DEPARTMENT OF TRANSPORTATION

Federal Highway Administration

23 CFR Part 655

[FHWA Docket No. FHWA-2009-0139]

RIN 2125-AF34

National Standards for Traffic Control Devices; the Manual on Uniform Traffic Control Devices for Streets and Highways; Maintaining Pavement Marking Retroreflectivity

AGENCY: Federal Highway Administration (FHWA), U.S. Department of Transportation (DOT).

ACTION: Supplemental notice of proposed amendments (SNPA); request for comments.

SUMMARY: The Manual on Uniform Traffic Control Devices (MUTCD) is incorporated in FHWA regulations and recognized as the national standard for traffic control devices used on all streets, highways, bikeways, and private roads open to public travel. The FHWA proposed in an earlier notice of proposed amendment (NPA) to amend the MUTCD to include standards, guidance, options, and supporting information related to maintaining minimum levels of retroreflectivity for pavement markings. Based on the review and analysis of the numerous comments received in response to the NPA, FHWA has substantially revised the proposed amendments to the MUTCD and, as a result, is issuing this SNPA.

DATES: Comments must be received on or before **[INSERT DATE 120 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER]**. Late-filed comments will be considered to the extent practicable.

ADDRESSES: Mail or hand deliver comments to the U.S. Department of Transportation, Dockets Management Facility, 1200 New Jersey Avenue, SE., Washington, DC 20590, or submit electronically at http://www.regulations.gov. All comments should include the docket number that appears in the heading of this document. All comments received will be available for examination and copying at the above address from 9 a.m. to 5 p.m., e.t., Monday through Friday, except Federal holidays. Those desiring notification of receipt of comments must include a self-addressed, stamped postcard or may print the acknowledgment page that appears after submitting comments electronically. In accordance with the Administrative Procedure Act, DOT solicits comments from the public to better inform its rulemaking process. The DOT posts these comments, without edit, to www.regulations.gov, as described in the system of records notice, DOT/ALL-14 FDMS, accessible through www.dot.gov/privacy. In order to facilitate comment tracking and response, we encourage commenters to provide their name, or the name of their organization; however, submission of names is completely optional. Whether or not commenters identify themselves, all timely comments will be fully considered. If you wish to provide comments containing proprietary or confidential information, please contact the agency for alternate submission instructions.

FOR FURTHER INFORMATION CONTACT: Ms. Cathy Satterfield, Office of Safety, cathy.satterfield@dot.gov, (708) 283-3552; or Mr. William Winne, Office of the Chief Counsel, william.winne@dot.gov, (202) 366-1397, Federal Highway Administration, 1200 New Jersey Avenue, SE., Washington, DC 20590. Office hours are from 8:00 a.m. to 4:30 p.m., e.t., Monday through Friday, except Federal holidays.

SUPPLEMENTARY INFORMATION:

Electronic Access and Filing

You may submit or access all comments received by the DOT online through http://www.regulations.gov. Electronic submission and retrieval help and guidelines are available on the Web site. It is available 24 hours each day, 365 days this year. Please follow the instructions. An electronic copy of this document may also be downloaded from the Office of the Federal Register's home page at: http://www.ofr.gov and the Government Publishing Office's Web page at: http://www.gpo.gov and is available for inspection and copying, as prescribed in 49 CFR part 7, at the FHWA Office of Transportation Operations (HOTO–1), 1200 New Jersey Avenue, SE., Washington, DC 20590. Furthermore, the text of the proposed revision is available on the MUTCD Internet Web site at http://mutcd.fhwa.dot.gov. The proposed additions are shown in blue text and proposed deletions are shown as red strikeout text. The complete current 2009 edition of the MUTCD is also available on the same Internet Web site. A copy of the proposed revision is included at the conclusion of the preamble in this document and is

also available as a separate document under the docket number noted above at http://www.regulations.gov.

Executive Summary

I. Purpose of the Regulatory Action

Section 406 of the Department of Transportation and Related Agencies Appropriations Act, 1993 (Pub. L. 102-388; October 6, 1992) directed the Secretary of Transportation to "revise the Manual on Uniform Traffic Control Devices to include – a standard for a minimum level of retroreflectivity that must be maintained for pavement markings and signs, which shall apply to all roads open to public travel." Improving safety and mobility throughout the transportation network are two of the core goals of the DOT. The purpose of FHWA's proposal to include minimum retroreflectivity levels in the MUTCD[1] is to advance safety and mobility by assisting with the nighttime visibility needs of drivers and improving the infrastructure's ability to work with Intelligent Transportation Systems (ITS) technologies. The final rule for maintaining minimum levels of retroreflectivity for traffic signs was issued on December 21, 2007, at 72 FR 72574. This proposed rule addresses driver visibility needs in terms of pavement markings.

II. Summary of the Major Provisions of the Regulatory Action in Question

This proposed rule would establish minimum retroreflectivity levels for pavement markings on all roads open to public travel with average annual daily traffic (AADT)

[1] The current edition of the Manual on Uniform Traffic Control Devices can be viewed at the following Internet Web site: http://mutcd.fhwa.dot.gov/kno_2009r1r2.htm.

volumes over 6,000 and speed limits of 35 mph or higher. Agencies or officials having jurisdiction would be required to develop and implement a method for maintaining pavement marking retroreflectivity at minimum levels. It would not require agencies or officials having jurisdiction to upgrade markings by a specific date, nor would it require them to ensure every marking is above the minimum retroreflectivity level at all times.

This SNPA includes revisions based on docket comments submitted as part of an NPA issued April 22, 2010, at 75 FR 20935. Retroreflectivity levels and locations were simplified from what was presented in the NPA to the following criteria making it easier to understand and implement:

- Requires a minimum retroreflectivity level of 50 mcd/m^2/lx where statutory or posted speed limits are greater than or equal to 35 mph
- Recommends a minimum retroreflectivity level of 100 mcd/m^2/lx where statutory or posted speed limits are greater than or equal to 70 mph
- Applies only to longitudinal lines (e.g., center lines, edge lines, and lane lines).

III. Costs and Benefits

The FHWA has considered the costs and potential benefits of this rulemaking and believes the rulemaking is being implemented in a manner that fulfills our obligation under Section 406 of the Department of Transportation and Related Agencies Appropriations Act, 1993 (Pub. L. 102-388; October 6, 1992), while also providing flexibility for agencies. The estimated national costs are documented in the updated economic analysis report and the flexibility is documented in the new publication titled,

"Methods for Maintaining Pavement Marking Retroreflectivity." Both of these are available on the docket.

The MUTCD already requires that pavement markings that must be visible at night shall be retroreflective unless ambient illumination assures that the markings are adequately visible, and that all markings on Interstate highways shall be retroreflective. The proposed changes in the MUTCD would provide agencies the benefit of minimum retroreflective performance levels which are supported by research to make markings visible at night. Additionally, recent research findings indicate that maintenance of pavement marking retroreflectivity may have a positive effect on safety.

The economic analysis provides a national estimate of the costs and benefits to implement this rulemaking and to replace markings. Costs for individual agencies would vary based on factors such as the amount of pavement marking mileage subject to the standards and current pavement marking practices. The analysis estimates first year start-up implementation costs of $29.4 million for all affected State and local agencies to develop maintenance methods and purchase necessary equipment. In addition, annual measurement and management activities of $14.9 million nationwide are expected to determine which markings require replacement. In the second and following years, if agencies were to replace markings that do not meet the minimum retroreflectivity levels, despite the fact that there are no replacement compliance dates there would be an estimated increase of approximately $52.5 million per year nationally from current estimated pavement marking replacement expenditures. Therefore, this proposed rule

would not result in the expenditure by State, local, and tribal governments, in the aggregate, or by the private sector, of $100 million or more in any one year.

The proposed changes in the MUTCD would provide additional guidance and clarification, while allowing flexibility in maintaining pavement marking retroreflectivity. The FHWA does not have enough information to determine the benefits of this document. The economic report summarizes findings from relevant research. The FHWA seeks comment on the issue.

Background

Pavement markings are one of the key methods of conveying information to the driver at night, conveying the location of the road center and edges, alignment information, presence of passing or no-passing zones, and indications that the driver is occupying the correct lane. The U.S. nighttime fatal crash rate is approximately three times that of the daytime crash rate, and safety studies[2] have shown that adding center line and edge line markings (or edge lines where only center lines were present) significantly reduces nighttime crashes. The MUTCD contains warrants indicating types of facilities that either shall or should have center line, edge line, or lane line markings. Therefore, FHWA has limited the proposed amendment to longitudinal markings to encompass center line, edge line, and lane line markings.

[2] The paper titled "The Benefits of Pavement Markings: A Renewed Perspective Based on Recent and Ongoing Research" can be viewed at the following Internet Web site: http://safety.fhwa.dot.gov/roadway_dept/night_visib/pavement_visib/no090488/.

Per the MUTCD, markings that must be visible at night shall be retroreflective unless ambient illumination assures that the markings are adequately visible. All markings on Interstate highways shall be retroreflective. Retroreflectivity is the measure of an object's ability to reflect light back towards a light source along the same axis from which it strikes the object. In the case of retroreflective markings, incoming light from vehicle headlamps is reflected back towards the headlamps, and, more importantly, the driver's eyes, allowing the driver to see the pavement marking. Glass beads embedded in the marking material produces the retroreflective property of the pavement marking. The Coefficient of Retroreflected Luminance (R_L), which is measured in millicandelas per meter squared per lux ($mcd/m^2/lx$), is the most common measurement. Retroreflectometers used in the United States are based on CEN[3]-prescribed 30-meter geometry per ASTM Test Method E1710[4].

Research has in some cases shown a correlation between increased retroreflectivity and reduced crashes, but has had limited success in quantifying that relationship. This is primarily due to the difficulty in what the level of retroreflectivity for the marking was at the time of a crash, along with the difficulty in accounting for other factors that may impact increases or reductions in crashes. Historically, agencies have not measured most of their pavement markings, and when they did it was typically to determine if newly installed markings met the standards of a contract. Once a

[3] CEN is the European Committee for Standardization.
[4] ASTM E1710, "Standard Test Method for Measurement of Retroreflective Pavement Marking Materials with CEN-Prescribed Geometry Using a Portable Retroreflectometer", is available through subscription or purchase at the following Internet Web site: http://www.astm.org/.

pavement marking is installed, the retroreflectivity of the marking begins to degrade. The degradation rate is difficult to predict because some of the beads embedded in the marking become dislodged by traffic, obscured by dirt, or removed in snow plowing operations. In recent years, with mobile retroreflectometers available, a few agencies have more information on the level of retroreflectivity of their longitudinal pavement markings, including some information on markings that have been in place for some time. With this new data, agencies are better positioned to proactively manage their pavement markings.

The FHWA sponsored research to establish recommended minimum pavement marking retroreflectivity levels that is based on the nighttime driving needs of drivers, including older drivers[5]. One of the key conditions considered in the research was that a minimum preview time[6] of 2.2 seconds was needed for nighttime drivers to safely navigate their vehicles. The research used updated visibility modeling techniques and tools to determine minimum retroreflectivity levels for a number of scenarios. The research scope was limited to dark, dry, rural, straight roads and longitudinal pavement

[5] The report titled, "Updates to Research on Recommended Minimum Levels for Pavement Marking Retroreflectivity to Meet Driver Night Visibility Needs" can be viewed at the following Internet Web site: http://www.fhwa.dot.gov/publications/research/safety/07059/.

[6] Preview time describes the distance a driver must be able to see pavement markings down the road in order to receive adequate information to perceive, process, and react to the information to safely guide the vehicle. Since this distance increases as the speed of the vehicle increases, preview time is used to express this distance for any speed.

markings. In addition, FHWA held workshops[7] to solicit input on potential standards for minimum pavement marking retroreflectivity.

On April 22, 2010, at 75 FR 20935, FHWA published in the Federal Register an NPA to amend the MUTCD to include standards, guidance, options, and supporting information related to maintaining minimum levels of retroreflectivity for pavement markings. The NPA was issued in response to Section 406 of the Department of Transportation and Related Agencies Appropriations Act, 1993 (Pub. L. 102-388; October 6, 1992). Section 406 of the Act directed the Secretary of Transportation to "revise the Manual on Uniform Traffic Control Devices to include – a standard for a minimum level of retroreflectivity that must be maintained for pavement markings and signs, which shall apply to all roads open to public travel." Improving safety and mobility throughout the transportation network are two of the core goals of the DOT. This SNPA would propose minimum retroreflectivity levels in the MUTCD to advance safety and mobility by meeting the nighttime visibility needs of drivers on our Nation's roads and improving the infrastructure's ability to work with ITS technologies. The final rule for maintaining minimum levels of retroreflectivity for traffic signs was issued on December 21, 2007, at 72 FR 72574. The sign retroreflectivity final rule, and Revision 2

[7] The summary report titled: "Pavement Marking Retroreflectivity Workshops" can be viewed at the following Internet Web site: http://safety.fhwa.dot.gov/roadway_dept/night_visib/pavement_visib/fhwasa08003/fhwasa08003.pdf.

of the 2009 MUTCD[8], requires agencies to implement and have continued use of an assessment or management method that is designed to maintain regulatory and warning sign retroreflectivity at or above the established minimum levels. This proposed rule addresses driver visibility needs in terms of pavement markings. The FHWA used knowledge it gained through the sign retroreflectivity rulemaking process to prepare the NPA, as well as this SNPA, for maintaining pavement marking retroreflectivity. This includes simplifying the minimum retroreflectivity levels, requiring the use of a method to maintain minimum retroreflectivity, and clarifying the types of longitudinal lines for which this proposed rule applies.

Since publishing the NPA, the need for improved pavement markings has become more apparent in relation to advanced driver assistance systems (ADAS) in vehicles. Numerous manufacturers have ADAS that include lane departure warning systems that use camera sensors to detect pavement markings to monitor the position of the vehicle. Automakers, suppliers, and research institutes have indicated in interviews that maintenance of pavement markings will be necessary to support vehicle automation. Michael J. Robinson of General Motors testified before the House Committee on Transportation and Infrastructure Subcommittee on Highway and Transit that, "one of the key highway needs is to provide – at a minimum – clearly marked lanes and shoulders."[9]

[8] Revision 2 of the 2009 MUTCD, 77 FR 28460 (May 14, 2012), revised certain information relating to target compliance dates for traffic control devices. It can be viewed at the following Internet Web site: https://www.gpo.gov/fdsys/pkg/FR-2012-05-14/pdf/2012-11710.pdf.

[9] Testimony of Michael J. Robinson, Vice President, Sustainability and Global Regulatory Affairs, before the House Committee on Transportation and Infrastructure Subcommittee on Highways and Transit,

In the same hearing, former NHTSA Administrator Strickland spoke of how the autonomous vehicle will advance safety and specifically mentioned FHWA's efforts to improve the infrastructure to "interact with and support automated or partially automated vehicles."[10] More recently, the American Association of State Highway and Transportation Officials (AASHTO) and SAE International (formerly the Society of Automotive Engineers) have formed a joint task force to develop a specification that includes criteria for road markings for vehicle cameras that detect and use lane markings for features such as Lane Departure Warning (LDW) and Lane Keeping Assist (LKA). The joint task force will use the information from National Cooperative Highway Research Program (NCHRP) 20-102(06), Road Markings for Machine Vision as a basis.[11]

The comment period for the NPA related to pavement marking retroreflectivity closed on August 20, 2010. The FHWA received approximately 100 responses that were submitted to the docket containing nearly 700 individual comments on the NPA. The FHWA received comments from the National Committee on Uniform Traffic Control Devices (NCUTCD), AASHTO, State departments of transportation (State DOTs), the

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Hearing on How Autonomous Vehicles will Shape the Future of Surface Transportation, November 19, 2013 http://transportation.house.gov/uploadedfiles/2013-11-19-robinson.pdf.

[10] Testimony of The Honorable David L. Strickland, Administrator, National Highways Traffic Safety Administration, before the House Committee on Transportation and Infrastructure Subcommittee on Highways and Transit, Hearing on How Autonomous Vehicles will Shape the Future of Surface Transportation, November 19, 2013. http://transportation.house.gov/uploadedfiles/2013-11-19-strickland.pdf.

[11] More information regarding the scope and status of NCHRP 20-102 (06), Road Markings for Machine Vision is available at the following Internet Web site: http://apps.trb.org/cmsfeed/TRBNetProjectDisplay.asp?ProjectID=4004.

National Association of County Engineers (NACE), the American Traffic Safety Services Association (ATSSA), Advocates for Highway and Auto Safety (AHAS), the American Association of Retired Persons (AARP), city and county governmental agencies, consulting firms, private industry, associations, other organizations, and individual private citizens. The FHWA has reviewed and analyzed the comments that were received in preparing this SNPA.

State and local DOTs, as well as associations that represent them, submitted many comments expressing concern over key elements of the MUTCD language as proposed in the NPA. The commenters expressed confusion about which pavement markings would be required to meet minimum retroreflectivity values and concern over compliance dates for replacing deficient markings, the proposed minimum retroreflectivity levels, cost, and liability. Organizations comprised of safety advocates and some industry suppliers of pavement markings submitted comments suggesting that the NPA did not go far enough in establishing retroreflectivity standards. In consideration of all the comments, FHWA desires to simplify the proposed MUTCD language to provide clarity while improving safety and minimizing the financial burden and potential liability concerns expressed by the commenters, particularly local agencies responsible for maintaining pavement markings. The FHWA also has a responsibility to meet the congressional intent of Section 406 of the Department of Transportation and Related Agencies Appropriations Act as discussed above, with an appreciation for economic impact.

The AASHTO and NACE requested delaying the final rule for pavement marking retroreflectivity until AASHTO's Subcommittee on Traffic Engineering funds and completes a proposed research project intended to provide a synthesis of pavement marking retroreflectivity maintenance practices. The organizations and many of their members felt this project would produce actual measurement of in-service pavement marking retroreflectivity levels to compare with the minimum values proposed by FHWA. The project was completed under NCHRP Project 20-07 Task 310. The findings were published January 2013 in a report titled, "Determination of Current Levels of Retroreflectance Attained and Maintained by State Departments of Transportation."[12]

In the NPA, it was noted that the proposed revisions regarding maintaining pavement marking retroreflectivity would be designated as Revision 1 to the 2009 edition of the MUTCD. Actual designation of revision numbers depends on the relative timing of final rules issued by FHWA related to the MUTCD.

As a result of the comments received in response to the NPA, FHWA concluded that significant changes to the proposed MUTCD language are warranted. As a result, FHWA is issuing this SNPA to provide the opportunity for public review and comment on the revised proposal. Docket comments and summaries of the FHWA's analyses and determinations are discussed below.

Proposed Supplemental Amendment

[12] The report titled, "Determination of Current Levels of Retroreflectance Attained and Maintained by State Departments of Transportation," can be viewed at the following Internet Web site: http://onlinepubs.trb.org/onlinepubs/nchrp/docs/NCHRP20-07(310)_FR.pdf.

In this SNPA, FHWA proposes to continue with the following key concepts from the NPA:

- Implementation and continued use of a method that is designed to maintain pavement markings at or above specific minimum retroreflectivity levels would be the key factor indicating compliance with this section of the MUTCD.
- The minimum retroreflectivity levels would apply only to longitudinal pavement markings under dry conditions, specifically center lines, edge lines and lane lines.
- The method would not be required to include markings on roads with statutory or posted speed limits under 35 mph.
- Markings that are adequately visible due to ambient illumination may be excluded from the method.
- Acknowledges that there may be some locations or certain periods of time where markings may be below the minimum retroreflectivity levels.

The FHWA proposes the following key changes from the language proposed in the April, 2010, NPA:

- Remove the compliance date for replacing markings;
- Simplify conditions so there are only two retroreflectivity values (one being a STANDARD and one being GUIDANCE) that are based on posted speed limit only, and apply to both white and yellow longitudinal pavement markings;

- Simplify the STANDARD to one minimum retroreflectivity level of 50 mcd/m^2/lx that applies to roads with statutory or posted speeds of 35 mph and greater;
- Change the requirement for high-speed roadways from a STANDARD to GUIDANCE, and condense the various minimum retroreflectivity levels to one minimum retroreflectivity level of 100 mcd/m^2/lx;
- Add an OPTION for agencies to exclude roadways with volumes less than 6,000 vehicles per day (vpd) from the application of their methods to maintain retroreflectivity; and
- Remove the exception for roadways with raised reflective pavement markers (RRPMs).

An analysis of the comments and the resulting proposed changes are discussed in more detail in the following sections.

The definitions of the MUTCD Section 1A.13 are used here, particularly in reference to the terms STANDARD, GUIDANCE, OPTION, and SUPPORT. A STANDARD refers to a required, mandatory or specifically prohibitive practice regarding a traffic control device. STANDARD statements are sometimes modified by an OPTION statement. GUIDANCE denotes a recommended, but not mandatory, practice in typical situations, with deviations allowed if engineering judgment or an engineering study indicates the deviation to be appropriate. An OPTION states a practice that is a permissive condition and may contain allowable modifications to a STANDARD or GUIDANCE statement while SUPPORT statements simply convey information.

This SNPA is being issued to provide an opportunity for public comment on these proposed amendments to the MUTCD. The FHWA requests comments on the proposed amendments to the MUTCD that are presented in this SNPA. After reviewing the comments received in response to the NPA and this SNPA, FHWA may issue a final rule concerning the proposed changes included in this document. In order to enable FHWA to appropriately review and address all comments, commenters should cite the Section and paragraph number of the proposed MUTCD text for each specific comment to the docket.

Section-by-Section Analysis

This section-by-section analysis includes a discussion of the proposed SNPA language and an analysis of the comments submitted to the NPA docket. Since Section 3A.03 contains the majority of the material specifically related to maintaining pavement marking retroreflectivity, that section is described first, followed by proposed changes to Section 1A.11 and the Introduction.

Section 3A.03 Maintaining Minimum Pavement Marking Retroreflectivity

1. The FHWA proposes to change the current section title to "Maintaining Minimum Retroreflectivity" to simplify the title and be consistent with the title for Sign Retroreflectivity in Section 2A.08 of the 2009 MUTCD.

2. The FHWA has revised the organization and content of the STANDARD statement from what was proposed in the NPA. Many commenters indicated there was confusion regarding which markings were included in the minimum retroreflectivity requirements and which minimum retroreflectivity values applied under specific roadway

marking conditions. To reduce confusion, FHWA proposes to base the minimum pavement marking retroreflectivity values only on posted speed limits, rather than a combination of posted speed and type of roadway marking pattern as proposed in Table 3A-1 of the NPA. In conjunction with this change, FHWA proposes to refrain from incorporating a table such as the NPA's Table 3A-1 and instead simplify the requirement for maintaining pavement marking retroreflectivity by including the retroreflectivity values in the text. The proposed retroreflectivity values apply to both white and yellow pavement markings.

3. In the STANDARD statement, paragraph 1, FHWA proposes that a method designed to maintain retroreflectivity at or above 50 mcd/m^2/lx shall be used for longitudinal markings on roadways with statutory or posted speed limits of 35 mph or greater. The proposed STANDARD is a minimum level intended to meet driver visibility needs. Many agencies currently have goals to achieve higher initial levels of retroreflectivity based on driver preferences and other factors. There are also a few agencies with goals to maintain higher levels. This rulemaking should not be misconstrued as a recommendation to lower these goals, but rather to encourage all agencies to replace or retrace markings before they reach this bare minimum level. This should result in markings that are typically well above these retroreflectivity levels throughout their useful life. As in the NPA, this STANDARD applies only to longitudinal markings. Information regarding markings that may be excluded and

clarification on markings to which this STANDARD does not apply are described in paragraphs 5 and 6 of the proposed MUTCD text.

The 50 mcd/m^2/lx requirement proposed for the STANDARD is based on research on pavement marking retroreflectivity requirements documented in publication FHWA-HRT-07-059, "Updates to Research on Recommended Minimum Levels for Pavement Marking Retroreflectivity to Meet Driver Night Visibility Needs."[13] In this report, fully marked roadways (those having edge lines, center lines, and lane lines, as needed) were identified as requiring retroreflectivity levels of 40 mcd/m^2/lx for speeds of 50 mph and lower and 60 mcd/m^2/lx for speeds of 55 to 65 mph. One of the key conditions considered in the research was that a minimum preview time of 2.2 seconds was needed for nighttime drivers to safely navigate their vehicles. The value of 50 mcd/m^2/lx is also one of the minimum retroreflectivity values proposed in the NPA.

The FHWA received comments from NCUTCD, AASHTO, NACE and several State and local agencies opposed to the higher retroreflectivity values presented in the NPA. Some of those commenters suggested alternate minimum retroreflectivity values that ranged from 50 to 150 mcd/m^2/lx, depending on the pavement marking configuration and posted speed limit. The FHWA received comments from ATSSA, AARP, and AHAS suggesting higher retroreflectivity values than proposed in the NPA and suggesting that minimum retroreflectivity values for roads with posted speed limits less

[13] The report titled, "Updates to Research on Recommended Minimum Levels for Pavement Marking Retroreflectivity to Meet Driver Night Visibility Needs" can be viewed at the following Internet Web site: http://www.fhwa.dot.gov/publications/research/safety/07059/.

than 35 mph should also be established. Specific comments referred to studies indicating that drivers prefer pavement markings with a range of 80 to 130 mcd/m^2/lx. The proposed minimum level of 50 mcd/m^2/lx was selected based on driver needs derived from a requirement of 2.2 second preview time, rather than public attitude surveys. This minimum will improve the retroreflectivity of markings in jurisdictions where pavement markings are not currently being adequately maintained, without placing an undue burden on agencies that choose to maintain markings at higher levels.

The FHWA also believes that establishing one retroreflectivity value as a STANDARD, rather than several values, will facilitate implementation of this proposed rule. In terms of roadways with posted speed limits of less than 35 mph, FHWA received comments from NACE and 26 local agencies supporting FHWA's proposal that the minimum levels not apply to roads with posted speeds of less than 35 mph; whereas, AHAS and ATSSA questioned whether the FHWA was meeting the congressional intent by not requiring the method to apply to these roads. The FHWA believes there would be little benefit in requiring agencies to implement a method to maintain a specific minimum retroreflectivity level of markings on these roads because properly working vehicle headlamps typically provide adequate preview distance of the road itself for the short preview distance needed at these speeds. Therefore, the level of retroreflectivity of the pavement markings is not as critical at these lower speeds.

4. In the GUIDANCE statement, paragraph 2, FHWA proposes that a method designed to maintain retroreflectivity at or above 100 mcd/m^2/lx should be used for

longitudinal markings on roadways with statutory or posted speed limits of 70 mph or greater. The GUIDANCE statement is included to encourage higher retroreflectivity levels for roadways with higher speeds. This is based on a preview time of 2.2 seconds, indicating drivers need longer viewing distances on higher speed roadways, which can be achieved by maintaining a higher level of retroreflective pavement markings. The 100 $mcd/m^2/lx$ level is based on research of pavement marking retroreflectivity requirements documented in publication FHWA-HRT-07-059, "Updates to Research on Recommended Minimum Levels for Pavement Marking Retroreflectivity to Meet Driver Night Visibility Needs."[14]

In Table 3A-1 of the NPA, FHWA also proposed separate minimum retroreflectivity values for two-lane roads with only center line markings. These separate minimum values were included to address driver needs for higher retroreflective center lines on facilities without edge lines. Based on the comments from agencies and their associations, this was one of the areas that caused confusion. Since this SNPA provides agencies with the option to exclude roadways with Annual Daily Traffic (ADT) less than 6,000 vpd from their method (for reasons explained in item 8 below), and edge lines are required on rural arterials with an ADT of 6,000 vpd or greater and recommended for rural arterials and collectors with an ADT of 3,000 or greater, FHWA believes it is not

[14] The report titled, "Updates to Research on Recommended Minimum Levels for Pavement Marking Retroreflectivity to Meet Driver Night Visibility Needs" can be viewed at the following Internet Web site: http://www.fhwa.dot.gov/publications/research/safety/07059/.

necessary to include a higher minimum retroreflectivity level on two-lane roads with center lines only.

The NPA proposed minimum retroreflectivity value of 250 mcd/m^2/lx for two-lane roads with only center line markings and speeds of 55 mph or higher was particularly controversial. The FHWA received comments from AASHTO, NCUTCD, NACE, as well as several State DOTs suggesting that it was not feasible with existing technologies to maintain a retroreflectivity level of 250 mcd/m^2/lx. The AASHTO and nine State DOTs suggested reducing this value to 100 mcd/m^2/lx; whereas, the NCUTCD and NACE suggested a value of 150 mcd/m^2/lx. Typical State requirements for yellow pavement markings are less than 250 mcd/m^2/lx due to the difficulty in achieving and sustaining this level of retroreflectivity with most available yellow marking materials. It is the intent of this GUIDANCE statement to encourage agencies to improve pavement marking conditions, and not to require public agencies to meet levels that would be impractical to maintain with existing technologies. In consideration of the factors discussed above, FHWA proposes that a value of 100 mcd/m^2/lx or above should be maintained for longitudinal markings on all roadways with posted speed limits of 70 mph or greater, regardless of the roadway pavement marking configuration.

5. The FHWA proposes to delete Table 3A-1 that was included in the NPA because of the proposed simplified retroreflectivity values contained in Section 3A.03, paragraphs 1 and 2 of the MUTCD. Table 3A-1, as proposed in the NPA, included two exceptions to maintaining minimum pavement marking retroreflectivity. One exception provided that

minimum retroreflectivity levels were not applicable to pavement markings on roadways with properly maintained RRPMs. Although this provision was supported by NCUTCD, AASHTO, and NACE, other organizations such as ATSSA, 3M, and AARP suggested that the use of RRPMs should not result in an exception to the required minimum retroreflectivity levels because there are no performance requirements for RRPMs.

After reviewing available research and considering the intended use and durability of RRPMs, FHWA proposes to delete the exception for roadways with RRPMs. The research conducted for pavement marking retroreflectivity indicates that even with RRPMs, a pavement marking retroreflectivity level of 40 to 50 mcd/m^2/lx is still needed for peripheral-vision lane keeping tasks.[15] This level of retroreflectivity is consistent with the proposed SNPA language that requires an agency to maintain retroreflectivity at 50 mcd/m^2/lx, rather than the higher values proposed in the NPA. If the exclusion for roadways with RRPMs were to remain, additional parameters would need to be considered. This would include parameters such as a minimum level of retroreflectivity for the RRPMs (for which there is currently insufficient research), spacing requirements (which varies in the MUTCD in accordance with the application), and maintenance requirements to replace missing or damaged devices. Setting such parameters for RRPMs is outside the scope of this rulemaking. Finally, the research[16] is based on dry pavement marking retroreflectivity. The RRPMs are commonly used to enhance wet

[15] The report titled, "Updates to Research on Recommended Minimum Levels for Pavement Marking Retroreflectivity to Meet Driver Night Visibility Needs" can be viewed at the following Internet Web site: http://www.fhwa.dot.gov/publications/research/safety/07059/.
[16] Ibid.

nighttime delineation, which further indicates that RRPMs fall outside of the scope of this rulemaking effort. In reviewing this information, along with the comments submitted to the docket, it became clear that providing an exclusion for roadways with RRPMs introduced a level of unintended complexity to the proposed rule, and therefore FHWA does not propose an exclusion for roadways with RRPMs in the SNPA.

Although not included as an exception in the NPA, NCUTCD, AASHTO, NACE, nine State DOTs and a consultant suggested adding an exception for roadways with post-mounted delineators for the same reason that roads with RRPMs were excluded in the NPA. The commenters felt that roadside post-mounted delineators have greater target value when compared to RRPMs, and are easily replaced, in most cases, without obstructing the traffic lanes. The commenters suggested that delineators are also used in snow and winter conditions and provide added visibility of the roadway geometry. While FHWA believes that roadside delineators are a valuable traffic control device, they are placed on the side of the road at varying distances from the outside edge of the travel lane and do not provide the same level of lane delineation as pavement markings. As a result, FHWA does not propose an exclusion for roadways with delineators. As discussed above in regard to RRPMs, such an exclusion would introduce an unnecessary level of complexity and is outside the scope of this rulemaking.

The FHWA retains the proposed exclusion for roadways where ambient illumination assures that the pavement markings are visible. The FHWA believes that it is appropriate to maintain this exclusion in order to provide consistency with existing

paragraph 3 of Section 3A.02 of the 2009 MUTCD which states, "Markings that must be visible at night shall be retroreflective unless ambient illumination assures that the markings are adequately visible."[17] Additional information regarding this exclusion, including a discussion of the comments, is included in item 8 of this document.

6. The FHWA proposes in paragraph 3, GUIDANCE, to recommend that the method used to maintain retroreflectivity should be one or more of those described in a separate document titled, "Methods for Maintaining Pavement Marking Retroreflectivity" or developed from an engineering study based on the minimum retroreflectivity values in Paragraphs 1 and 2. A draft version of this document is available in the docket. In the NPA, FHWA proposed to include short descriptions of the recommended methods. However, FHWA believes more details are needed to fully describe the intent of the methods and to avoid misinterpretation. In an effort to simplify the MUTCD, FHWA believes it is more appropriate to refer MUTCD users to this supplemental document rather than trying to briefly summarize it in the MUTCD. An added benefit to this approach is that this document, which will be available on FHWA's Web site, will include detailed guidance on how to use the methods and inform agencies that other methods can be developed if they are tied to the minimum retroreflectivity levels through an engineering study. In addition to containing information describing the acceptable methods, this document also includes information about methods that are not acceptable for maintaining minimum pavement marking retroreflectivity because they cannot be tied

[17] The 2009 MUTCD can be viewed at the following Internet Web site: http://mutcd.fhwa.dot.gov.

to the minimum retroreflectivity levels, along with recommendations of items to consider and include in an agency's documentation of its method. The FHWA believes that by providing all of the pertinent information related to the methods to maintain pavement marking retroreflectivity in one place, users are more likely to obtain complete information and therefore make more informed decisions about the method(s) they use for maintaining minimum pavement marking retroreflectivity.

7. In paragraph 4, SUPPORT, the FHWA proposes to indicate that retroreflectivity levels for pavement marking are measured at an entrance angle of 88.76 degrees and an observation angle of 1.05 degrees, also referred to as 30-meter geometry, and that the units are reported in mcd/m^2/lx. The FHWA proposes to add this statement to capture these specifics regarding measurement and associated units of pavement marking retroreflectivity that were included as a note in Table 3A-1 of the NPA. For the reasons discussed in item 5 of this document, the FHWA proposes to delete Table 3A-1 in the SNPA, but this pertinent information is still needed, so the FHWA proposes this SUPPORT statement to retain the information.

8. In paragraph 5, OPTION, FHWA proposes to list several types of pavement markings that agencies may exclude from their method to maintain minimum pavement marking retroreflectivity. The pavement markings excluded from an agency's method under this OPTION are still required to be retroreflective unless otherwise excluded under MUTCD Section 3A.02. Items C through F of this OPTION statement refer to specific types of markings and remain unchanged from the NPA. Those types of

markings are as follows: dotted extension lines (extending a longitudinal line through an intersection, major driveway or interchange area), curb markings, parking space markings, and shared-use path markings. These markings are effectively optional, and additional research would be needed to support establishment of minimum retroreflectivity levels for these markings.

In item A of this OPTION, FHWA proposes an exclusion for markings where ambient illumination assures that the markings are adequately visible. The FHWA proposes to relocate and reword this text from what appeared in the NPA to clarify its meaning. In Table 3A-1 of the NPA, FHWA included an exception for markings on roadways where continuous roadway lighting assures that the markings are visible. Since FHWA deleted Table 3A-1 from the SNPA, it is more appropriate to list this exclusion in proposed paragraph 5. The FHWA also proposes to use text in the OPTION statement that more closely matches the existing text in Section 3A.02, paragraph 3. Existing paragraph 3 of Section 3A.02 of the 2009 MUTCD also includes the statement, "All markings on Interstate highways shall be retroreflective." Therefore, Interstate markings that are adequately visible due to lighting do not need to meet the minimum levels nor be included in an agency's method, but they do need to be retroreflective. Although NCUTCD, AASHTO, and NACE supported an exception for lighting in the NPA, AARP and a supplier suggested that the exception for roadways with roadway lighting would undermine the safety benefits of the proposed amendments. The FHWA proposes to retain the exclusion for lighting to provide agencies with the flexibility to illuminate

roadways without the added burden of implementing a method for maintaining pavement marking retroreflectivity.

In item B of this OPTION, FHWA proposes to allow agencies the option to exclude markings on roadways with ADTs less than 6,000 vpd from their method. This change is in response to comments on the approach used in the NPA, which was based on the MUTCD warrants for longitudinal pavement markings. The warrants are based on roadway characteristics such as traffic volume, functional class, and pavement width. Pavement markings not included by these warrants were excluded from the method in the NPA, although the comments indicated this was not clear. The exclusion provided in item B, based solely on traffic volume, substitutes for the more complex exclusion based on warrants proposed in the NPA. This responds specifically to comments FHWA received from 2 local agencies and one road commission representing over 80 local agencies suggesting that low volume roads be excluded from meeting minimum pavement marking retroreflectivity values. The commenters' definition of "low volume" ranged from 3,000 to 6,000 vpd. The exclusion also responds to many comments that optional markings (those neither required nor recommended by the warrants) should be excluded from the method. The AHAS and two suppliers commented that these optional marking should not be excluded.

Another complicating factor in the NPA approach is that the MUTCD warrants require certain pavement markings under specific roadway conditions and recommend certain pavement markings under other roadway conditions. The FHWA received

comments from NCUTCD, AASHTO, NACE, and over 40 State and local agencies pertaining to whether the standard should include only those pavement markings required in the MUTCD, or a combination of required and recommended pavement markings, as was proposed in the NPA. Some State and local DOTs suggested that if there were a requirement to maintain retroreflectivity on pavement markings that were only recommended (by means of a GUIDANCE statement) and not required, then their agency might elect not to install such recommended markings.

The FHWA conducted a thorough review of the MUTCD language related to required, recommended, and optional markings and determined that using a specific volume of traffic for the exclusion would be considerably easier for agencies to understand and implement than use of the warrants. By removing functional class and pavement width from the determination of whether a pavement marking is included in the method, the only consideration is the appropriate volume threshold to select. Because a volume of 6,000 vpd is the threshold above which a center line is required on an urban arterial and collector road (see Section 3B.02, paragraph 9) and the threshold above which rural arterials are required to have edge lines (see Section 3B.07, paragraph 1), FHWA believes that it is appropriate to establish 6,000 vpd as the volume above which a method for maintaining pavement marking retroreflectivity applies. The FHWA believes this is consistent with its goal of simplifying the language while meeting congressional intent and appreciating agency's resource concern. Because this is proposed as an OPTION statement, agencies could choose to include roadways with less than 6,000 vpd

in their methods for maintaining minimum pavement marking retroreflectivity, as resources allow.

The NPA excluded additional markings that are generally not classified as longitudinal markings. Due to the reformatting of the MUTCD text in this SNPA, those markings are now addressed in a separate proposed SUPPORT statement, paragraph 6. A discussion of those markings and related comments appears in item 9 below.

9. The FHWA proposes a SUPPORT statement, paragraph 6, to clarify that the provisions of proposed Section 3A.03 do not apply to non-longitudinal pavement markings, and to specifically list several non-longitudinal types of pavement markings that are excluded from this proposed rule. The following markings, which are the same as those presented in the NPA, would be listed in paragraph 6: transverse markings, words, symbol, and arrow markings, crosswalk markings, and chevron, diagonal, and crosshatch markings. The MUTCD does not require the use of these markings, so there is a concern that same agencies may choose to discontinue their use if minimum levels of retroreflectivity are established. The ATSSA, AARP, a State DOT, and a supplier disagreed with allowing agencies to exclude pavement markings such as, words, symbols, and arrows, crosswalks, railroad crossing markings, etc., because the commenters felt that these markings are important. Other than longitudinal markings, there are few markings required by the MUTCD. There is a concern that establishing minimum retroreflectivity levels for markings that are not required may result in some agencies choosing to discontinue their use. In addition, these markings are excluded because the existing body

of research does not cover the retroreflectivity needs of drivers for non-longitudinal markings.

10. The FHWA proposes a SUPPORT statement, paragraph 7, that acknowledges that special circumstances will periodically cause pavement marking retroreflectivity to be below the minimum retroreflectivity levels. The FHWA proposed similar information in paragraphs 2 and 3 of the NPA. The FHWA received comments from NCUTCD, AASHTO, NACE, ATSSA, and more than 40 State and local agencies suggesting that the language be changed from a SUPPORT statement to a STANDARD statement to further assist them in potential liability defense, especially in light of the 2009 MUTCD language regarding the terms "standard" and "engineering judgment."[18] Due to the issuance of Revision 1 of the 2009 MUTCD, FHWA believes that it is appropriate to retain this language as a SUPPORT statement. Within this SUPPORT statement, paragraph 7, FHWA proposes text that describes some of the occurrences that may cause pavement markings to periodically be below the minimum retroreflectivity levels. The items included in this statement are similar to those contained in paragraph 3 of the NPA, but are expanded to clarify additional circumstances in response to comments.

The FHWA proposes to add item A, isolated locations of abnormal degradation, to the list to address comments from NCUTCD and AASHTO suggesting that this item be added. The FHWA agrees that there may be isolated locations where pavement

[18] Revision 1 of the 2009 MUTCD was issued in May 2012 to address many of these concerns, well after the pavement marking retroreflectivity NPA was published in April 2010. The Revision 1 final rule is available at: http://www.gpo.gov/fdsys/pkg/FR-2012-05-14/html/2012-11712.htm.

markings experience abnormal wear or degradation due to adjacent land uses or types of vehicles using the roadway, and that it is impractical to expect retroreflectivity levels to be continuously maintained at or above minimum levels at such locations.

The FHWA proposes to rephrase the text regarding pavement resurfacing, item B, to better explain that this rule is not intended to apply during periods preceding imminent resurfacing or reconstruction. The FHWA does not believe that it is a cost effective use of labor and materials to re-apply pavement markings immediately prior to resurfacing, rehabilitating or reconstructing a roadway.

In item C, FHWA proposes to include unanticipated events such as equipment breakdowns, material shortages, contracting problems, and other similar conditions to this listing. Although not included in the NPA, FHWA proposes to add these items based on comments from State and local agencies suggesting that these unanticipated events can and do occur. For example, in 2010 there was a global shortage of certain types of pavement marking materials. In addition, it is possible that a pavement marking contract could fall behind schedule if equipment malfunctions unexpectedly or if there is a problem with a contract. The FHWA believes that including such a provision is appropriate, because it is possible that unanticipated events beyond an agency's control may contribute to markings falling below the minimum levels.

Finally, FHWA proposes to add item D to address the loss of retroreflectivity due to snow maintenance operations. Snow maintenance operations include plowing as well as applying materials to roadway surfaces that may negatively impact pavement marking

retroreflectivity. The AASHTO and 20 State and local DOTs, particularly those in northern tier States, expressed concern with maintaining prescribed retroreflectivity levels during the winter months. The commenters indicated that roadway maintenance activities such as snow plowing and placement of traction sand degrades the pavement markings at such time when replacement of the markings is impossible. Although the revised minimum levels of this SNPA should mitigate this concern, the results of NCHRP Project 20-07 indicate maintaining pavement marking retroreflectivity during winter months will continue to be a problem for at least some agencies in many snow belt States. The FHWA agrees with the stated concern and proposes to add this item to address the difficulty associated with maintaining pavement marking retroreflectivity during winter maintenance operations. While this is a more recurring type of retroreflectivity maintenance issue than those listed in items A through C, the schedule to restore markings is based largely on the weather in a particular year and can vary significantly by region.

Following the list of items, FHWA proposes to indicate that when these circumstances occur, compliance with Paragraphs 1 and 2 is achieved if a reasonable course of action is taken to restore such markings in a timely manner. The FHWA proposes this revised statement following the list of examples to clarify that compliance with the minimum pavement marking retroreflectivity levels may take such factors into consideration. The FHWA realizes that when such circumstances occur, agencies will need to schedule their resources and priorities in order to restore the pavement markings.

The FHWA's intent is for agencies take an appropriate course of action in a timely manner.

Section 1A.11 Relation to Other Publications

11. The FHWA proposes to add a new publication titled, "Methods for Maintaining Pavement Marking Retroreflectivity" to the list of other publications that are useful sources. A draft version of this document is available in the docket. This draft publication is a supplemental document for informational purposes. The final version of this document will reflect any changes made to this proposed rule and will be published and distributed by FHWA. In the NPA, FHWA proposed to reference a summary of this report instead. The FHWA has reconsidered the intent and resulting content of this supplemental document, and proposes to reference this document which contains more information about the methods to be used for maintaining pavement marking retroreflectivity than can be adequately described in the MUTCD text or a summary document. Several State and local DOTs submitted specific questions and comments to the docket related to the methods as described in the proposed MUTCD text. Because FHWA proposes to simplify the MUTCD language in the SNPA, FHWA believes it is appropriate to reference a supplemental document that would be easily accessible on FHWA's Web site and would provide detailed guidance on how to implement the methods, rather than to provide partial information in the MUTCD text. See item 6 of this document for more information about the proposed publication "Methods for Maintaining Pavement Marking Retroreflectivity."

Introduction

In the Introduction, FHWA proposes to add to Table I-2 Target Compliance Dates Established by FHWA, a compliance date for new Section 3A.03 Maintaining Minimum Retroreflectivity. The FHWA proposes a compliance period of 4 years from the effective date of the Final Rule for this revision of the MUTCD for implementation and continued use of a method that is designed to maintain retroreflectivity of longitudinal pavement markings, and refers the reader to Paragraph 1. This proposed 4-year compliance period is similar to that proposed in the NPA. In the NPA, FHWA also proposed to include a compliance period for replacing markings that were found to be deficient by the agency's method for maintaining minimum pavement marking retroreflectivity. While ATSSA agreed with the compliance periods, the NCUTCD, AASHTO, NACE, members of those organizations, and two local agencies agreed with establishing a 4-year compliance period for establishing and using a method to maintain pavement marking retroreflectivity, but did not support a compliance date for replacing deficient markings. The FHWA believes that a 4-year compliance period for establishing and implementing such a method is appropriate; however, FHWA is no longer seeking to establish compliance dates for replacement of deficient markings as this should be established by agencies pursuant to their methods. This is consistent with Revision 2 of the 2009 MUTCD in regard to Minimum Retroreflectivity compliance dates for Traffic Signs. Without specific compliance dates in the MUTCD for replacing deficient markings, agencies would still need to replace or remark pavement markings they identify as not

meeting the established minimum retroreflectivity values, but each agency would be allowed to establish a schedule for replacement based on resources and relative priorities. Agencies would need to establish their replacement schedules using the same level of consideration as they would any other engineering decision regarding maintenance of traffic control devices.

In consideration of the foregoing, FHWA proposes to revise the 2009 MUTCD text as follows:

Add a row to Table I-2 Target Compliance Dates Established by FHWA:

2009 MUTCD Section Number(s)	2009 MUTCD Section Title	Specific Provision	Compliance Date
3A.03	Maintaining Minimum Retroreflectivity	Implementation and continued use of a method that is designed to maintain retroreflectivity of longitudinal pavement markings (see Paragraph 1)	4 years from the effective date of this revision of the MUTCD

Add new reference document to Section 1A.11 Relation to Other Publications:

Section 1A.11

"Methods for Maintaining Pavement Marking Retroreflectivity," Report No. FHWA-SA-14-017 (FHWA)

Revise Section 3A.03 as follows:

Section 3A.03 Maintaining Minimum Retroreflectivity

Standard:

01 Except as provided in Paragraph 5, a method designed to maintain retroreflectivity at or above 50 mcd/m^2/lx shall be used for longitudinal markings on roadways with statutory or posted speed limits of 35 mph or greater.

Guidance:

02 Except as provided in Paragraph 5, a method designed to maintain retroreflectivity at or above 100 mcd/m^2/lx should be used for longitudinal markings on roadways with statutory or posted speed limits of 70 mph or greater.

03 The method used to maintain retroreflectivity should be one or more of those described in "Methods for Maintaining Pavement Marking Retroreflectivity" (see Section 1A.11) or developed from an engineering study based on the values in Paragraphs 1 and 2.

Support:

04 Retroreflectivity levels for pavement markings are measured with an entrance angle of 88.76 degrees and an observation angle of 1.05 degrees. This geometry is also referred to as 30-meter geometry. The units of pavement marking retroreflectivity are reported in mcd/m^2/lx, which means millicandelas per square meter per lux.

Option:

05 The following markings may be excluded from the provisions established in Paragraphs 1 and 2:

A. Markings where ambient illumination assures that the markings are adequately visible;

B. Markings on roadways that have an ADT of less than 6,000 vehicles per day;

C. Dotted extension lines that extend a longitudinal line through an intersection, major driveway, or interchange area (see Section 3B.08);

D. Curb markings;

E. Parking space markings; and

F. Shared-use path markings.

Support:

06 The provisions of this Section do not apply to non-longitudinal pavement markings including, but not limited to, the following:

A. Transverse markings;

B. Word, symbol, and arrow markings;

C. Crosswalk markings; and

D. Chevron, diagonal, and crosshatch markings.

07 Special circumstances will periodically cause pavement marking retroreflectivity to be below the minimum levels. These circumstances include, but are not limited to, the following:

A. Isolated locations of abnormal degradation;

B. Periods preceding imminent resurfacing or reconstruction;

C. Unanticipated events such as equipment breakdowns, material shortages, contracting problems, and other similar conditions; and

D. Loss of retroreflectivity resulting from snow maintenance operations.

When such circumstances occur, compliance with Paragraphs 1 and 2 is still considered to be achieved if a reasonable course of action is taken to restore such markings in a timely manner.

Rulemaking Analyses and Notices

All comments received before the close of business on the comment closing date indicated above will be considered and will be available for examination using the docket number appearing at the top of this document in the docket room at the above address. The FHWA will file comments received after the comment closing date and will consider late comments to the extent practicable. In addition, FHWA will also continue to file in the docket relevant information becoming available after the comment closing date, and interested persons should continue to examine the docket for new material.

Executive Order 12866 (Regulatory Planning and Review), Executive Order 13563 (Improving Regulations and Regulatory Review), and DOT Regulatory Policies and Procedures

The FHWA has determined that this action would be a significant regulatory action within the meaning of Executive Order 12866 and within the meaning of DOT regulatory policies and procedures because of the significant public interest in the MUTCD. Additionally, this action complies with the principles of Executive Order

13563. The FHWA has considered the costs and potential benefits of this rulemaking and believes the rulemaking is being implemented in a manner that fulfills our obligation under Section 406 of the Department of Transportation and Related Agencies Appropriations Act, 1993 (Pub. L. 102-388; October 6, 1992) and provides flexibility for agencies. The estimated national costs are documented in the updated economic analysis report, which is available as a separate document under the docket number noted in the title of this document at http://www.regulations.gov. The flexibility is documented in the new publication titled, "Methods for Maintaining Pavement Marking Retroreflectivity," to which the MUTCD refers readers.

The MUTCD already requires that pavement markings that must be visible at night shall be retroreflective unless ambient illumination assures that the markings are adequately visible and that all markings on Interstate highways shall be retroreflective. The proposed changes in the MUTCD would provide additional guidance and clarification, while allowing flexibility in maintaining pavement marking retroreflectivity. The pavement markings excluded from the proposed rulemaking are not to be excluded from any other MUTCD standards. The FHWA believes that the uniform application of traffic control devices will greatly improve the traffic operations efficiency and roadway safety. The standards, guidance, and support are also used to create uniformity and to enhance safety and mobility at little additional expense to public agencies or the motoring public.

The economic analysis provides a national estimate of the costs to implement this rulemaking and to replace markings. Costs for individual agencies would vary based on factors such as the amount of pavement marking mileage subject to the standards and current pavement marking practices. The analysis estimates first year start-up implementation costs of $29.4 million for all affected State and local agencies to develop maintenance methods and purchase necessary equipment. In addition, annual measurement and management activities of $14.9 million nationwide are expected to determine which markings require replacement. In the second and following years, if agencies were to replace markings that do not meet the minimums despite the fact that there are no replacement compliance dates, there is an estimated increase of approximately $52.5 million per year nationally from current estimated pavement marking replacement expenditures. Therefore, this proposed rule will not result in the expenditure by State, local, and tribal governments, in the aggregate, or by the private sector, of $100 million or more in any one year. These changes are not anticipated to adversely affect, in any material way, any sector of the economy. In addition, these changes would not create a serious inconsistency with any other Federal agency's action or materially alter the budgetary impact of any entitlements, grants, user fees, or loan programs. It is anticipated that the economic impact of this rulemaking would be minimal; therefore, a full regulatory evaluation is not required, though FHWA has prepared an economic analysis, which has been placed in the docket. Although it is not possible to calculate the benefits specifically attributed to this proposal, numerous safety

studies dating back to the 1970's clearly show that adding pavement markings to two lane highways reduces nighttime crashes, a result of those markings providing enough retroreflectivity to be visible to drivers at night. The limited safe speed on unmarked roads at night is a clear indication that there are also operational benefits of visible pavement markings both day and night. The FHWA believes that lives will be saved and injuries reduced by the improved maintenance of pavement marking retroreflectivity. As indicated in the economic analysis, a crash reduction factor is not available to estimate the safety benefits of maintaining pavement marking retroreflectivity. Lack of crash reduction factors associated specifically with retroreflectivity has limited the analysis to developing a range of potential benefit-cost ratios between 1 and 60.

Regulatory Flexibility Act

In compliance with the Regulatory Flexibility Act (Pub. L. 96-354, 5 U.S.C. 601-612), FHWA has evaluated the effects of this proposed action on small entities, including small governments. This proposed action would apply to State and local DOTs in the execution of their highway programs, specifically with respect to the retroreflectivity of pavement markings. In addition, pavement marking improvement is eligible for up to 100 percent Federal-aid funding. This also applies to local jurisdictions and tribal governments, pursuant to 23 U.S.C. 120(c). I hereby certify that this proposed action will not have a significant economic impact on a substantial number of small entities.

Executive Order 13132 (Federalism)

The FHWA analyzed this proposed amendment in accordance with the principles and criteria contained in Executive Order 13132, dated August 4, 1999, and FHWA has determined that this proposed action would not have a substantial direct effect or sufficient federalism implications on States and local governments that would limit the policymaking discretion of the States and local governments. Nothing in the MUTCD directly preempts any State law or regulation.

The MUTCD is incorporated by reference in 23 CFR part 655, subpart F. These proposed amendments are in keeping with the Secretary of Transportation's authority under 23 U.S.C. 109(d), 315, and 402(a) to promulgate uniform guidelines to promote the safe and efficient use of the highway.

Unfunded Mandates Reform Act of 1995

This proposed rule would not impose unfunded mandates as defined by the Unfunded Mandates Reform Act of 1995 (Pub. L. 104-4, 109 Stat. 48, March 22, 1995). The economic impacts analysis shows that implementing these standards would likely increase current pavement marking replacement expenditures by approximately $52.5 million per year for all State and local agencies nationwide. The estimates are based upon the assumption that the distribution of marking materials on a national basis is 75 percent paint, 20 percent thermoplastic, and 5 percent epoxy. There would also be an estimated cost of $14.9 million in annual measurement and management activities nationwide to ensure compliance with the minimum values. In addition, in the first year,

before annual implementation or replacement costs began, the State and local agencies are estimated to have nationwide start-up implementation costs of $29.4 million to develop maintenance methods and purchase measurement equipment. Finally, the compliance dates to replace markings that do not meet the minimum retroreflectivity have been eliminated. Although agencies will still need to replace these markings, their schedules would be based on their method for maintaining retroreflectivity as well as their resources and relative priorities. Therefore, this proposed rule would not result in the expenditure by State, local, and tribal governments, in the aggregate, or by the private sector, of $151 million or more in any one year. In addition, pavement marking replacement is eligible for up to 100 percent Federal-aid funding. This applies to local jurisdictions and tribal governments, pursuant to 23 U.S.C. 120(c). Further, the definition of "Federal Mandate" in the Unfunded Mandates Reform Act excludes financial assistance of the type in which State, local, or tribal governments have authority to adjust their participation in the program in accordance with changes made in the program by the Federal Government. The Federal-aid highway program permits this type of flexibility.

Executive Order 13175 (Tribal Consultation)

The FHWA has analyzed this proposed action under Executive Order 13175, dated November 6, 2000, and believes that it would not have substantial direct effects on one or more Indian tribes, would not impose substantial direct compliance costs on Indian tribal governments, and would not preempt tribal law. Therefore, a tribal summary impact statement is not required.

Executive Order 13211 (Energy Effects)

The FHWA has analyzed this proposed action under Executive Order 13211, Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use. The FHWA has determined that this is not a significant energy action under that order because it is not likely to have a significant adverse effect on the supply, distribution, or use of energy. Therefore, a Statement of Energy Effects under Executive Order 13211 is not required.

Executive Order 12372 (Intergovernmental Review)

Catalog of Federal Domestic Assistance Program Number 20.205, Highway Planning and Construction. The regulations implementing Executive Order 12372 regarding intergovernmental consultation on Federal programs and activities apply to this program.

Paperwork Reduction Act

Under the Paperwork Reduction Act of 1995 (PRA) (44 U.S.C. 3501, et seq.), Federal agencies must obtain approval from the Office of Management and Budget for each collection of information they conduct, sponsor, or require through regulations. The FHWA has determined that this proposed action does not contain a collection of information requirement for the purposes of the PRA.

Executive Order 12988 (Civil Justice Reform)

This proposed action meets applicable standards in Sections 3(a) and 3(b)(2) of Executive Order 12988, Civil Justice Reform, to minimize litigation, to eliminate ambiguity, and to reduce burden.

Executive Order 13045 (Protection of Children)

The FHWA has analyzed this proposed action under Executive Order 13045, Protection of Children from Environmental Health Risks and Safety Risks. This is not an economically significant action and does not concern an environmental risk to health or safety that might disproportionately affect children.

Executive Order 12630 (Taking of Private Property)

This proposed action would not affect a taking of private property or otherwise have taking implications under Executive Order 12630, Governmental Actions and Interference with Constitutionally Protected Property Rights.

National Environmental Policy Act

The agency has analyzed this proposed action for the purpose of the National Environmental Policy Act of 1969 (42 U.S.C. 4321 et seq.) and has determined that it will not have any significant effect on the quality of the environment and is categorically excluded under 23 CFR 771.117(c)(20).

Regulation Identifier Number

A regulation identification number (RIN) is assigned to each regulatory action listed in the Unified Agenda of Federal Regulations. The Regulatory Information Service Center publishes the Unified Agenda in April and October of each year. The RIN

contained in the heading of this document can be used to cross reference this action with the Unified Agenda.

List of Subjects in 23 CFR Part 655

Design Standards, Grant programs – Transportation, Highways and roads, Incorporation by reference, Pavement Markings, Traffic regulations.

Issued in Washington, DC under authority delegated in 49 CFR 1.85:

Gregory G. Nadeau,

Administrator,

Federal Highway Administration.

For the reasons stated in the preamble, FHWA proposes to amend title 23, Code of Federal Regulations, part 655, subpart F as follows:

PART 655 – TRAFFIC OPERATIONS

1. The authority for part 655 is revised to read as follows:

Authority: 23 U.S.C. 101(a), 104, 109(d), 114(a), 217, 315 and 402(a); 23 CFR 1.32; and 49 CFR 1.85.

Subpart F – Traffic Control Devices on Federal-Aid and Other Streets and Highways [Amended]

2. Revise § 655.601(d)(2)(i), to read as follows:

§ 655.601 Purpose

* * * * *

(d) * * *

(2) * * *

(i) Manual on Uniform Traffic Control Devices for Streets and Highways (MUTCD), 2009 edition, including Revision No. 1 and No.2, dated May 2012, and No.[number to be inserted], dated [date to be inserted], FHWA.

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