University of Nebraska-Lincoln
Railroad Engineering Program

Dr. Aemal Khattak
Department of Civil Engineering and Nebraska Transportation Center

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Nebraska Transportation Center

- Umbrella organization for transportation research at the University of Nebraska
- Research-focused
- Encourage multi-disciplinary research
  - Engineering (civil, mechanical, computer, ...)
  - Business
  - Arts and Science (statistics, psychology, ...)
- Soft-money (e.g. competitive grants)
NTC Research Funding

• By the Numbers
  – 91 faculty affiliates
    • 64 research projects
  – 5 Year Total Funding
    • $42.2 million
  – Current: Total Funding
    • $18.8 million
    • 30 projects
  – Expenditures FY 2016
    • ~ $6 million

• Students:
  – 47 Graduate students
  – 59 Undergraduate
Research Sponsors

- NE Department of Roads (DOT?)
- NE Emergency Mgmt. Agency
- NE DMV
- US DOT
- US DoD
- National Science Foundation
- Union Pacific, Valmont, Motorsports Safety Technology, Wavetronix, ...
Industry Partnerships

- Nebraska Trucking Association
- Nebraska Logistics Council
- Crete Carrier
- Werner Enterprises
- Union Pacific
- Iteris
- Trinity Industries
- Ingram Barge Lines
US DOT University Transp. Centers Program

• UTC for Railway Safety
  – Partner in Tier 1 UTC

• Mid-America Transportation Center
  – Region 7 UTC
Space

Whittier Building

ITS Lab (2000 ft²)
- 3 test beds: railway, arterial, highway
- Focus: Safety and Operations
Education
MATC Intern Program

- Founded in 1996
- > 300 participants
- Technical Tours
- Student Presentations
- Scholarships
- Funded by MATC, Public and Private Sponsors
Roads, Rails, and Racecars After School Program
MATC Scholars Program
MATC Courses & Seminars

- MATC Courses
  Railroad operations graduate course
  KSU, KU, UNL

- MATC Seminar / Union Pacific Rail Lecture Series
  - Adobe Connect recording & live streaming via website
Research
Background

- Rail research program at MATC started in 2004
- NDOR sponsored research on unsafe driver maneuvers at highway-rail grade crossings
- Concern was drivers playing “chicken” with trains
- Since then research on crossing safety has continued
- Nebraska-based crossing safety research features prominently in published literature over the past 12 years
Test Bed for Train Detection
HRGC layout - 35th St. and Adams St. in Lincoln, NE
Mobile data collection trailer
Speed profiles of vehicles that are last to proceed the HRGC

(a)

![Graph showing speed profiles of vehicles last to proceed.]

- Speed limit at 56 km/h (35 mph)
- Mean = 1.96std
- Graph indicates speed profiles for different initial speeds and decision points.

Speed profile of vehicle that are first to stop at the stop-lines

(b)

![Graph showing speed profiles of vehicles first to stop.]

- Speed limit at 56 km/h (35 mph)
- Mean = 1.96std
- Graph indicates speed profiles for different initial speeds and decision points.
Crashes At Rail Crossings
Distracted Driving At Crossings
Distracted Driving
Gate Violations
Gate Violations

• Long train warning times
• Long duration of road closure
• Day of week and time of day
• Train stoppage on tracks
• Multiple crossing trains
• Motor vehicle traffic at the crossing
• Adverse weather
Ongoing Research

- AADT in highway-rail crossing crash prediction models
  - The relevant exposure is the motor vehicle traffic encountered when trains are in proximity of the crossing
- Use of AADT versus Traffic Encountering Trains
- How may site ranking differ based on crash model predictions based on AADT and Traffic Encountering Trains
Ongoing Research

• Shipment of oil by rails: Economic implications for rail safety
  • Forecast oil shipments using the Energy Information Administration projections
  • Develop different scenarios (no expansion of pipeline capacity, 20% expansion, ...)
• Estimate changes in safety for different scenarios
• Conduct economic analysis
TRB Committee on Highway/Rail Crossing – AHB60

• **Scope:** “The committee is concerned with the safety and other affected characteristics (including economic considerations, traffic flow and delay, and countermeasures) of both highway and rail traffic at points where they intersect at grade, including the proximate surrounding environment and rail transit facilities. The committee is also concerned with issues related to railroad trespassing, involving pedestrians and people riding on motorized or non-motorized vehicles on railroad tracks and rights-of-way without permission”

• Two subcommittees
  - Rail ROW Trespass & Suicide Prevention Subcommittee
  - Rail Safety Data Subcommittee

• Meets twice – January (at TRB annual meeting) and July

• Members and Friends of the Committee
  - MyTRB.Org
Thank You

Questions