Chairman Keith Cota opened the meeting at 8:15 am welcoming the members to Toronto. Present were Buchan, Focke, Opiela, McDonnell, Walker, Niessner, McDonough, Sicking, Lacy, Meza, Clocksin, Jones, Allen, Julian, Fossier, Frederick, Wilder, Ayton, and Artimovich.

Cota introduced new committee members Damon Allen from Idaho and Paul Fossier of Louisiana. Dean Sicking will also give us an update on his roadside safety projects.

Cota passed the roster around for corrections. He noted that former Committee Secretary Dick Powers would be on board with FHWA until January 2007 while he helps train a new person in the office. Also noted that those who were present yesterday heard some interesting presentations and discussions with Task Force 13. Mentioned that minutes of Orange Beach meeting in 2005 were distributed and reflected committee activities.

Cota summarized the agenda for the next 2.5 days. Will go through the work plan and make new assignments as necessary. Most critical is the NCHRP Report 350 update and the process, including a draft implementation plan, will be a priority over the next 6 months. Also important is the development of new problem statements and the rewrite of RDG which will be done a few chapters every year so that it does not come all at once.

Because of retirements, New assignments for chapter teams are in order:
Chapter 1, 2, and 3: Add to the team: Fossier will replace Israel. Damon will replace Christiansen.
Chapter 4: No changes
Chapter 5: Powers and Tenaglia gone. Add Focke and Artimovich
Chapter 6: Israel and Tenaglia gone. Opiela will replace Powers. Add Meza.
Chapter 7: Fossier will replace Dick Powers. Add Matt Lupes of FHWA tentatively.
Chapter 8: Artimovich will replace Powers.
Chapter 9: Meza will take authorship. Add Damon and Opiela.
Chapter 10: No changes
Chapter 11: Artimovich will take authorship and Lupes and Opiela will assist.
Chapter 12: Powers authored chapter. Add Lupes.
RSAP Appendix A. Will be done by contractor. Opiela will take lead.
Appendix B keep same as chapter teams
Appendix C keep same as chapter teams
Appendix D keep same as chapter teams
AASHTO T-12 Add Fossier
AASHTO T-7 No Change.

Other Assignments: NCHRP Projects:
On these studies we encourage members to participate in the panels.

17-20 (4/5) never got underway and was cancelled. Opiela will look into it.
17-24 EDR completed. NHTSA issued EDR regulation.
20-7(168) Finished with barrier heights for railings
20-7(171) Finished with clear zone terminology
20-7(196) corrected name for this TF-13 effort.
20-7(214) TF-13 Small sign support guide.
21-9 (3) Closed
22-14(2) Current project,
22-14(3) Report 350 updates evaluation – additional crash testing only. Keep same panel.
22-18 WZ devices Completed Report 553
22-19 Aesthetic Barriers completed Report 554
22-20 MSE walls TTI doing the work No change
22-21 No change
22-22 Barriers on slopes No change
22-23 Restoration Long Barriers No change
22-24 Validation and Verification of FE simulation. Focke and Opiela also on panel.
AFB 20 Add Focke


Implementation Plan for 350 Update: Take previous FHWA/AASHTO plan and update it. Only activity was emails between Cota and Artimovich. Will need to draft up a document and bring before TCRS for acceptance. Timing should be close to time of 350 update completion. Any 22-14(3) $$$ available for this? Niessner – yes, available for travel to DC for this discussion. Albin: we should agree on the “philosophy” here. Any other volunteers – Cota and Artimovich as co-leads. This subcommittee shall meet here in Toronto.

Sicking 22-14 draft now includes comments thru Appendix A. Non panel members may comment thru Niessner and cc Ron Seitz. Please comment by October 28. Reviewers should consider what devices their states use and what the concerns might be under the update. Frank Julian, Ben Buchan, Jim McDonnell, Keith Cota, Drew, Dean Focke, Ken Opiela, Nick Artimovich.

RDG Chapter 6 Addendum. Success! Chap 6 hot off the press and McDonnell handed out with CD of entire RDG. Cota expressed thanks to the Chapter Team.

For NCHRP Report 350 update it is important that TCRS members promote adoption to their own states by informing those in charge. Ayton asked if it was available for download, and McDonnell will check on it.

Discussion over 2006 RDG vs update to 2002 with rev Chapter 6. Artimovich will look into “announcing” the update to the RDG via FedRegister or whatever…
Lacy: Will there be any other amendments to Chapter 6 in the near future? No, nothing will happen until total rewrite of RDG in a few years. Chapter 6 was a higher priority and we wanted to go forward ahead of other chapters. Cota recommends we go with a full rewrite of RDG and discuss that before we leave.

Secure Mailbox Initiative. Opiela: tests have been completed, but not documented, nor was the surrogate test design completed. FEA showed what connections would work. That surrogate testing was officially put on the back burner because of other activities. Research shows that attachment to post is critical to safe performance. Opiela will collect update info and this will affect update to Mailbox Chapter 11.

Survey of State DOTs regarding usage of RDG. Joe, Dick, Frank. Julian recalls discussion with Powers. McDonnell provided a survey approach and potential questions. It was agreed that this survey is still valuable. Albin thinks this is a good time since we have a new chapter. Have subgroup review this and get back to TCRS. New timeline to get survey out in January 2007. FHWA Division Offices use the RDG and we need to solicit info from them, too. Add McDonough to list. This subcommittee should meet before Friday and report back.

Domestic Scan Tour has been competed and report is being prepared. Cota gave a presentation on Friday.

Barrier runout lengths. Lacy will focus on resolving this with RDG chapter 5. Will require coordination with chapter 8. Albin asked if we need a runout length behind barrier terminals. Cota wants to draft a document that does not preclude states from using good practices that they already have.

Zone of intrusion study. Interesting conclusions that chapter authors must look at.

Low volume roads. Powers drafted new Chapter 12 to RDG. Please comment on this.

Reference library material. Need to manage and maintain that library. Will reside at NCAC library. An updating scheme is also available. Chapter authors will please keep up with references when changing their chapters.

Appendix A and RSAP to be discussed later.

Barriers on sharp curves at intersections or driveways that are close to structures are a significant problem and a difficult design concern. Sicking’s research says containment is done, but meeting OIV and ridedown is proving difficult. TL2 is easy. TL3 is not. This detail is very necessary. MWRSF is still working on this. Should TCRS fund? Let MW consortium handle.

Cota highlighted Task 171 of 20-1 regarding Clear Zone conflicts. We will get a rundown on that.
Seattle Washington will be the site of 2007 and we need a host for 2008.

**Update on Relevant NCHRP Projects**

Chuck Niessner of TRB gave us an update on each of the following NCHRP projects relating to roadside safety.

16-04 Developing data collection plan
- **16-04** Design Guidelines for Safe and Aesthetic Roadside Treatments in Urban Areas (Active)

17-22 Reconstructing case studies
- **17-** Identification of Vehicular Impact Conditions Associated with Serious Ran-Off-Road Crashes (Active)
- **22** Task 210 Guidelines for the Selection of Cable Barrier Systems

20-7(196) draft website
- Task 196 Development of a Guide to Crashworthy Bridge Rail Systems

20-7(210) completing draft final report
- Task 210 Guidelines for the Selection of Cable Barrier Systems

22-12 (02) B/C analysis with RSAP and preparing draft guidelines
- **22-12(02)** Selection Criteria and Guidelines for Highway Safety Features (Active)

22-14 (02) Revised draft guidelines completed. Appendices to be reviewed. Panel may be done by end of 2006
- **22-14(02)** Improved Procedures for Safety-Performance Evaluation of Roadside Features (Active)

22-20 Phase 2 underway.
- **22-20** Design of Roadside Barrier Systems Placed on MSE Retaining Walls (Active)

22-21 Phase 1 underway.
- **22-21** Median Cross-Section Design for Rural Divided Highways (Pending)

22-22 Contract pending
- **22-22** Placement of Traffic Barriers on Roadside and Median Slopes (Pending)

22-23 Work plan submitted
- **22-23** Criteria for Restoration of Longitudinal Barriers (Active)

Approved last march:
- **22-14(03)** Additional testing/evaluation for 350 Update. Proposals received 9-28-06
- 22-24 RFP issued.

22-24 Guidelines for Verification and Validation of Crash Simulations Used in Roadside Safety Applications (Posted date: 9/28/06) (Proj. Statement)

17-22 Look into having NASS teams collect roadside data while they are collecting vehicle and driver data.

22-14(3) TCRS can submit recommendations. Panel needs to prioritize test needs and will meet November 30.

**Sicking**:

22-12(02) I have his TF13 presentation for here. Discussion ensued over TL-4 Single Unit Truck test and that it really must pass 32 inch Jersey Barrier. Recommended to panel that CG height be dropped by 6 inches. However, will this make the SUT non-representative of the school bus?

TMAs Test 53 will be with lightest shadow vehicle to exhibit most roll ahead distance.

**Wednesday Afternoon:**

**Sicking** – 22-12(02) Get Dean’s Presentation
Lack of severity data is one of the major faults in this process.

Chart on Unobstructed Zones has signs in wrong direction.

Implementation Plan for Report 350 Update. What will our philosophy be? 1998 AASHTO/FHWA agreement stated that all hardware would have to meet the new 350 criteria. What about this one?

230 to 350 was a quantum leap. 350 to 350 update is not. Some feel that barriers in use under 350 are good and do not need to be replaced. Over time, proprietary terminals will upgrade and we will eventually get all updated devices, but there is no need to set deadlines for adopting new or re-certified devices.

**Sicking:** Recommends that 24 months after AASHTO adopts new guidance FHWA will stop approving under 350. TCRS should then annually revisit the list and set sunset dates for use in new construction. This way we move in the right direction without setting artificial barriers. Anything in place that met 350 may remain in place unless it has to be removed due to construction or accident. Common for any hardware. Ultimately all 230 hardware should be replaced.

For the time being, 350 hardware may remain in place indefinitely, with no deadline date for conversion. In 24 months all new crash testing must conform to 350 update. Proprietary hardware will probably be tested under new criteria.

Is there a point in the future that we want to say that all new installations must meet the new criteria? Do we ask for $$$ for research for proprietary products?
**Cota:** Strong post w-beam passed with quad cab. What if we developed a slightly better version that cost more. Why should a state buy it if the current one passed?

Should 230 hardware be brought up to date? Yes, follow footnote #2 from the FHWA/AASHTO Agreement of July 28, 1998. Each state would define when adjustments to the highway would kick in the mandate to upgrade a 230 system. If a 230 system off the NHS needs to be repaired with low ADT and the repair cost is XX% of total replacement, go do it.

Summary:

1: 24 months after new document all new crash tests will be according to the new criteria.

2: Hardware under 350 may remain in the toolbox.

3: We encourage any 230 systems to be replaced at the end of their serviceable life, to be determined by the state.

Over time we will gain experience with the new testing criteria and with crash history of 350 hardware and when problems are identified we will deal with it on a case-by-case basis.

Focus on Jersey Barrier. Under our discussion it would remain in our toolbox. Because our testing has showed that it is inadequate under TL-4 it will drop down in status to TL-3 and will generally be replaced by TL-4 concrete barriers over time.

**Frederick** How does new upper/lower range testing affect 350 hardware? As long as 350 hardware is acceptable it may remain. Also the NCHRP contract to evaluate 350 hardware under the new criteria will help answer the questions.

New installations – use footnote 2 as in original agreement.

**Thursday, October 05, 2006**

Survey committee met yesterday evening.

**Buchan** drafted a position on implementation.

Chapter Authors need to review recently completed research and incorporate this info into our chapters.

**Opiela** discussed TFHRC and NCAC

Reviewed Lab Assessment by Peer Review Panel.
Covered cable barrier modeling
Discussed capability of NCAC and FOIL
Discussed various vehicle models they have developed

Should TCRS send a message back to TFHRC that we encourage development of 350-Update model vehicles? Yes, this resolution should be undertaken. Walker, Cota, Artimovich, Opiela will draft same. Ken said they have been waiting until the new test pickup is nailed down. Some testing will be shown at TRB in January and it may show if current models may be of some use.

Chapters of Roadside Design Guide: Cota wants feedback from each Chapter Author to get an idea of when we should be looking towards a new edition. Cota enumerated a number of NCHRP projects that may affect the various chapters.

Chapter 1: Nothing new. Need traffic fatality data and first harmful event. Also need to ref new test criteria. Cota said implementation plan for 350 Update ought to be explained.
Chapter 2: No changes needed at this time ex reference to RSAP update, which will probably be later than RDG update.
Chapter 3: Topo and Drainage. Mark presented info last year on curbs (NCHRP 537) and slopes. Will share with his new team members and work on revising. Will look into the FHWA report on Design Considerations for Large Trucks. Also should work with Albin to clean up differences in “Clear Zone” terminology. Will also, someday, be affected by long term crash data analysis for run-off-road crashes. Julian asked if “slope averaging” ought to be taken out of examples since it was taken out of the text.
Chapter 4: Sign and Luminaire support. Author Reeves was not present. Artimovich will coordinate with team leaders. Julian noted Utility Pole research, as repeated in Report 500 Series. This info should be referenced and brought before the Chapter Author. Reference Task Force 13 publications and where they can be found on the web.
Chapter 5: Need to incorporate zone of intrusion, no blockout guardrail, lots of other pending research that can be incorporated. McDonnell noted that research is never-ending and we need to set a cut off. Albin noted that there are critical studies that may set that timing. A number of the recently completed research studies will affect the guidance in this chapter, ie slope traversability, curbs, etc.

Chapter 6: Was just re written, but new research on cable barriers should be incorporated. Also some of the products that affect Chapter 5 need to be incorporated. Chapter authors need to coordinate text.

Chapter 7: Will begin work on this chapter. Consider MSE wall barrier study results, but does this go with structures or with roadside? Should be incorporated into Chapter 7, but Chapter 5 needs to reference it for the road designer to find it. Can we provide any guidance on test levels for the bridge rail, especially on high-level structures? Julian noted that safety shaped walls should be oriented perpendicular to the bridge deck when on a super-elevation, rather than vertical. Opiela was asked if this could be simulated. Wasn’t deemed to be significant to warrant a problem statement. Other current
research may be answering this also. Artimovich recalled FHWA guidance on safety shapes on superelevations but that ancient documentation is proving difficult to track down.

Chapter 8: Dave Little provided Draft C to us and comments should be discussed. Numerous proprietary end treatments have been developed and should we keep adding these or drop most in favor of examples. Each comment was reviewed and discussed.

Extra runout length behind a gating terminal was discussed. Albin noted that you can get behind either type of terminal and continue on toward the hazard. Lacy notes that their SRTs are flared well off the road and shield the hazard better than an ET up next to the road. It was decided not to call for extra distance behind gating terminals, but to alert the designer of the potential differences.

For any other comments on the text of Chapter 8 Please email them to Little & Focke.

Do we want to continue identifying all barrier terminals with the table and a picture, or do we want to illustrate just one of each type? One photo of a commonly used representative terminal of each type will suffice, and give the link to the TF13 website will be adequate. Keep a table of the accepted system in the RDG? Yes, pictures are optional but dimensions and properties are critical. Note that user must go to TF13 site for more info and for systems that have been accepted since then. CHAPTER AUTHORS NOTE: This applies to Chapter 5, Chapter 6, Chapter 8, Chapter 9.

Leave dimensions the way they are. Metric first, then English units.

Chapter 9: Include NCHRP Report 553 info, and ref to FHWA web site and NWSIC. Artimovich to email Harry Taylor’s email address to Rory Meza, or Harry’s proposal for chapter 9.

Julian: question about flare rates in work zones comes up frequently.

Chapter 10: We only have an outline of the rewrite from the 16-04 author, Karen Dixon. So this info may arrive too late for incorporation into the chapter. Latest progress report should have been in hand, but it is late. The RDG Questionnaire will help us focus improvements on Chapter10 because we will most certainly get feedback on urban concerns.

Chapter 11: Incorporate info on secure mailboxes. Continue to enumerate those few proprietary designs that have been accepted, but no need for photos of all. Get summary of findings from Opiela for adding to Chapter 11

Chapter 12: Review Dick Powers’ draft and submit comments to Meza.
Appendix B: Discussion ensued over need to include drawings, perhaps include generic drawings, but refer to TF13 website for info on proprietary. Agreed to include generic systems in the Appendices only.

Ayton suggested that tolerances might be appropriate for the Appendix. There are tolerances for building the system, and tolerances for maintaining it. The designer should be alerted that some systems may have very serious performance issues if installed higher or lower than designed. For other systems where we do not reliably know tolerances we can remain silent.

OUR GOAL FOR FALL 2007 IS TO REVIEW ALL CHAPTERS AGGRESSIVELY – ALL CHAPTER AUTHORS ARE ENCOURAGED TO DO THEIR HOMEWORK WELL IN ADVANCE OF OUR VISIT TO SEATTLE. MEMBERS PLEASE REVIEW AND PROVIDE PROMPT FEEDBACK.

Discussion on 350 Update Document:

Should Interims be issued if we have critical research that affects only a few pages? Chapter 6 was issued as it was supposed to have a significant affect. McDonnell noted that TCRS should maybe meet twice to deal with both 350 update and RDG rewrite. He could write a letter stressing the need to meet. NCHRP may have $$$ for just those states that have a problem. Since we anticipate the 350 update to be complete by January we should plan on a Spring meeting. Could we have a joint meeting between the Panel and TCRS? There is much overlap anyway. (Albin: TL-4 test is still a concern and we need that to be resolved by the panel.) We can begin planning for that meeting now and revise if necessary if 350 updated isn’t finished. Meza: meeting should be devoted solely to 350. Frederick: What will we do with 350 update? McDonnell: Research report typically needs some massaging, even though it was set up to be a final product. Realistically it needs need wordsmithing to make it into an AASHTO Report. Should be called an AASHTO “Specification”. Suggested title “Specification on the Performance Evaluation of Highway Features.”

Frederick: Could we issue the 350 update as a Committee Report, and call for an AASHTO Resolution adopting the FHWA/AASHTO Implementation Plan?

McDonnell: Either way, the 350 Update document will need some rewriting to get it into a format that is acceptable to AASHTO. Plan on adopting it as an AASHTO Spec. TCRS members need to review the 350 update document and email comments to Niessner and Seitz. Look for words that will cause problems from a liability viewpoint.

Albin made a presentation on the conflicts between AASHTO documents using “clear zone” terms. I have Albin’s PPT presentation on Clear Zone.

4 Major areas:

Treatment of Auxiliary lanes, bike lanes, etc.
Definitions
Relationships with curbs
Horizontal Clearance vs Clear Zone

Auxiliary lanes like truck climbing lanes depend on the anticipated speed of traffic actually using the lane. Can look at both the speed of vehicles in the aux lane and the speed of traffic in the thru lane and calculate cz for both.

Bike lanes: cz begins where vehicle leaves intended travelway. Does that include the bike lane that is merely striped on the pavement? Travel way is bounded by the edge line or “fog line” regardless of presence of curbs.

AGREED with his committees suggestion to define travel way as exclusive of shoulder and/or designated (striped) bike lane.

Definitions: Existing clear zone, design clear zone, project clear zone(s) See handout and PPT. Much discussion over the “project clear zone.” Ayton noted that Dick Powers has always considered the Design Clear Zone as a minimum.

Clear zone and curbs: Not a fixed object, but do affect vehicle trajectory.

Horizontal Clearance: Albin open to comments.

RESEARCH PROBLEM STATEMENTS

1) Long Term Accident Data Collection Program: Adds roadside data to NASS crashes. This project would also include reconstruction so that we can get the info we need to understand what really happens in roadside crashes. Ultimately FHWA needs to convince NHTSA that they should collect this information as part of doing business. Unanimous agreement that we should move forward with this one.

2) Improved Procedure for Determining Longitudinal Barrier Length of Need: The data behind current procedures is 30 years old and needs updating. Since we don’t have any new data yet, this should be put off ‘till we do. Consensus to delay this effort.

3) Development of Improved In Service Evaluation Procedures for Roadside Safety Features. We are missing the boat by not learning how our products really perform in the field. Having an established procedure would also add legitimacy to hardware approval through good field performance. NCHRP 490 is apparently a tedious procedure that hasn’t caught on. This very project was considered by MWRS consortium but it did not receive funding. TCRS does not have a practical procedure for backing up or assertions that crashworthy hardware is a good idea. Consensus.

4) Development of a High Performance Portable Barrier – The Texas X-bolt connection F-shaped barrier and Constant Slope Barrier have 18” deflection which appears to be as good as you can get without pinning it to the pavement. Do not support.
5) Development of an Optimized Concrete Barrier: MWRS consortium is looking at this.

6) Evaluation of the use and need for Shy Distance: Sometimes shoulders are less than shy distance. People shy away from merging traffic, not barriers. Is it possible for research to answer this question? Bigger question – do we need to consider shy distance if you do not have a shoulder? Can we find the source document for the original shy distance? 8 yes, 8 no. Chairman says we carry it forward.

7) Update Software and Severity Indices for RSAP Will almost require a total rewrite to updated and include patches. It is being used by a number of states, but the bugs make it very difficult. There is also significant disagreement over the severity values. Possibility that this can be funded as part of IHSDM if we can’t get $$. Consensus is to carry forward at $500K. Or could it be two projects, one on severity indices and the other on software? $400K

8) Development of AASHTO Guidelines for Median Cable Barrier Systems

9) Design Layout and Placement Guidelines for Cable Barrier Systems Dean Alberston’s project is finishing up but it has raised many questions that remain unanswered. Combine these two, incorporate latest research, and move them forward as one.

10) Safe and Effective Placement of Trees and Landscape Elements along Urban and Suburban Roadways. Wait until we get results from 16-04 project.

11) Guidance for Curbs Used in Conjunction with Crash Cushions and Guardrail End Terminals. Literature search and summary of best practices, then panel can decide to move forward … Could Phase 1 be a 20-7 project? Bring it down to $75K and it has a good chance. Carry forward for a vote as a 20-7 project.

Friday, October 06, 2006

Next year’s Work Plan – Topics to be discussed:

350 Update Spring Meeting @ TRB facility in Woods Hole, DC, or Irvine.
Survey for Roadside Design Guide
Opiela and process for adding material to NCAC Library
Chapter Authors need to incorporate research into chapters of RDG
Resolution from TCRS to TFHRC to update vehicle models
Clear Zone coordination with Green Book and other AASHTO Products
Problem Statements
Updating Roster and Assignments
Establish 2008 Meeting Location

Vote on Problem Statements:
Long Term Accident Data Collection Dick Albin 17 Yes
Develop Improved In Service Evaluation Procedures Dean Focke 12 Yes 1 No
Evaluation of the use and need for Shy Distance Dick Albin 4 Yes 12 No
Update Software and Severity Indices for RSAP Ken Opiela 16 Yes
Maintenance Guidelines for Median Cable Barrier Systems 20-7 Project 11 yes 3 No
(This would support the Maintenance TC, but a larger project to distill all the current research on cable barriers may still be of use.)

**Design Layout and Placement Guidelines for Cable Barrier Systems**  Joe Jones  12 yes

**Guidance for Curbs Used in Conjunction with Crash Cushions and Guardrail End Terminals. Phase I as a 20-7 Project**  7 Yes

Two carried forward as 20-7 Projects

We are supporting Maintenance in the Cable barrier project

We independently support the Curbs/Hardware guidance project.

**Top Priorities for NCHRP Research FINAL PROBLEM STATEMENTS NEEDED BY NOVEMBER FIRST**

1) Long Term Accident Data Collection
2) Update Software and Severity Indices for RSAP
3) **Design Layout and Placement Guidelines for Median Cable Barrier Systems**
4) Development of Improved In Service Evaluation Procedures

Web based Survey of States and Roadside Design Guide. Identify issues not covered in 2002 Roadside Design Guide. Send to AASHTO committee members and FHWA Field offices, NACE, APWA, Consultants. Will sort by organization. Want it forwarded to all levels of users including administrators, standards engineers, designers, etc. Best to send out in early January, after the holiday rush.

350 Update Implementation Plan Draft

**Add DRAFT implementation plan to the minutes HERE!**

**Bernie Clocksin:** MWRSF Pooled Fund Project Status

**Keith Cota:** New England Transportation Consortium Crash Tests

**Joe Jones:** In service performance of cable barrier on slopes in Missouri ranging from 2.7:1 to 20:1 with a good number placed on 4:1. Success rate does not appear to be affected by slope. Will have peer review of existing data on I-44 and if looks OK will review additional 1200 crashes in depth.

**Rory Meza:** Discussed a new highway mandated by governor with design speed of 80 mph to 100 mph.


**Keith Cota** Domestic Scan Tour PPT

Meeting adjourned at 12:25 pm Friday, October 06, 2006