

Missouri Transportation Research
Education Center

MOTREC

2003



Missouri Department of Transportation

MOTREC 2003

August 14, 2003
Capital Plaza Hotel

Addresses by

Kevin Keith, Chief Engineer

MOTREC Partners

Dr. James Thompson – UMC

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Wes Lum – Caltrans (SCOR/RAC)

The 4th Annual Missouri Transportation Research Education Center (MOTREC) Meeting was held August 14, 2003 at the Capitol Plaza Hotel in Jefferson City, MO. MOTREC is a partnership between the University of Missouri – Columbia, University of Missouri – Rolla and MoDOT. MoTREC serves as a venue where academia and practitioners come together to solve transportation challenges in Missouri. The purpose of the biennial meeting is to review the research agenda for MoDOT and make adjustments based on new and changing department directives. This year the meeting was opened by the department’s Chief Engineer, Kevin Keith, MoTREC Leadership and the AASHTO Research Chairman Wes Lum. The morning sessions focused on the needs of department’s business units, Operations, Administration and Project Development. These sessions were chaired by the Business Unit Directors. Technical Advisory Group (TAG) breakout sessions were held in the afternoon. Emphasis areas included the following:

- Project Development/Bridge
- Pavements
- Social/Economic/Environmental
- Geotechnical
- Traffic/Safety
- Operations

The meeting came to a close with TAG summary presentations and concluding remarks from Wes Lum the AASHTO Research Chariman.

National Research Update

MOTREC 2003

(Speaker: Wes Lum)

- Reauthorization
- Future Strategic Highway Research Program
- Research and Technology Partnership Forum
- Research and Technology Coordinating Committee (FHWA)
- AASHTO Standing Committee on Research and Research Advisory Committee
- Federal Highway Administration
- Transportation Research Board

The following are summaries of the Morning Breakout sessions:

Project Development

Morning Breakout

(Moderator: Tim Chojnacki)

Bridge

- How to maintain innovative material structures
- Instrumentation of bridges
 - How to get information from bridge to office
- Better design which will lead to better maintenance
- Data from instrumentation to improve design
- Economical way to instrument existing bridges
- Monitor structures for security purposes
- Geotech investigation for seismic design
- Nonferrous-reinforced bridge decks
- Automated anti-icing bridge decks (automated salt or heated)
- Replace salt
- Implementing LRFD
- Vulnerability assessment (what is the follow-up)
- Renew historically significant bridges
- Keep track of what's been implemented (how did it work)
- Treat bridges as having infinite life
- Bridge approach slabs
- Context sensitive solutions
 - Aesthetics of bridge
- Identify critical structures for security
 - Large cities – Leases underneath
- Build bridges faster
 - Off site construction
 - Long life and can be maintained
- Precast deck panels for bridge
 - Superstructure
 - Appropriate use and construction standards (post tension)
 - Type and thickness of surface course

Design

- GPS and surveying
- CADD technology and visualization
- GIS implementation
- Context sensitive solutions (ADA, bikes, pedestrian)
- Roundabouts/single point urban interchange
- Median design in mountainous terrain

- Tower lighting
- Median acceleration lanes
- Have to reduce number of fatalities
- Low-cost solutions to safety issues (easily implementable)
- What balance to be good stewards of environment
- Endangered species/stream quality
 - Erosion control – policies
- Erosion control – during construction and long term performance
- Seeding or alternative methods – how to hold contractor responsible
- Wetland mitigation versus west Nile virus
- Pavement design – reduce dollar per mile to do more miles
- Need better bases for roadway
- Asset management – keep pavement in good condition
- Plan delivery process
- Public Involvement
- More definitive road user costs
- Economic analysis of performance based specifications
- Value/ return on investment for contractor bonuses, especially related to accelerating construction
- Environmental effects of using non-roadway painted concrete/ brick as clean fill

Right Of Way

- Need uniformity in billboard requirements
- Economic impact of access management
- Scenic byway investment versus economic development
- Relocation assistance for impacted businesses
- Privatization/commercialization of roadway
- Innovative acquisition incentives

Multimodal

- Transit – Oats, buses
- Rail crossing safety
- Access to ports/airports
- Signing to rural airports
- Connectivity between modes

Misc

- Rapid embankment construction
- Performance measures or assessments of systems
 - pavements
 - bridge
 - environment
 - contracting

Policy/Administration

Morning Breakout

(Moderator: Mike Shea)

Fleet

Standards for equipment use (LCC)

Facilities

Standards for build and replacement

Effective Workforce

Desktop delivery for courses/training

Accounting

Fully Integrated Accounting System

- Ties budget to strategic goals
- Use measures to run district/division

Metrics (Measures) for Information Technology

What are we getting out of a project for the dollar amount

Freight

Planning for truck, passenger, OATS and SMTS movements

Economic Analysis

Benefits/costs of a project

User Fees

- Hydrogen
- Hybrid
- Vehicle Registration Tax
- GPS

Performance Measures

Timelines A to B (Reliability)

Operations

Morning Breakout

(Moderator: Don Davidson)

Don Hillis' opening remarks:

- Need safe and secure highway system
- Cost effective research
- Speed and quality research
- Implement within state and federal levels

- Develop champion early in research process
- Security – Bridges, also highway system
- Safety – Education efforts
- Research collaboration
- Districts need to document successful research

Jim Carney’s opening remarks:

- FRP – has worked good
- Bridge approach settlements 6” – 8” are a problem
- Cracking in concrete I-Girders
- Cracking in bridge decks
- HERMES – bridge projects
- Preventive maintenance ideas
- Safety/work zone safety emphasis
- CB radio implementation
- TMA’s – truck friendly???
- Pavement markings – need more than a three month life
- Truck warning lights
- Equipment, GL-400
- De-Icing materials (alternatives)

Mark Shelton’s opening remarks:

- More contractor innovation
 - Performance specifications
- Improve testing procedures for performance specifications
- QC/QA
- Need simple performance testing
- Stay practical/applicable
- Test results need to show “Life Cycle”
- Need more NDT (non destructive testing)
- Environmental issues-must be environmentally sound

Steve McDonald’s opening remarks:

- Tie all ITS together
 - I-70 traffic tie-ups are getting worse
 - Traffic condition thru-out Missouri
 - Evaluate ITS in Kansas City/St Louis areas
- RPM’s – Good but expensive
- Antique radio system (Evaluation)
- Sign sheeting – decision to use high intensity
- LED’s (Acceptable level of burn out LED’s) before replacement
- Signal timing needs to be updated statewide
- Access benefits evaluations
- Striping projects – District 7
Currently, numerous

Tom Ryan – District 6 opening remarks:

- Meaningful and real time research
- Exchange information between District 4 and District 6
- Missing telecommunication links
 - Districts to university research (Implementation)
- Need better implementation between districts
- How do we determine performance measures?
- Remember the traveling public – trust
- Safety – MoDOT and public

Don Hillis Summary

- Do more with less
- High public expectations
- Fewer work zones

Feed Back Session

- Nighttime work zone standards

Social Economic and Environmental Afternoon Breakout

(Moderators: Mike Shea and Ernie Perry)

Training

- Business
- Public Involvement

Research Areas

- Historical bridges (increase service life)
- Increase service life
- West Nile virus impact on wetlands
- Access management – impact on communities
- Excess right away (leasing and security)
- Effects of asphaltic concrete on adjacent green space
- Scenic byways – economic impact
- Environmental management system
- Driver behavior
- Marketing transportation
- Intermodal connections
- Increase safety factor for motor carriers (trucks and buses)
- Impact of motor carrier on highway safety
- Consistency of cost/benefit analysis
- Advertising campaign on driver safety

- Consolidation of services
 - Motor carriers
 - Public safety
- Soil erosion
 - Fiber mats
 - Amendments
 - UMC Biological Engineering

Bridge Tag

Afternoon Breakout

(Moderator: J.D. Wenzlick)

Already working on

- FRP Strengthening
- GPR
- LRFD Design
- Seismic
- Bridge Mix
- Security

New Initiatives

- RMU
- Smart Bridge
- Scour Monitoring
- Pre Fab Bridges
- Cost of Seismic
- Instrument

FRP strengthening and rebars

- GPR - Hermes II
- LRFD design
- Seismic
- Bridge mix
- Security - statewide assessment
- RMU for structures
- Smart bridge (Acoustic, seismic, RFID) – Showcase bridge with instrument, heated deck, etc. (wireless)
- Scour monitoring
- Pre fabricated bridges
- Cost of seismic design - is new design code cost effective for Missouri, geotech investigation (MoDOT cost \$400 million with new code)
- Instrument Mississippi river bridges in Southeast Missouri

Operations TAG

Afternoon Breakout

(Moderator: Tom Anna)

- Implement products/processes results as early as possible during the investigation
- Presently, District 1 is on a 24 year cycle for overlays on lettered routes
- What is the life of our asphalt, pavements today
- Treatments need not be expensive
- We need to investigate research ideas from the Midwest, not from areas that don't have the same or similar soil, weather and traffic conditions
- Cost effective measures for collector roads
 - Cold overlays 1950-1970 had MC asphalt oils. From mid 70's on we were using more, EA asphalt oils. MC's worked better
- Better defined research problems for research
 - Focus on MoDOT problems not retrofit vendor products
 - Get an objective view of what is needed
- Laundry list of MoDOT needs, match to vendor products
- Research on deicing material is critical
- Abandon as soon as possible
- Limited time and resources to continue evaluating products/processes that are either not supported or are not showing favorable results
 - Focus research on what is showing promise
- University participation on operation TAG
- Use ITS in operations (example: concrete loads tracked by truck. ITS could give inspectors the time the mix has been in the truck)

Geotechnical TAG

Afternoon Breakout

(Moderator: Patty Lemongelli)

- LRFD
- Bridge approach slabs
- Erosion Control
 - During construction
 - Long term
- Performance monitoring
- Final product performance tests
- Evaluate earth retained structures
 - Retaining walls
 - Reinforced earth walls

- Slopes – Reinforced
- Soil nailed walls
- Rapid construction
- Continued emphasis on seismic issues
- Need emergency (incident) management system
- Geotech linked with plan scoping
- Better tracking and determination of geotech related costs for better decision making

Pavement TAG

Afternoon Breakout

(Moderator: John Donahue)

- Drainable bases
- Geosynthetics for stabilization
- Pavement nondestructive testing
- Fast accurate specific gravity test
- In-place concrete air voids test
- Preventive maintenance treatments
- Seismic wave surface analysis (SWSA) for subgrade/embankment compaction

Traffic TAG

Afternoon Breakout

(Moderator: Dan Smith)

- Research versus new product to state procedures
- Research vision
- Identify needs
- State strategic plan and business plan
- TAG create a strategic plan to accomplish MoDOT goals
- History synthesis of past products
- Literature review for speed
 - Quick Search (University may have one or two students on a particular project)
 - Set and meet goals in work plans
- Review researching process and send the information state wide
- Implementation
 - How can Universities and RDT be able to implement the studies or products?
 - Maybe have University representative on EPSC to have idea accepted into process of specifications or recommendation
 - Standardize the process
 - Use of districts

Closing Remarks

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(Speaker: Wes Lum)

- “Begin with the end in mind”
- Implementation:
 - What are the practitioner’s problems?
 - Do others share the problem?
 - Will research provide practical solutions?
 - Use practitioners on advisory panels
 - Will research findings require further development and or commercialization?
 - Is this a long-term program with many projects?
 - What have others researched or applied that lends to your problem/solution?
 - Can FHWA help?
 - Customize past or best practices to you situation
 - Are implementation skills different from research skills?
 - Can practitioners on advisory panels help anticipate and prepare for implementation?
 - Do approvals of research projects have a vision or expectation of implementation?
- Speed:
 - Speed of response to research needs is a two-way street. Align MoDOT resources, data, management, priority and processes to anticipate the needs of Missouri and beyond
- Policy:
 - Policy research responds to top management. Do it now.

The Missouri Department of Transportation

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