Comments on Docket ID FHWA-2020-0001 National Standards for Traffic Control Devices; the *Manual on Uniform Traffic Control Devices for Streets and Highways*; Revision

May 11, 2021

Rules Docket Clerk
U.S. Department of Transportation
1200 New Jersey Avenue SE
Washington, DC 20590

RE: Comment on the proposed rule; notice of proposed amendment to the Manual on Uniform Traffic Control Devices for Streets and Highways (MUTCD), Docket ID FHWA-2020-0001

Dear Rules Docket Clerk:

The following comments to the Docket ID FHWA-2020-0001 are submitted on behalf of the American Traffic Safety Services Association (ATSSA). The association represents the manufacturers and installers of traffic safety devices as well as roadway owners and operators interested in traffic safety. ATSSA's core purpose is *To Advance Roadway Safet*y and eliminate all roadway fatalities. Our members are on the front lines in temporary traffic control zones and the invention, manufacture, sale and installation of most of the traffic control devices used on our nation's roadways.

As requested in the Docket, ATSSA used this form to provide comments on the Notice of Proposed Amendments for the MUTCD.

Proposed Section Number(s)	Agree with concept and text as proposed	Agree with concept; suggested rewording of text in Comments	Disagree with concept	Comments *Please include justification for your position based on objective experience and empirical data. If there is a specific statement with which you take exception, please provide the Page and Line numbers from the mark-up version of the proposed MUTCD text.*
1A.	N/A	N/A	N/A	Chapter 1A is a 100 % improvement. Clear and concise!
1A.01	YES	N/A	N/A	ATSSA agrees with the new proposed support statements regarding the purpose of the MUTCD, particularly C. and D., shown on page 1 (lines 23 – 26). This support language emphasizes the application of traffic engineering principles and promoting safety in the use, installation, operation, maintenance, and removal of TCDs.
1A.03	NO	N/A	YES	ATSSA disagrees with bicyclists being placed in the same category as operators of vehicles. We believe the two categories should be ""A. Motor Vehicle Road Users" and "B. Vulnerable Road Users (VRUs)". VRU is inclusive of all road users that are unprotected by an outside shield. ATSSA's policy defines VRUs as persons who use streets, roads and highways without the benefit of the protection offered by an automobile or truck. This would also align with the VRU definition established by some states. For instance, 46.2-816.1. in the Code of Virginia, defines a vulnerable road user as "a pedestrian; the operator of or passenger on a bicycle, electric personal assistive mobility device, electric power-assisted bicycle, wheelchair or wheelchair conveyance, skateboard, roller skates, motorized skateboard or scooter, or animal-drawn vehicle or any attached device; or any person riding an animal." The updated version of the MUTCD is making strides at improving bicyclist safety with Part 9, comprised of the application of bicycle-specific signs and markings. We have reviewed Part 9 and appreciate the progress made there but

				would urge FHWA to move away from lumping bicycles in as vehicles. We suggest the following revised text: B. Vulnerable Road Users (VRU) --This target user is a person who uses streets, roads and highways without the benefit of the protection offered by an automobile or truck. Typically, VRU are walking or traveling by bicycle, wheelchair, scooter, or skates—in other words those users who "walk and roll."
1A.03	NO	N/A	YES	ATSSA disagrees with the description of the "B. Pedestrians" target road user (Lines 43-46). This description is restrictive and non-inclusive of all road users, such as children and seniors. Non-motorized road users/VRUs should not have conditions placed on them regarding their ability to access and use of streets, roads and highways.
1A.05	NO	YES	N/A	The content and presentation of this section need further study and development. We recommend FHWA to go over each reference, evaluate its application, and ensure that the described version of the document is up to date. We would highly encourage FHWA to include important documents and/or websites that align with MUTCD's purpose statement of promoting safety and efficiency. In addition to referencing documents that and are widely and frequently used by practitioners and adopted by DOTs. Below is a suggestion of some of documents and websites to include: • AASHTO Highway Safety Manual (HSM http://www.highwaysafetymanual.org/ • FHWA Crash Modification Factor (CMF) Clearing House website cmfclearinghouse.org • Every Day Counts (EDC) programs, such as FHWA Safe Transportation for Every Pedestrian (STEP) Program EDC-4 Innovations | Federal Highway Administration (dot.gov) • AASHTO Transportation Asset Management (TAM) Guide and TAM Portal: tam-portal.com • ANSI/ISEA 107-2020 American National Standard for High-Visibility Safety Apparel • Manual for Assessing Safety Hardware (MASH) Second Edition, 2016 The references and sources listed above are some tools that are widely used by several DOTs for conducting objective evaluations and decisions.
1B.06	NO	NO	YES	We recommend reverting to a guidance statement for the request for permission to experiment as described on lines 41-49 on page 10 and lines 1-33 on page 11. Meeting this proposed standard might be challenging for some DOTs for the following reasons: • Knowing specific locations to test a device can be challenging due to: o Common and frequent changes to the layout and design of Maintenance of Traffic (MOT).

				o Agencies might not have all MOT plans and locations ready for the construction season by the time they submit their request for experimentation approval. o Agencies sometimes install experimental devices to solve an unanticipated issue that came up in the field. As a minimum, ATSSA asks FHWA to consider requiring location approval for only up to a certain amount. This would allow flexibility and be more practical.
1B.06	NO	NO	YES	ATSSA recommends relaxing the standard requirements (lines 38-42 on page 11) for agencies to submit semi-annual progress report for any approved experiment, to provide experimenting agencies with enough time, without jeopardizing the safety of road users, to collect and process data for conclusive results. Agencies would appreciate receiving a timely feedback from FHWA after the submission of a progress report. This would help all parties involved (FHWA and experimenting agency) to have a common agreement and understanding of next steps.
1C.02	NO	NO	YES	We recommend modifying definition # 44 (page 18, lines 3-16) to read: "A device shall be determined crashworthy by a nationally established standard such as "Manual for Assessing Safety Hardware", 2016 Edition (AASHTO) or subsequent revisions".
1C.02	NO	NO	YES	Page 19 Line 28-36. The use of the term "Engineer" to only mean a "Professional Engineer (P.E.)" is well intended. While we recognize the intent of having highly qualified and trained individuals to oversee areas of traffic control design and implementation, we recommend that the terms not be used interchangeably, especially as it relates to Part 5. Requiring a P.E. to make certain changes is not practical nor does it facilitate the desired outcome, of having a highly trained and qualified individual overseeing design and implementation. We propose that both the definition of "Engineer", and "Engineering Judgement" be adjusted. In addition to a definition change for Engineer and Professional Engineer, we ask that they not be used interchangeably. But instead, the terms be adjusted throughout the MUTCD to be more consistent with its intent and not a single term for all instances. Subsequently using, Engineer, Professional Engineer, and Engineering Judgement as appropriate. We also suggest that language be added to reflect that what levels of knowledge and experience should be defined be the governing body, and not be determined qualified and knowledgeable solely by virtue of the P.E. designation. Such requirement, in many instances, will not be practical or possible for DOT's and contractors. In addition, requiring this particularly as it relates to part 5 could make it difficult for automobile manufactures to comply as they are creating and innovating these technologies.

				Below is a proposed change consistent with our desired outcome: Engineer – Is considered to be an individual with an appropriate amount of education and experience as it pertains to the application of appropriate principles, provisions, and practices as contained in this Manual. Engineer Judgement – the evaluation of available pertinent information, and the application of appropriate principles, provisions, and practices as contained in this Manual and other sources, for the purpose of deciding upon the appearance, use, installation, or operation, of a traffic control device. Engineering Judgement may be utilized by qualified personal that have adequate training and experience with temporary traffic control.
Part 2 - General	N/A	N/A	N/A	Some sections in the MUTCD impact other sections, and these impacts are not identified. For example, section 4S.03 Warning Beacon has an impact on section 2A.20 Retroreflection and Illumination, however, these impacts are not noted in 2A.20.
Part 2 - General	N/A	N/A	N/A	There are multiple inconsistencies across the different sections. These need to be cleaned up to allow for greater clarity. For example, the R10-23a signs has different wording in different sections. Consider reverting to previous wording for R10-23 sign and to also match with section 4F. Use wording “STOP ON RED—PROCEED ON FLASHING RED WHEN CLEAR”.
2A	N/A	N/A	N/A	Chapter 2 in general is organized in an efficient order for manual users.
2A.04	NO	N/A	YES	Lines 18-19 do not state if manufacturer information would be a sticker or integrated into sign sheeting. Common practice now is a sticker on the back of the sign.
2A.09	NO	YES	N/A	Wording is too ambiguous. Typically symbols and word legends are used interchangeably. Unless explicitly allowed is not defined.
2A.11	NO	YES	N/A	Retroreflective strips on sign posts enhanced with LED units adds conspicuity when used in conjunction with LED-enhanced static signs. We suggest adding the underlined text after the sentence ending on line 49. “If a strip of retroreflective material is used on the sign support [...] except that the color of the strip for the YIELD and DO NOT ENTER signs shall be red. <u>If the retroreflective strip is enhanced with LED units it shall only be used in conjunction with an LED enhanced sign as detailed in Section 2A.20.</u> The retroreflective strip shall not display any legend or other information.”
In 2A.11	NO	YES	N/A	Suggest adding general language that states these practices should also comply with current crash testing standards (MASH 16 or current version).
2A.12	YES	N/A	N/A	Agree - Further guidance was needed to eliminate sign clutter.
2A.17	NO	YES	N/A	A South facing sign cannot achieve optimum performance if the solar panel has to be mounted behind or below the static sign. Very common deployment in the field currently is to have a top-of-pole solar mount and the following underlined

				text proposes a change to the sentence on lines 6-8 would allow that: "[...] Such equipment shall be mounted either below or behind the sign, or a minimum 3 feet above the top edge of the sign so as not to detract from or obscure the face of the sign, either directly or by casting shadows onto the sign, and so as not to obscure the shape of the sign."
2A.20	NO	YES	N/A	Replace "retroreflection" with "retroreflectivity". The term "retroreflectivity" is an industry term used for many years.
2A.20	NO	NO	YES	Disagree that "All the LED units in a sign legend or border shall be illuminated simultaneously with no sequential (chasing)". Some agencies prefer the chasing flash pattern to not overwhelm drivers or cause distractions. Suggestion is to remove this statement or change "shall" to "should". Also, some approved signs (school speed limits) have multiple colors. In order to see the different warnings / regulations both should not be flashed at the same time. Suggestion is to remove this statement. Alternate flash rates should be allowed. Please reference suggested additional research in Modern Traffic Control Devices to Improve Safety at Rural Intersections Report No. FHWA/TX-12/0-6462-1. Please reference findings achieved in Indoor Simulator and Field Study Evaluation of Sequential Flashing Chevron Signs on Two-Lane Rural Highways Report No. FHWA-SA-18-07 and Impacts of LED Brightness, Flash Pattern, and Location for Illuminated Pedestrian Traffic Control Device displaying the effectiveness and value achieved through alternative flash patterns within LED-enhanced signs.
2A.20	NO	NO	YES	The proposed changes on lines 44-52 on page 57 and lines 1-2 on page 58 defines the intent without placing restrictive design criteria as described in certain manufacturers' patents. There is empirical evidence available for signs already deployed that, by observation, have proven to help convey the shape of the sign to observers in all conditions. "Researchers used imaging technology combined with genetically expressed sensors to study the function of thousands of individual neurons involved in processing color and shape in the primary visual cortex. The team found that visual neurons selectively responded to color and shape along a continuum." – Science Daily, deciphering how the brain encodes color and shape, June 2019. By having these LED-enhanced signs flashing 24/7 it creates white noise. By allowing these signs to be activated will reduce white noise. Also, there are options to have these signs only activated during specific scenarios (higher speeds or in presence of vehicles) to further increase the effectiveness of the device. Actuation of LED units should be allowed. According to the FHWA document FHWA-SA-09-0006 "LEDs may be illuminated 24 hours a day, or be activated by vehicles or pedestrians" and states a Texas Transportation Institute study that found a 28.9 percent

				reduction in the number of vehicles not fully stopping. Also, activated signs are the basis of Intersection Conflict Warning Systems which are an economical intermediate solution between a static sign-controlled intersection and a full signalized intersection. Please refence findings in Advanced LED Warning system for Rural Intersections: Phase 2 (Alert-2) Report NO. MN/RC 2014-10 and Safety Evaluation of Intersection Conflict Warning Systems Publication NO. FHWA-HRT-16-035 displaying effectiveness and value of activated LED-enhanced intersection signs. Actuated LED signs have greater effect on motorists that see the sign activated as they approach, reduce power consumption and reliability on solar powered signs, and reduce complaints of neighbors about signs flashing in the middle of the night, when there is no traffic on the street. We propose the following changes to lines 44-52 on page 57 and lines 1-2 on page 58: "[...] All the LED units in a sign legend or border shall be illuminated simultaneously with no sequential (chasing) or variable flash rates. ~~A cluster of LEDs shall not be used within the border of a sign.~~ ~~Where used in STOP or YIELD signs, flashing LED units shall operate continuously. Actuation of the LED units shall not be allowed.~~ Where LED units are used along the edge of a sign, at least one LED units shall be placed along each edge of the sign~~, in addition to one LED unit at each corner of the sign, so that that the distinct outline of the sign shape is recognized under nighttime viewing conditions. The LED units along each side of the sign shall be spaced approximately equidistantly.~~ <u>The LEDs at the sign's edge shall be in such a distribution that unmistakably defines the shape of the sign.</u> For a circular sign shape, the number of LED units shall clearly form the appearance of a circle and not be perceived as some other shape."
2A.20	NO	YES	NO	Change following statement from "shall" to "should" in "The LED units <u>shall</u> have the capability to be dimmed automatically". Some agencies do not want dimming. Also, not all devices have the capability to dim.
2A.21	YES	N/A	N/A	We like the fact that minimum maintained retroreflectivity levels are now defined for sign replacement.
2B.04	NO	N/A	YES	We recommend keeping lines "The ALL WAY plaque shall only be used if all intersection approaches are controlled by STOP signs." It would be unsafe for motorist to eliminate the 'All Way' plaques.
2B.06	NO	YES	N/A	Consideration needs to be given in establishing a new Part in the MUTCD for conducting <u>Intersection Control Evaluations</u> (ICE) or <u>Intersection and Junction Control Evaluation</u> (IJCE). Intersection control and the evaluation of proper control is a critical need. Having clear and defined methods on how

				intersection control devices are to be evaluated and implemented is critical. Intersection control is an issue traffic engineers have dealt with and are dealing with everyday everywhere. Yet, there really is no clear national method to evaluate it to and determine which sort of control provides the most safety and efficiency. While there are guides and information available on how to do this, the MUTCD does not provide a clear and concise methods on how that is to be done. Instead, the information is scattered in both Part 2 and 4. As an alternative to creating a new part in the MUTCD addressing Intersection Control Evaluations (ICE) or Intersection and Junction Control Evaluation (IJCE) would be to include this content in proposed section 4B.05 Alternative to Traffic Control Signals.
2B.17	YES	N/A	N/A	We like that a complete section is warranted for All Way Stop considerations.
2B.21	YES	N/A	N/A	Setting of speed limits is the most crucial item for safe highways
2C.02	YES	N/A	N/A	Allowing custom messages for unique conditions should be used to enhance messaging to drivers
Table 2C-1	NO	YES	N/A	Table 2C-1 dimensions cannot be manufactured as standard sizes due to the size of pixel blocks. Please review the design details of these sign constructs and ensure that the sizes are appropriate to meet the needs of standard fonts and electronic display for a hybrid sign.
Table 2.C.1	NO	YES	N/A	The height of the sign face may be increased in order to achieve the highway gothic font, as defined in Section 2.A, height and width ratio for optimum visibility, viewing distance and uniformity. We propose the following change: Optional: Vehicle Feedback Sign height dimensions may be greater than those in table 2.C.1 for each roadway type.
2C.08	NO	NO	YES	Remove “LEDs shall not be flashed from one sign to the next along the curve or turn”. Some agencies prefer this sequential pattern to help guide drivers through the curve. Having all chevrons flash at once can be seen as too intimidating. A vast majority of LED-enhanced Chevron users today have implemented configurations where the LED signs flash from one sign to the next noting valuable and quantifiable improvement in safety results achieved through such. Sequential flash patterns have been proven effective at guiding motorists through the duration of a curve safely. Please reference findings achieved in Highways for Life Publication No. FHWA-15-CAI-012 and Indoor Simulator and Field Study Evaluation of Sequential Flashing Chevron Signs on Two-Lane Rural Highways Report No. FHWA-SA-18-075 displaying effectiveness and value of sequential LED-enhanced Chevron systems. Also, as previously suggested to the NCUTCD, further flash pattern research is necessary to analyze and determine the most beneficial pattern for varying curve applications.
2C.08	NO	NO	YES	The FHWA has identified sequencing Chevrons as a proven low-cost counter measure for reducing roadway departures

				on horizontal curves: https://safety.fhwa.dot.gov/provencountermeasures/enhanced_delineation/. The following is an excerpt from the study: *Enhanced delineation treatments can alert drivers in advance of the curve and vary by the severity of the curvature and operating speed. Price ranges for these strategies are low to moderate. Treatments include the following:* • *Pavement markings.* • *Post-mounted delineation.* • *Larger signs and signs with enhanced retroreflectivity.* • *Dynamic advance curve warning signs and sequential curve signs.* In addition, the National Committee on Uniform Traffic Control Devices (NCUTCD) Regulatory and Warning Sign Technical Committee (RWSTC) has supported the use of sequencing chevrons and has prioritized initiating a national study to examine the flash rate of sequencing chevrons and the effect on drivers. Proposed changes below: ~~LEDs shall not be flashed from one sign to the next along the curve or turn.~~ The Sequencing of Chevrons, where LED units are flashed from one sign to the next along the curve or turn are allowed.
2C.13	NO	YES	N/A	Feedback signs should be allowed in school zones in fluorescent yellow green. Feedback signs should also be used in areas where speed in a curve may cause rollover or run off road. Should be allowed in fluorescent orange in construction zones if speeds are factors that endanger workers. Should be allowed where excessive speed may endanger pedestrians i.e., special events, parks, bike or pedestrian trail crossing areas.
Figure 2C-6	NO	YES	N/A	Consider adding additional information to address potential sight distance limitations as shown on the drawing.
2D.04	NO	YES	N/A	Line 29 - Alphabet for street name signs needs to be addressed as using the C font no E Mod or Clearview. Agencies have consistently used Clearview with no regard to the standard.
2D.11	YES	N/A	N/A	Standardization of state route signs is needed.
2D.45	YES	N/A	N/A	Standardization of street name signs is needed.
2D.55	YES	N/A	N/A	Conventional lettering style should always have been a standard in MUTCD.
2F.01	YES	N/A	N/A	We like all sections in 2F. Entrance and Exiting of toll roads are confusing to motorists.
Section 2H.07	NO	NO	YES	We disagree with the new proposed standard on lines 27-28, on page 283 and recommend the deletion of those lines. Labeling State Welcome Signs would be beneficial to agencies and contractors for inventory tracking and ownership determination.
2I.02	YES	N/A	N/A	Clarification of urgent care/hospital signs could mean life or death. Operating hours and pertinent information should be required and continually updated on these signs.

Section 2L.01	NO	NO	YES	We disagree with the new proposed standard on the second sentence (lines 35-37) and recommend the deletion of those lines. Labeling TCDs would be beneficial to agencies and contractors for inventory tracking and ownership determination.
2L.04	NO	YES	NO	Page 321 Line 22-24. Change "Should" to "Shall" in “where an LED matrix is used to form the changeable legend, signs with pixel spacing greater than 20mm should display only word legends and no symbols or route shields."
3A.04	YES	NO	N/A	• ATSSA supports FHWA’s proposed language clarifying the functions of dotted edge line extensions (D&E) (Lines 25-27). • ATSSA strongly supports FHWA’s proposal to standardize the use of 6-inches wide lines for freeways, expressways, and ramps (Lines 29-31). The proposed change is especially important for high-speed roadways and would improve the safety of road users and machine vision detectability. Those proposed changes were based on a ATSSA Report, entitled ‘‘Evaluation of the Effects of Pavement Marking Width on Detectability by Machine Vision: 4-Inch vs 6-Inch Markings.’’
3A.04	NO	NO	YES	ATSSA recognizes the importance of promoting uniformity relative to pavement marking width. FHWA provides guidance relative to the use of centerline markings based on the width of the traveled way. There is concern that requiring 6 inches wide pavement markings on all roadways with speed limits >40 mph will result in marking removal from low-volume roads.
3A.04	NO	YES	N/A	ATSSA supports FHWA’s proposal regarding wide line width found on lines 32-34. ATSSA requests that FHWA amend NPA 3A.04 Guidance (Lines 7-9) regarding the use of broken lines to include the following: “On Interstates, freeways, and expressways, 15-foot line segments and 25-foot gaps should be used for broken lines.” This language was unanimously approved by the National Committee on Uniform Traffic Control Devices (NCUTCD) on January 9, 2020 (19B-MKG-02). The original adoption within the MUTCD of a 10-30 broken line length and gap ratio occurred when the national maximum speed limit was 55 mph. Previously, MUTCD “Guidance” was 15-foot line segments with 25-foot gaps. Speed limits on limited access highways today are as high as 85 mph. Humans and camera system technologies benefit from this proposed change on our nation’s highest-speed roadways. We request that it be included as “Guidance” within NPA Section 3A.04 or at least be listed within NPA Section 5B.02 Markings in Part 5 – Automated Vehicles, as a practice that road agencies could employ to support AV technologies.
3A.05	N/A	N/A	N/A	ATSSA is disappointed that FHWA did not release a final rule establishing a minimum pavement marking retroreflectivity “Standard” as part of the NPA. A uniform minimum marking visibility “Standard” is essential for road agencies seeking to evaluate the impact of proposals within the NPA. A minimum standard would be beneficial in supporting lifesaving advanced driver assistance system (ADAS) technologies that rely on pavement markings to warn drivers of lane departure

				or that autocorrect when drivers stray into oncoming traffic. FHWA was tasked by Congress to establish this standard nearly 30-years ago. Its release has never been more urgent.
3B.07	YES	N/A	N/A	ATSSA strongly supports FHWA proposed changes to NPA Section 3B.07 changing two "Options" to "Standards" requiring dotted white line extensions for deceleration lanes at exit ramps and for acceleration lanes at entrance ramps. These changes will provide clarity for human drivers, improve the effectiveness of ADAS lane keep technologies and assist in the deployment of automated vehicle technologies.
3B.17	YES	N/A	N/A	ATSSA strongly supports FHWA's upgrade to a "Standard" the prohibition of using non-reflective raised pavement markers alone. These markings create difficulties for machine vision systems.
3B.25	YES	N/A	N/A	• ATSSA appreciates FHWA's strong support for the installation of chevron and diagonal markings as an enhanced safety feature. The National Transportation Safety Board (NTSB) has recommended that chevron markings be installed for left exit transitions. Machine vision system developers also support chevron installation. ATSSA supports upgrading the installation of chevron markings on left exit transitions to "Guidance" from "Option." • ATSSA supports proposed changes related to chevron and diagonal markings as found in NPA Section 3B.25.
3H.05	YES	N/A	N/A	ATSSA supports FHWA proposing that white colored pavement may be installed as an "Option" instead of chevron markings in neutral areas (NPA Sections 3B.13 and 3B.25). We appreciate the inclusion of the NPA Figure 3H-13 to illustrate the white pavement use. As proposed, white colored pavement should be easier to install and maintain for agencies.

<table>
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<td>Item #370.</td>
<td>NO</td>
<td>YES</td>
<td>N/A</td>
<td>In Section 3H.06 Green-Colored Pavement for Bicycle Facilities, FHWA references “Interim Approval No. 14.[64] In reviewing the footnote it provides a link to a letter dated April 15, 2011 (HOTO-1) from Jeffrey A. Lindley to Federal Lands Highway Division Engineers Division Administrators. We request that FHWA review the interim approvals website. On the April 15, 2011 – Interim Approval for Optional Use of Green Colored Pavement for Bike Lanes (IA-14) letter (https://mutcd.fhwa.dot.gov/res-interim_approvals.htm), there are two references. We respectfully suggest that the letter dated June 17, 2016, Official Interpretation #9(09)-86 (I) on Chromaticity Requirements for Green-Colored Pavement is in fact, the controlling reference.
https://mutcd.fhwa.dot.gov/resources/interpretations/pdf/9_09_86.pdf
This letter affirms “FHWA is rescinding the requirement for nighttime chromaticity” for green bike lane material. It also strongly suggests that FHWA “will restrict the color box to better reflect the range of products available. At this time, the future daytime chromaticity requirements are expected to be as suggested in the revised color box.” In the proposed section 3H.01 Standardization of Application (support lines 27-29) reads: “The chromaticity coordinates that define the ranges of acceptable colors to be used in pavement marking applications are found in Appendix to Subpart F of 23 CFR 655.” NPA 3H.01 lines 36-37 reads <u>Standard: Colored pavement shall be limited to uses only where it supplements other markings as provided in this manual</u>.
While the explanation in NPA item # 370 references the interim approval, we ask FHWA to provide clarity as it relates to the issue of daytime and nighttime chromaticity.
We strongly agree with FHWA’s decision, referenced in the letter, to rescind the nighttime chromaticity requirement for green bike lane material. We remain supportive of the intent to codify the color box as follows:
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<td>3H.07</td>
<td>N/A</td>
<td>YES</td>
<td>N/A</td>
<td>Within Section 3H.07 Red-Colored Pavement for Public Transit Systems.”, there is no additional information specific to chromaticity coordinates. Without additional clarification, section 3H.01, Standardization of Application (support lines 27-29), “The chromaticity coordinates that define the ranges of acceptable colors to be used in pavement marking applications are found in Appendix to Subpart F of 23 CFR 655” and lines 36-37, “Standard: Colored pavement shall be limited to uses only where it supplements other markings as provided in this manual”, remain in force.
On December 4, 2019, FHWA released an Interim Approval for Optional Use of Red-Colored Pavement for Transit Lanes (IA-22) (HOTO-1).
https://mutcd.fhwa.dot.gov/resources/interim_approval/ia22/index.htm.The third item relative to red-colored pavement includes two items of interest. In 3B it affirms that FHWA will not require a nighttime chromaticity requirement for red-colored pavement. It also includes daytime</td>
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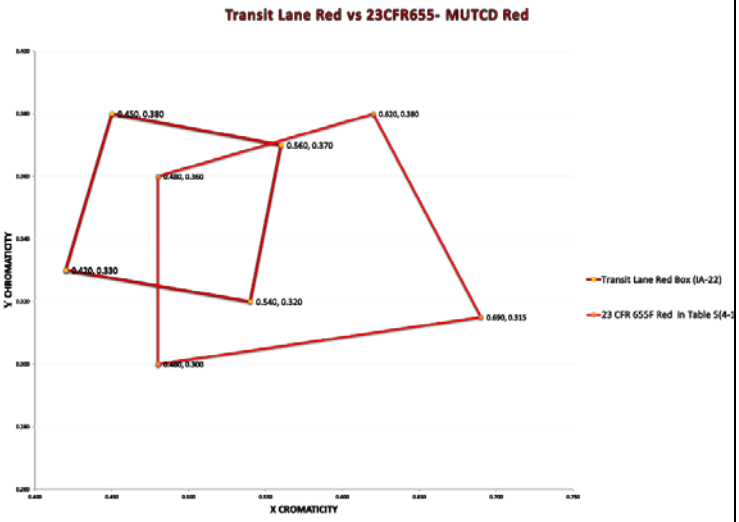
				chromaticity coordinates. These coordinates are very different from those found in 23 CFR 655F Red (see below).  We respectfully request that FHWA review this matter and provide clarity regarding the desired chromaticity requirements for red bus transit lane material.
Item #383	N/A	YES	N/A	ATSSA agrees with the addition of the option, conditional to it keeping it as an option. Utah have used the Flashing Yellow Arrow (FYA) for years and found it to be effective. We do not use the particular applications proposed in the updated MUTCD, with three section heads and a yellow indication in the center that goes from flashing to steady. Utah places a separate signal head over the left-turn lane, with four sections; this way the indication moves up the head for each phase change from green, to FYA, to steady yellow and red. The shift from flashing to steady, indicating the end of the phase, gets more attention when it's a separate section of the signal head. Utah uses a supplemental sign with the FYA to remind drivers to yield, but the FYA allows more flexibility in timing plans with lead/lag protected left-turn movements. The original recommendation (NCHRP study done by Jay Bonnison of TTI) for flashing yellow arrow was to provide a transition signal between permissive left turn changing to the protected lagging left turn. It was to help the driver know they were going to get the green arrow and they were not "trapped." The application of the flashing yellow arrow seems to not be uniform, with it having different applications and meanings (e.g., even for permissive left turns) across different states. Are we truly certain that it is a proven traffic safety intervention that outweighs its potential to cause driver confusion and cause additional visual noise on our streets both night and day? Has FHWA done any human factors studies and polling of road users on the use of flashing yellow arrow?
Item #393	NO	NO	YES	Tables 4C-2, 4C-3, 4C-4 and 4C-5. In the past a fatal has been valued at around $5.6 million dollars. The typical cost of a traffic signal, depending on what all is involved, can range from $500,000 to around $2.5 million. But typically, a traffic signal will easily meet a benefit to cost ratio of 2 to 1 (per

				typical HSIP criteria), if it involves mitigating a crash type that can be mitigated by a traffic signal (turn, angle and pedestrian crossing crashes). However, with these proposed warrants, the number of fatal-and-injury angle and pedestrian crashes is set by the number of crashes depending on number of through lanes and each approach by the type of street. The minimum number of totals of angle and pedestrian crashes (all severities) and total of fatal-injury angle crashes and pedestrian crashes varies in Community less than 10,000 population or above 40 mph on major street. If these tables are taken literally in some instances 3 or 6 people would have to be killed or injured in a one-year period or 3, 4, to 6 people have to be killed or injured in a 3-year period for these warrants to be met. These seems like a very high bar. Is it appropriate to have such a numeric criterion in the MUTCD as some might use this to say no to a traffic signal that could prevent a fatal or injury-prone crash before it happens or to address a certain pattern that has not resulted in an injury or fatal crash yet? With today's safety devices in vehicles, the boundary between a property damage only / minor injury crash and a serious injury / fatal crash is often laser thin. Additionally, crashes are rare and random events. This is particularly true with serious injury and fatal crashes. The more worthwhile part of these tables is the use of total crashes criteria. This would seem to be more accurate in helping to define a problem that could be mitigated by a signal. The inclusion of the number of fatalities opens the door that leads to that age-old question that many municipal Traffic Engineers face from citizens "How many people have to die or be hurt before you are going to do something?"
Item #398	NO	NO	YES	Would FHWA provide the research supporting these new provisions? We believe the issues is related to steady turn arrow indication. With this, there is a more than likely chance that drivers can react in error to the color of the signal and not necessarily to the arrow symbol. This happens when a turn arrow signal is misplaced or is close to a through lane. When drivers see the green arrow comes up, they will react to the green color, not necessarily the green arrow. There is a particular chance of this happening when the arrow signals are a good distance away and it is at nighttime. We believe this can be explained because the brightness of the green light coming out of the arrow symbol has a tendency to overwhelm the symbology of the arrow. Consequently, if a driver is not paying close attention or is visually impaired in some manner, they might mistake the green arrow as a standard ball signal even though there are red ball signals showing directly at them. We have seen numerous drivers make this mistake. Sometimes they catch themselves prior to running the red light. But we have also seen drivers simply run the red light. We believe this issue could be resolved if the light output of a green arrow was specifically designed for night seeing conditions. Additionally, we believe consideration should be given to making turn arrow signal bigger than 12-inches in diameter lenses. Say 16-inches in diameter lenses with a much bigger arrow symbol. This would provide better

				definition and legibility potential of the arrow symbol, but also provide drivers a visual clue that the signal is for a turn lane and not a through lane. Back in the early 2000s, the ITE LED Traffic Signal Specification Committee considered this proposal.
Item #403	NO	NO	YES	These statements are out of date. Why are incandescent lamps even mentioned? We believe the EPA Energy Star mandates have long ago almost led to the complete demise of incandescent lamps being used in traffic signal heads. Perhaps incandescent is still used in some snow area states? FHWA needs to coordinate with ITE to reform and reconvene a traffic signal specification committee to update their specification for all Vehicle Traffic Control Signal Head for both balls and arrows as well as pedestrian traffic signals. Plus, we do not believe there is a specification for bike traffic signals. The last time ITE of the LED Traffic Signal Specification met was sometime back in 2010. Since then, we do not believe there has been any effort to continue updating these most important specifications. There have been many technologic improvements to traffic signals in the past 11 years. These specifications need to be updated with that technology, so they are relevant, meaningful, and useful. Additionally, we believe there is much work to be done on both the arrow, U-Turn and bike signal specifications with regards to their photometric performance and related human factors issues. We believe there is cause to be concerned that these signals accurate symbol and color message performance may lead to interpretation error by road users at night because they are too bright.
Item #403	NO	YES	N/A	Concur with the revised standard P5. It would be more appropriate if the “Standard” was revised to prohibit this display even with the designated departure lanes. The right-turn departure lane is controlled by a Yield sign. Engineers may read this and interpret it to mean if you have this condition, you must signalize it which may lead to more crashes, especially where the channelization is applied with pavement markings in lieu of a raised island. Rain, fog, snow, and nighttime conditions will be the worst cases. When a right turning vehicle sees the green arrow the road user does not expect a vehicle from his left and if the markings are not emphasized to remain in the lane crashes will likely occur. Concur with the modified Standard P6 to clarify which signal displays are prohibited when a combined left-turn/through lane exists on an approach.
4F.08	YES	N/A	N/A	Agree- As far as Flashing Yellow Arrow (FYA) operations are deemed appropriate by the controlling agency, allowing the FYA indication and the Yellow clearance indication to use the same signal face will make the FYA capability available to more locations at less cost. Allowing FYA use in a standard 3 section signal head will mean that agencies will not need to add infrastructure to implement this feature. It can be done with existing signal heads, wiring, and equipment. It will only require a controller unit and monitoring unit programming task, as well as necessary signage. (Note: The use of FYA, the ways it is being utilized, and effect on Safety and/or driver confusion should continue to be studied).

4F.19	YES	N/A	N/A	Agree- This change disallows the shortening or omission of pedestrian movements due to emergency vehicle preemption, where it was allowable before. This will give protections to the most vulnerable road user at the intersection as opposed to regular and emergency vehicles. It is also agreed that due to the unstoppable nature of boats at bridges and trains at crossings, the continued ability to shorten or omit preemption movements in these limited situations should continue, if needed.
Item #416	NO	YES	N/A	We recommend FHWA to prohibit the yellow-red flash mode for traffic signals. For safety reasons we believe the MUTCD should require that all-red flash should be the new standard. However, if this is not possible, then we believe as a minimum, all red flash should be required for signalized intersections that are more than three lanes wide (two through lanes and dedicated right turn lane). We believe this is necessarily to help protect pedestrians who might cross at a flashing signal. All way red flash would help mitigate the multiple threat pedestrian crash that might be set up by yellow flash. Multiple threat being that one vehicle stops on the yellow flash for the crossing pedestrian and another vehicle coming up behind the stop vehicle does yield and hits the pedestrian.
Item #417	NO	NO	YES	We believe that bicycle signals should take a different form than 12-inch round vehicle signals. Originally, pedestrian signal used round signal indications. Eventually, pedestrian signals became square and at first used an illuminated text message of “Walk” in white light and “Don’t Walk” in orange light. However, eventually the international symbol of the “walking person” in lunar white light and the “upraised hand” in orange light were adopted. Then in the late 2010s, the countdown signal was added. Why shouldn’t something like this be done for bicycle signals? Or another idea would be to revisit the entire approach to supplemental traffic signals for both pedestrians and bicyclist and develop something that works for both? Thus, avoiding another piece of unique infrastructure that agencies have to maintain. We believe that adding of bicycle signals is yet another example of what happens when consideration of life cycle costs does not play into decisions. Instead, we simply add more stuff that agencies need to be aware of and then maintain.
Item #420	NO	NO	YES	All of the ITE of the LED Traffic Signal Specifications are out of date and need to be worked on. FHWA should coordinate with ITE to form an update committee so they can get to work updating these most important specifications. The issue of sun phantom and other issues with traffic signals (snow and ice buildup, etc.) could be addressed at that time. It is important to note that sun phantom on pedestrian signals can be easily mitigated with the use of an “egg crate” visor.
Item #430	YES	N/A	N/A	Agree with this change, there are always situations where flexibility is necessary to locate a ped pole, more often in urban areas where the ideal location has installation prohibitions.
4L.01	NO	N/A	YES	Change “shall” to “should” for statement in “An RRFB shall only be installed to function as a Warning Beacon”. This statement forbids similar items to enhance

				traffic safety. Research has shown it is the flash pattern that is effective, not the RRFB itself. A device similar to the RRFB could be used in other applications to increase traffic safety. The MUTCD should not prevent any future improvement to traffic safety.
4L.02	NO	N/A	YES	Red LEDs should be added as an optional color for the light bar, above certain speeds, as it is more recognizable as STOP.
4L.02	NO	YES	N/A	MUTCD should define paragraph X (errant place holder that was not updated) in lines 17-18 on page 488.
4L.02	NO	YES	NO	Sign legend and sign description does not match (R10-25, Section 2B.62, Figure 2B-26) – in multiple areas (4U.02). Please make signs and their written descriptions in the MUTCD match.
4L.03	NO	YES	NO	"The predetermined flash period shall be immediately initiated each and every time that a pedestrian is detected either through passive detection". Rewording is needed, how it currently reads is that RRFBs should be activated if a pedestrian is detected leaving the crosswalk. The goal of detection is to know location/direction of the pedestrian and only activate as a pedestrian approaches or is in the crosswalk, and to not activated when a pedestrian is detected leaving/outside of the crosswalk.
4J	NO	YES	NO	For sign R10-23 suggest using previous wording "stop on red – proceed on flashing red when clear"
4J.01	NO	NO	YES	Remove "Option: A pedestrian hybrid beacon may be considered for installation to facilitate pedestrian crossings at a location that does not meet traffic signal warrants…". It is hard to understand and interpret this "option." The option could be interpreted as half of the crossing could have a HAWK signal while the other half could have no crossing enhancement – resulting in a stranded pedestrian - which is dangerous.
4S.01	NO	N/A	YES	Change "shall" to "should" for statement, "Beacons <u>shall</u> be flashed at a rate of not less than 50 or more than 60 times per minute. The illuminated period of each flash shall be a minimum of 1/2 and a maximum of 2/3 of the total cycle". For some applications the ½ to 2/3 flash cycle is too long, and some agencies prefer shorter flash durations.
4S.03	NO	NO	YES	Remove point "E", on lines 26-30 on page 501. Most agencies use LED-enhanced signs in these scenarios. Warning Beacon are decreasing in popularity, and not as preferred in many agencies. By only allowing Warning Beacons to be used in "when flashing" applications, the MUTCD is reverting back to older technology that is not preferred by many agencies. Road users are becoming accustom to LED-enhanced signs. In addition, by only using Warning Beacons, the MUTCD is stifling innovation that can improve traffic safety. At a minimum, consider removing the added text on lines 28-30. Not allowing LED-enhanced signs is counter to the allowances in Section 2A where currently LED-enhanced signs are used in conflict intersection warning systems across the country.
4S.04	NO	NO	YES	Remove statement "Flashing light emitting diode (LED) units shall not be used within the legend or border of a Speed Limit

				sign to indicate that the displayed speed limit is in effect." Agencies have widely adopted LED-Enhanced signs in School Zone applications. By adding this statement, the MUTCD could be causing confusion to drivers who are used to LED-Enhanced signs used in School Zones.
Part 5 - General				This new part would take what is in Part 2 and in Part 4 and put them in the proper context so an evaluation could be done that determine what is the safest most efficient form of intersection or junction traffic control. This would include the evaluation on how to prevent crashes before they happen and determining which form of control provides the best life cycle costs. This would include not only stop signs and traffic signals, but roundabouts and other less conventional approaches such as indirect lefts and two stage left turns. Note many DOTs have developed and adopted ICE type of approaches. The Virginia DOT has its innovative intersection or junction program Innovative Intersections and Interchanges - Info | Virginia Department of Transportation (virginiadot.org) and CALTRANS has its ICE, Intersection Control Evaluation (ICE) | Caltrans) to name just two of the better known ones. The MUTCD does not address standardizing several areas that might be important to AV technologies such as digital infrastructure, geometric road design, setting maintenance levels for all traffic control devices, and setting minimum condition levels for paving materials. It is important for early implementers of automated vehicles to understand the ramifications of traffic control devices in a mixed fleet environment and to consider the needs of both human and machine led road users. Partial automation technologies are already commercially available in the vehicle fleet and are operating under current infrastructure conditions. The overall effectiveness of the automation is impacted by the uniformity and consistent application of the highway infrastructure, including traffic control devices.
5A.01	N/A	YES	N/A	The MUTCD is clearly the standard that the transportation industry looks to for guidance on how roadways must operate for the safe and efficient movement of goods and services. We are glad to see guidance on how CAV's now integrate with the systems and practices of this document. As we have seen in the past 10 years, the introduction of CAV's is bringing about rapid changes that states and municipalities need to keep up with in order to deliver safe and efficient travel. Changes in roadway and roadside technologies and federal regulations have moved quickly during this time and it will be important for transportation practitioners to get authoritative guidance from the MUTCD in the future. We ask that more frequent updates to the MUTCD or individual chapters be scheduled in order that the approach to integrating CAVs into our transportation are clear and uniform.
5A.01	NO	YES	NO	Agree with the concept, however, the technology changes at such a rapid pace, that the guidelines need to be prefaced and worded to reflect that.

				Below is a proposed preamble to the existing language in 5A.01. Original text is in black and proposed changes/additions are reflected with an underlined font: Title: Automated Vehicles Chapter 5A – Preamble This chapter provides guidance to administrative, engineering, and technical staff. Engineering practice requires that professionals use a combination of technical skills and judgment in decision making. Engineering judgment is necessary to allow decisions to account for unique site-specific conditions and considerations to provide high quality products, within budget, and to protect the public health, safety, and welfare. This chapter provides the general operational guidelines; however, it is understood that adaptation, adjustments, and deviations are sometimes necessary. Innovation is a key foundational element to advance the state of engineering practice and develop more effective and efficient engineering solutions and materials. As such, it is essential that Part 5 provides a vehicle to promote, pilot, or implement technologies or practices that provide efficiencies and quality products, while maintaining the safety, health, and welfare of the public. It is expected when making significant or impactful deviations from the technical information from these guidance materials, that reasonable consultations with experts, technical committees, and/or policy setting bodies occur prior to actions within the timeframes allowed. It is also expected that these consultations will eliminate any potential conflicts of interest, perceived or otherwise. The suggestions listed in this chapter are for reference purposes only and are subject to change as technology for connected and automated vehicles (CAVs) changes. Section 5A.01 Purpose and Scope Support: The purpose of this Chapter is to provide agencies with general considerations for vehicle automation as they assess their infrastructure needs, prepare their roadways for automated vehicle (AV) technologies, to support the safe deployment of automated vehicle technology on roadways explicitly dedicated to AVs. These provisions are not intended for all roadways. As of the date of this document's publication, this Chapter provides an overview of foundational AV technology terminology, key principles, considerations for traffic control devices, and topics for agencies to consider, but are subject to change as technology for CAVs evolves, or new technologies are developed, known or unknown at the time of the document's publication. Deviations from provisions in this chapter may be made, with input and guidance of experts and/or technical committees.
5B.01	NO	YES	N/A	DAS needs to be changed to AV and refresh rates need to be addressed.
5B.01	YES	N/A	N/A	Agree and believe it is a great idea to encourage cooperation between all parties involved.

5B.02	YES	N/A	N/A	• ATSSA strongly supports FHWA's effort to provide road agencies guidance regarding how best to prepare roads for driving automation system technologies. • ATSSA supports NPA Section 5B.02's language encouraging agencies to "consider" these practices in support of machine vision.
5B.02	NO	N/A	YES	ATSSA would encourage FHWA to eliminate references found in NPA Section 5B.02A and B, Support (Lines 25-28). These provisions are newly proposed "Standards" and need not be referenced.
5B.02	NO	N/A	YES	We oppose referencing NPA Section 3B.06's reference related to broken line length and gaps as proposed in NPA Section 5B.02 "Guidance" (H). We refer FHWA to our response regarding broken lines on high-speed roadways such as freeways, highways, and expressways. NCUTCD 19B-MKG-02 includes specific language supporting the use of 15-foot length and 25-foot gaps for broken lines. We ask that clarifying language be included in this section. Given that the other provisions within NPA Section 5B.02 "Guidance" only refer to consideration of the remaining elements, ATSSA believes this clarification and the development of corresponding language within NPA Section 3B.06 permitting this configuration is appropriate.
5B.02	NO	N/A	YES	ATSSA recognizes that the use of "Guidance" language in Section 5B.02 refers to agency "***consideration****"* of the listed practices, not the practices themselves. ATSSA encourages FHWA to remove "Guidance" C and F, in section 5B.02, since these reference NPA "Standards" language in Part 3. Also, ATSSA recommends deleting Guidance # F (line 40, page 513) due to the lack of provision for replacement of temporary markings in projects such as bituminous surface treatment. This would be applicable to work zone projects.
5B.04	NO	YES	YES	ATSSA recommends the deletion of the two sentences on lines 40-41 of Section 5B.02 and of the last sentence on lines 40-41 of the Guidance paragraph in Section 5B.04 until more research is completed documenting the rationale for eliminating the use of temporary raised pavement markers (TRPMs) in work zones without provision for a replacement for temporary markings. As written, these lines would eliminate a category of widely used reflectors with nothing to replace them – especially in bituminous surface treatment projects. TRPMs effectively provide short-term temporary markings in projects where existing lines are eliminated either due to a bituminous surface treatment such as a chip seal or a slurry seal, or asphalt paving projects where immediate restriping of the road is not logistically possible. This is precisely where these markers are designed to be used.
5B.04	NO	N/A	YES	ATSSA recommends the deletion of the first sentence (lines 38-40) of the last Guidance paragraph until more research is completed documenting the proposed rational for a minimum 8-inch dimension. As written, it lacks clarity on the dimensions of channelizing devices and the required amount of retroreflective material. In addition, it would eliminate a category of widely used channelizing devices (e.g., tubular markers) with no alternatives and without adequate research to justify such a restriction. Projects such as 2-way, 2-lane

				detours on 4-lane interstate freeways do not have sufficient widths to allow for the use of an 8-inch wide channelizer such as a drum. Not to mention the problems that would arise due to drums being knocked out of alignment, into the path of oncoming traffic traveling 70 MPH, etc. Lastly, this provision was inserted to reflect current technology, which is widely recognized to be rapidly changing, and may not be necessary for guidance of automated vehicles in the not-too-distant future.
Tables 6B-1 & 6P-5	NO	YES	NO	Add guidance on the spacing of more than three signs, which happens often on the field. Various locales with published guidance have use either A, or 1/2 A. Potential case: TTC Flagger set up included seven signs (Bike Lane Ends – Share the Road; two speed reduction signs; Be Prepared to Stop; plus the standard three TA-10. The three required signs were spaced correctly; the other signs were interspaced among them. Drivers more likely to read the signs than watch out for the workers.
Tables 6B-2 & 6D-1	NO	YES	N/A	Should include Stopping Sight Distance for 80 mph (Variously given as 930 feet or 960 feet). Many western jurisdictions have the higher speed limits, plus Taper Guidance prefers use of the prevailing speeds – and drivers frequently and routinely exceed posted speeds in sparsely populated areas.
6J.04	NO	NO	YES	We oppose to the deletion of lines 6-7 and recommend adding the underlined text to the provision. We propose the text to read as follows: "Standard: When used, delineators shall combine with or supplement other TTC devices. <u>They shall be mounted on crashworthy supports</u> and shall be in accordance with Chapter 3G."
6C.05	N/A	YES	N/A	ANSI 107-2015 has already been superseded by ANSI 107-2020. Suggest using current edition or just leave the year off.
6D.02	YES	N/A	N/A	The STOP/SLOW Paddle configuration options listed in A-E have been proven to be very effective in saving lives in the work zone. NYS DOT, NHTSA, and NIH studies. 14 states DOTs have standardized on this version of LED STOP/SLOW paddles for work zone applications and many of these DOTs have mandated them for DOT maintenance type trucks. Thousands of municipalities and Department of Public Works have incorporated these devices into their work zones for safety.
6E.04	YES	N/A	N/A	ATSSA supports Pilot car method with other methods of control as described on lines 7-8 on page 543: "The pilot car operation shall be coordinated with flagging operations or other 8 methods of control at each end of the one lane section of the work zone."
All Flagging TA's	NO	YES	NO	Facing page Notes should include reference to both AFAD figures (old Figure 6E-1. Example of the Use of a STOP/SLOW Automated Flagger Assistance Device (AFAD) & Figure 6E-2. Example of the Use of a Red/Yellow Lens Automated Flagger Assistance Device (AFAD).).
All Flagging & 6D.03				1. Flags should only be used in emergencies: If you have a flag, you were prepared for an emergency; if you were prepared, why didn't you have the preferred device (Stop/Slow paddle)?

				2. There are also safety and liability issues with Driver Assist / CAV vehicles, where algorithms are based on (strict?) MUTCD TAs & Standards. Are they able to distinguish between a pedestrian on the shoulder waving a book bag or other object from a Flagger using the flag (i.e., do CAV/Driver Assist systems have built-in color recognition)? 3. It's already difficult to find an MUTCD compliant flag - do a Google or catalog search & read the descriptions; a new color won't make them more available.
6H.17	NO	N/A	YES	ATSSA believes the NPA's movement of the Opposing Traffic Lane Divider from 6F.76 to the new 6H.17 is in error. These devices are channelizing devices and should be relocated back from its proposed Warning Sign category, returning it to the Channelizing Devices category; specifically to Section 6K.12, and continue to be subject to all testing and restrictions in place for such devices. we recommend renumbering the current 6K.12 to 6K.13. We further recommend changing the words "center lane" on line 10, page 554 to read "center line".
Figure 6K-01	N/A	YES	N/A	Recommend changing figure title of 6K-1 to "Examples of Channelizing Devices".
6K.01	NO	N/A	YES	We disagree with the new proposed standard and recommend the deletion of lines11-13 on page 566. Labeling TCDs would be beneficial to agencies and contractors for inventory tracking and ownership determination.
6K.01	NO	YES	N/A	We recommend maintaining existing P18 (lines 24-25 on page 566) as a standard and making the following changes (underlined font represent new text we propose): "Devices that are damaged no longer serviceable or have lost a significant amount of their retroreflectivity and effectiveness shall be replaced." Support: see Section 1C.02 Line 208: "Serviceable" (page 28); Section 1D.02: RE maintenance of traffic control devices (page 35, line 22); Section 1D.12: Maintenance of TCD's (page 41, line 29).
6K.07	NO	N/A	YES	We disagree with change from Standard to Guidance for visibility of barricades in the second sentence of P22.
Fig 6K-1	NO	YES	NO	Channelization devices do not include an entire device type – many states / locales use a device between Cones and Tubular Markers, variously called "Skinny cones", "Loopers", "Grabbers", Traffic Channelizer Cones, etc. Please include missing device & standardize its nomenclature.
Fig 6K-1	NO	YES	N/A	The width of the retroreflective bands on the "28 inches min. to 36 inches max." seem to be the same on the cone drawing. We recommend showing the 4"-6" bands and OWOW schematically. Also, add retroreflective arrows to all bands on the "More than 36 inches" cone diagram.
Fig 6K-2	NO	YES	N/A	We recommend defining the minimum length of a continuous where hand-trailing edge and/or detection plates are optional in note #4. We propose adding the underlines text to Note #4: "Hand-trailing edge and/or detection plates are optional for continuous walls with a height over 32 inches."
Item 504	YES	N/A	N/A	We like the revised statement of the existing P8 to broaden the description of movable barriers.

6N.18	NO	YES	N/A	Note that this section included text about nighttime work which now is moved to an earlier section 6A.05, called Night Work. However, the pieces of text that remain in section 6N.18 now seem to lack sufficient context. The sentences that include "consideration should be given" seem to downplay the importance of retroreflective materials – even though this may not be the intention of the writers. Perhaps the statement can be clarified with saying something like "In addition to requirements for retroreflective signs and personal equipment, consideration should be given to providing additional lights and retroreflective markings….".
6N.19	NO	N/A	YES	We recommend removing the guidance statement on Line 14 on page 605.
Fig 6P-10	NO	YES	N/A	Use 6B-3 for TA-10 because it includes a buffer for both directions of traffic. Also make consistent / uniform.
Fig 6P-10	NO	YES	NO	Add optional use of a temporary stop bar (see Texas DOT TCP (2-2b). The increasing use of driver assisted vehicles / CAV logic for a flagger held stop sign is unknown: State drivers' handbooks state that after stopping, you are allowed to proceed if clear. This is a safety and liability issues with Driver Assist / CAV vehicles, where algorithms are based on (strict?) MUTCD TAs & Standards. Are they able to distinguish between a pedestrian on the shoulder near a Stop Sign and a Flagger?
Fig 6P-28 (TA-28)	NO	NO	YES	The MUCTD states that the minimum diverted sidewalk width is 60 inches. This is incorrect: ADA (the Law) requires a minimum of 36 inches. Some states / locales use or have adopted the PROWAG standard of 60 inches, with a minimum width of 48 inches. Use of the PROWAG desired width will create a litigation nightmare in jurisdictions which have not adopted the more restrictive standards, and confusion in jurisdictions which have adopted it. We suggest the use "if Desired" instead of "Minimum". We also recommend including guidance in facing page to include a should note for users to check state / local standards, and a note on width passing areas required for minimum widths.
Fig 6P-28 (TA-28)	NO	N/A	YES	Sidewalk Diversion drawing incorrect and misleading. 1. LCDs depicted are pedestrian channelizers. Traffic delineators (not depicted) are also required. The use of reflective tabs / lights is allowed in a few jurisdictions but are not delineators as illustrated/ defined in the MUTCD. 2. Set up doesn't fit lane width. Lane widths are 12 foot or less; deduct Traffic Delineator 15 to 18 inch base; LCD 18 inches to 24 inches (both sides of diversion); Ped path 60 inches. Plus, how wide is the work which required the diversion? There are also shy distance or sign requirements. Seldom (never?) are base widths for devices specified. The contractor will use what he has – doubtful that this would be a consideration by the TTC designer or plan reviewer.
Fig 6P-28 (TA 28)	NO	YES	NO	No provision for a displaced pedestrian crossing. Detour takes a pedestrian to the next marked crosswalk. In Maricopa County, Arizona (the Valley, or the Greater Phoenix area), this can be up to one mile away. In the harsh climate (summer temperatures of 110 degrees or greater, and pavement temperatures of 140 degrees or greater), Jaywalking is a certainty.

				We suggest the use of AFADs as HAWK like crossings as part of the TTC setup. Give guidance; such as "use temporary crossing if the distance to the next marked crosswalk exceeds X (200 feet?). Also use if TTC detour exceeds X (four?) hours.
Fig 6P-33 (TA-33)	NO	YES	NO	Titled "Stationary Lane Closure on a Divided Highway" misleading: This TA, without signs on the left side, is equally valid for non-divided roadways. Where there is a Two-Way Left-Turn center lane, signs can also be set on both sides. See Figure 3B-7.
6P-35 (TA-35)	NO	N/A	YES	Work vehicle should not have TMA - should not be an option because MASH testing is done on a dedicated vehicle. The use of a TMA is very likely to injure or kill workers in proximity. Other MASH approved TMAs / TTMAs less severe, but still a danger to dismounted workers.
6P-41 (TA-41)	NO	YES	N/A	We recommend FHWA to add guidance for maximum exit angles, particularly for lane shifts on freeways/highways to ensure that the TTC configuration is safe (e.g., not having a 90 degree exit lane shift.
7B.01	NO	YES	NO	Keep the rational of the statement "The signs used for school area traffic control shall be retroreflective or illuminated." for other areas, especially section 4S. Agencies have used illuminated / LED-enhanced signs for school zones – and this section supports their use.
7B.03	N/A	YES	N/A	Update references (Section 2B.12)
8A.01	Yes	N/A	N/A	Agree, and believe it is a great idea, to encourage cooperation between all parties involved.
8A.02	N/A	YES	N/A	Lines 44-48 on page 681: "Traffic Signals provided with preemption 200' from an LRT". Does this mean emergency preemption or the LRT would preempt the traffic signal? Can't tell from the way it is worded.
8A.14	N/A	YES	N/A	Include in guidance paragraph the importance of cooperation among all parties when developing a Traffic Control Plan.
9B.01	YES	N/A	N/A	Agree - this is a great idea.
9B.13	N/A	YES	N/A	What is the purpose of the R9-7 sign? If to inform bicyclists, reconsider the wording of the sign. "Bicycle Detector in Use" or something along those lines to better inform the public.
9E.15	N/A	YES	N/A	Great Idea – In work zones could signs like this be allowed?