

1st Program Progress Performance Report
for
National University Rail (NURail) Center:
Tier 1 University Transportation Center



National University Rail Center - NURail
USDOT-RITA Tier I University Transportation Center (UTC)

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A handwritten signature in black ink that reads "Chris Barkan". The signature is fluid and cursive, with the first name "Chris" and last name "Barkan" clearly legible.

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1. Accomplishments

a. What are the major goals of the program?

Building on the foundation of the NURail Center 2011 grant, the NURail Center 2013 grant will continue our focus on rail and align with the US DOT Strategic Goal of *Economic Competitiveness*. The overarching objective of this proposal is to provide the transportation community with significant research results and a new generation of well-educated leaders who will foster smart, strategic and sustainable investments serving the traveling public, facilitating freight movement across a multi-modal network and bringing equitable economic benefits to the nation.

b. What was accomplished under these goals?

University of Illinois Urbana-Champaign

As the lead for the consortium UIUC established and successfully executed the subawards from the FFY13 Grant for MIT, MTU, RHIT, UK, and UT-Knoxville. UIUC also transferred the anticipated NURail funding allocations to UIC – CUPPA and UIC – COE.

UIUC also submitted to RITA headquarters the NURail funding plan for the FFY14 UTC funding. The funding plan was approved by RITA in late April.

c. How have the results been disseminated?

Nothing to report from any of the partner universities.

d. What do you plan to do during the next reporting period to accomplish the goals?

University of Illinois Urbana-Champaign

Planning has begun for a new full-semester graduate-level course on Railway Terminal Design and Operations to be given in Fall 2014.

During summer 2014, RTC simulation work will begin on the initial task of the project to investigate the interaction between mainline and terminal capacity.

UIUC anticipates establishing and executing the subawards and funding to UIC from the FFY14 funding shortly after receiving the award from RITA.

University of Illinois Chicago – COE

Research in the college is focused on one of the two main NURail research areas: **Railway Vehicles and Infrastructure: Analysis, Design, and Performance**. Under this heading we have three projects:

1. Dynamic Modeling of Railroad Vehicles and Vehicle-Track Interaction

The project will develop new computational multibody system (MBS) procedures for the systematic and efficient dynamic modeling and virtual proto-typing of complex railroad vehicle systems, including both vehicles and infrastructure. It will be a collaborative effort of mechanical and civil engineers and computer visualization specialists.

2. Improving Track-Bridge Interaction using Recycled Plastic Crossties

This research evaluates track-bridge interaction systems to determine an efficient and cost-effective system for HSR applications. Lab tests will determine the mechanical properties of High Density Polyethylene recycled plastic railroad ties. The performance of these ties will be compared with concrete and timber ties in terms of efficiency, feasibility, practicality, durability, field-performance and cost.

3. Computational Ballast and Soil Models to Improve Track Transition Design

This project will use previously developed computational ballast and soil models to evaluate the degradation of ballast, subballast, and subgrade under rail loading. It will focus on bridge approaches, where foundations create a dramatic change in stiffness under the rail amplifying settlement issues and leading to poor ride quality or even derailment. Expected results include more accurate derailment criteria, improved understanding of derailment causes, and recommendations for infrastructure design and maintenance.

University of Illinois Chicago – CUPPA

During the next reporting period the goal of the Urban Transportation Center (UTC) and its affiliated faculty and researchers in the College of Urban Planning and Public Affairs (CUPPA) intend to continue with research similar to that being conducted under the FY2011-funded NURail Center. This work is to include research concerning the planning, operations, funding, finance and economic impact of passenger and freight rail systems. Further, UTC will endeavor to continue supporting graduate students in their educational and professional development as transportation researchers, planners, and eventually contributing members of the transportation field.

Massachusetts Institute of Technology

In the next reporting period MIT will be in the planning stages for their research considering economic growth enabled by development of mega-regions through high-quality surface transportation (in particular, HSR) and complementary enhancements of urban transportation systems. An additional research project will include studying the contribution of mega-region development towards environmental sustainability that we believe will take place through a modal shift from air and highway that are intrinsically less benign than rail transportation.

Michigan Tech University

Michigan Department of Transportation (MDOT) has pledged matching support for mutually beneficial rail related projects conducted under NURail 13 grant. Michigan Tech plans to initiate (and complete) identification of collaborative projects, complete the contracting process with MDOT and get project(s) under way.

University of Kentucky

We will work with the University of Tennessee on rail infrastructure testing in UT's Tickle Engineering Building structures lab. The lab includes a 20x20 foot by 6 foot deep test pit. We have already obtained an in-kind donation of a track panel from NS to test. We will also continue to develop our rail crossing sensors and applications.

University of Tennessee, Knoxville

We will begin at least one new project. Education and training activities will continue.

Rose-Hulman Institute of Technology

In the next reporting period, Rose-Hulman will review student evaluations from the Spring 2014 semester of CEE490 – Railroad Engineering and continue to update and improve this undergraduate class. Also, planning will begin to develop rail programs to reach under represented minority students with the AREMA student chapter partnering with Class 1 and regional railroads.

2. Products: What has the program produced

Nothing to report from any of the partner universities.

3. Participants and Other Collaborating Organizations

a. Partners

Organization Name:	Location of the Organization:	Partner's Contribution to the Project:	Name (First and Last)	University
Wabash Valley Railroaders Museum	Terre Haute, IN	collaborative support, facilities	Bill Foster	Rose-Hulman
Indiana Rail Road	Indianapolis, IN	In-kind support	Bob Pennel	Rose-Hulman
Rose-Hulman Facilities	Terre Haute, IN	In-kind support	Jacob Wagle	Rose-Hulman
Wayne Strickland	Norfolk Southern	Donation of Track Panel for testing	Jerry Rose	University of

				Kentucky
Fred Baumann	Baumann Paper Company	Donation of use of railroad siding for full scale tests	Reg Souleyrette	University of Kentucky
CSX Transportation	Jacksonville, FL	Seminar, data for project	Dharma Acharya	UTK

b. Additional collaborators

University of Kentucky

Dan Lau, Dept. of Electrical Engineering, University of Kentucky
Baoshan Huang, Dept of Civil Engineering, University of Tennessee

4. Impact

Nothing to report from any of the partner universities.

5. Changes/Problems

Nothing to report from any of the partner universities.