# Joint Discussion Meeting
# AASHTO Task Force 13 and Midwest Pooled Fund Program
# April 16, 2014 Lied Center – University of Nebraska

Ron Faller welcomed Task Force 13 and Pooled Fund members to the discussion while members have traveled to the same city.

Topic #1: FHWA Update: Will Longstreet – G4(1S) Retrofit Flowchart.

Topic #2: FHWA Eligibility Procedures Nick Artimovich – See for latest procedures posted online. http://safety.fhwa.dot.gov/roadway_dept/policy_guide/road_hardware/acceptprocess/

Open for comment: Should the FHWA form note that the Lab's signature indicates the effect is positive or inconsequential? Large organizations may have issues with Electronic Signature, so check with your IT people to ensure there are no problems. The lab should be the last signer, but should be cc'd when the manufacturer submits it to FHWA. Test Lab can load backup tests and other info onto their own FTP site and be sure of what info is there, and what they are signing off on.

Topic #3 Intersecting roadways: Eric Emmerson: WisDOT Short Radius presentation with numerous photos. SRG installed adjacent to a long-span gap, need larger radius to accommodate turning trucks, roads and driveways are often difficult to move.

Phil Tenhulzen: NE DOR additional photos.

Lance Bullard: Recent project – Best practices for barrier protection of bridge ends – synthesis of current practices. Current practice for most states is Yuma County short radius system.

Cody Stolle WisDOT funded larger "short radius" project. Impact at the center of the nose is most critical. Both Wash DOT and Yuma Co were TL-2 systems tested under NCHRP Report 230. MW study looked at radii up to 70 feet. Simulated 27 and 31 inch G4(1S) systems but were unsuccessful. Phase I membrane tension dominates, Phase II transition, Phase III pocketing develops. Expect that adding blockouts to 31" system will be effective. FEA did not include rail rupture, and rails to tend to tear under these conditions.

Bielenberg summarized testing on short radius guardrail. UNL did a lot of work with slotted nose thrie beam radius. Looked promising but the system was getting too long to be practical, and work stopped. Received funding for NDOR to "take a clean sheet of paper" and look at the situation with existing technologies. Looked at dragnet, sand barrel systems, and bullnose with net.

Faller: what can we agree to for the terrain behind a short radius treatment to make sure our design will meet real world conditions? State engineers say there is no flat terrain you can count on.

Chris Poole: Is this a real world problem? Are we having problems with vehicles hitting radius guardrail? Do we have any real world experience?
Mark Bush: NCHRP project will address this in an upcoming project with $500,000.

Dave Bizuga noted New Jersey has used the Washington State design and it has worked well.

Phil Tenhulzen: Maybe we should use TL-2 and provide as much as we can.

Chris Poole: Our first priority should be to relocate driveway. (Right of way costs are often prohibitive.)

Bill Wilson: Dragnet idea is intriguing.

Dean Alberson: States don't like to use crash cushions where they don't have to. To solve this problem we will not be able to reject "stupid ideas."

Don Gripne: WA State DOT has many canals and ditch rider roads so they came up with weak post radius concept.

Topic #4 Tall Barriers and Barrier Attachements.
Scott Rosenbaugh: ZOI. Showed TL-4 truck knocking off light pole. Also showed pickup interaction with ped rail that led to truck rollover. ZOI varies greatly by barrier profile, height, vehicle/test conditions, and impact speed. Head ejection criteria attempts to avoid passengers head from hitting barrier.

Bizuga notes LRFD and RDG are in conflict. A lot of frustration in New Jersey over this.

Eduardo Arispe: Does the side curtain airbag solve the problem? Do we know when airbags go off?
Dean Alberson: ZOI for Barrier Mounted Hardware. Chain link fence on top of Jersey barrier would have been contacted by dummy head. Tested sign on top of temp barrier that deflected – head may have impacted sign.

State perspectives:
Chris Poole Iowa DOT: Showed MW pooled-fund head-ejection median barrier. Also developed half-shape and a 54-inch tall for LRFD. (42" version topmost slope extended up at same angle till you get to 54") Use 54" version to shield piers or poles in the median. Installations in Iowa use aesthetic texturing of the face.(Iowa also usually adds 2" to their concrete barriers to accommodate overlays, but not to these. Other states treat heights differently.) Vertical barrier showing improved performance over F shape. TTI and MWRSF agree. Both single slope designs show more climb than vertical. FHWA should push for vertical barriers.?

Mike Elli MinnDOT uses bridgerails of 32" ,42", 54". Showed video of pickup hitting a 32" bridgerail of a flyover and vehicle overtopped rail. Led to increasing the height of standard railings. Snow piled in front of these barriers may cause ramping problem, so state policy calls for removing this snow after mainlines are cleared. (Also discovered that OSHA calls for

minimum height of 42” +/- 3 whenever workers are on the bridge.) Minnesota are also working on implementing Head Ejection Criteria , Zone of Intrusion, Bicycle Rail Height and MASH.

Fouad Jaber, NDOR: Prefers “open rail” to permit view of water and better public perception of the facility. Use 42” parapets that meet head ejection criteria. Cast in place with steel forms. Slip forming just didn’t work.

Emerson: Wisconsin: it is very difficult to keep designers from putting stuff on top of concrete barriers. Same for PennDot.

Bill Wilson: Wyoming: Try to keep face of poles, sign bridges, etc., 18” behind the face of barriers.

Poole: Iowa: we should be using simulation to expand our knowledge of ZOI and Head Ejection. Should report working width and head ejection on all crash tests.

Faller: We should be using dummies on more of these tests to better evaluate head slap. There was a master’s thesis looking at adding dummies to simulations.

Jaber: NE DOR: What is the real risk of head slap? Faller noted that barriers meeting the criteria eliminate the concern for such injury. Dean Sicking had done some analysis a while ago and noted there were more injuries when hitting taller barriers.

Alberson: Why isn’t head slap a criteria to be evaluated in MASH? Proposes that this should be included. MWRSF agrees.

# Task Force 13 Meeting
# Thursday, April 17, 2014

Task Force Co-Chair John Durkos welcomed members to Lincoln and thanked the TTI team for their good work to coordinate the College Station meeting last fall, and made special not of Larry Bock, Ron Faller, and UNL for all the preparations at the current meeting. He also thanked Karen Boodlal and all co-chairs for their efforts. Mentioned pooled fund joint meeting held yesterday afternoon, and the prior history of meeting with AFB20 and TCRS. Discussed subcommittee meetings and new Subcommittee on Computational Mechanics. Durkos showed the FHWA Eligibility Flow Chart and where Computational Mechanics fit in. Discussed moving guides to RoadSafeLLC and to keep the Drawing Review Process with TTI. Asked who looked at drawings since last meeting? All who did will get a drink on TF13 tonight.

All present introduced themselves. Artimovich then reviewed the subcommittee activity from the Fall 2013 meeting in College Station. John moved to approve minutes. Karla Lechtenberg seconded. Approved.

**<u>Subcommittee #1</u> Publications Maintenance**
Dr. Malcolm Ray addressed web site transition. Maine had a wicked hard winter. Developing contract for web services with 5 Online guides. Barrier Hardware is busiest, located at TTI along with the Task Force 13 Home Page and drawing review. Bridge Transition, Sign, Luminaire, and Components will stay at Roadsafe. Roadsafe will host all guides in the future as well as the homepage. Will maintain content of homepage and the hardware guides. Will transform the Barrier Hardware Guide into same format as the Bridge Rail Guide. Will then update the Hardware Guide with content from 20-7 products.

Lechtenberg: how will components be addressed? All components from all the guides will be linked to the Component Guide once all guides are hosted together.

John LaTurner: Who will handle drawing review process? That is still up in the air and is up to the Task Force. [It has since been agreed that RoadSafeLLC will handle the website, publications, and drawing review.]

Durkos noted that in the last 6 months FHWA has assigned 20-30 designators, and the drawings are either ready with that number incorporated, or have no drawing prepared. But many drawings for FHWA-Eligible hardware have not yet been reviewed/posted to the website. We need to decide on next step to move these drawings forward.

Eric Lohrey gave us a status update of the 20-7 project on the Barrier Guide. The year-long project was to collect all designators and drawings and consolidate onto a single spreadsheet. Each designator has a folder with drawings, FHWA letter, video, whatever info is associated with the designator. Each alpha designation is split out as a different line. Proprietary and non-proprietary are segregated. They did work on non-proprietary to link to FHWA letter, etc. For proprietary products the manufacturer was asked to provide the information. This information needs now to be loaded up to the TF13 page. Ray noted Chad Heimbecker used MySQL well and it will be easy to incorporate that information into the guide's structure. Lechtenberg asked

how many have been reviewed. About one third have been. Lohrey suggests all drawings be posted with a note as to whether they have been reviewed and approved by TF13. Dusty noted that the Tech Reps report they have no drawings to review. The TR and members need to set deadlines to get the drawings reviewed and approved. Current guides have only 350-approved hardware. Lohrey archived 230 and earlier hardware that is not part of active database. Asked manufacturers if older hardware was still supported.

**Subcommittee #2 Barrier Hardware**
Lechtenberg led a review of a number of drawings that had been submitted to the Task Force. Comments and reviews were done on line from www.aashtotf13.org.

When manufacturers submit drawings they should be saved as unrestricted PDF files. Otherwise they cannot be uploaded/reviewed by Task Force members.

**Subcommittee #3 Bridge Rails and Transitions**
Roger Bligh reviewed their progress in updating rails. Reviewed material from Kurt Brauner who is the Concrete Tech Rep. Four concrete railings are ready to move to ready status. A few others have issues. William Williams' Steel group had 5 systems completed and ready for Accepted status and 2 others need updates, with one new system to be submitted soon. Discussed minor wording for search criteria – "approval" status change to" review" status. Discussed a wish list for website. Add a checklist for reviewers. Simplify submittal process with automated menu. Bridge rail drawings are posted immediately to the guide, and review occurs in that venue.

**Subcommittee #4 Drainage Hardware**
Did not meet.

**Subcommittee #5 Sign and Luminaire Supports**
Eric Lohrey provided the following notes:

Fifteen (15) attendees present.

Eric Lohrey was appointed co-chair of Subcommittee #5, Sign & Luminaire Supports. Previous co-chair, Richard Brown has retired, and will not be as active in TF13 activities.

Current co-chair, Keith Fulton of WYDOT has changed work responsibilities, and will no longer be directly involved with TF13. An invitation to any interested person from FHWA or a state DOT who wishes to serve as co-chair was presented to the full group. Those interested may contact Eric Lohrey or John Durkos.

The subcommittee currently maintains two (2) TF13 guides, as follows:

1. A Guide to Small Sign Support Hardware.
2. A Guide to Luminaire Supports.

To facilitate improvements and new additions to TF13 guides, Technical Representatives are assigned to coordinate review activities and revisions for functional groups of hardware systems. After soliciting volunteers, the following have been assigned as Technical Representatives for Subcommittee #5:

Small Sign Supports (less than 9 lbs/ft)

Joe Frazzetta, Nucor Highway Products, joe.frazzetta@nucor.com.

Medium Sign Supports (9 - 45 lbs/ft)

Eric Lohrey, P.E., ECL Engineering, PLLC, Eric@ECLengineering.com.

Luminaire Supports

Barry Sladek, P.E., Valmont Structures, bsladek@valmont.com.

TF13 members and other users of the Sign & Luminaires guides may send new or updated guide materials to these Technical Representatives for the appropriate sub-category.

Both the Sign & Luminaires guides were accessed online and reviewed during the meeting. A number of systems are labeled with status "In Review". By the next meeting, these systems will be reviewed to determine what revisions are necessary to obtain "TF13 Reviewed" status. If necessary, new or revised materials will be created and submitted to the drawing review process.

It was noted that only two (2) pole system manufacturers are currently represented in the online Luminaire Support Guide. By the next meeting, the subcommittee hopes to contact some additional pole manufacturers to solicit more participation in the guide.

A question was asked: Are the number of hits (page views) recorded and/or available for each of the TF13 online guides? Answer to be determined by the next meeting.

**Subcommittee #6 Work Zone Hardware**

Greg Schertz provided the following notes:

28 Participants

**Truck Mounted Attenuator (TMA) Delineation:**

The reason for the Problem Statement was due to the differences of patterns, colors, and the effect on the motoring public. Rick Mauer has been in contact with Paul Carlson of TTI, who is on the NCUTCD. He stated back in January that it is really the role of TF-13. Rick is continuing to work with Paul and plans on pursuing a change in the MUTCD to standardize TMA delineation. Rick will be in contact with those that participated in the Workzone Hardware Subcommittee meeting today to see who might want to be involved in developing the problem statement.

**Standardized Mounting of Signs on Portable Barriers:**

Dusty said that the two projects are completed and ready to be published Project # 0-6646 & Project # 0-6143. The reports should be available on the TTI website.

**Use of a Message Board In Lieu of Arrow Panel:**

There was a discussion about the need to allow use of a message board in place of an arrow board to display the arrows at the same dimensions for the characters, but the overall size should be allowed to vary slightly.
Artimovich said that the MUTCD does have an experimental feature provision to allow for variations of the recommended standard. Donna Clark will check into the ability to allow this variation. Keith and Barry will develop a problem statement for submission to the NCUTCD for a possible change to the MUTCD.

**TMA Host Vehicle Roll-ahead Distance Chart:**
Kevin Groeniwig wants TF13 to revisit the roll-ahead distance chart. The impacting vehicle weights in the chart goes from 2000 # to 80,000 #'s. There is a belief that the chart could be misleading. Thoughts were that the chart would have to be expanded, and that is not practical due to the enormous resulting distances that would not be feasible in the work zone. It was even stated that some states have used two host vehicles in an effort to absorb a large truck impact. Tony Capella said that he thought that it would be most useful to just make sure the existing chart is up to date (recheck calculations). Dusty Arrington will check that. (Humphrey Sullivan chart) Donna said that ATSSA also uses the chart in their training courses and would appreciate being informed of any modifications.

**Evaluation of In-Service Concrete Barriers to Determine Serviceability:**
John Durkos briefed the subcommittee. Pricilla Tobias from IL DOT agreed to take the Problem Statement to AASHTO to see if it could obtain funding. She will also check with ILDOT to see if they would directly fund it.

**Work Zone Barrier Charts**
Karen Boodlal with KLS showed a chart that is being created to show work zone barriers and portrays them in a similar manner to the current resource charts now available for guardrail, cable rail, crash cushions, etc. The chart will be reviewed by the manufacturers before it is available to the public.

**Work Zone Devices – Do they need to meet MASH?**
Artimovich asked what the group thought about retesting 350 tested work zone devices to meet MASH. Test facilities indicated that they have conducted tests showing a weakness in that area, but that would not be true for all of those products. A presentation is requested for the next meeting of TF-13.

**Subcommittee #7** Certification of Test Facilities
Lance Bullard and Karla Lechtenberg

Inter Laboratory Comparisons on film/ high speed video analysis will be sent out by Dusty. Will be contacting labs with a few questions, then will be sending .cine files.

Lechtenberg reviewed proposed MASH changes/updates - TCRS gave approval to move these forward.

- Hinged post
- Location of post for soil test – propose that post be placed on level terrain
- Soil evaluation on day of test-clarify to allow dynamic testing on day of test
- Dynamic post test
- Force Measurement: Accelerometers currently not acceptable – should be used as they are more conservative
- Displacement measurement: requires electronic measurement – should allow either video or accelerometers in addition to e.
- Target impact speed – At 20mph post will not deflect enough – propose 20-25 mph.
- MASH required minimum soil resistance – propose certain minimum energy requirements over the distance of the impact.
- Soil Gradation Tolerance – propose to add new example. (Who should conduct sieve analysis? Labs should run analysis on each load to verify what the supplier tells you. Propose to use 6 sieve sizes specified by NCRHP Report 350.)

Need to determine who / if these proposals were submitted to TCRS. FHWA agreed to allow these to be incorporated into testing if TCRS approves their use.

New ILC on MASH Vehicle Dimensions. Each lab should provide measurements of 5 KIA Reo measurements. Or take a photo of where they are measuring hood height from.

TTI will do film analysis ILC and UNL will do Hood Height.

What are lab's pet peeves with accreditation auditors?

UNL: Documenting everything – wanted checklists or paper trail for everything they did. Wanted calibration certificate for every device they had calibrated and listed on their calibration log. Wanted all parts of speed trap device calibrated, when only calibration card and tape measure were needed. Tried to require a threshold for discarding an accelerometer – this is more subjective as the accelerometers may be used in different tests.

SafeTech: Calibration certs had to have the measurement specification added.

MWRSF: Calibration certs had to have the measurement specification added. Faller: cost for accreditation is approx. $50,000 per year. They tracked these requirements in terms of hours spent in meetings, getting ready for audits.

E-Tech had to show a calibration sheet for every accelerometer used in a year-old test.

**Subcommittee #8 Rail Highway Crossings**
Did not meet.

**Subcommittee #9 Special Subcommittee on Marketing**
Met on Friday. Please see notes there.

**<u>Subcommittee #10</u> Computational Mechanics.**

Ray The Subcommittee's Mission is to assist FHWA in determining what organizations should be eligible to submit FEA as part of the roadside hardware eligibility process. Currently there are 6 on the list already because of long track record. There is no organization that "accredits" FEA labs or analysts.

Possible process: Collaboration between AFB20(1) and TF13(10). AFB20(1) can make recommendations about how to demonstrate competence in a Transportation Research Circular. TF13(10) can assess labs to see if they meet TRC criteria. Demonstrating competence, Facilities (software and hardware), Personnel (principals and associated personnel), Experience. Most users in our field have come up through the crash testing field, and that specialized knowledge is critical. How does an LS Dyna analyst prove he is competent in the roadside hardware field. Once approved, how does someone lose their competence?
Could require round-robin analysis of a physical crash. Could have an apprenticeship program. Need one V&V analysis to 'stay in the club.'

What does FHWA want from TF13? Want a process for determining competence. Reid: if a modeler can build a model that predicts success, then don't worry much about V&V.
Submit a portfolio and determine what additional simulation or documentation is needed. The "combo" approach.

Who will be Mac Ray's co-chair? Looking for volunteers!!

**<u>EXECUTIVE BOARD MEETING</u>**
In attendance: Durkos, Longstreet, Schertz, Alberson, Bligh, Capella, Mauer, Clark, Ray, Lohrey, Arrington, Takach, Lechtenberg, Artimovich

Drawing review process. How many are out there that need review? Why do proprietary drawings need to be reviewed. Fonts, line weight, FHWA letter, specs, etc. Everyone misses stuff when preparing drawings, and another set of eyes are very helpful. States just want the stuff, and can't use it because it isn't out there. Three or four approvals should be ok for most drawings. May need Mac to check on the older drawings and see which can be grandfathered, and which need real reviews. Bridge rail guide format does see that drawings are posted, but some still need to be reviewed before getting TF13 approval. Need to identify what drawings on Chad's spreadsheet need to be reviewed. Also need to reiterate to drawing owner that they need to send their drawings to TF13 once they receive an FHWA letter.

Data from 20-7 project needs to be put into Mac's format so that we can see what is in need for review.

Mauer does not think review process at TF13 meetings is appropriate because of the people's time sitting here. This should be done by conference call, Lechtenberg wants to do this on a monthly basis. Subcommittee 2 meeting should be a discussion of policies and procedures, not

drawing reviews. Older devices that are no longer being sold should have their drawings archived.

All designators need to be in the database so that Dusty's Automatic Designator Generator will not copy an existing number.

Mac will upload all "Y" drawings as approved. "N" drawings attached will be uploaded and noted "In Review." All "N" that are "Submitted and Incomplete" will be put on back burner. Under Mac's scenario, the other search criteria needs to be reviewed to make sure all those attributes are correct.

Newsletter should highlight the need for drawing reviews.
All FHWA letters are uploaded as PDFs.

Adjourned at 5:59 pm.

## Friday, April 18, 2014

Durkos noted that SubComm2 drawing reviews are not what we want to do at TF13 meetings. They should be reviewed between meetings. The 20-7 project that showed numerous drawings that needed to be reviewed should actually be a manageable number.

The Crash test that was delayed from Wednesday will be run this afternoon between 1:30 and 2 pm.

Fall meeting will be September 15-19 in Shepherdstown WV at the Clarion Hotel. We will meet in Joint Session with the TTI Pooled Fund state representatives on Sep 17. TF-13 meeting on Sep 18-19.

**AASHTO**: Mark Bush updated for Hardy of AASHTO. About 100 committees, Tech committees, working groups, etc. Kelly Hardy is the new AASHTO Liaison. Working on issues with funding, Trust Fund is critical and will go broke in July. Congress is beginning to look at this. Additional staff changes at AASHTO.

July 13-16 AFB20 and TCRS will be meeting in Portland Maine. Putting together a great agenda. Look up www.roadsafellc.com website for info on this meeting.

**ATSSA** – Donna Clark. April 7-11 National Work Zone Safety Week in Seattle Washington. "Work Zone Speeding – A Costly Mistake." Midyear meeting will be in Kansas City August 20. Had nearly 3000 attendees at Traffic Expo in San Antonio and a record number of exhibitors. Feb 6-10, 2014, will be the next Expo in Tampa. Discussed Circle of Innovation – Wrong Way Driving booklet resulted from last year's circle. ATSSA on the Hill in 2013 was very active promoting funding for safety training. Have launched first On Line course – first is the Flagger course. Developing new courses including TMAs and Sign installation. ATSSA's first Leadership Program began in April 2014. Help future volunteer leaders of ATSSA. Durkos noted the value of ATSSA scholarships to DOT employees – they can really make it happen.

**NACE** conference was April 13-14, 2014, in Baton Rouge. Most crashes are on local roads, but crash data is very limited.

**Special Subcommittee #9 Marketing.**
Rick Mauer wants to include info on Drawing Reviews in the newsletter.

**New Standardization Areas**.
1. Talked about motorcycle test criteria. We are in the background in this area. Is there opportunity for TF13?
2. Rail highway crossing protection at 90 degrees.
3. Supports mounted on barriers, sign bridges, overhead sign supports, sound walls.
Keep in mind the opportunities for new standardization for the next meeting.

**Update of Ongoing Research**
**NCHRP**: Mark Bush: Research is driven by state DOTs and is applied research. 5.5% of all state's Planning and Research Funds (2% of total Federal Aid apportionment) go to this program. Showed timeline of problem statement submittal (Sep), evaluation (Dec), program formulation / approval (Mar to Jul), panels, proposals(Jul to Oct), contractor selection (Oct to Feb).
FY2015 program – 118 problem statements for approx. $51 million were discussed. Total budget was $30 million. $20 mill for new projects, $8.8 million for continuations. Set $1.3 million for contingency projects. Safety was again very successful with 14 new projects in Traffic Engineering and Safety Category.
Of special interest to TF13:

- 17-72 Updates of Crash Mitigation Factors
- 22-31 TL-2 TL-5 median barriers
- 03-119 Assessment of Small and Medium Sign Supports, Work Zone Devices, and Luminaires to MASH.
- 17-54 Continuation was approved for another $510,000
- Synthesis 20-05 Specs of High Tension Cable Barriers approved for $115,000.;
- 12-105 Design and Load Rating of Culverts $600,000
- 15-53 Roadside Barrier Designs Near Bridge Ends with Restricted Rights of Way Pending
- 16-05 Guidelines for Cost-Effective Safety Treatments of Roadside Ditches

Quantifying crash risks of trees on roadside was not selected. Just hasn't reached high enough priority to be funded. Bush approached Ray to see if some of this could be incorporated into 17-54 project.
Handout lists all safety related projects.
Synthesis Report 458 on Safety Data has just been published.
Durkos asked Bush to send his spreadsheet to Artimovich for distribution with the minutes. This PDF file is attached to the electronic version of these minutes.

**Recent Testing at Texas A&M Transportation Institute** Roger Bligh. All reports can be seen at www.roadsidepooledfund.org
Completed:

Transition from Free Standing to Barrier Pinned in Asphalt Pavement Used FEA to evaluate various pinning scenarios and various impact points. Crash test "F" shape passed MASH even though there were some significant "angular displacements" (anchored section with 3 pins, then transition section with one pin, then unpinned) Barrier profile does make a difference, as does the connection hardware.

Wood Support System for Large Guide Signs for temporary signs. Wanted to hit two 6x8 inch posts, 48 inch direct embedment, 4 inch holes at bumper and ground line. 3 5/8 inch hole just below sign panel. Used lag screws to attach angles to post. MASH calls for three tests. Low speed sign fell on car no intrusion. In high speed test sign legs rotated and then penetrated the windshield. Then they tethered legs to sign and re tested successfully with car and pickup. Report will include table of wind loads and sign sizes with recommendations for post sizes.

NCHRP Report 350 Finite Element Analysis of Stacked W-Beam Transition for 31" Guardrail. Validated model against old 350 test, then raised top rail to 31" and left bottom rail down, then raised bottom rail. These simulations have yet to be run.

**Midwest Roadside Safety Facility** Karla Lechtenberg
Transition between Guardrail and F Shape Portable Concrete Barriers. Flared PCB with the G4(1S) attaching to PCB segment #3. Looked at nesting, removing posts, use thrie beam, chamfered end segments, etc… Simulated with MASH 3-21 in various locations. Kept adding modifications until the configuration passed MASH. Sponsors then asked to look at MGS version.

Socketed Foundations for Cable Barrier Posts
Looked at S3x5.7 and the new MWP (Deuce post). Did dynamic component testing with bogie. Varied the steel sleeve inside concrete foundation. Developed tables for type of soil, foundation diameter and depth.

Four Cable High Tension Median Barrier Uses MWP Midwest Weak Post with tabbed bracket (lower cables) and 3/16" brass rod (keeping cable in V notch in top of post.) Cable tension reduced to 2500#. Tension does not affect deflection as much as post spacing does. Lower three cables are held in place by tabbed bracket. MASH Test 3-17 passed. Will run 3-11 next. Why brass rod: Checked various materials and brass rods worked best, plus they are standard items in cable systems.

**George Mason University** Dhafer Marzoughi
Development of Guidance for the Selection Use and Maintenance of Cable Barrier Systems.
This was NCHRP Project 20-25 and was published as NCHRP Report 711. Lower Cost. Lower Severity. Flexibility in placement. Higher deflection. More frequent maintenance and repair. Analyzed generic low tension systems and proprietary high tension systems. For V shaped medians 4:1 do not place anywhere within 8 feet of ditch bottom. When you get to 6:1 or flatter you can place one foot from CL but then avoid the area 1 ft to 8 ft from ditch.

**Technical Presentations**

**Dave Bizuga** – Manager – Roadway Design Group 1- New Jersey DOT
Crash Cushion Presentation Showed two videos of high speed impacts of cars approaching toll booths at high speed. Vehicles ramped on sloped concrete noses. Specs had old crash cushions like HydroCells and Adiems. New approved chapter 9 allows wider selection of crash cushions for the contractor. TRACC, QuadGuard II SCI Universal Tau II . Low Maintenance category included QuadGuard Lite, SCI, React 350 and React 350 II and have specific selection criteria for these. Also specify temporary low maintenance crash cushions.

Have design tables for each manufacturers crash cushion looking at speeds and hazard width. Contractor gets three or four options for an attenuator to be used at any one site, based on the ones that have been determined to meet the criteria for that site. Have good cooperation between Design and Maintenance in the selection of products to be used.
Longstreet repeated FHWA Form discussion.

TO DO LIST
Add note on Drawings web pages referencing the changing FHWA terminology regarding Approval / Acceptance / Eligibility.
ILCs need to be sent to labs.
Have presentations dealing with crash testing of WZ devices according to MASH.
Each Tech Rep shall upload drawings and have conference calls to get people to review drawings between meetings – at the TF13 meeting each Tech Rep will have 5 minutes to discuss the drawings that they have reviewed and are now ready for publications.
Joint Session in Shepherdstown should include a discussion on categorization and selection of Crash Cushions.
Secretary needs to get minutes posted to the website.