

DRAFT MINUTES OF Spring 2013 TASK FORCE 13 MEETING MINUTES

Opened following MidWest States Pooled Fund group meeting

Lincoln, Nebraska April 17-19

Draft of May28, 2013

**Joint Task Force 13 / MWRSF Pooled Fund meeting.**

**1:30 pm Wednesday, April 17, 2013**

**Embassy Suites Hotel, Alumni Room.**

Karla Lechtenberg (MWRSF) put together an agenda and it was populated with representatives from crash test laboratories, manufacturers, and state DOT representatives. This Session was shared using Adobe Connect. In excess of 65 people were attending in person at this joint session.

John Durkos invited the state DOT people to consider the position of Task Force 13 Co-Chair to replace Greg Frederick of Wyoming DOT.

**Roadway Departure Safety Information Clearinghouse Dr. Roger Bligh, TTI**

The Clearinghouse was recommended by AFB20 in their Strategic Plan. The contract to outline the Clearinghouse was initiated with seed money from the FHWA Office of Safety. User in the roadside safety community need more rapid access to, and implementation, of new safety countermeasures and successful practices. As proposed the clearinghouse would be an actively managed information site. A survey of practitioners indicated that FHWA Office of Safety web site was the one they most frequently used currently, but not all of their needs are being met by that site, even in conjunction with internet searches. Advocates of the clearinghouse are now attempting to find funding sources. ATSSA has joined forces with TTI and are bringing their expertise in marketing. Dr. Bligh circulated a form that members could sign to show support from the highway safety community. Development would take \$600K to \$700K and approximately \$200K per year to operate.

**Topic #1 Crash Cushion Implementation**

**Guidelines for Crash Cushion Selection by Kevin Schrum of MWRSF.** The guidance is based on benefit cost analysis using RSAP. Focus items of revision were: Repair Costs, Category Labels, Updated Societal Costs, Incremental BC Analysis. The study looked at crash test numbers 3-31, 3-33, 3-37 for each attenuator and collected the normalized repair costs of those three tests. Ended up with three categories of damage:

- RLM: Repair cost less than \$1000 per impact
- RGM: repair greater than \$1000 per impact
- NRS: Sacrificial (most if not all of the system needs to be replaced after impact.)

As an example of the guidelines, using a B/C requirement of 2, the RLM (least cost to repair) is recommended for a freeway at 75,000 ADT or above. The RGM is recommended at 5000 to 50000 ADT. The report also has recommendations for other functional classes, differing offsets, and degree of curvature. For the future would like to record repair costs and times more precisely for a better comparison. Estimate level of damage to the system to update the Severity Index for the system. Roger Bligh asked if TL-2 attenuators might be cost effective in certain lower volume locations. Answer was yes. Dave Bruzga of NJ DOT said that risk of injury while repairing devices significantly lowers the traffic volumes that justify a low maintenance attenuator. This report will be sent to manufacturers and states for their comments prior to finalizing.

### **Crash Cushion Installation needs:**

Eric Emerson of Wisconsin DOT. Wisconsin funded Mr. Schrum's research because a lot of engineers asked what attenuator to use. [ASK FOR PRESENTATION] Is a gap between an attenuator and the beginning of the barrier OK? If you connect the attenuator to the barrier, how important is the connection? States need better guidance on designing attenuator connections to barriers. Also need to make sure the pavement under the attenuator is the correct strength and/or depth. All permanent attenuators should have a concrete pad that meets manufacturer's recommendations. Asphalt is OK for temp.

Rod Lacy and Scott King of Kansas DOT. KDOT has centralized design. Crash Cushion selection and design are site specific. Their practices and procedures are good on construction. Not yet good with maintenance criteria. These workers are at high risk. Current procedure is to install a normal unit, then if it is hit frequently they will eventually replace it with a low maintenance attenuator. Need to train maintenance staff to repair them efficiently. KDOT likes to avoid wide backup transitions from the attenuator. Easier to do this with concrete to narrow the hazard. KDOT informs media of lane or ramp closures when they repair an attenuator. They also did a B/C analysis on attenuators that showed that the easier they were to repair, the greater the cost-effectiveness.

### Barry Stephens Trinity/Energy Absorption

Barry has "seen it all" regarding poor design, installation, maintenance. His company focuses on site-specific issues so they can help the user with proper design and transitions. As competition came on line, state QPLs resulted in the quality of design to drop. Some states are countering this by requiring training of the installers. Installation manuals are important, but proper design should be addressed up front. John Mauthner of Florida DOT noted that Florida is putting together very detailed design information on attenuators. Contractor's complaints may get back to the Construction Office but that does not get back to Designers.

Gerrit Dyke Lindsay/Barrier Systems also has an "applications engineering team" and trainers.

Tony Capella Biggest problem is contractor involvement. They don't care. Will install the cheapest thing they can find that meets the specification. Contractors will also take shortcuts that affect performance. Mentioned KLS Focus State Contract with Dick Powers providing design info and manufacturers

showcasing their products. Designers are wary of “salesmen” talking to them about their product, this is crucial information that is needed for the safe installation of the device.

Eric Emerson was asked “what do the states want?” Installation manuals are good, but there is not enough information on designing attenuators for varying locations. State DOTs don’t want to do the details needed for a contractor or manufacturer to provide the proper product. If manufacturers are having problems in construction, call the DOT designer to discuss the proper way of resolving issues.

## **Topic 2 3” Guardrail Implementation**

### **State DOT perspective**

Maria Ruppe Ohio DOT. Biggest test was changing the 25 +/- construction drawings over the last year to implement the new guardrail standards. Much of the problem was in making sure new parts match up with old parts. Required all GR panels to have MGS bolt hole spacing. Bridge terminal assemblies were a challenge: had 5 different systems and reduced that to 2 for MGS. Transition 2” in height over 25 foot panel length. When less than 200 feet of guardrail is damaged, they repair in kind. Longer repairs upgrade to MGS. MGS median barrier is wider than many of the crash cushions that they use and that could cause snagging issues. May use 8” blockouts immediately beyond attenuator, then go to 12” blockouts.

Phil TenHulzen of Nebraska DOT. New standard plans using MGS came out last March. Use SRT offset at four feet. Have special detail for thrie beam bridge connection.

Rory Meza of Texas DOT. Texas wanted to keep the 8” blockout and modified the MGS with the shorter blockout which was subsequently tested by TTI and reviewed by FHWA (FHWA Eligibility Letter B-???). Thrie beam bridge transition is the same, except for asymmetrical “Y” piece. TTI also tested a short TL-2 thrie beam transition. They developed a downstream anchor terminal because they were concerned about snagging small cars hitting near the end of their old Texas Twist trailing end anchor. They still face some challenges: retrofitting with existing 27” systems, including T101 bridge rail. Still contending with radius rail, using 27” until their new research on 31” radius rail is tested.

Scott King Kansas DOT. Use 31” MGS with 12” blockouts, using 6 ft posts. Needed to keep terminals at the same length for bidding purposes, use 43 ft 9 inches. The MGS was implemented last year and the drawings are at KSDOT.org under “Doing Business.” They are trying to keep the transition process as simple as possible for contractors. Have had to adjust drainage at the ends of bridges to accommodate MGS post spacing.

### **Manufacturers’ Representatives**

Joe Frazetta of Nucor Steel and the Nu-guard. The Nu-Guard passed TL-4 performance per Report 350. Showed photos of Franconia Notch project using the Nu-Guard median barrier. Both roadside and median tested to TL-3 to MASH.

Andy Artar of Gregory Industries. GMS Gregory Mini Spacer. Only unique feature is special bolt/spacer system that connects rail to the post without an offset block. Noted that implementing the system is made more difficult because they are competing with MGS. Most MGS use is where you don't have enough ROW to use the 12 inch offset block. Does not see where there is a lot of incentive to promote a non-blockout system. Most owners are not interested in using proprietary systems. Performance: 10 states plus Ontario. 100,000 feet in place. Repairs have been routine, and have not got a lot of performance info back from the states. In service performance evaluations are difficult, especially when the market for the product is so small.

John Durkos of Road Systems Inc. MGS Terminal Rail Lengths and Pay Limits. Durkos expected MGS implementation to occur in more states more quickly. There are some issues that have presented a challenge. Encourage first rail section of any terminal should be 12 ft 6 inches as this can be standardized. Accommodating the 3 ft 3 inch shift of the splice to a non-post location can be done elsewhere in the terminal.

#### **Topic #4 Breakaway Sign Supports and Work Zone Sign Supports – MASH, Slopes, and Foundations**

Jennifer Schmidt, MwRSF. Summarized WZ testing sponsored by Grant Dicke etc. 350 devices were essentially "tuned" to pass the 820C. Failure under MASH results can result from very minor differences but various heights and substrates were tested with small car and pickup resulting in failures. Grippe asked if these results are really a problem in the real world, and Sicking noted we always test to the "state of the possible." Breakaway supports have performed very well.

Roger Bligh, TTI. MASH Impact Performance on permanent breakaway sign supports. Roger reported on 5 different projects that included small sign support testing. Big change in MASH is the addition of the 2270P test for all breakaway supports. Breakaway sign support occupant risk criteria is much more stringent than for other safety features. Tested the following: Wedge Anchor, Slip Base, U-Channel, Perforated Square Steel Tube. Noted that TX DoT minimum sign mounting height is 7 feet. The MUTCD allows 5 feet in rural areas which has very negative implications for all vehicles under MASH because shorter sign installations would result in more windshield contact. Recommendation to strengthen sign connection to PSST was to keep the CG height up.

#### **Topic #4 Cable Median Barriers**

Ron Faller MwRSF. Test Matrix Update. Test 9 was removed from the matrices proposed for testing cable barriers in V-ditch medians. Test 3 is optional for narrow medians. Results in 7 tests if your cable barrier is located four feet off the hinge point. Looking to have a draft of these changes to MASH prior to the New Orleans summer meeting of TCRS.

Cody Stolle MwRSF. Cable barrier placement from accident perspective. Analyzed over 6000 cable barrier crashes and saw penetrations, rollovers, and severe crashes ("K" or "A Injury" severity.) More penetrations occur when barrier is placed near center of ditch. Rollovers follow opposite trend. More rollovers happen when barrier is close to traveled way. Speed and mass of vehicle have a significant effect on cable penetrations. Significant reduction in A+K with four cable system if cables are at

different heights. Post spacing was typically 12 to 16 feet, with a few up to 20 feet post spacing. Length of damaged barrier has poor correlation to severity, but impact angle does show high correlation to high severity. [Editor's note: This has interesting implications because we say that median barriers are placed to prevent cross median crashes, yet the "safest" location overall is in the middle of the median. At this location the overall crash number and severity is the lowest, yet the potential for underride is greatest.]

Roger Bligh, TTI. A Pillar deformation criteria for cable and tall barriers. Higher cables may interact with vehicle above hood height and contact "A" pillar, side window, and "B" pillar. Is the side window broken by cable or by "A" pillar deformation? Do we know enough yet to reduce the 12" / 9" deformation down to 3" range, or allow any contact with cable thru side window? Do we need a measurement for the "A" pillar or continue to rely on roof and windshield deformation?

## **Task Force 13 Spring Meeting April 18, 2013**

### **Lincoln, Nebraska**

At 8:08 am John Durkos opened the meeting, welcoming members back to Lincoln. Because of promotions and additional duties, Gregg Fredrick of Wyoming DOT has stepped down as co-chair of Task Force 13. We are looking for a state DOT member to accept the other co-chair position. Four people were on line through Adobe Connect as we broadcast to membership unable to join us in person. Tomorrow we will meet at the City Campus Union Building three blocks east, one block north to the building on the UNL campus at R and 14<sup>th</sup> street. John thanked Ron Faller, Karla Lechtenberg, Larry Bock and the rest of the UNL staff for all of their preparations for this meeting. There were numerous First Time Attendees: Ten new faces at this meeting.

John explained our general schedule over the next day and a half. 2011 Roadside Design Guide refers directly to the Task Force 13 website for hardware details. There is work yet to be done for the drawing review process. We have a responsibility to provide accurate and up to date information on the website. We are still seeking participation in the Drainage Hardware Subcommittee.

Lunch will be in the atrium. Dinner will be at Single Barrel just across the street from the Embassy Suites. Will have two breakout sessions this afternoon in the Alumni Room.

We had good success with early registration. We appreciate members signing up early, as it is important to have a good handle on who is coming in order to secure the best rates for rooms, meals, snacks, etc., so please, register as early as you can for upcoming meetings.

Artimovich summarized the Subcommittee activities from Gettysburg.

#### Task Force 13 Website and TTI Website Maintenance Contract - Subcommittee #1

Durkos noted that John LaTurner initiated the TF13 website nearly ten years ago, and thanked him for that pioneering effort. We now have a contract with TTI to maintain the website. Chad Heimbecker summarized his work on the NCHRP 20-7 Task 328 contract Update of the AASHTO Guide to Standardized Highway Barrier Hardware Online guide. Chad's goal is to assist TTI in their website work

with our drawings. He reviewed 691 separate designators to see what is needed to bring the drawings up on the website in an optimum condition so that our website can get caught up. Many of those designators do not yet have drawings associated with them. If manufacturers have TF13 drawings and have not been contacted by Chad, please send an email to him at: [cheimbecker@swiftwater-solutions.com](mailto:cheimbecker@swiftwater-solutions.com)

Dave Bizouga of NJDOT asked if there was a way to print out all drawings. This is not possible now as the concept for the website is that it is dynamic and will be continually upgraded, rendering paper copies obsolete. There are many other suggestions for improvements to the website.

Ron Faller asked what is the time frame for getting drawings posted to the website. There are a number of drawings that have been reviewed and in the queue. ProBoards era drawings are no longer posted. Most of the drawings are saved in various locations on TTI's server.

Arrington noted that there are some missing drawings (about 50) and the drawing owners have been asked to send the latest version. Have also sequestered other old drawings because status was uncertain, and asked manufacturers to send new or updated drawings.

While Chad has this contract, he should receive drawings that are ready to post (in addition to Dusty.)

Karla asked if Chad knows which drawings have already gone through the review process. He does have flags on some drawings, some he does not. Some of this history may be in the meeting minutes. Eric Lowrey noted that their contract includes preparing content and drawings for designators for which there is no "owner." Durkos proposed a conference call to discuss these in detail.

Dusty Arrington discussed the TTI Contract.

He only wants drawings that are approved and ready to post. If it is in the "Review" stage drawings must be sent to the Task Group Leader and to Chad. Dusty again showed the basic website structure. TTI is now proposing for the Third Phase Contract where the user Interface is the hot topic. The whole reason we went to a web based document is to avoid the need for a paper copy that will be quickly obsolete. Next task is for Tech Reps to upload files directly to add them to the database. We do not yet have the funding to move Roadsafe LLC's files to TTI yet.

Bill Wilson of Wyoming asked if component drawings, like the asymmetrical "Y", were going to be available in the Transition Guide? BR and Transition guide will be linked, but still working on the BR guide and haven't yet dealt with transitions.

Keith Platte of AASHTO sent a survey to the states and got many good comments from the users about the TF13 site.

Lechtenberg noted the following Guardrail and Median Barrier drawings were reviewed with the group in Spring 2012 and are ready for the guide:

SWC16 PCB transition; FPA03 Cable Anchor Bracket; PDE18 Timber GuardRail post; PDE20 White Pine GR post; PWE10 Wide Flange Anchor Base Post.

These were reviewed and approved in Fall 2012:

FMW04 End Pin Pipe Sleeve; FPA04 Nose Cable anchor plate; FWR10 U bolt plate washer.

Five drawings were reviewed and approved with changes although there were only 3 to 4 reviewers. 1 required resubmittal. Is the TF OK with bringing a drawing forward with only 3 to 4 people having reviewed it? Durkos will put this on the Executive Board agenda for this afternoon. Rick Mauer asked if a Tech Rep should approve a drawing if a reviewer makes comments that lead to a change in the drawing. Takach noted that the reviewers should have some expertise with the products. In reality we only get a few people looking at each drawing. Gripne said it's good to get the drawings reviewed, but they need to get posted as a priority. Three people should be enough to get it posted, then you will have dozens of people looking at it that will find errors. Rich Brown of Transpo noted that we need guidelines for the reviewers; Bizouga noted that a reviewer may just have questions that don't necessarily relate to potential changes. These should be asked of the drawing owner for clarification. If you then have a suggestion to clarify the drawing, then it should go to the tech rep.

If you want to become a member of a TF-13 Review Group, contact the Tech Rep for that group and let them know. When you log on to drawing review you will see all the drawings that you have to review. Once you review a drawing and submit it (and changing the status to "approved" "approved with comments" or not approved) it will drop off your list.

Lechtenberg will send out a few drawings every few weeks with a deadline for review. This will make drawing reviews seem less daunting. [Editor's note. I just took a few minutes to log into our website and review the drawings Karla sent out recently. I admit I had to make a few experimental clicks here and there to get everything to allow me to review and comment, and to approve the drawings, but it works like a charm. If we can all get on board with reviewing drawings between meetings, we may have to find other things to talk about. Shall we re-hash English/Metric units again? More than likely we will be able to reduce the overlap with some of our subcommittees.]

Mauthner asked if the drawings are dated. Yes. But the approval date by TF-13 would be useful to include.

Reviewed at this meeting:

FBU01 U-bolt and nut. Logged on reviewers may make comments directly to the PDF. When done, click on "Publish Comments" to send. Direction of threads was wrong on one leg of bolt. Tried to avoid discussion on metric units again (as we discussed at every meeting from April 2001 to September 2005.)

PWE11 Discussed need for specific tolerances in some uses; PTE08; RCM02 Thrie Beam Bullnose Cable.

Subcommittee #3 Bridge Railing and Transition Hardware. Bligh and Brauner (not present)

Our push is to get meaningful reviews done of our drawings and get them up on the guide. Volunteers always needed to review drawings. Unfortunately, few in attendance had completed their assigned railing reviews. We don't want to make it too burdensome, how can we make the process easier? BR guide is different from Barrier Hardware Guide. It does not have the same drawing format and is dynamically generated. Not as detailed as Barrier Guide, more a catalog of what is available. Info required:

- Contact Info
- System Attributes
- Photos (Minimum 1)
- Drawing – cross section with key dimensions
- Supplemental Info optional: Other photos, FHWA letter, state DOT drawings.

The review process ensures that all info is up to date and accurate, and that all links work. Many photos are not correct and need updating. Many system drawings are outdated. Cross section sketches need dimensions. Weight per foot is missing. FHWA Acceptance/Eligibility is missing. Artimovich noted that FHWA website includes a spreadsheet of railings tested in the 1980's and early 1990's that were grandfathered into NCHRP Report 350. [Here is the link to that spreadsheet: [http://safety.fhwa.dot.gov/roadway\\_dept/policy\\_guide/road\\_hardware/barriers/bridgerailings/docs/apendixb5.pdf](http://safety.fhwa.dot.gov/roadway_dept/policy_guide/road_hardware/barriers/bridgerailings/docs/apendixb5.pdf) Here is the link to the research report titles that are associated with each railing: [http://safety.fhwa.dot.gov/roadway\\_dept/policy\\_guide/road\\_hardware/barriers/bridgerailings/docs/apendixb6.pdf](http://safety.fhwa.dot.gov/roadway_dept/policy_guide/road_hardware/barriers/bridgerailings/docs/apendixb6.pdf) ]

Kurt Brauner and William Williams will help reviewers to update drawings. A checklist for reviewers would be very helpful, too. William Williams has a PPT on this.

Three working groups: Concrete: Brauner; Steel: Williams; Other: Fuller

Ron gave an update on his working group. Aluminum, Wood, and other materials.

SBD01a & SBD07a Reviews were completed, but problems noted later; SBD01b: TL2 Glulam Timber; SBD01d TL-4 Glulam Timber. "Deck Mounted" because of the direction of the mounting bolt; SBD02c Tubular steel backed timber railing; SBD04a Glacier National Park removable railing.

The following need reviews SBD03b, SBC02b, SBA01b, SBA02b, SBA03b, SBA04b, SBA05d, SBA07d.

#### Subcommittee #7 Certification of Test Facilities

Lance Bullard. Kelsey Chiu has left Karco and Karla Lechtenberg has agreed to be a co-chair.

All labs but one have ISO 17025 certification. All labs need Inter-laboratory Comparisons (ILCs) to maintain their certification. ILCs help labs to maintain their proficiency.

#### **2012 ILC**



Arrington. ILC: TRAP is a program for reducing the data recorded from a crash test to determine occupant impact values. A set of data was circulated among the labs. The way that data was filtered has changed according to EN1317. This ILC was initiated to validate the new lab methods. A sample MASH 3-11 test data set was sent to all the labs to run. Request was to calculate the ASI. TTI, Caltrans, and TRC all got an ASI of 2.08. TTI filters data as it is downloaded. Some labs need the original data to filter. Based on those comments, another set of raw test data was sent to the labs as well as the filtered data. Apparently TRAP can't properly run un-filtered data as the ASI was 0. TTI has contacted the contractor to revise TRAP, then the crash data will be sent to the labs again. (All data actually is already filtered through CFC 1000 as it is recorded to prevent anti-aliasing.)

Bielberg: Went in depth into their analysis of the data set that TTI had sent out. MWRSF and TRAP 2.3.7 produced similar results using un filtered data. TRAP does not appear to be filtering data properly.

2012 ILC analysis had several issues that prevented valid comparisons including filtering issues and software bugs.

Bielberg noted the goals of ILC are to ensure consistent data. Must be more than a simple analysis, comparing the data from the various labs; need to compare results to known results and find sources of deviations. All the labs need to be following the same procedures in order to get the most accurate answers.

Auditors will want to see that the labs have taken corrective action. Once the TRAP software is corrected, labs will go through this again.

### **Soil Performance Testing**

Lechtenberg discussed this in Gettysburg. Next step is to re write Appendix B of MASH to correct the issue. Where will the funding come from, and who will make the edits? Will FHWA accept test results with the proposed soil performance tests before they are finalized in MASH? Artimovich agreed that FHWA will allow the revised method if it is given preliminary OK by TCRS.

There was discussion regarding the uncertainty of the existing procedures. Mark Bush noted that if TCRS approves the proposed revision of MASH then 20-7 funding could be available.

### **FHWA and FEA/V&V**

FHWA would like to continue to provide the service of reviewing modifications to crashworthy hardware. In the past, the submitter had to run crash tests to verify that the modified device still met the test criteria, or provide an engineering analysis that proved the modification would enhance crashworthiness, or at worst would have no significant effect on the performance of the device. Finite Element Analysis gives us an extra level of confidence when reviewing proposed modifications that are not expected to have a significant effect on the crashworthiness of the device. The V&V analysis was intended to show that the modeling of the revised device was good, and that states could be confident that the modified device still met the crash test criteria. Currently FHWA's FORM for submitting devices for review:

[\[http://safety.fhwa.dot.gov/roadway\\_dept/policy\\_guide/road\\_hardware/forms/eligibility\\_form\\_v7\\_032\\_813.pdf\]](http://safety.fhwa.dot.gov/roadway_dept/policy_guide/road_hardware/forms/eligibility_form_v7_032_813.pdf) lists a number of labs that have shown proficiency in FEA modeling. FHWA has confidence that these laboratories will produce valid models and test simulations. But like with physical crash test laboratories, we need some way to verify FEA modelers know what they are doing. Like the ISO17025 we need some process that FEA modelers can go through to show they are competent in doing such modeling. This was brought before AFB20 in January in Washington, DC, but because they have no system in place for ILC, they deferred the question to Task Force 13. However, TF-13 notes that the most extensive experience with FEA lies with the membership of AFB20. Both Task Force 13 SubComm 7 and AFB20 Computational Mechanics Subcommittee need to be involved in determining which labs are qualified to run and submit FEA.

### **Next Inter Laboratory Comparison**

Film analysis is proposed

### **Summary of Other Breakout Sessions**

**#3 Bridge Rails and Transitions:** Need more active participation. NJ dot offered subject matter experts. Could use more. Discussed how to enhance and encourage the railing review process.

**#4 Drainage: Chuck Patterson VDOT.** Chuck surveyed 50 states and no one replied that they use it. Next process is to identify what products they would find useful. Many ASTM and AASHTO designations need to be updated. Stormwater management needs to be added.

**#5 Breakaway Supports:** Richard Brown. 20 people. Covered 3 discussion topics as possible research statements.

- Ground clearance per MASH criteria. TTI testing shows some concern for low signs. As signs get higher, retroreflectivity could be compromised with taller signs.
- Ability of sign panel to activate hinge plates for both 20 and 60 mph tests. There are no standardized sign panels used by the various states.
- Update needed for pendulum testing criteria per MASH.

### **#6 Work Zone Hardware Meeting Minutes (recorded by Karen Boodlal)**

With absence of Co-Chairs Greg Schertz and Mike Dreznes, Barry Stephens served as the substitute chair of the meeting.

Subcommittee's mission statement was briefly reviewed. Minutes from last WZ subcommittee meeting (Gettysburg) were briefly reviewed and accepted by the attendees. Discussions then covered the following topics;

Topic: Harmonizing TMA Delineation

No clear TMA delineation guidelines are provided in the RDG or MUTCD. A wide variety of TMA delineation shapes, sizes and colors have been specified by various agencies since TMA were introduced in the late 1970's....examples were presented. During the Fall 2012 meeting, suggestion was made to consider standardization. There exists a FEMA conspicuity study for emergency vehicles. Should these standards be considered for TMAs?

Group reviewed a draft Problem Statement covering this topic and suggested two revisions (*copy is available from Barry Stephens... [barry.stephens@trin.net](mailto:barry.stephens@trin.net)*): a) consider adding use as a temporary crash cushion as a fourth principal reason for using TMAs, b) revise the 3rd bullet under Phase II – Existing units in the field should be considered for upgrading, especially if they lack night reflectivity.

- Dean Alberson agreed to share draft of problem statement with Dr. Jerry Ullman, who chairs a TRB's WZ committee. This committee might be the best one to take this problem statement forward.
- Recommended Funding: Phase I - \$50,000 NCHRP 20-7 Synthesis Fund

Topic: Standardizing of signs mounted to the tops of portable concrete barrier

TTI (Dean Alberson) provided an update on TXDOT Project 0-6143. Under this project hardware was developed and successfully tested. This report has been completed and is available online. TTI is currently wrapping up a related Project 0-6646, which should be available shortly. Other States will have access and could use these reports to create sign mounting standards.

Topic: MASH Testing of Temporary WZ Devices

How do we motivate manufacturers to test their devices to new MASH testing standards? States are concerned about small, temporary signs being impacted by the new MASH 2270p pickup, with its higher windshield. Manufacturers are not testing the devices to MASH because there is no mandate. Some questioned the relevance of this testing. Do statistics show people being injured or killed by these signs? Testing costs and potential sign redesign were mentioned as issues.

Topic: TMA Roll Ahead – Confusion in the field

Dreznes requested that TMA roll ahead be discussed. He stated there may be a false perception that shadow trucks equipped with TMAs experience reduced roll ahead after impacts. Although the roll ahead might be very slightly reduced, generally the reduction will be insignificant. There exists a 1980's Humphrey/Sullivan report (Univ. of Tennessee) that predicts anticipated TMA roll ahead for different weight shadow truck at different impact speeds when impacted by different weight vehicles. Should this study be updated to clarify roll ahead issues for end-users? If yes, should the update reflect other types of shadow trucks and larger impact vehicles?

Outcome of discussion: Dusty Arrington and Kevin Groeneweg (Mobile Barriers, [kevin@mobilebarriers.com](mailto:kevin@mobilebarriers.com)) agreed to jointly prepare a "white paper/problem-statement" to consider an update to the Humphrey/Sullivan study. They will include the merits of adding automatic shadow truck braking (activated by impact into the TMA) to help minimize roll ahead.

Topic: Should we promote elimination of human flaggers?

This topic was presented, focusing on the efforts in Europe to use robotic flaggers. Concerns were expressed about a) the high cost of robotic flaggers b) the loss of flagger flexibility in short-term work zones and c) and the lack of data that shows that flaggers are getting injured. Group agreed to revisit this topic during next meeting.

Other Misc. WZ hardware discussions;

- Crash Cushion Foundations – should these be standardized for common crash cushion classes? Group agreed that although the idea has merit, many CC foundations must address site-specific issues. Also, placement of rebar in foundations may be specific to a crash cushion type. Group agreed that no further action is required.
- Crash Cushion Delineation – should these be standardized? Comment was made that States use the MUTCD or their own standard. Although idea has merit, the group agreed that this would likely be very difficult to implement. Group agreed to shelve this idea.

#### **Artimovich and FAQs.**

The FAQs that were summarized are presented in detail on the FHWA Websites:

Barriers, Terminals, Bridge Railings:

[http://safety.fhwa.dot.gov/roadway\\_dept/policy\\_guide/road\\_hardware/qa\\_bttabr.cfm](http://safety.fhwa.dot.gov/roadway_dept/policy_guide/road_hardware/qa_bttabr.cfm)

Eligibility Letters for Roadside Hardware:

[http://safety.fhwa.dot.gov/roadway\\_dept/policy\\_guide/road\\_hardware/faq\\_eligibility\\_letters.cfm](http://safety.fhwa.dot.gov/roadway_dept/policy_guide/road_hardware/faq_eligibility_letters.cfm)

#### Executive Board Meeting – Co Chairs and Tech Reps

In attendance were: Durkos, Artimovich, Brown, Mauer, Lechtenberg, Patterson, Clark, Arrington, Bullard, Bligh, Stevens, LaTurner, Tackach , Hare

TTI/TF-13 Phase 3 contract. Dusty summarized it. Estimated cost for the next two years was \$55,484.

- Update Barrier Hardware Guide user interface
- Let Tech Reps update and maintain Barrier Hardware Guide
- Service and maintenance of online guides
- Maintenance of web pages.
- On line training for TF13 members
- Update and maintenance of Standard Operating Procedure as they develop stuff
- Provide added functionality
- Travel to meetings

Durkos noted we have slowly raised our registration fees over the years and our checking account can cover this. We will review the contract and get back to TTI on this.

What about drawings that Chad says are missing? We should have a conference call to clarify this. Also need to discuss the format of information that Chad responds with so that it will conform to the TTI data base. Some of the “missing” drawings may be from the hard copy 1995 manual, Designators that FHWA has granted but the manufacturer has not submitted the drawing yet, etc.

What does a Tech Rep need to move a drawing forward?

Note which units the drawing was constructed in, SI or English. Conversion is not just dimensions, actually results in different hardware. Should we do drawings in English only? Durkos noted we should clear this with TCRS if we want to change. Since RDG is dual unit should we continue to use dual units? Do metric dimensions imply something that is not valid?

DOT participation, we had 11 different DOTs represented. Also need to encourage Local FHWA Division Office to attend.

TTI has not set a date for the fall meeting. Last week in September is a distinct possibility.

2014: We don't know if TCRS and AFB20 will meet together in the summer. If we meet with AFB20 again, or with some other organization, where/when would that be? Portsmouth, NH, St. Louis MO.

[Friday, April 19, 2013](#)

Began at 8:00 a.m.

### **Affiliated Committee / Activity Reports**

#### **AASHTO Subcommittee on Bridges and Structures:**

Keith Fulton sent Durkos a few notes. **[JOHN, PLEASE ADD KEITH'S NOTES HERE]**

Next meeting will be in July in Portland OR. 2014 Meeting to be held in Columbus, Ohio.

AASHTO Update? Mark Bush Volunteered to discuss AASHTO during his presentation.

NACE Conference in Des Moines begins next week. Highway Safety projects are to be data driven, since the majority of fatal crashes occur in rural areas County Engineers should be more involved.

#### **Donna Clark ATSSA:**

Clark brought the membership up to date on [ATSSA](#) activities including the Annual Meeting held last February in San Diego, the Mid Year to be held in August in Nashville, the National Work Zone Awareness Week, the ATSSA Legislative Fly In, the National Work Zone Memorial, and Work Zone Safety Grants, among other Association activities.

TRB Committee AFB20:

Durkos noted next meeting will be in New Orleans July 7 through July 10 with TCRS meeting July 10-12. Subcommittees and Joint subcommittee on Positive Protection will meet, as will an RSAP workshop.

Task Force 13 Marketing Subcommittee.

Donna Clark. Next newsletter should go out in May and looking for articles to publish. Want to publicize the Drainage Subcommittee and the proposed Roadside Safety Clearinghouse. Will add an events calendar. Task Force 13 is the longest standing [Task Force under the Joint Committee, begun in 1969](#). Now that we are part of the RDG effort our name is getting out there.

New Areas of Standardization

Review Group under Subcommittee #7 for review of FEA / V&V competency should be formed to coordinate efforts with AFB 20 Subcommittee #2 on Computational Mechanics.

Past proposed efforts: portable concrete barriers, connection of devices on top of barriers.

Mark Bush National Cooperative Highway Research Program

Provided handout on NCHRP Safety Projects.[Ask Mark for this file as well as his PPT]

AFB20 will meet with TCRS in July.

NCHRP Celebrated 50 years, created in June 1962. National Academies celebrating 150 years.

Mark mentioned the following NCHRP projects. See the NCHRP Website to see any past or current project: <http://www.trb.org/NCHRP/NCHRPProjects.aspx>

17-43, 22-12(03), 22-20(02) were last year's continuations

03-96, 17-46, 17-50 are this year's continuations.

16-05	In Phase 2
17-11(02)	Interim report released
17-54	Ongoing
17-55	Ongoing
22-12(03)	moving along very well
22-14(04)	Cable in ditches
22-20(02)	Continuation request was funded
22-26	Project extended in order to collect additional data

- 22-27 Recently completed. Available thru website and AASHTO RDG bookstore???
- 22-28 In phase 2
- 15-53 Barriers at bridge rail ends
- 22-30 In Service Evaluation of End Terminals

Roger Bligh of TTI

Bligh reported on the following TTI projects:

- Field Inspection Technique for Guardrail Beam Integrity.
- Non Pinned End Treatment for Low Profile Concrete Barrier.
- Terminal for 20-inch portable system for urban work zones. Original end treatment designed to be pinned to pavement. New end connects to line of barriers. Max dynamic deflection was 42 inches with 5000P. Small car gated over terminal successfully. Remained upright with 51 degree maximum roll angle.
- TL-3 Guardrail Transition without curb. Nested thrie beam transition. Developed by MWRSF in 1998. Failed as pickup rolled onto its side. Even though thrie beam is within 11 inches of the ground, without the curb there is too much tire contact with the end of the parapet, causing vehicle instability.

Karla Lechtenberg of MWRSF.

Lechtenberg reported on the following MidWest efforts at UNL:

- Thrie Beam Stiffness Transition from MGS (test in the vicinity of the asymmetrical “Y” piece.) After failure with small car, added w beam nesting just ahead of asymmetrical “Y”. 2270P test yet to be conducted.
- Cable Median Barrier. TL-3 compliant 4-cable system. Redesigned top cable attachment. Developed new post shape, lighter than S3x5.7 Redesigned cable to post attachment to ensure release and to decrease loads on the a-pillar.

Eduardo Arispe FHWA / FOIL / NCAC

Arispe discussed roadside safety program at FHWA. Current contract with GWU/NCAC will end at the end of this year. There will be an RFP on the street this fall for the next contract.

- Working on Department of State security barriers.
- Looking at future vehicle fleet using current FEA models, but reducing the weight of the components while keeping their strength.
- Honeycomb nose for a MASH bogie, waiting for material to arrive to fabricate nose.
- Working on ditch traversability testing, sharing with TTI on 17-55 project.
- Finishing mid-size Camry model. Will be running tests for NCHRP 22-28 restoration project.

### Will Longstreet

Longstreet was brought to us via Adobe Connect. He gave the presentation on FHWA Eligibility. The Federal Aid Reimbursement Eligibility Process is linked here:

[http://safety.fhwa.dot.gov/roadway\\_dept/policy\\_guide/road\\_hardware/acceptprocess/](http://safety.fhwa.dot.gov/roadway_dept/policy_guide/road_hardware/acceptprocess/)

The FORM that submitters should use is linked here:

[http://safety.fhwa.dot.gov/roadway\\_dept/policy\\_guide/road\\_hardware/forms/eligibility\\_form\\_v7\\_032813.pdf](http://safety.fhwa.dot.gov/roadway_dept/policy_guide/road_hardware/forms/eligibility_form_v7_032813.pdf)

The most recent version differs from earlier forms by incorporating a number of improvements, which are detailed on the FHWA website:

[http://safety.fhwa.dot.gov/roadway\\_dept/policy\\_guide/road\\_hardware/forms/eligibility\\_form\\_listofchanges040113.pdf](http://safety.fhwa.dot.gov/roadway_dept/policy_guide/road_hardware/forms/eligibility_form_listofchanges040113.pdf)

Rod Lacy of KDOT noted the State still takes our letter and reviews the hardware for use in Kansas. John Mauthner asked that original electronic images be attached to the letter rather than be copied and cut and pasted and scanned where you lose a lot of fidelity. Barry Stephens disused cosmetic changes and asked if these changes needed FHWA review.

Longstreet also discussed the hardware charts "Roadside System Resource Charts" produced by KLS Engineering. These charts summarize crashworthy roadside safety hardware and include contact information so that users can obtain additional information for proper use of these devices.

### John Mauthner Florida DOT

Roadside Safety System Installer and Design Mentor Courses. Held in Florida in March of 2013. This information is very valuable to counties and cities lacking information on roadside safety. Local jurisdictions should be included on training such as this. Very valuable resource and beneficial to the state of Florida. Received a lot of positive feedback.

In Service Performance Evaluations for G4(1S) Strong Post W-Beam Guardrail System and Cable Median Barrier. Collected data using Google Street View. Using data from 2006-2010 the researchers identified 40,738 crashes into w-beam. Found overrides and penetrations, but no underrides. The evaluation showed that the 31" guardrail should be used in Florida as there was a significant difference in performance of w beam with cars vs light trucks.

ISPE of cable median barrier. Reviewed 8818 crashes over the period 2003-2010. Had underride, override, and penetrations. Of the 549 cable barrier crashes they only found 14 crashes (2.6%) that resulted in vehicles crossing over and getting into the opposing lanes. Fatal crash rate dropped by 42%. Overall crossover rate decreased by 78.8%. Overall K&A rate reduced by 26.6%.

Would like to get together with other states regarding implementation of roadside and median barriers and barrier terminals.

### Old and New Business



Will meet in College Station TX in the fall. TTI will give us the date as soon as they can set it.

2014 meetings? Don't know if TCRS/AFB20 will meet together or with TF-13. We could meet with others, such as AASHTO Committee on Maintenance. ATSSA? NACE? Art Dinitz has connections to Sarasota, Florida. Rick Mauer offered Portsmouth NH. Joe Frazzetta offered St. Louis, MO. Barry Stevens suggested South Lake Tahoe, CA. Voted on the following: Sarasota 8, Portsmouth 7, So Lake Tahoe 19, St Louis 1. (Sorry, Joe.)

If we continue to partner with MW Pooled Fund, it will be Lincoln, Nebraska, again in April 2014.

Durkos summarized the Executive Board meeting. TF members will review Phase 3 contract with TTI. Conference Call on drawings with Chad. Gave latitude to tech reps for approving drawings.

Artimovich prepared the following To Do List for Task Force 13:

Durkos and Boodlal to send all Lincoln Presentations to Dusty for Website

All members should get a username and password for the website and sign up for a free Adobe account in order to review and comment on drawings.

Manufacturers work with Chad Heimbecker to update drawings

Coordinate MASH Soil Strength Guideline Revisions with TCRS

Chuck Patterson will send an article on drainage Subcommittee

Roger Bligh will send an article on Clearinghouse

Secretary to ensure that speakers know that they are on the TF meeting agenda

Encourage local FHWA and State DOT officials to join our meetings

Coordinate ILC of FEA/V&V with AFB20

Comment on "Guidelines for Crash Cushion Selection" by Kevin Schrum of MWRSF

Hardware manufacturers should provide better information to designers, not just to installers.

Coordinate minimum sign height with MUTCD

Refine failure criteria for a-pillar deformation

# Current NCHRP Safety Projects

Project #	Project Title	Qtr for Completion	Objective
03-108	Guidance on Quantifying Benefits of TIM Strategies	Q1, 2015 (Pending)	To develop a guidance document for analyzing and quantifying the impacts of traffic incidents and the economic benefits of TIM strategies. The guidance shall be useful and applicable for TIM program mid-level managers/analysts in planning and operations for a broad spectrum of transportation and incident responding agencies with varying TIM program maturity levels and a variety of data collection capabilities.
16-05	Development of Cost-Effective Treatments of Roadside Ditches to Reduce the Number and Severity of Roadside Crashes	Q4, 2013	To develop guidelines for cost-effective treatments of roadside ditches and appurtenances in order to reduce the severity of ditch crashes.
17-11(02)	Development of Clear Recovery Area Guidelines	Q3, 2013	To develop guidelines for roadside clear zones that can be incorporated into the AASHTO <i>Roadside Design Guide</i> .
17-43	Long-Term Roadside Crash Data Collection Program	Q3, 2016	To (1) supplement the long-term crash data collection program created under NCHRP Project 17-22, (2) investigate options for modifying the database and linking it with other relevant databases, (3) demonstrate the types of analyses that would be possible with a detailed database of roadside crashes, (4) develop an improved procedure for determining longitudinal barrier length of need, and (5) recommend procedures for ongoing collection and management of the database. This research should provide solid evidence that demonstrates the value of having a long-term, detailed roadside crash database that can provide an in-depth, continually growing, data resource applicable to solving roadside safety problems.
17-46	Comprehensive Analysis Framework for Safety Investment Decisions	Q2, 2013	To (1) develop a comprehensive analysis framework for safety investment decisions across engineering, education, enforcement, and emergency medical services that are transferable across federal, state, and local governments and (2) evaluate the relative effectiveness of the framework.
17-47	Human Factors Guidelines for Road Systems-Phase IV	Q2, 2013	To complete the development of the Human Factors Guide.
17-48	Highway Infrastructure and Operations Safety Research Needs	Q2, 2013	To: (a) Develop a detailed methodology for identifying and evaluating research needs in the area of highway infrastructure and operations safety. (b) After objective (a) has been completed, reviewed, and approved by the NCHRP, implement the methodology to identify and evaluate research needs in the areas of highway infrastructure and operations safety. (c) Develop a detailed plan that can be implemented by other entities within the transportation community to transform the identified research needs into a formal national research agenda.

<b>Project #</b>	<b>Project Title</b>	<b>Qtr for Completion</b>	<b>Objective</b>
<b>17-50</b>	Lead States Initiative for Implementing the Highway Safety Manual	Q2, 2013	To provide technical assistance to facilitate the implementation of the Highway Safety Manual (HSM) and to develop an HSM User Guide based on the experiences and examples of the lead states to assist other highway agencies in implementing the HSM.
<b>17-51</b>	Input to the Development of a National Highway Safety Strategy	Q4, 2013	To identify strategies, existing and proposed, to achieve various safety-related goals over an extended period of 25 years. An array of potential strategies will be organized into a framework based on the desired safety outcome and the expected degree or rate of success. Via the framework, stakeholders will be presented with options for formulating their highway safety plans to address national, state, or local levels of activity. Strategies may also include new directions for needed research.
<b>17-54</b>	Consideration of Roadside Features in the Highway Safety Manual	Q3, 2014	To develop quantitative measures that can be incorporated into the HSM to evaluate the effects of roadside designs and features on the frequency and severity of lane departure crashes.
<b>17-55</b>	Guidelines for Slope Traversability	Q4, 2014	The objective of this research is to develop guidelines for what constitutes recoverable, traversable, and critical sideslope conditions considering the characteristics of today's passenger vehicle fleet.

Project #	Project Title	Qtr for Completion	Objective
17-57	Development of a Comprehensive Approach for Serious Traffic Crash Injury Measurement and Reporting Systems	Q2, 2014	<p>The objectives of this research are to:</p> <p>(a) Identify an injury scoring system for further consideration. Analyze the advantages and disadvantages of conventional injury scoring systems based on International Statistical Classification of Diseases and Related Health Problems (ICD) codes and KABCO. Document advantages and disadvantages of various definitions for a serious injury metric. (b) Develop a roadmap to assist states in developing and implementing an interim system to measure and report injury severity using accepted injury scoring systems based on ICD codes. The intent of the roadmap is to enable year-to-year performance assessment by states using a standard measure. At a minimum, the roadmap should document a workable process(es) for linking statewide crash and hospital discharge data. For states where complete crash and/or hospital discharge data do not exist, identify surrogate sources, such as trauma registries, or alternative measures, such as estimates, that can be used within the workable process as an interim step until the preferred process(es) can be implemented. Identify means to overcome technical, legal, political, financial, and other challenges to implementation and linkage of these state-based data systems. The states' future performance assessments will yield at a minimum the number of serious injury crashes and the number of persons seriously injured in each state using a standardized definition. This step should lead to the ultimate outcome, which is a unified database as described further in (c). (c) Expanding on (b), develop a state-based framework to perform comprehensive linkage of records related to motor vehicle crashes resulting in serious injuries, and incremental steps and priorities for achieving the linkage. A direct linkage is strongly preferred but it is recognized that alternative linkage methods may be appropriate, so the framework should include methods to be used when linkage is unsuccessful. Records may include crash and citation records; pre-hospital (telematics, 911, EMS, etc.); hospital (ED/inpatient); disability; death (coroner, medical examiner, vital statistics); trauma registries; traumatic brain injury registries; and roadway and traffic inventories. The framework will provide for a comprehensive analysis and understanding of the factors associated with serious injuries before, during, and after the crashes, and the associated medical outcomes. This will allow for the development, implementation, and evaluation of countermeasures for serious injury crashes, and continuous system improvement.</p>
17-58	Safety Prediction Models for Six-Lane and One-Way Urban and Suburban Arterials	Q1, 2016	<p>The objectives of this research are to (1) develop a predictive method for use in the HSM to address crash frequency and severity for both roadway segments and intersections on arterials with six or more lanes and one-way arterial streets and (2) provide procedures that will assist transportation agencies to consider safety in decisions related to these facilities during widening and modifying existing arterials or designing new facilities. The scope of the research will be limited to urban and suburban highways and streets other than freeways.</p>

Project #	Project Title	Qtr for Completion	Objective
17-60	Cost-Benefit Metrics for Behavioral Highway Safety Countermeasures	Q2, 2014	<p>(a) Develop a benefit-cost methodology for behavioral highway safety countermeasures that can be used by state and local entities. The methodology should provide a quantitative analytical approach that uses clearly defined criteria to determine the value of the countermeasure. It should also include an approach for isolating the effects of individual countermeasures. Costs should include specific state and local program implementation costs, other costs borne by government, and societal costs (e.g., private medical costs, lost wages, reduced productivity).</p> <p>(b) Apply the methodology to at least three proven (known effectiveness) countermeasures to demonstrate that the methodology is effective and widely usable. The proven countermeasures should come from the areas of occupant protection, alcohol/drug impairment, and speed. Revise the methodology as needed.</p> <p>(c) Once the benefit-cost methodology is successfully used (objective “b”), apply it to three to five of the countermeasures rated as “likely” to be effective (see <i>NCHRP Report 622</i>). This is a two-part process: (1) quantify the effectiveness and (2) apply the methodology to determine the benefit-cost of the countermeasure.</p>
17-62	Improved Prediction Models for Crash Types and Crash Severities	Q2, 2016 (Pending)	<p>To develop:</p> <ol style="list-style-type: none"> <li>1. Crash severity and crash type SPFs or distributions or both that can be used in the estimation of the crash type and crash severity likely on the facility types contained or intended for use in the HSM;</li> <li>2. Recommendations of how the research results can be incorporated into the HSM and associated tools, including the development of associated chapters or chapter content in AASHTO standard format for the HSM second edition and recommended procedures for consistent use of crash severity and crash type SPFs or distributions or both; and</li> <li>3. A description of the statistical and practical advantages and disadvantages of the methodology developed in the research and potential barriers to implementation.</li> </ol>
17-63	Guidance for the Development and Application of Crash Modification Factors	Q2, 2016 (Pending)	<p>To develop:</p> <ol style="list-style-type: none"> <li>1. Guidelines for calibration of current CMFs to assess treatment effectiveness at sites for which the site characteristics (e.g., geographical location, terrain, traffic demand, geometric design, traffic control features) may be different.</li> <li>2. Guidelines for how existing and future CMFs can be combined in a single location with multiple treatments.</li> <li>3. Recommended procedures for formulating and calibrating future CMFs that identify key influential site characteristics.</li> </ol>
17-64	Guidance for the Implementation of the Toward Zero Deaths National Highway Safety Strategy	Pending	<p>To advance the implementation of the Toward Zero Deaths national strategy on highway safety which is expected to be adopted by AASHTO and other safety partners.</p>

<b>Project #</b>	<b>Project Title</b>	<b>Qtr for Completion</b>	<b>Objective</b>
<b>20-24(37)k</b>	Measuring Performance among State DOTs: Sharing Good Practices – Safety (Serious Injuries)	Q3, 2013	To (a) review and assess states' current practices for quantifying serious injuries from motor vehicle crashes, (b) describe issues to be addressed in adapting CODES or other available databases to provide a basis for comparative analysis of DOT performance regarding serious crash injuries and safety management, and (c) describe feasible options for addressing these issues and assess their relative merits.
<b>22-12(03)</b>	Recommended Guidelines for the Selection of Test Levels 2 Through 5 Bridge Rails	Q4, 2013	To develop recommended guidelines for the selection of Test Levels 2 through 5 bridge rails considering in-service performance.
<b>22-14(04)</b>	Testing of Cable Median Barrier in a Narrow Ditch	Q4, 2013	To conduct a full-scale crash test of a generic 4-cable median barrier in a narrow ditch with 4H:1V slopes – one on the ditch foreslope with a pickup truck, and one on the ditch backslope with a small car and develop a final matrix for updating and refining the MASH.
<b>22-20(02)</b>	Design Guidelines for TL-3 through TL-5 Roadside Barrier Systems Placed on Mechanically Stabilized Earth (MSE) Retaining Walls	Q1, 2014	To develop, in a format suitable for consideration by AASHTO, recommended guidelines for designing roadside barrier systems placed on MSE retaining structures to resist vehicular impact loadings varying from passenger vehicles to heavy trucks. To extend the work done under Project 22-20, this project will consist of engineering analyses, computer modeling, and bogie testing for Test Levels 3 through 5 and will include full-scale crash testing of a tractor-van trailer (TL-5) into a barrier placed atop an MSE retaining wall. The guidelines should address Test Levels 3 through 5. Specific considerations include defining appropriate design loads, developing procedures for sizing the traffic barrier foundation, and designing the MSE wall when traffic barriers are required.
<b>22-26</b>	Identification of Factors Related to Serious Injury and Fatal Motorcycle Crashes into Traffic Barriers	Q4, 2013	To identify factors contributing to serious injury and fatal motorcycle collisions with traffic barriers.
<b>22-27</b>	Roadside Safety Analysis Program (RSAP) Update	Completed	To rewrite the software, update the manuals, improve the user interface, and update the embedded default data tables of the Roadside Safety Analysis Program (RSAP).
<b>22-28</b>	Criteria for Restoration of Longitudinal Barriers, Phase II	Q4, 2014	To develop more comprehensive guidance to assist maintenance personnel in determining the extent of damage to semi-rigid longitudinal barriers that affects operational performance. The guidance may cover additional strong steel post W-beam guardrail failure modes or other types of longitudinal barriers. It is expected that this research will continue the work begun under NCHRP Project 22-23 and may involve a combination of component testing, pendulum testing, and computer simulation. Full-scale crash testing may be considered to validate the other methods of analysis, but is not the focus of this research.

Project #	Project Title	Objective
17-46	Comprehensive Analysis Framework for Safety Investment Decisions (continuation)	<p>(1) To identify proven safety countermeasures from both behavioral and engineering disciplines by compiling information from the research literature and through surveys targeting state DOTs and highway safety offices (HSO). Where gaps in the research literature exist, the research team would be expected to identify educated assumptions based on available research or recognize the need for additional primary research.</p> <p>(2) To work with the major highway safety agencies to obtain input on the proposed rating scheme and identify a process whereby this uniform scheme would be incorporated into safety publications.</p>
17-50	Lead States Initiative for Implementing the Highway Safety Manual (continuation)	<p>To provide, maintain and advance implementation efforts of the HSM. This would occur through the following activities.</p> <ul style="list-style-type: none"> <li>• Hold two additional peer exchanges, with the invitees expanded to include eight (8)-ten (10) support states, and potentially select local agencies.</li> <li>• Develop templates that can be used by states to develop polices for HSM implementation.</li> <li>• Develop a series of webinars of best practices of HSM Implementation that will be available to all agencies that are interested in sharing best practices and learning from states that have been successful.</li> <li>• Continue briefings of AASHTO Committees on progress toward implementation, insights on lessons learned, barriers overcome, and successes in implementation.</li> </ul>
03-111	Effectiveness of Work Zone Transportation Management Plan (TMP) Strategies (+\$100,000 from FHWA)	<p>To provide additional guidance to work zone practitioners on the selection of TMP strategies by synthesizing the results of existing TMP strategy evaluations, conducting additional TMP strategy evaluations, and providing a mechanism to disseminate information on TMP strategy effectiveness to work zone practitioners.</p>
03-112	Operational and Safety Considerations in Making Lane Width Decisions on Urban and Suburban Arterials	<p>To investigate the effects of lane width on operations and safety on urban and suburban arterials with specific consideration of transit, freight, on-street parking, bicycle usage, and shared vs. exclusive lane use to create a guidance document that can be used to identify the most efficient use of a given pavement width as a function of available space and anticipated use by transit, bicycles, on-street parking, and/or freight.</p>
03-113	Spacing, Signal Timing and Performance of Diverging Diamond Interchange and Adjacent Intersections	<p>Develop a foundation of guidelines for the effectiveness of the DDI for factors related to spacing, volumes and adjacent intersections.</p>
03-114	Operational and Reliability Impacts of Active Traffic Management (ATM) Strategies	<p>To: (1) review existing studies on operational and reliability impacts of ATM strategies, and corresponding lifecycle costs, resource requirements, and institutional and management challenges with operating and maintaining ATM strategies, and make the study data easily accessible, and (2) validate and expand the current ATM HCM-based Analysis Methodology to incorporate a wider range of ATM strategies, synergistic impacts of multiple ATM strategies, and the relative impacts of applying ATM strategies further along the active management continuum (e.g., moving from fixed time-of-day ramp metering to adaptive, system-wide ramp metering).</p>

<b>Project #</b>	<b>Project Title</b>	<b>Objective</b>
<b>03-115</b>	Production of a Major Update to the 2010 Highway Capacity Manual	To update the HCM 2010 (with a target publication date within 2015) so that it can fully support (1) the performance measure requirements of MAP-21, (2) travel time reliability analysis, and (3) ATDM strategy evaluation, while maintaining its support of the more traditional system planning, design, and operations activities.
<b>15-53</b>	Roadside Design for Conflicts in Proximity to Bridge Ends and Intersecting Roadways	To develop safety treatment alternatives for documentation in future update of the AASHTO Roadside Design Guide to be used where intersecting driveways, streets, local roads or other conflicts are placed near a bridge end.
<b>17-65</b>	Two-Lane Highway Operational Performance and Design Effects on Safety	To: 1) create a calibrated two-lane highway simulation tool that can be used to develop operational models for the HCM and assist in the evaluation of the safety effects of operation in the HSM and IHSDM, 2) Test several candidate performance measures and identify the most promising one(s), and 3) Develop new performance relationships using the preferred performance measure(s).
<b>17-66</b>	Evaluation of Opposite Direction Crashes and Appropriate Countermeasures (for 2-Lane Highways)	To (1) understand the roadway factors that influence opposite direction crashes and their frequency, such as ADT, horizontal curves, speed limits, access control, etc. (2) quantify the safety performance of countermeasures in place individually and when used together, such as rumble strips/stripes, providing separation between opposing lanes, addition of a barrier, etc., if there are differences between performance of countermeasures on tangent and curved roads, the extent that barrier placement in narrow medians may increase collisions, and if the countermeasures impact other road users (such as bicyclists and motorcyclists) as well as adjacent property owners (i.e. noise from rumble strips/stripes).
<b>17-67</b>	Identification of Factors Contributing to the Decline of Traffic Fatalities in the United States	To identify factors in the decline of traffic fatalities in the United States and quantify their effects on safety.
<b>17-68</b>	Intersection Crash Prediction Methods for the Highway Safety Manual	To develop a set of safety prediction methods that are comprehensive in their ability to address a wide range of intersection configurations and traffic control modes in rural and urban areas.
<b>22-30</b>	In Service Evaluation of End Terminals	To: <ul style="list-style-type: none"> <li>• Work with selected States to conduct an in-service performance study to evaluate the real-world impact performance of the most common barrier end terminals currently in service in this country.</li> <li>• Develop a list of in-service factors that may affect end terminal performance. These factors are expected to include weather and climate, maintenance and installation factors, actual impact parameters, and others.</li> <li>• Evaluate the comparative crash performance of end terminals currently in service in this country in terms of injury severity, secondary crash involvement, repair costs, and routine maintenance needs.</li> </ul>