SUMMARY CHANGES FOR NCHRP REPORT 350 GUIDELINES

[NCHRP 22-14 (02)]

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on Roadside Safety

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BACKGROUND

- **Circular 482 – (1962) – First full scale crash test procedures**
- **Circular 191 – (1978)**
- **NCHRP Report 230 – (1980)**
- **NCHRP Report 350 – (1993)**
- **NCHRP 22-14(02) – Adoption 2007/08 ?**

350 Category Changes

- Test matrices and conditions.
- Test installation.
- Test vehicle specifications.
- Evaluation criteria.
- Test documentation.
- In-service performance evaluation.

TEST MATRICES AND CONDITIONS

- **Small car impact angle (20 degree to 25 degree).**
- **Impact speed for single unit truck test (80 km/h to 90 km/h).**
- **Occupant risk for length-of-need tests.**
- **Impact angle for terminals and crash cushions (20 degree to 25 degrees).**
- **Gating terminal/crash cushion (Reduce angle from 15 degrees to 5 degrees).**
- **Mid-size car test (Add 1500A test vehicle for staged impact attenuation devices).**

TEST MATRICES AND CONDITIONS (Cont'd)

- **Barrier testing heights** (Establish max. for small vehicle and min. height for pickup test).
- **CIP's for terminals and redirective crash cushions** (Test CIP at barrier change from redirective to gating or capture point) .
- **CIPs for reverse direction impacts.**
- **TMA optional tests to mandatory** (Define max/min truck weight, control ballast shifting and vehicle braking).
- **Variable message sign and arrow board trailers** (Require same test criteria as TMA's) .

TEST MATRICES AND CONDITIONS (Cont'd)

- **Support structures and work zone traffic control devices** (Add light truck test in addition to the small vehicle testing criteria).
- **Longitudinal channelizing barricades** (Add new category and recommended test matrix).
- **EDR data collection** (Provide data on impact conditions and accelerations from vehicle).

TEST INSTALLATION

- **Soil Condition** (soil type, gradation, compaction and density) .
- **Embedment of Posts** (not necessary with reporting of soil conditions)
- **Components** (provide documentation of components used).
- **Installation Lengths** (document length of test installation).

TEST VEHICLES

- **Test vehicles** (change small vehicle and pickup).
- **Single unit truck mass** (from 8000 kg to 10,000 kg).
- **Light truck test vehicle** (Minimum c.g. height of 28 inches)
- **Vehicle age** (six years older or less).
- **Truck box attachment** (limit detachment, reduce inconclusive testing results) .
- **Vehicle damage** (document external vehicle crush damage using NASS procedures) .
- **Crushable nose characteristics** (develop updated surrogate vehicle testing from 1981 Volkswagen Rabbit).
- **TMA support vehicle** (Report maximum weight of support vehicle).

EVALUATION CRITERIA

- **Occupant risk** (Modify calculations for Occupancy Impact Velocity and Ridedown Acceleration with vehicle yawing).
- **Windshield damage** (Provides more quantitative criteria; apply criteria to structural support devices the same for work zone devices).
- **Occupant compartment damage** (Set objective criteria).
- **Marginal pass** (Strictly pass or fail criteria results).
- **Maximum roll angle** (Roll and pitch angle at 75 degrees).
- **Exit conditions** (Report lane intrusions and exit angle with exit box criteria).
- **Vehicle rebound for crash cushions** (reporting criteria) .

TEST DOCUMENTATION

- CAD drawings (AutoCAD or Micro Station drawing files)
- Test report (More detailed documentation on conducted of the test and the test results).

IN-SERVICE EVALUATION

- Encourage in-service evaluation to demonstrate satisfactory field performance.
- Pool resources (partnering) between State proprietary device manufacturers.
- Disseminate information through resource channels like National Technical Information Services (NTIS), FHWA regional resource centers and State pooled fund consortiums.
- Consider the establishment of new national center on in-service evaluation.

NCHRP 22-14(02)
Full Scale Crash Tests

- Strong Post W-Beam System (with 5000 # pickup truck) – passed TL-3 test criteria
- Midwest Guardrail System (with 5000 # pickup truck & 2400 # small vehicle) – passed TL-3 test criteria
- New Jersey Shaped Concrete Barrier (with 2400 # small vehicle) – passed TL-3 test criteria
- F-Shape temp. concrete barrier with 3-loop connection (with 5000 # pickup truck) – passed TL-3 criteria

NCHRP 22-14(02)
Full Scale Crash Tests, Con't

- Iowa Transition (with 5000 # pickup truck) – passed TL-3 criteria
- Tangent Guardrail terminal (with 2400 # sedan) – passed TL-3 criteria
- New Jersey Shaped Concrete Barrier (32 inches) (with 10,000 kg single unit truck) – did not pass TL-4 criteria

Old vs. New

W-Beam Guardrail

Midwest Guardrail System

Evaluation of 25° Impact Angle w/MGS Guardrail Mounted at 32”

AASHTO/FHWA IMPLEMENTATION PLAN

DRAFT

Draft AASHTO/FHWA Joint Implementation Plan for the Manual for Evaluating the Safety-Performance of Highway Features, 2007

Background

NCHRP Report 350: Recommended Procedures for the Safety Performance Evaluation of Highway Features contains the existing guidelines for evaluating the safety performance of highway features, such as longitudinal barriers, terminals, crash cushions, work zone elements, and breakaway structures. This document was published in 1993 and was formally adopted as the national standard by the Federal Highway Administration (FHWA) later that year with an implementation date of late 1998.

The American Association of State Highway and Transportation Officials (AASHTO) created a Task Force on NCHRP 350 Implementation and in July 1998, AASHTO and FHWA agreed that most types of safety features installed along the National Highway System must meet the safety-performance evaluation criteria contained in *NCHRP Report 350*. One outcome of these task force efforts was the recommendation that AASHTO play a stronger role in the future development, approval, and maintenance of the evaluation procedures. The process of accepting hardware under NCHRP Report 350 on the National Highway System has been undertaken by FHWA. AASHTO, through its Technical Committee on Roadside Safety, has undertaken the role of establishing and updating the evaluation criteria.

The draft AASHTO *Manual for Evaluating the Safety-Performance of Highway Features 2007* (*MESPHF 2007*) has been developed under NCHRP Project 22-14(02), "Improvement of Procedures for the Safety-Performance Evaluation of Roadside Features." *MESPHF 2007* contains revised criteria for safety-performance evaluation of virtually all highway safety features, based primarily on changes in the vehicle fleet, and will replace *NCHRP Report 350*.

Requirements in Section 1408 of SAFETEA-LU state that “The Secretary, in cooperation with the Association [i.e., AASHTO], shall publish updated guidance regarding the conditions under which States, when choosing to improve or replace highway features on the National Highway System, should improve or replace such features…”.

Implementation Plan

Implementation of the *MESPHF 2007* on the National Highway System will be as follows:

- **The AASHTO Technical Committee on Roadside Safety is responsible for developing and maintaining the evaluation criteria as adopted by AASHTO. FHWA shall continue its role in the review and acceptance of highway safety hardware.**

Implementation Plan, Con't

- **All highway safety hardware accepted prior to adoption of *MESPHF 2007* using criteria contained in *NCHRP Report 350* may remain in place and may continue to be manufactured and installed.**

Implementation Plan, Con't

- **Upon adoption of *MESPHF 2007* by AASHTO, any new highway safety hardware not previously evaluated shall utilize *MESPHF 2007* for evaluation and testing.**

Implementation Plan, Con't

- Any new or revised highway safety hardware under development at the time the *MESPHF 2007* is adopted may continue to be tested using the criteria in *NCHRP Report 350*. However, FHWA will not issue acceptance letters for new or revised highway safety hardware tested using *NCHRP Report 350* criteria after January 1, 2010.

Implementation Plan, Con't

- **Highway safety hardware installed on new construction and reconstruction projects shall be those accepted under *NCHRP Report 350* or *MESPHF 2007*.**

Implementation Plan, Con't

- Agencies are encouraged to upgrade existing highway safety hardware that has not been accepted under *NCHRP Report 350* or *MESPHF 2007:*
  - during reconstruction projects,
  - during 3R projects, or
  - when the system is damaged beyond repair.

Implementation Plan, Con't

- **Highway safety hardware not accepted under *NCHRP Report 350* or *MESPHF 2007* with no suitable alternatives available may remain in place and may continue to be installed.**

TCRS Schedule for Adoption

- TCRS met on May 15 & 16, in Woods Hole, MA to review final draft document from NCHRP 22-14(02) panel & finalize “Draft Implementation Plan” with FHWA;
- Ballot of TCRS results to be completed by July 15, 2007;
- Ballot to SCOD in Summer of 2007; TCRS to review results at Sept. 2007 TCRS meeting in Seattle, Wash;
- Ballot to SCOH in Winter of 2007/08;
- Complete NCHRP 22-14(03) with additional full scale crash testing of non-proprietary devices using the new criteria (Completion in 2008/09).

CONTACT INFORMATION

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