Technical Committee on Roadside Safety Meeting Begins

WEDNESDAY, SEPTEMBER 14, 2011

- Continental Breakfast 7:00 AM to 8:00 AM

Morning Session [8:00 AM to 12:00 AM]

- Committee Business and Administration
- Introductions and Roll Call
  
  Keith Cota welcomed members to Rapid City and Thanked Bernie Clocksin and Linda Wood of So. Dakota DOT for their efforts in hosting our meeting. The following were present: Rod Lacy Kansas DOT, Joe Jones MO Dot, Bernie Clocksin SD Dot, Mike Bline OH Dot, Will Longstreet, Chuck Niessner, Rory Meza - Texas, Chris Poole - Iowa, Keith Cota, Terry Soos MD Dot, Paul Fossier LADOTD, Clay Gabler, Drew Boyce DelDot, Ken Opiela, Keith Platte, Paula Sind-Prunier NTSB, Roger Bligh TTI
- Review of Minutes from Kansas City, Missouri Meeting - Cota posted the minutes and they were approved.
- Review Roster and Member Assignments
  The Following changes were made. Retirees were deleted. Steve Reeves of Mississippi, Dave Little of Iowa, Ben Buchan of Georgia. Keith Platte has put out a call to the states but there has been little interest. Chris is taking Dave's place until formally approved. We have three Bridge positions open.
- Review NCHRP Project Roster and Member Assignments: Fossier should be on NCHRP 12-90
- Agenda Review/Revisions
- Safety Recommendations on Barriers [Findings from the Munfordville, Kentucky Accident], National Transportation Safety Board (NTSB Dr. Paula Sind-Prunier) [Cota has her PPT]
  NTSB is a catalyst as it has no enforcement authority. The following were issued pursuant to the cross-median crash in Munfordville, KY:

Work with the American Association of State Highway and Transportation Officials to establish warrants and implementation criteria for the selection and installation of Test Level Four and Test Level Five median barriers on the National Highway System. (H-11-XX)

Work with the American Association of State Highway and Transportation Officials to identify cross-median crash rates that call for special consideration when selecting median barriers. (H-11-XX)

Work with the American Association of State Highway and Transportation Officials to define the criteria for median barrier selection, including heavy vehicle traffic volume. (H-11-XX)

Provide to state transportation agencies information from current research, such as National Cooperative Highway Research Program Project 22-25, Development of Guidance
for the Selection, Use, and Maintenance of Cable Barrier Systems, about the safety risks associated with the installation of cable barrier systems that differ from the configuration of the system as designed and tested; information should include the risks associated with the dynamic deflection that may occur when installation distances between cable barrier anchorages differ from the 600-foot test length prescribed in the Manual for Assessing Safety Hardware. (H-11-XX)

Include, in your product acceptance letters for cable barrier safety devices, cautionary language reflecting current research, such as National Cooperative Highway Research Program Project 22-25, Development of Guidance for the Selection, Use, and Maintenance of Cable Barrier Systems, to warn state transportation agencies of the safety risks associated with the installation of cable barrier systems that differ from the configuration of the system as designed and tested; language should include the risks associated with the dynamic deflection that may occur when installation distances between cable barrier anchorages differ from the 600-foot test length prescribed in the Manual for Assessing Safety Hardware. (H-11-XX)

Cota noted that TCRS did not have the research available in the development of the RDG 4th Edition to make these changes. Now we have the research underway that can be used to develop warrants and we need to plan for incorporating this guidance into the RDG. Do we need a motorcoach crash test? Even successful school bus crash tests are not pretty. Also, there are few criteria for upgrading obsolete barriers, but even fewer dollars available to replace these older barriers. FHWA will copy TCRS Chairman on any NTSB recommendations and these will be copied to the membership. Once the guidance is incorporated into the RDG then NTSB can close out the recommendation. If a crash occurs in a state that ignored the guidance, NTSB would issue a recommendation to that state.

- Project Research Presentations (Part 1)
  - NCHRP 22-14(04) – Cable Median Testing on Median Slopes (Texas A&M Roger Bligh)

Ongoing study in cooperation with MWRSF to develop a matrix for testing to MASH on sloped ditch median. Cables tested on flat generally accepted down to 6:1 slopes. Want to reduce impact severity so get barrier as far away from traffic as possible. MWRSF developing a system to be placed anywhere in a 4:1 ditch median. When looking at 350 testing realized each lab had different ditch widths. Showed Matrix A. Since 4:1 to 4:1 ditch is non traversable it had not been considered a problem for vehicle traversability. Currently both the TTI and MW 4:1 projects are on hold because of the failures. MW is shifting concern to 6:1 slopes. Should we continue this research? Should we limit the use of cables on these ditches unless modified by earthwork? Should 4:1 medians be shielded with double runs of cable? Rory asked what states will do if they have cable barriers placed on 6:1 slopes if/when a new test matrix comes out.

- NCHRP 17-11(02) – Development of Clear Recovery Area Guidelines (Texas A&M Roger Bligh)

Began with GM Proving Ground 30 foot clear zone. 1977 Barrier guide used HVOSM to modify 30 foot. 1989 RDG CZ defined by ADT. Same in 2002 and 2011 RDG. There is a need to update CZ that balance safety and cost. Looking at full range of highway classes. Clinical analysis of in depth crash data from 17-11 and 17-22 NASS CDS database. Include driver response and injury severity and
rollover probability. Also use computer simulation study. Data quality issues have been a real hang-up. Rollover crashes will drive clear zones - soil friction, furrowing, soft soil, etc., will have effect. In HVOSM they are determining maximum lateral extent of encroachment with probability distributions (which come from crash data). Also some vehicles are non tracking. Cost effectiveness analysis will use RSAP. Hazard type and severity will be based on crash data. Encroachment rates depend on reanalysis of Cooper data.

Roadside Safety Pooled Fund Research Program.


Crash wall for MSE wall; T-intersection short radius guardrail at TL-2 FHWA letter B-209; Guardrail Deflection Synthesis; Mailbox Hazard and Risk Assessment; Rebar locator for pinned precast barrier application; Split single slope median wall for grade separation; Strong post w-beam on a 2:1 slope (face of rail at SBP) (27" failed, 31" test planned in Nov.); Pinned down concrete barrier for placement on asphalt; Transition from pinned-down barrier on concrete to free-standing; Transition from pinned-down concrete barrier to rigid barrier (with different shapes); Weathering steel guardrail inspection; Portable concrete barrier with large drainage scuppers; Box culvert guardrail; Sign and light standard foundation design when installed on slopes.

- FHWA/AASHTO – European Motorcycle Scanning Tour Overview (NHDOT Keith Cota)

Keith gave his PPT. Focused on infrastructure countermeasures but the Europeans are doing much more. European MC fatalities have been steady or decreasing while in the USA our numbers are increasing. Europeans concentrate on Integrated Approach and address the vehicle, driver, and the road. Heavy emphasis on training and outreach. Infrastructure crash testing of MC friendly barriers based on forces that are survivable in a sliding impact towards the post. Impact speed 40 kmh. Prioritize countermeasure treatment to the high side of a superelevated curve. German guidance for radius less than 400m for motorways and less than 250m on surface roads. Bike modification can increase cost of roadside barrier by 30 percent.

Most Europeans ban cable barriers, but Germans don’t believe wire rope systems are the real problem. Swedes continue to use wire rope systems, but generally have increased spacing of posts. Other treatments include improved delineation, widen clear zones, improve sight distance. Only France had an evaluation underway of these modifications. Gabler confirmed that sliding bikers into posts are a common accident type.

- AASHTO Procedure for Research Project Proposals (AASHTO Keith Platte)
- AFB20 Research Proposals for 2013 (Dick Albin, AFB20)

- Lunch Recess – Noon to 1:00 PM

Afternoon Session [1:00 PM to 5:00 PM]

- Project Research Presentations (Part 2)
  - NCHRP 22-12 (03) - Recommended Guidelines for the Selection of Test Levels 2 Through 5 Bridge Rails (RoadSafe Malcolm Ray)
Replace guidance in 1989 Guide Specs for Bridge Railings. Only using data from closed profile concrete bridge railings. Use new RSAP to generate crash info. 105 miles of NJ Turnpike with only TL5 bridge rails and median barriers. [June 2012 expected completion.]

- NCHRP 22-24 – Guidelines for Verification and Validation of Crash Simulations Used in Roadside Safety Applications (RoadSafe Malcolm Ray)

Completed. To be published as a web only document. Focus on being used to develop / analyze an incremental change to an already crash tested / accepted roadside device. NOT talking about acceptance based solely on simulation. "Validation is the comparison of a numerical result to a physical test." How should TCRS incorporate V&V into our process? TCRS should adopt V&V as our preferred procedure for validating FE analyses. It can be accepted by TCRS letter to FHWA and NCHRP. This should also be sent to TF-13 members to let them know what AASHTO expects with respect to FEA. Cota and Ray will write letter to this effect and send draft through TCRS membership. Rod Lacy moved to have TCRS endorse 22-24 for FEA. Joe Jones seconded. Vote was unanimous to approve.

- NCHRP 22-27 - Roadside Safety Analysis Program (RSAP) Update (RoadSafe Malcolm Ray)

Coding is nearly complete and hope to have alpha test webinar in November / December and a beta workshop at TRB in January. Code is a macro enabled Excel worksheet using Visual Basic for Applications (VBA). Will be easier to update. Many improvements to vehicle trajectories, injury probability have been made. Includes unreported crashes and speed affects. [Approx 35% of cable median barrier crashes are unreported. 75% of concrete barriers are unreported.] Severity is related to the square of the speed.

- NCHRP 22-26 – Factors Relating to Serious Injury and Fatal Motorcycle Crashes with Traffic Barriers (VPI Clay Gabler)

In 2004 MC fatal hits into barriers exceeded automobile fatal crashes into guardrails.

- NCHRP 17-43 – Long-Term Roadside Crash Data Collection Program (VPI Clay Gabler)

NHTSA is supportive of VT dealing with Calspan and KLD collection teams. Hope to have TRB NHTSA MOU in October 2011. Tree Pole crash study: Median delta V of serious injury crashes is only 21.7 mph. 80 percent of serious crashes occur within 30 feet! Gabler will develop a 'white paper' for Keith Platte to help convince NHTSA to collect roadside info under NASS.

- Overview of NCHRP Roadside Safety Related Research – (TRB - Chuck Niessner)
  - Ongoing Road Safety Research Projects
  - NCHRP 12-90
Guidelines for Designing and Shielding Bridge Piers
New Project Proposal will be developed in Nov.

- NCHRP 16-05
Guidelines for Cost-Effective Safety Treatments of Roadside Ditches
Preparing interim report.
NCHRP 17-11(02)
Development of Clear Recovery Area Guidelines
Currently resolving issues with database.

NCHRP 17-43
Long-Term Roadside Crash Data Collection Program
Preparing interim report  Panel meeting late Oct early Nov

NCHRP 17-44
Factors Contributing to Median Encroachments and Cross-Median Crashes
Interim report approved. Identifying countermeasures and developing decision tree.

NCHRP 17-54
Consideration of Roadside Features in the Highway Safety Manual
Develop more quantitative data and crash modification factors to use in the HSM. Conducting Survey

NCHRP 17-55
Guidelines for Slope Traversability
New Project. RFP has been issued

NCHRP 17-61
Work Zone Crash Characteristics
New Project. Amalgamated project on barrier crashes. Drafting RFP

NCHRP 22-12(03)
Recommended Guidelines for the Selection of Test Levels 2 Through 5 Bridge Rails
Executing work plan.

NCHRP 22-14(03) Evaluation of Existing Roadside Safety Hardware Using Updated Criteria
The research has been completed Published as RRD 349. Additional funding for testing cable barriers in median ditches was approved under NCHRP 22-14(4)

NCHRP 22-20(02)
Design Guidelines for TL-3 through TL-5 Roadside Barrier Systems Placed on Mechanically Stabilized Earth (MSE) Retaining Walls
This project is for design forces, not warrants. Concrete barrier is placed directly on top of the wall and a moment slab is used to deal with forces. Conducting simulations on TL3 to TL5 on MSE walls

NCHRP 22-21
Median Cross-Section Design for Rural Divided Highways
Draft Final report been submitted

NCHRP 22-22 Placement of Traffic Barriers on Roadside and Median Slopes
Interim report submitted.

NCHRP 22-23 Criteria for Restoration of Longitudinal Barriers
Completed as NCHRP Report 656
NCHRP 22–24 Guidelines for Verification and Validation of Crash Simulations Used in Roadside Safety Applications—Final report completed.

NCHRP 22-25
Development of Guidance for the Selection, Use, and Maintenance of Cable Barrier Systems
Completed draft barrier placement guidelines. Should be done by end of Sept.

NCHRP 22-26
Factors Related to Serious Injury and Fatal Motorcycle Crashes with Traffic Barriers
Interim report approved by project panel. Collecting case studies. Getting details from trauma centers on extent of injuries. Not as many severe crashes have been occurring as anticipated.

NCHRP 22-27
Roadside Safety Analysis Program (RSAP) Update
Executing approved work plan. Workshop on new RSAP in January 2012

NCHRP 22-28
Criteria for Restoration of Longitudinal Barriers Phase II
New follow on effort. Contract Pending

NCHRP 22-29
Performance of Longitudinal Barriers on Curves and Super-Elevated Roadway Sections.
New project. Work started June 2011.

- Overview of FHWA Turner Fairbanks Research Studies (FHWA - Ken Opiela)
  Ken showed the simulations of the NCHRP 22-14(3) failures. TTI used the Dodge Ram while NHTSA paid for the Silverado model. If TCRS wanted, NCAC could re-run the simulations with modifications to show they meet MASH criteria. Ken was asked if they analyzed the wood post w-beam failure of the splice joint to see if the issue was one of height or strength? No. Ken has provided Artimovich with the NCAC and ACAP lists that are to be appended to these minutes.
- Overview of FHWA Office of Safety

  Dick Albin began with FHWA overview. Gave FHWA definition of Roadway Departure crash. Artimovich discussed upcoming FHWA memo on RDG. Longstreet discussed the TF-13 RDG link.
- Overview of TTI Highway Safety Pooled Fund (Paul Fossier)
- Overview and Discussion on 2013 NCHRP Research Proposals
- Cota reviewed the recently completed research to determine which chapter authors should be assigned the task of reviewing the report and determining what should be changed in that chapter.
Research Problem Statements to be voted on Friday:

- Characteristics of Injury and Fatality of Run-Off-Road Crashes on Low Volume Roadways
- Development of Relationships Between Police Reported Crash Severity and Impact Conditions for Use in RSAP
- Guidelines for Upgrading In-Situ W-Beam Guardrail when subjected to Maintenance and Repairs.
- In Service Evaluation of End Terminals
- Roadside Encroachment Data for High-Volume Roads and Associated Crash Data Collection and Analysis
- Warrants and Implementation Guidelines for TL-4 and TL-5 Median Barriers and Development of a MASH TL-4 and TL-5 Flexible or Semi-Rigid Median Barrier - Do not support in light of the work already done under NCHRP Report 638
- Develop Plan and Guidelines to Improve Roadways and Roadsides for Motorcyclist - Postpone for one year
- Injury and Fatality Causation During Rigid Barrier Impact
- Safety Effects of Roadside Mowing Practices
- Highway and Worker Safety and the Effects of Driver Distraction Caused by Roadside Design Do not support

- Adjourn [5:00 PM]

THURSDAY, SEPTEMBER 23, 2010

- Continental Breakfast 7:00 AM to 8:00 AM

Morning Session [8:00 AM to 12:00 AM]

Keith began with a discussion of when TCRS should be meeting with respect to Task Force 13. We have a close relationship with TF-13 as their website hosts the drawings linked from the Roadside Design Guide. AFB20 also meets with TF-13 but AFB20 was historically a Summer meeting and the joint AFB20/TF13 meeting compromised in the late-May / early June time frame. Niessner said that even though the "deadline" for problem statements was mid-September but would always accept research problem statements even if late. Now AASHTO HQ wants the Technical Committees to submit research through their parent Subcommittees (in our case, the Subcommittee on Design) and they want to receive these ranked by September 1 so they can vote on them before submitting to NCHRP. May have to vote and rank these Problem Statements and forward them to SCOD by September 1. Albin asked what is his deadline for submitting them to TCRS? Opiela noted there is a lot of competition and the problem statements need to be well written. Cota asked what about a meeting every three years where TCRS meets with AFB20 to talk about major research issues. This met with approval with TC members. Although this would separate the formal meeting with TF-13 many TF-13 members attend AFB20 as well. If we have this joint AFB20/TCRS meeting it would be at a TRB facility, namely Irvine CA. Albin will see if TRB is open to hosting a meeting at a non-TRB facility, but maybe we should go to
Irvine. TCRS agreed to a joint meeting next July with AFB20. Albin with check with TRB to see if Irvine is available.

- **Overview of 2011 Update for Roadside Design Guide**
  - Chapter Author Assignments
    - What is the frequency of updating the RDG?
      - Depends on the value of the research, Here are some of the recent topics:
        - Clear Zone
        - Length of Need
        - Placement of Barriers on Slopes
        - Test level selection guidance
        - Slope traversability
        - RSAP
        - Road departure data
        - Drainage grates
        - Tree evaluation in rural and urban areas
        - Breakaway base testing under MASH
        - Pier protection
        - Maintenance practice of hardware systems
        - Barrier updates to MASH
        - MASH transitions to bridgerails
        - Superelevation effects on barriers
        - Short Radius barrier transition details (TL2 and TL3)
        - Transition to 36 inch bridge rails
        - Pre cast portable barrier research
        - Pinning of portable barrier systems
        - Definition of low volume
        - More data to support low volume applications
        - Application of practical experience to low volume roads
        - Cross reference to Highway Safety Manual
        - General Discussion on Process (Strengths and Weakness)
        - Status of publishing
        - Errata Process

- **New Areas of RDG interest**
  - Motorcycle research
  - Maintenance
  - Roadside and object Delineation /Rumble Strips

- **TCRS Support**
  - Can NCHRP 20-7 funding be used to help us update the RDG?
  - On-line word documents for errata and updates
  - AASHTO Ballot comments and editor review process to TCRS (weakness)

- **RDG Reorganization**
  - Should RDG be reorganized to separate barrier warrant issues from physical barrier details and placement considerations. Albin, Jones, Poole, Lacy, Herritt
On line feedback from AASHTO. Questions will be forwarded to Chapter Authors and TCRS Chair for discussion. Remind questioners that the RDG is guidance and the state is the first line agency to interpret that guidance. Lead to FAQs

- Consider asking NACE and/or APWA to appoint a member liaison to TCRS.
- Development of FHWA/AASHTO Protocol for NCHRP 350 Hardware Not Meeting MASH Crash Test Criteria
  - Conditional Acceptance Analysis
  - Sun-Setting Criteria
  - Identify Strategies to Address MASH Non-acceptance
    - Barrier Retrofits Design - Computer Simulations by Turner Fairbanks Research? – (FHWA Ken Opiela)
    - Barrier Crash Testing through Pool Fund States or NCHRP Proposal?
    - In Service Evaluation by Pool Fund States or by NCHRP Proposal?
    - Recommend discontinuance of hardware system use (Notice Process? – AASHTO Balloting?)
    - [Insert Artimovich's PowerPoint here]
  - Draft memo should avoid sounding like it raises the required test level. If we recommend 36" bridge railings how do we deal with GR-BR transitions? A 3:1 taper of the top of the concrete is OK per Ron Faller. Texas uses GR transitions with their 41" parapets. It is pretty certain that 36" is the lowest CMB height that will pass MASH.
  - Page 5-35 of the RDG references the transition guidance for differing test levels. Cota got agreement with TCRS that this was a manageable approach to MASH failures of 350 devices. Need to get details of failed hardware to make sure we know the height of the barrier so that retrofits can be modeled by TFHRC.

- Lunch Recess – Noon to 1:00 PM

Afternoon Session [1:00 PM to 5:00 PM]

- Strategic Planning for MASH Addendum or Rewrite
  - Identification of Critical Research Under Contract
  - Identification of Critical Research Require for Update
  - Strategic Schedule
  - TCRS Overview Process (NCHRP 20-07 Proposal Assistance)
- Strategic Planning for Update of Roadside
  - Addendum Process (Based Upon Critical Research)
  - Identification of Critical Research Under Contract
  - Identification of Critical Research Require for Update
  - Strategic Schedule
  - TCRS Overview Process (NCHRP 20-07 Proposal Assistance)
  - Current NCHRP 350 systems not meeting MASH – Standard Strong Post Beam Guardrail (TL 3), 32-inch Concrete Barrier (TL-4), etc.
  - Identify Strategies to Address
- Barrier Retrofits Design - Computer Simulations by Turner Fairbanks Research? – (FHWA Ken Opiela)
- Barrier Crash Testing through Pool Fund States or NCHRP Proposal?
- In Service Evaluation by Pool Fund States or by NCHRP Proposal?
- Recommend discontinuance of hardware system use (Notice Process? – AASHTO Balloting?)

- Review 2013 Research Problem Statements
  - Characteristics of Injury and Fatality of Run-Off-Road Crashes on Low Volume Roadways Voted and ranked #1
  - Development of Relationships Between Police Reported Crash Severity and Impact Conditions for Use in RSAP 6
  - Guidelines for Upgrading In-Situ W-Beam Guardrail when subjected to Maintenance and Repairs. 2
  - In Service Evaluation of End Terminals 7
  - Roadside Encroachment Data for High-Volume Roads and Associated Crash Data Collection and Analysis 5
  - Warrants and Implementation Guidelines for TL 4 and TL 5 Median Barriers and Development of a MASH TL 4 and TL 5 Flexible or Semi-Rigid Median Barrier
  - Develop Plan and Guidelines to Improve Roadways and Roadside for Motorcyclist
    - Injury and Fatality Causation During Rigid Barrier Impact 4
  - Safety Effects of Roadside Mowing Practices 8
  - Crash Risk of Trees within the Clear Zone. 3
  - Highway and Worker Safety and the Effects of Driver Distraction Caused by Roadside Design

- Adjourn [5:00 PM]

FRIDAY, SEPTEMBER 24, 2010

- Breakfast 7:00 AM to 8:00 AM

Morning Session [8:00 AM to 12:30 AM]

- 2013 Research Problem Statements Priorities and Monitor Assignments
- Review Committee Members Assignments
- Confirm Schedule and Assignments
- Review Work Plan for 2012
- Location and Host for Future TCRS Meetings
  - 2012 Volunteers (Region 2 - Mississippi)
  - 2013 Volunteers (Region 1 New York / New Hampshire / Maryland)
- Adjourn (12:30 PM) - Lunch (on your own) Have a “Safe Trip Home”