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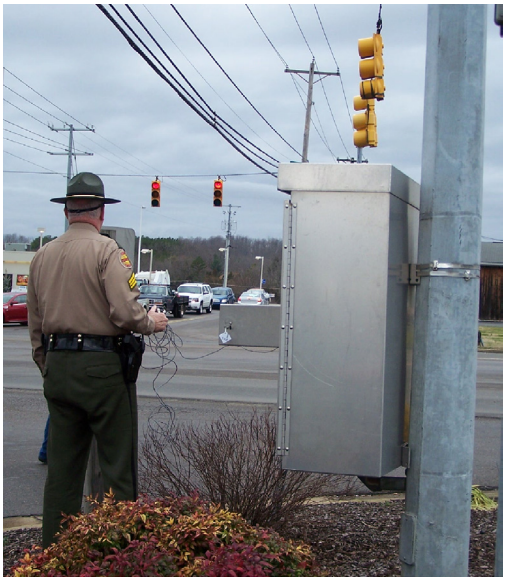
Road Talk
TTAP

200,000 Football Fans to Converge for Battle at Bristol in September

by David Metzger, City of Bristol



A Tennessee Highway Patrol sergeant manually operates a traffic signal in Piney Flats seven miles south of Bristol Motor Speedway.

Since 1961, Bristol Motor Speedway (BMS) has been hosting NASCAR races for hundreds of thousands of race fans, and the facility has grown over the years to its current capacity of 164,000 persons. In terms of number of seats, this is one of the top five stadiums on the planet. Between the racing action on the track and the thousands of throats cheering or booing, BMS roars with sound during Race Weekend.

Yet, come September 10, 2016, BMS will ring with a different kind of roar, as temporary stands on the racetrack surface itself raise the seating capacity to 200,000 persons cheering on the game between the University of Tennessee and Virginia Tech in the Battle at Bristol, smashing the old nationwide record for largest attendance at a college football game. In a period of about three weeks, BMS has to transform itself from a top-notch racing venue following the August Race Weekend to a one-of-a-kind football stadium, complete with all the required accoutrements for NCAA football. The excitement of the football game already has everyone talking from Knoxville to Blacksburg.

For the City of Bristol and the other eight cities, six counties, three state police agencies, two state departments of transportation, multiple federal agencies, and the Cumberland Gap Tunnel Authority that work BMS traffic, the Battle at Bristol presents another challenge...how to ensure that those 200,000 football fans, of which it is estimated that 60 percent have not been to BMS before, will get to and from the game and stay safe during their visit. These different governments and agencies have long worked together to make the race traffic flow to and from BMS; a full sell-out for an August Race Weekend translates into about 700,000 vehicles flowing around BMS over a 4.5-day period.

"The basic traffic plan for a Race Weekend at Bristol Motor Speedway has evolved over the years as BMS has grown, and has proved very successful in its execution," said David Metzger, Traffic Engineer for the City of Bristol and a coordinator of traffic operations for Race Weekend. "However, we can't just take the race traffic plan, change the dates, and call it sufficient for the Battle at Bristol. We recognize that we are dealing with a different type of population....less multi-day camping, more day-of-event traffic...tailgating activities in the parking lots that can consume

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The views, opinions, and recommendations contained within this newsletter are those of the authors and do not necessarily reflect the views of FHWA and TDOT.

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From the Director

As I write this column I am in Madison, Wisconsin, to attend the 2016 LTAP/TTAP Conference. I always look forward to this gathering as an opportunity to learn more about what our fellow LTAP and TTAP centers have been up to over the past year. We've come home with a lot of good ideas from these meetings, and this year shouldn't disappoint. Many of the sessions focus on tips and tricks to make an LTAP center function smoothly behind the scenes, but others feature trends and technology that impact our customers (and that's you). Highlights include a train-the-trainer session on an update to the popular Road Safety 365 workshop, a technical session on the use of unmanned aerial vehicles, safety research with local application and interest, and tips for developing effective interactive training exercises.

After a mild spring, it seems that we are now stuck in a pattern of high temperatures and severe weather. The heat obviously impacts the men and women responsible for building and maintaining Tennessee's roadways. Severe weather, whether in the form of heavy rain, hail, high winds, or even tornadoes, impacts the entire transportation system. Rain reduces visibility, increases stopping distances, and can even cause loss of vehicle control through hydroplaning. High winds and tornadoes knock down trees, damage buildings, and disrupt power. In the short term these issues may block roadways or disrupt signal control at busy intersections. Days after Knoxville's most recent storm I still saw traffic signal heads twisted by the winds. Worst of all, these storms require the same roadway workers who have been laboring all day in the heat to work overtime to clean up the mess and restore order as quickly as possible. I don't know about you, but I am ready for fall's arrival.

Finally, we recently learned that the U.S. recorded its first traffic fatality associated with a vehicle in autonomous or semi-autonomous operation. In this incident, a Tesla Model S using the company's Autopilot feature struck a large truck turning across the car's path on a divided highway. There is early speculation that the truck's light color against an overcast sky offered insufficient contrast for the vehicle's video processors. There are also reports that the human driver of the vehicle may have been distracted when the crash occurred. This incident will be investigated by both the National Highway Transportation Safety Administration and the National Transportation Safety Board. This event only reinforces my belief that the transportation network (and our jobs) will become increasingly complex in the future.

That's all for now. Stay safe out there regardless of the weather conditions, and please let us know if there is anything that TTAP can do to make your job easier.

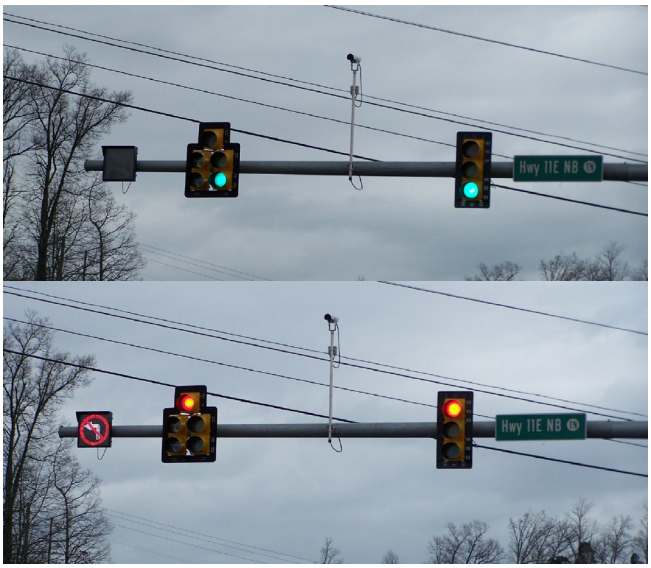
parking capacity...timing changes because football doesn't stop for inclement weather the same way that a NASCAR race does...differences in how the competitors arrive at the venue...the differences go on and on." While officials are confident that the 225 recognized camping and day-parking fields that surround BMS within a three-mile radius will have sufficient capacity for the Battle at Bristol, BMS has gained control over four of the largest campgrounds and designated two for UT fans and two for VT fans.

Some of the features of the race traffic plan that will again be used for the Battle at Bristol include tried-and-true techniques such as manual control of traffic signals over multiple jurisdictions; three sets of contraflow lanes; lane closures on Interstate 81 to control merging movements; turn prohibitions at key locations; closures of median openings; and thousands of traffic control devices spread out over a 150-mile radius of Bristol. As with all such events, a partnership between traffic engineering, public works, and public safety agencies also means traffic support for such items as pre-designated temporary landing zones for helicopters working medical evacuations; enhanced navigation mileposts and E-911 landmarks; and pre-emption of traffic signals for emergency vehicles.

Parking control is very important; keeping medians, shoulders, and even some grassy areas behind the shoulders clear of parked vehicles means that pedestrians have a place to walk outside of the travel lanes; emergency vehicles have travel options; motorists don't park facing the wrong way for post-event one-way flows; and sight distance is maintained at intersections to the appropriate standards. Recent Race Weekends have averaged one illegally-parked vehicle tow per Race Weekend among the 65,000 vehicles in the area.

Coordination and communication for such a massive event is key to its success. The Multi-Agency Command Center in Bristol, Tennessee, in communication with its counterpart in Bristol, Virginia, as well as the traffic management centers in Knoxville and Roanoke, work in concert to keep traffic flowing. Static signage, both permanent and portable variable message boards, live radio broadcasts, Wizard Radio (a device used by the Virginia DOT to mass-communicate with truckers over Citizen's Band radio) and myriad other devices keep the motoring public advised as to traffic conditions, crash locations, tips to post-event travel, parking restrictions, and other atypical traffic characteristics.

"One of the challenges to event traffic is the fact that commercial mapping software and GPS are typically not aware of event-day lane and ramp closures, turn prohibitions, and similar features that are common to special event traffic," said Metzger. "Someone relying only on their GPS and not paying attention to the signs and police officers can find themselves in the wrong place at the wrong time."



This traffic signal in Bristol has been configured so that when the No Left Turn sign is activated manually, the left green arrow is disabled.

The ten major signed routes carrying post-event traffic away from BMS will be used again after the Battle at Bristol. A longtime goal is to balance the level of congestion between these routes, so that there isn't one or two heavily congested routes and eight lightly used routes. Sometimes race fans wanting to go west find themselves going east to get to I-81 or I-26 after a race. "In ancient times, all roads led to Rome; after an event at BMS, all roads lead to the Interstate," said Metzger, "just follow the signs." As with all special events, the cooperation of the motoring public is key to successful event traffic flow.

In this photo (taken several years ago, judging by the orange vests), a Bristol Public Works crew deploys 3.5 miles of lane separators for the Highway 11E post-race contraflow system from a flatbed tractor-trailer during a BMS race.

Addressing Intersections in Curves

by Airton Kohls (Source: Low-Cost Treatments for Horizontal Curve Safety 2016 – FHWA Safety Program)

The AASHTO Policy on Geometric Design of Highways and Streets recommends that when an intersecting roadway is located within a curve "the alignment should be as straight and the gradient as flat as practical" to allow for easy recognition of the potential conflicts. It further states that "an intersection on a sharp curve should be avoided or designed to compensate for potential adverse grade and reduced sight distance."

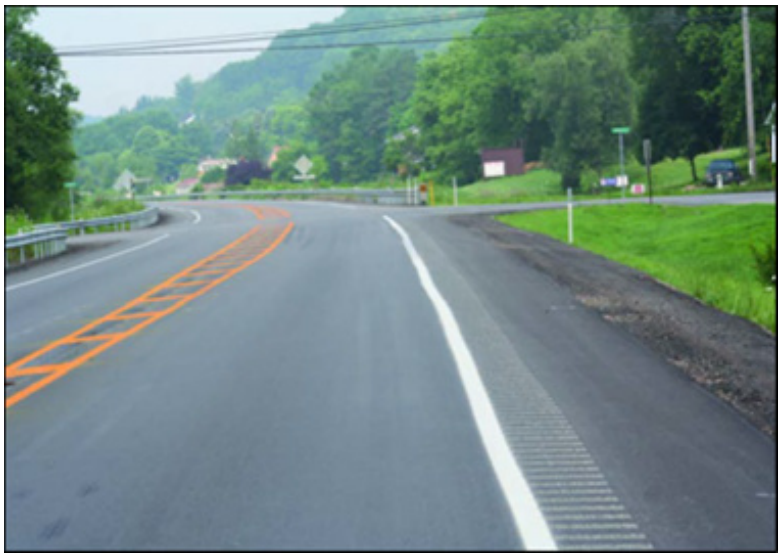
However, many agencies have existing intersections with less than ideal design. The demands on drivers approaching and navigating horizontal curves include visual demands, vehicle control demands, and speed selection. The closer the driver is to the curve, the harder it is for the driver to effectively assimilate information relating to anything other than navigating the curve. The geometry often limits the available sight distance for safe maneuvering and the physical constraints of the intersecting roadway often limit the application of signing and other delineation. The following discusses a few treatments unique to the combination of intersections and curves.

Adjusting Signs and Markings for the Intersecting Roadway

Where an intersecting roadway is within the curve, the traditional means of delineating the roadway alignment is often interrupted. Center line and edge line markings are typically not continued through the intersection. The edge line marking is of particular concern if the intersecting roadway has a wide throat. The MUTCD allows dotted edge line extensions consisting of 2-foot line segments and 2- to 6-foot gaps through intersections along the mainline. In fact, the MUTCD guidance recommends this treatment to help guide motorists through the intersection. Similarly, where chevrons or delineators would typically be used to provide delineation, the discontinuance through the intersection may leave a significant portion of the curve lacking delineation. Adjusting the location of the remaining chevrons or delineators may be appropriate to delineate the maximum curve length. Providing a visible stop line on the minor road approach may also be helpful, especially where the stop line can be seen from a significant distance from the intersection or where crashes indicate stop sign violations.

Smooth Lane Narrowing

The "smooth lane narrowing" treatment narrows the lane width approaching the intersection with a combination of markings and rumble strips. The narrowing is accomplished by gradually tapering out from the center. The rumble strips are milled in along both the left and right sides of each direction of travel, with longitudinal center and edge line markings added. The combination of rumble strips and markings to narrow the lanes reduces operating speeds on the intersection approach. When a curve is present, the preferred design is to narrow the lanes on the approach to the curve. The paved width is not changed in this countermeasure, but the narrower lane width continues throughout the entire length of the curve. The rumble strips and markings are discontinued at the intersection.



Pavement markings narrowing the travel lane as driver approaches the intersection.

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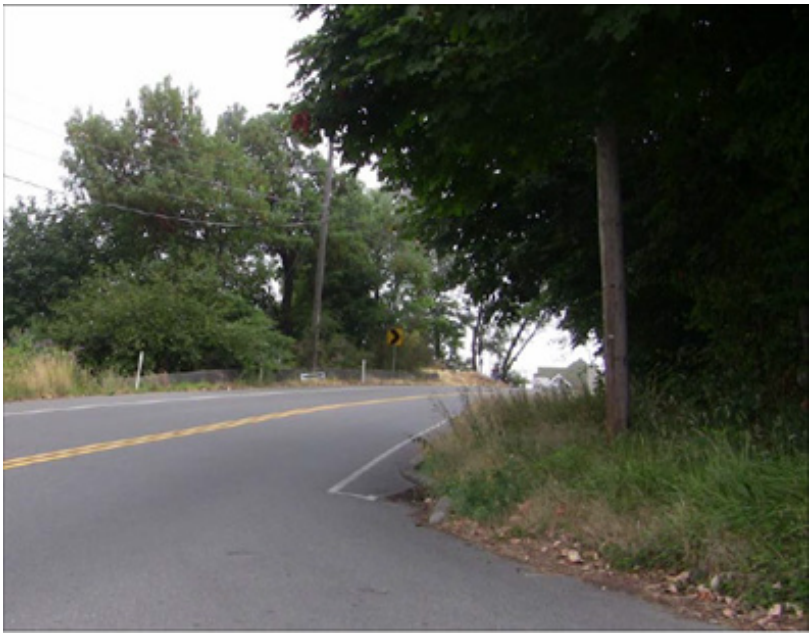
Intersection Sight Triangles

In the typical rural curve with an intersection, the minor road will be stop controlled.

Assuming the intersecting roadway is aligned perpendicular to the curve of the main roadway and is at or near the center of the curve, the sight distance issues on the outside of curve are similar or perhaps even better than for a tangent roadway section. Providing appropriate sight triangles will often be adequate. The intersection on the inside of the curve, however, is restricted by the geometry and requires the driver to have more mobility to see over-the shoulder to view oncoming traffic. If the intersection is not near the center of the curve, sight triangles may cut across the curve and require significantly more clearing. If the terrain is not flat, it may be necessary to cut into slopes to provide the adequate minimum intersection sight distance. The use of and location of guardrails on grades should also be considered as it could interrupt the sight lines for intersections in and near curves. Where providing the appropriate intersection sight distance is not feasible, the intersection may need to be re-configured. In certain limited cases, an “All-Way” stop-controlled intersection may be appropriate.

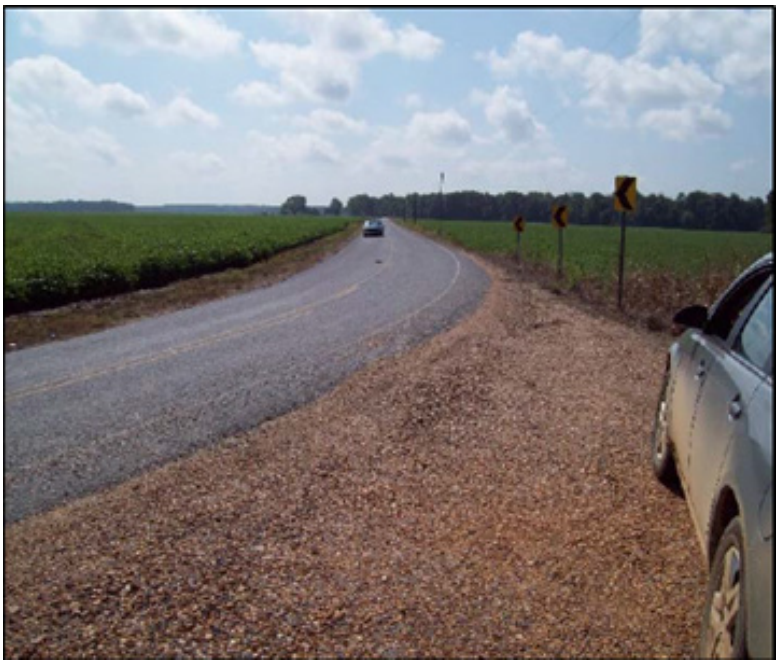


Limited sight distance due to the intersection being inside the curve.

Additional considerations includes:

- Intersection conflict warning systems – use of dynamic warning signs;
- Lighting – use of lighting to improve intersection safety;
- Pavement friction improvement – use of HFST (high friction surface treatments);
- Adjustment of superelevation;
- Pave intersection approach on gravel roads;
- Change intersection configuration;
- Add turn lanes.

“Addressing Intersection in Curves” is part of a comprehensive material provided by FHWA on the Low-Cost Treatments for Horizontal Curve Safety 2016 Guidelines (http://safety.fhwa.dot.gov/roadway_dept/horicurves/fhwasa15084/fhwasa15084.pdf) focused on reducing fatalities caused by roadway departure crashes.



Paving the intersection approach would avoid hazardous condition of having gravel on the main road.

Every Day Counts Update

by Matt Cate, P.E.

Here is an update regarding items of interest from the Federal Highway Administration's Every Day Counts (EDC) program.

EDC 3 Initiatives in Tennessee

At the group's most recent meeting in June, members of Tennessee's State Transportation Innovation Council (STIC) received an update on the Tennessee Department of Transportation's efforts to evaluate and/or implement initiatives from the third round of EDC innovations.

- TDOT and FHWA have formed a Smarter Work Zones team to explore this EDC initiative. Representatives from TDOT's Traffic Operations Division attended a regional Smarter Work Zones peer exchange in Raleigh, NC. TDOT and the Memphis Metropolitan Planning Organization are partnering on a $250,000 SHRP2 project to implement the Work Zone Impact Strategy Estimator (WISE) software tool. Finally, a work zone intelligent transportation systems (ITS) workshop is planned for the fall of this year.

- TDOT is also pursuing the Data-Driven Safety Analysis initiative. Tennessee hosted a DDSA peer exchange in September 2015. TDOT and the FHWA Tennessee Division also participated in the Highway Safety Manual (HSM) Pooled Funds Study peer exchange in the same month. TDOT has established an HSM implementation committee with representatives from TDOT Design, Project Safety, all four TDOT regions, and the FHWA Tennessee Division. The committee is working to develop Tennessee-specific safety performance functions for specific countermeasures. The group has also worked with the Washington DOT to learn more about that state's HSM implementation experiences. The FHWA Tennessee Division coordinated a pilot Safety Analysis of Freeways and Interchanges workshop in January of this year. Finally, TDOT and FHWA participated in the HSM Implementation Plan and Safety Analysis in Project Development peer exchange in May.

- TDOT has completed road diets in Region 1 (Kingsport), Region 2 (Chattanooga), and Region 4 (Memphis). The agency has developed a draft flowchart to help determine when road diets may be appropriate on Tennessee roadways. Ultimately TDOT will develop a Road Diet guide to identify best practices and to standardize the evaluation and implementation of road diet projects across the state. TDOT, the FHWA Tennessee Division, and five in-state local agencies participated in the EDC Road Diets peer exchange in April 2015. Finally, the FHWA Tennessee Division and TDOT will host a road diets peer exchange in August.

- TDOT is also pursuing the Implementing Quality Environmental Documentation (IQED) initiative. TDOT is updating current National Environmental Policy Act (NEPA) document templates to make them more efficient, produce higher-quality documents, and meet current regulations from MAP-21. A two-week general NEPA training course was held in late 2015 to familiarize new TDOT Environmental Division employees with NEPA documentation. A one-day Purpose and Need course was offered to TDOT personnel in March of this year.

EDC 4 Initiatives Announced

In June, FHWA released the list of innovations that will make up the fourth round of the Every Day Counts initiative. These innovations will be rolled out in greater detail over the remainder of 2016 as state DOTs, LTAP centers, industry associations, and other transportation stakeholders participate in regional EDC Summits during the fall.

- Accelerating Traffic Incident Management (TIM) Data Collection
- Advanced Hydraulic Modeling Tools
- Automated Traffic Signal Performance Measures (ATSPMs)
- Community Connections
- Data-Driven Safety Analysis (DDSA)
- e-Construction and Partnering
- Integrating NEPA and Permitting
- Pavement Preservation (When, Where, and How)
- Road Weather Management – Weather-Savvy
- Safe Transportation for Every Pedestrian (STEP)

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- Ultra-High Performance Concrete Connections for Prefabricated Bridge Elements (PBEs)

TDOT will select a subset of these innovations for exploration and implementation as a part of the EDC summits. Some of these innovations will be featured in future EDC Exchanges. Watch future issues of RoadTalk for additional information. To learn more about the EDC 4 innovations, visit the EDC website at http://www.fhwa.dot.gov/innovation/everydaycounts/edc_4/.

The MUTCD and the NCUTCD

by Frank Brewer

On June 8-10, 2016 the NCUTCD met in Savannah Georgia for the summer session of its bi-annual meeting, I was able to attend this meeting and had the opportunity to sit in on the Temporary Traffic Control Technical sessions. Let me explain how this group affects the MUTCD.

The Manual on Uniform Traffic Control Devices (MUTCD) is not a stagnate document. Where does the MUTCD come from? It is compiled by the Federal Highway Administration (FHWA), distributed nationwide by transportation organizations, e.g., AASHTO, ITE, and adopted by all states, districts, territories, and tribal government transportation agencies within the United States. Although the current edition was released in 2009, it had undergone revision. The 2009 MUTCD has been revised twice. How are these revisions added and is this all done by the FHWA? MUTCD is a document that has been around in several forms since the early 1920's. Although the MUTCD is a federal document it is not wholly created by our federal government. The National Committee on Uniform Traffic Control Devices (NCUTCD) is the primary organization to advise the FHWA on what is included in the MUTCD.

The NCUTCD is a group of over two hundred people, including engineers, academics, members of traffic organizations, and practitioners. They continually review the MUTCD and advise the FHWA of needed revisions, additions and interpretations. Changes in several areas, e.g., technology, driver abilities, traffic volume, are considered. Areas such as these have great effect on efficiency and safety of our roadways and highways.

The National Committee on Uniform Traffic Control Devices assists in the development of standards, guides, and warrants for traffic control devices and practices used to regulate, warn, and guide traffic on streets and highways. The National Committee also develops public and professional awareness of the principles of safe traffic control devices and practices and provides a forum for qualified individuals with diverse backgrounds and viewpoints to exchange professional information.

The FHWA is responsible, under federal law, for maintaining the standards in the MUTCD. Changes to the MUTCD (often responding to advances in technology) are made through rulemaking in the Federal Register. Any interested person or organization may provide input to the rulemaking process by submitting comments to the rulemaking docket.

The National Committee is highly regarded for its consensus building. The Committee's strength lies in its ability to forge a consensus among the diverse viewpoints represented by the National Committee members. The Committee is the preeminent voice for the provisions in the MUTCD.

The National Committee meets bi-annually. It is comprised of voting members, associate members, and technical members. The technical members make up eight separate committees that concentrate on the different parts of the MUTCD. The Technical Committee members review the MUTCD against the current transportation environment and evaluate the efficacy of its standards and recommendations. Research on specific devices or procedures considered for inclusion is also reviewed. Any revision or addition that is approved by the Technical Committee is presented to the Voting Committee. The Voting Committee having agreed with the submission then presents it to the FHWA.

When proposed changes are received by the FHWA, the rulemaking process will begin including a lengthy period of public comment and evaluation. Once all evaluations and comments are considered and the changes are approved for acceptance, the FHWA will then submit the changes to the Federal Register and they become a part of the MUTCD.

A new MUTCD is coming. However, it will not be very soon. The NCUTCD is working to create the most accurate document possible. Some revisions on critical items may receive interim release. A new MUTCD may not be seen until 2018. When a new edition is released, there will be an adoption period, usually of one year. TTAP will keep you advised with any significant revisions to the MUTCD as they are released.

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2. Please list any additional training workshops you would be interested in attending.

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3. Please list any other ideas or suggestions on how TTAP could assist you.

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