-7
Railroad Capacity Expansion	1-4-2	Track Geometry	2-2-1
Rail Industry & Employment	1-5-1	Turnouts & Switches	2-2-2
Intro Rolling Stock	1-6-0	FRA Regulations	2-3-1
Freight Cars	1-6-1	Power	3-1-0
Box Cars	1-6-2	Distributed Power	3-1-1
Flat Cars	1-6-3	Crossings	4-1-0
Gondola Cars	1-6-4	Intermodal	5-1-0
Coil Cars	1-6-5	Terminals	5-2-0
Spline Cars	1-6-6	Yards-Classification	5-3-0
Hopper Cars - Open	1-6-7	Intro Passenger	6-1-0
Hopper Cars - Closed	1-6-8	Passenger - Urban	6-1-1
Tank Cars	1-6-9	Passenger - Intercity/AMTRAK	6-1-2
CBR tank Cars	1-6-9-1	HSR	6-1-3
Auto Racks Cars	1-6-10	HSR-World Wide	6-1-4
Intermodal Cars	1-6-11	RR Controls	7-1-0
Misc. Cars	1-6-12	RR-Signal-Beginning	7-2-1
Car Ownership	1-6-13	RR-Signal-Automatic	7-2-2
Locomotives	1-7-1	RR-Signal-Interlocking	7-2-3
EMD vs GE Locomotives	1-7-1-1	RR-Signal-Modern	7-2-4
Locomotive - GenSets & Slugs	1-7-2	RR-Signal-PTC	7-2-5
Locomotive - Multiple Units	1-7-3	Railroad Engineering Future	8-1-0
Locomotive Fuel Efficiency	1-7-4		
Locomotive Emissions	1-7-5		
Locomotive Future	1-7-6		
Railway Safety	1-8-1		

CE 483

RAILROAD ENGINEERING

Student Comments

The Good

- *I learned a lot and enjoyed the material we covered. If there was a second railroad class I would take it, because this class got me very interested in it.*
- *This course was very good for me because I understood a lot of things my father used to tell me since I was child. I also learned tons of new things as how the railroads systems works in the US. You taught us a lot of things, how a locomotive works to how to design a track. Another thing that I enjoyed was the real life examples. For example the operation costs, fuel efficiency of railroads, owners of railroad cars, comparison between EMD and GE locomotives, safety, regulations and so on. I cannot forget the site visits and the homework, measuring the frog was interesting exercise because we could see how it works and its real dimensions.*
- *Always connected with the real world – not just theory. Field trips were good.*
- *Good class content, good introduction to the industry for those who have no experience with it. This class got me out of bed most days so it prevented laziness or wasting a whole day.*
- *The class was actually interesting – one of my very few classes where I learned something practical and applicable. Well worth getting up early to take this class.*
- *Very good class, everything about RR.*
- *Hands on – visiting Haley Historic Tower, seeing lots of equipment 1st hand, counting trains, measuring track. Work load consistent with other classes.*
- *Loved all the information. Definitely learned a lot about the railroad and things that I will use/observe in my everyday life. Gained a much better overall knowledge with having to learn every technical detail. Keep this class going. I thought the homework was appropriate and nothing was required that seemed over the top or excessive.*
- *I liked that the class is not super heavy with homework. I also really liked that the first test was very straight forward. I really like going to Haley Historic Tower as well.*
- *It was a great general class for someone like myself who knew nothing about the industry. Field trip to Haley Historic Tower was good. I actually enjoyed coming to class. Interactive homework was good.*
- *The field trip to Haley historic Tower was really fun/interesting.*
- *Decent wide variety of topics covered over the course of the class. A good balance of technical and trivial knowledge.*
- *Overview of railroad industry.*
- *The quality of images and information over each topic being discussed for the day was good. The scope of the class is really enjoyable.*
- *Homework work load is the right amount. Quizzes were not too many and were a good balance between tests and quizzes.*
- *The professor has much knowledge and is good to pass it on to the students.*
- *Good points of the class were - many examples and exercises, different topics, local examples, field trips.*
- *I really liked this class and the content. It was very interesting and I learned more than I thought I would. I liked the field trips and all the different examples of different railroad companies and different parts of the country.*

The Bad/The Ugly

- *A few more home works may have helped break the course down a little. More rail design and “future” design aspects*
- *There is a lot of information to go over which isn’t really a bad thing. It is just a lot to process some days.*
- *Too many slides to study for one test.*
- *A lot of PowerPoints. First hour.*
- *None*
- *One suggestion I have would be some kind of hands-on type of project in the class. I don’t have any idea what would be good for this projects, but something more to supplement the notes and home work would be good*
- *1st hour – 8:05 a.m.*
- *I was not a fan of the turnout measurements homework assignment.*
- *Surprise quizzes.*
- *At times some informational photos seemed glossed over. Possibly less images with more time spent on just a few in higher detail.*
- *PowerPoints*
- *The tests were extremely hard to study for because of the amount of material covered. The signals part was a bit much. A more brief and general view of signals would have been better.*

RHIT AREMA STUDENT CHAPTER MEETINGS

AREMA STUDENT CHAPTER MEETINGS 2012 - 2013							
Year	Name	Department	Precollege	College	Faculty	Industry	Comments
2012 Sept	Meeting	CE/EE/ME/CS		x	x	x	AREMA Student Chapter Exploratory Formation Meeting: NS & UIUC Internships
2012 Nov	Meeting	CE/EE/ME/CS		x	x	x	RHIT AREMA Student Chapter Organization
2012 Dec	Meeting	CE/ME/EE/CS		x	x	x	Rail Industry Internship & Jobs
2013 Jan	Meeting	CE/ME/EE/CS		x	x	x	IHB RR, BNSF Geometry Car; AREMA Scholarships
2013 Feb	Meeting	CE/ME/EE/CS		x	x	x	Terre Haute RR History
2013 Mar	Meeting	CE/ME/EE/CS		x	x	x	Amtrak; Indiana Transportation Museum
2013 Apr	Meeting	CE/ME/EE/CS		x	x	x	INRD Hiawatha Yard; Argentina Railroads
2013 May	Meeting	CE/ME/EE/CS		x	x	x	WVRRM; INRD Indianapolis & Morgantown Projects
2013 Sept	Meeting	CE/ME/EE/CS		x	x	x	Internships: NS; UIUC; Moffat & Nichol
2013 Oct	Meeting	CE/ME/EE/CS		x	x	x	Railroad Bridge Ratings; HDR Railroad Projects
2013 Nov	Meeting	CE/ME/EE/CS		x	x	x	Railroad MOW; NS Altoona; INRD Bear Run
2013 Dec	Meeting	CE/ME/EE/CS		x	x	x	CN Kirk Yard & Woodcrest Shops; Applying for Rail Industry Jobs & Internships

RHIT AREMA STUDENT CHAPTER MEETINGS

AREMA STUDENT CHAPTER MEETINGS 2014 - 2015							
Year	Name	Department	Precollege	College	Faculty	Industry	Comments
2014 Mar	Meeting	CE/ME/EE/CS		x	x	x	Working in Rail Preservation Museums
2014 Apr	Meeting	CE/ME/EE/CS		x	x	x	Railroad Bridges & Railway Structural Engineering
2014 May	Meeting	CE/ME/EE/CS		x	x	x	Indiana Rail Road Preparing for Heavy Haul
2014 Sept	Meeting	CE/ME/EE/CS		x	x	x	Internships: Amtrak; NS; Site review NS-Altoona
2014 Oct	Meeting	CE/ME/EE/CS		x	x	x	BNSF-Argentine Yard
2014 Nov	Meeting	CE/ME/EE/CS		x	x	x	GATX - National
2014 Dec	Meeting	CE/ME/EE/CS		x	x	x	Applying for Rail Industry Jobs & Internships
2015 Feb	Meeting	CE/ME/EE/CS		x	x	x	BNSF Management Trainee Program
2015 Feb	Meeting	CE/ME/EE/CS		x	x	x	BNSF -Galesburg; Management Trainee Experience
2015 Apr	Meeting	CE/ME/EE/CS		x	x	x	Illinois Higher Speed Rail Projects
2015 May	Meeting	CE/ME/EE/CS		x	x	x	Illinois Railway Museum Volunteer Program
2015 Sep	Meeting	CE/ME/EE/CS		x	x	x	Internships: BNSF; CN
2015 Sept	Meeting	CE/ME/EE/CS		x	x	x	Summer Rail Internships Experiences
2015 Oct	Meeting	CE/ME/EE/CS		x	x	x	Urban Rail in Tokyo
2015 Nov	Meeting	CE/ME/EE/CS		x	X	x	BNSF & CE Internships: Experiences and Applications
2015 Dec	Meeting	CE/ME/EE/CS		x	x	x	INRD White River Bridge Replacement

RHIT AREMA STUDENT CHAPTER SITE VISITS

AREMA STUDENT CHAPTER SITE VISITS 2012 - 2013							
Year	Name	Department	Precollege	College	Faculty	Industry	Comments
2012 Nov	Field Trip	CE/ME/EE/CS		x	x	x	Wabash Valley Railroaders Museum/Haley Tower Historical Society, /Terre Haute, IN
2013 Jan	Field Trip	CE/ME/EE/CS		x	x	x	Indiana Harbor Belt RR: Gibson Yard & Blue Island Yard
2013 Feb	Field Trip	CE/ME/EE/CS		x	x	x	AMTRAK Beech Grove Shops, Indianapolis, IN
2013 Feb	Field Trip	CE/ME/EE/CS		x	x	x	Indiana Transportation Museum
2013 Mar	Field Trip	CE/ME/EE/CS		x	x	x	Indiana Railroad: Hiawatha Yard, Jasonville, IN
2013 May	Field Trip	CE/ME/EE/CS		x	x	x	Indiana Railroad Indianapolis Intermodal Terminal; Morgantown Rail Slide
2013 Oct	Field Trip	CE/ME/EE/CS		x	x	x	Indiana Railroad: Bear Run Mine Loading Facility Expansion
2013 Oct	Field Trip	CE/ME/EE/CS		x	x	x	Norfolk Southern - Decatur Yard, ILL
2013 Nov	Field Trip	CE/ME/EE/CS		x	x	x	CN RR: Kirk Yard; Woodcrest Shops; Markham Yard

AREMA STUDENT CHAPTER SITE VISITS 2014 - 2015							
Year	Name	Department	Precollege	College	Faculty	Industry	Comments
2014 Mar	Field Trip	CE/ME/EE/CS		x	x	x	AMTRAK Beech Grove Shops. Indianapolis, IN
2014 Apr	Field Trip	CE/ME/EE/CS		x	x	x	Indiana Rail Road Hiawatha Yard Locomotive Shop, Jasonville, IN
2014 Oct	Field Trip	CE/ME/EE/CS		x	x	x	CN Kirk Yard, Gary, IN
2014 Nov	Field Trip	CE/ME/EE/CS		x	x	x	GATX - GATH - Facility - Terre Haute, IN
2015 Jan	Field Trip	CE/ME/EE/CS		x	x	x	Indiana Rail Road Van Yard, Terre Haute, IN
2015 Feb	Field Trip	CE/ME/EE/CS		x	x	x	CSX Avon Yard, Avon, IN
2015 Mar	Field Trip	CE/ME/EE/CS		x	x	x	Wabash Valley Railroaders Museum/Haley Tower Historical Society, /Terre Haute, IN
2015 Apr	Field Trip	CE/ME/EE/CS		x	x	x	Rail & Innovation Laboratory - RAIL - University of Illinois Urbana/Champaign, ILL
2015 Apr	Field Trip	CE/ME/EE/CS		x	x	x	Indiana Rail Road White River Bridge Reconstruction, Lyons, IN
2015 Jun	Field Trip	CE/ME/EE/CS		x	x	x	Indiana Rail Road White River Bridge Component Acquisition, Lyons, IN
2015 Oct	Field Trip	CE/ME/EE/CS		x	x	x	AMTRAK Beech Grove Shops, Beech Grove, IN
2015 Dec	Field Trip	CE/ME/EE/CS		x	x	x	CSX Avon Yard, Avon, IN

RHIT INTERNSHIPS and FULL EMPLOYMENT

Internships				
Year	Student	Company	Internship / co-op	Major
2012	Sam Beck	Norfolk Southern	Internship / co-op	ME
2012	Greg Frech	University of Illinois	Research	CE
2012	Zach Ehlers	Indiana Transportation Museum	Part-Time work	CE
2013	Sam Beck	Norfolk Southern	Internship / co-op	ME
2012	Greg Frech	University of Illinois	Research	CE
2013	Greg Frech	Moffat & Nichol	Rail Design Intern	CE
2013	Zach Ehlers	University of Illinois	Research	CE
2014	Zach Ehlers	AMTRAK	Internship / co-op	CE
2014	Allison Phillips	CN	Internship / co-op	CE
2015	Lauren Plouff	BNSF	Internship / co-op	CE
2015	Andy Roan	CN	Internship / co-op	EE
2015	Blair Briscoe	CN	internship / co-op	CE
Full Time Positions				
Year	Student	Company	BS/MS/PhD	Major
1982	Mike Shipper	Cleveland Transit Company	BS	CE
1985	Walter Rosenberger	NS	BS	ME
1996	Kevin Walker	CSR Engineering	BS	CE
2005	Dave Honan	HDR	BS	CE
2012	Brian Murphy	CSX	BS	CE
2014	Sam Beck	BNSF	BS	ME
2014	Greg Frech	BNSF	BS	CE
2015	Zach Taylor	BNSF	BS	ME
2016	Zach Johnson	CN	BS	CE
2016	Blair Briscoe	NS	BS	CE

INDUSTRY PARTICIPATION

Industry Professionals Participating in NURail Activities					
Year	Name	Affiliation	Program	Purpose	Comments
2012	Thomas Hoback	Indiana Rail Road Company	Program Mentor	Industry Exposure	President INRD
2012	Peter Ray PE	Indiana Rail Road Company	AREMA Student Chapter Industry Liaison	Technical Guidance Educational Opportunities	VP Engineering INRD
2013	Bill Foster	Wabash Valley Railroaders Museum & Haley Tower Historical Society	AREA Student Chapter	Historical RR Overview; Museum Special Projects; WWII Troop Car Track Project	President WVRM
2014	Justin Cronin	Indiana Rail Road Company	AREMA Student Chapter Industry Liaison	AREMA Field Trips/Site Visits	Engineering Project Manager
2014	Bob Pennell	Indiana Rail Road Company	WVRM Track Project	Track Component Acquisition	Manager: Maintenance of Way
2014	Matthew Chrapek	Design Nine	White River Bridge Replacement	Acquisition of Bridge Components for Campus Display	INRD White River Bridge Design and Construction Inspection
2014	Raymond Baker	CN	CN & EJ& E Integration Project	AREMA Site Visit & Intern Mentor	Senior Manger Engineering
2014	Paul Titterton	GATX	GATX Company Overview & GATH & Site Visit	Rail Car Industry	Chief CFA GATX
2015	Bernia Ivey	BNSF	Management Trainee Program	Recruitment	Human Resources/Recruiting
2015	Michael Garcia	Patrick Engineering	Why 110 mph? Illinois High Speed Rail Chicago to St. Louis	Design Aspects of High Speed rail	Former IDOT High Speed Rail Project Manager
2015	Steve Metz; Rick Popplewell	AMTRAK - Beech Grove Shops	AMTRAK Shops Facility Tour	Introduction to work performed by AMTRAK Shops	Management & Craft Trade Rep
2015	Brian Holder	CSX Avon Yard	Hump Yard, Car Shop, Locomotive Shop Tour	Operation of Classification Yard	CSX AVON Roadmaster

CE 490 Railroad Engineering Class Project

Year	Name	Department	Precollege	College	Faculty	Industry	Comments	
2014 Apr	Wabash Valley Railroaders Museum: WW II Troop Car 60 ft. Track Project: Design & Build				x	x	x	11 Students, 1 Faculty, 5 Industry



Grade Survey & Subgrade Excavation



Sub-ballast & Ballast



Tie Placement



Tie Placement

60' TRACK CONSTRUCTION PROJECT CE 490 Railroad Engineering Spring 2014



**Wabash Valley Railroaders Museum
Pullman Troop Sleeper Project**
*Help our museum acquire and restore this
unique piece of railroad and military history*

www.wvrrm.org

The WVRM is excited to announce its plans to acquire a rare World War II vintage Pullman troop sleeper car.

Pullman Standard built 2400 troop sleeper cars for the US government between 1943 and 1946 and ran them as part of the Pullman sleeper pool. When mobilized, these trains could move hundreds of troops to anywhere in the country in a matter of hours. Each car held 29 enlisted personnel and a Pullman porter. Troops slept in bunks stacked three high.

In 1947, the government offered the cars for sale as war surplus. 45 cars, with trap doors and step wells in the middle, were purchased by the C&EJ railroad, which ran through Terre Haute and the heart of the Wabash Valley. The car we wish to acquire is the only C&EJ railroad car like it known to still exist.

While not what most people associate with Pullman sleeper cars, their unique place in military and railroad history make them something that should definitely be preserved.



(Left) A Pullman porter helps a mobilized soldier get settled in. (Right) The troop sleepers were a model of efficiency: not a square foot of usable space was wasted in their design.



One of the troop cars in maintenance service on the C&EJ. Most cars were heavily modified by the railroads, but the car we plan to acquire is unmodified and nearly complete. Photo courtesy of JD Santucci!



Troop Car Arrival



Tie Plates



Rail Placement



Joint Bar



Spiking



Spiking



Crib Ballast Infill



Finished Track



2012 AREMA Annual Conference



Indiana Rail Road Morgantown Rail Slide



Indiana Harbor Belt RR



Wabash Valley Railroaders Museum



2012-2013



Indiana Transportation Museum



AMTRAK Beech Grove



Indiana Rail Road Hiawatha Yard



2013 AREMA Annual Conference

ROSE-HULMAN AREMA HDR
Monthly Meeting
Wednesday October 2nd
5:00 PM O-227
 Kevin Wilbur (CE '94)—CEM Engineering
 "Load Rating of Railroad Bridges"
 Dave Hansen (CE '92)—HDR Engineering
 "HDR and Project Experience"
 October 9th—Indiana Rail Road track project
 and Bear Run Mine tour
 For questions, email Evan Beck at beckevan@rose-hulman.edu



2013-2014



CN - Homewood Shops

ROSE-HULMAN AREMA Peabody
October Site Visit:
Wednesday October 9th
 Peabody Energy and Indiana Rail Road
 Bear Run Mine Tour and Track Work
 Leaving Rose at 1:00 PM
 Returning in the afternoon
 Questions or to say that you will be in attendance,
 Email Evan Beck at beckevan@rose-hulman.edu



Indiana Rail Road Bear Run



NS- Decatur

ROSE-HULMAN AREMA
March Site Visit:
Saturday March 15th
 Amtrak Beech Grove Shops
 (Indianapolis)
 Leaving Rose at 9:30 AM
 Work boots are required
 PPE can be obtained from Kevin Beck in O-227
 Questions or to say that you will be in attendance,
 email Evan Beck at beckevan@rose-hulman.edu



AMTRAK – Beech Grove



Indiana Rail Road Hiawatha



CN – Kirk Yard

ROSE-HULMAN AREMA
Monthly Meeting
Tuesday, May 6th
5:00 PM O-227
 Peter Ray—Indiana Rail Road
 Meeting counts for PDHs
 Questions, contact Evan Beck at
 beckevan@rose-hulman.edu



AREMA Guest Speaker – Matt Chrapek PE – Design Nine



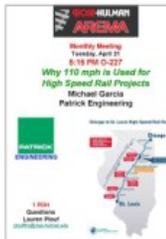
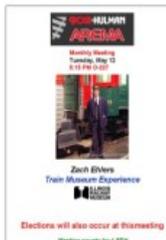
2014 AREMA Annual Conference



RHIT AREMA - Activities Fair



CN - Kirk Yard - Gary



2014-2015



INRD - Van Yard - Terre Haute



INRD - White River Bridge



GATX - Terre Haute



CSX - Avon Yard - Indianapolis



AREMA Speaker - Michael Garcia - Patrick Engineering

INRD People



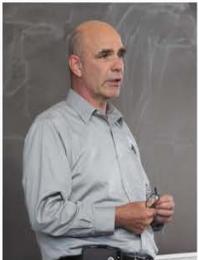
Tom Hoback
President & CEO INRD



RHIT Honorary Doctorate
2012



Peter Ray PE
VP Engineering INRD



RHIT AREMA
Guest Speaker



Justin Cronin P.E.
Project Manager INRD



White River Bridge
Replacement

INRD Project Support



Track Construction Wabash
Valley RR Museum

INRD Site Visits



INRD Van Yard



INRD Rail Slide



INRD Hiawatha Yard



INRD Safety Briefing



INRD White River Bridge



INRD Bridge Display Components



INRD & RHIT AREMA Student Chapter