



National Committee on Uniform Traffic Control Devices

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Item Number: 26A-MKG-01

NCUTCD RECOMMENDATION FOR CHANGES TO THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES

COMMITTEE / TASK FORCE: Markings Technical Committee
ITEM NUMBER: 26A-MKG-01
TOPIC: Interim Approval for Orange Color as a Supplemental Marking
ORIGIN OF REQUEST: Orange Markings MCTF
AFFECTED SECTIONS OF MUTCD: 3A.03, 6J.02

DEVELOPMENT HISTORY:

Approved by Markings TC: 01/08/2026, 06/25/2026
Concurrence by TTC TC: 01/08/2026, 06/25/2026
Approved by NCUTCD Council: 06/26/2026

This is a recommended change to the MUTCD that has been approved by the NCUTCD Council. This proposal does not represent a revision of the MUTCD and does not constitute official MUTCD standards, guidance, or options. It will be submitted to FHWA for consideration for inclusion in a future MUTCD revision. The MUTCD can be revised only through the federal rulemaking process.

SUMMARY:

The purpose of this document is to request that FHWA issue an Interim Approval for the optional use of orange-colored pavement markings to supplement and enhance the conspicuity of yellow and white longitudinal lane markings installed in TTC zones on freeways and expressways.

DISCUSSION:

The Markings and Temporary Traffic Control TCs formed a multi-committee task force to review experimental applications of orange markings in temporary traffic control zones. They developed this Interim Approval request on the Optional Use of Orange Color for Supplemental Markings in Temporary Traffic Control Applications. The experimentation conducted on expressway and freeway applications found that applying orange pavement markings to serve as the sole indicator of TTC zone lane localization had limitations related to nighttime visibility. When used as a supplemental marking, the benefit of this enhanced conspicuity treatment on freeways and expressways is especially acute in the initial phase of TTC zone installation and at locations where multi-stage TTC zone installation and removal practices result in multiple “ghost” patterns. Other benefits from the use of supplemental orange treatments are situations in which pavement rejuvenation processes create false lane indicators, especially at night.

The Interim Approval is to be issued in accordance with Section 1B.07 Interim Approvals, of the 11th Edition of the Manual on Uniform Traffic Control Devices (MUTCD). Interim Approvals allow interim use, pending official rulemaking, of a new traffic control device, a revision to the application or manner of use of an existing traffic control device, or a provision not specifically described in the *Manual on Uniform Traffic Control Devices for Streets and Highways (MUTCD)*.

This Interim Approval permits agencies to request authorization to designate and use orange as a supplemental pavement marking treatment in TTC zones on freeways and expressways. Once granted, Interim Approval permits agencies to install orange supplemental markings in conjunction with broken white lane lines, as part of a TTC zone. The installation of orange supplemental broken lane line markings is permitted in a lag pattern (see Figure 1). The Interim Approval permits agencies that install solid white lane lines and/or a solid yellow edge line on the left side of a TTC zone, the option to supplement these lane lines with orange solid longitudinal markings placed contiguous to the outside edges of the lines defining the temporary lane (see Figure 2). In multi-lane configurations where internal solid lane lines are installed, solid orange supplemental lane lines may be placed on the right side of the solid white internal longitudinal lane lines (see Figure 3).

When granted, the Interim Approval permits agencies to install orange supplemental markings adjacent to the right side of the white dotted edge line extension. Dimensions are to match to the extent practicable. Optional orange supplemental lag pattern markings may be installed with dotted white lane line extensions and the dimensions should match to the extent practicable (See Figure 4).

Figure 1. Lag Pattern

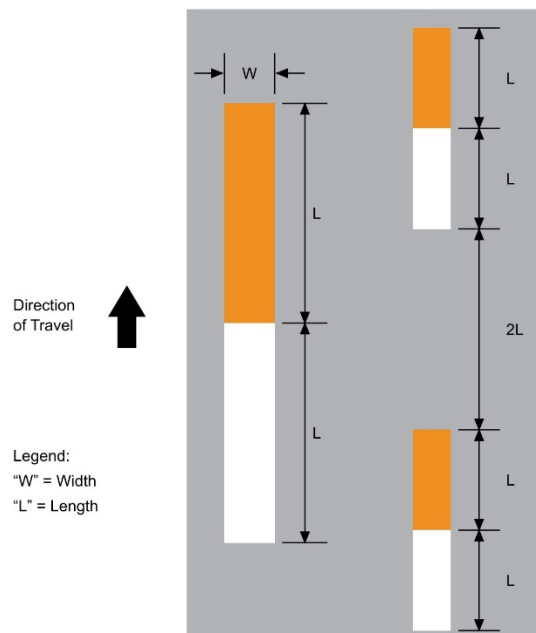


Figure 3. Temporary Multi-Lane Shift with Optional Orange Supplemental Markings

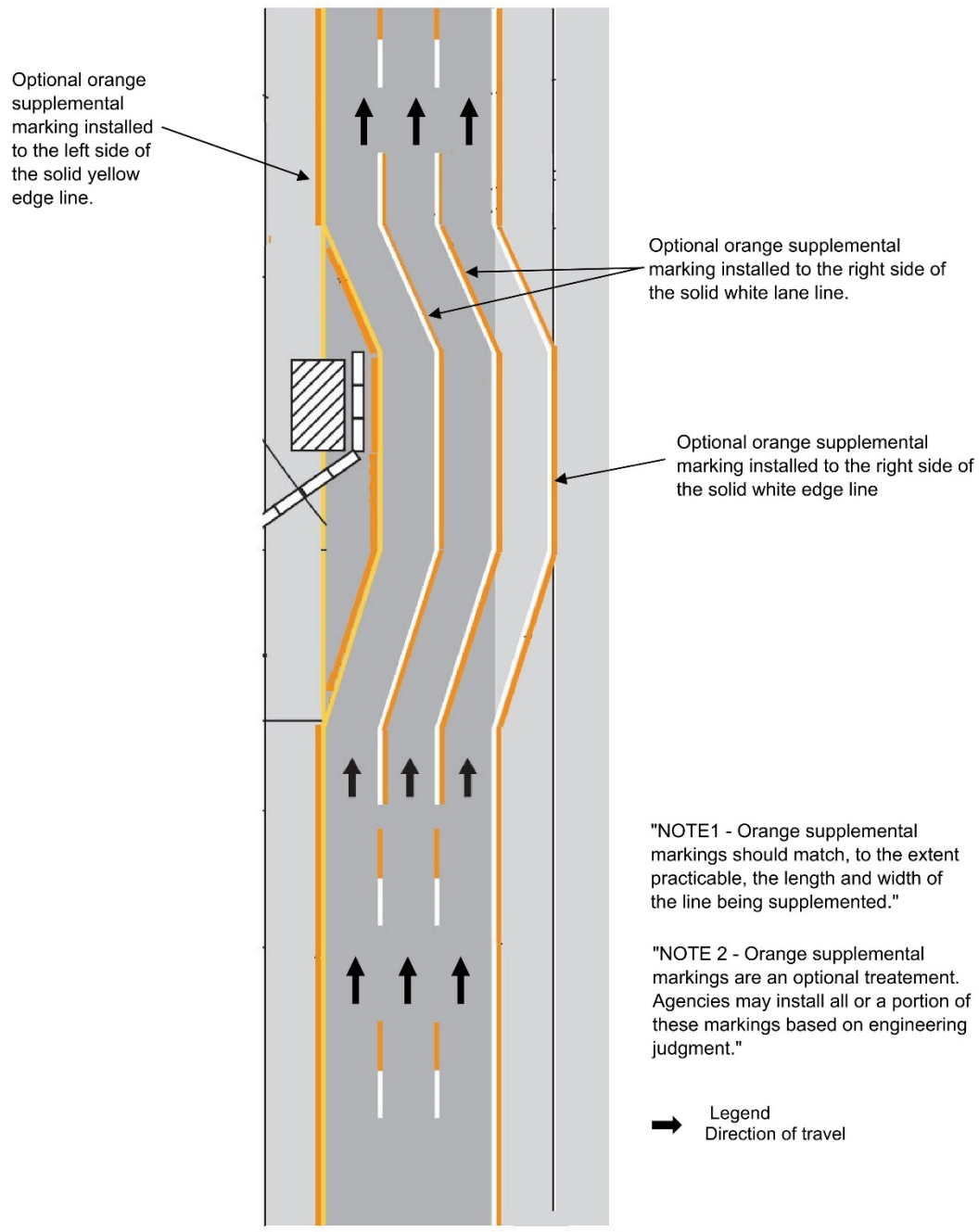
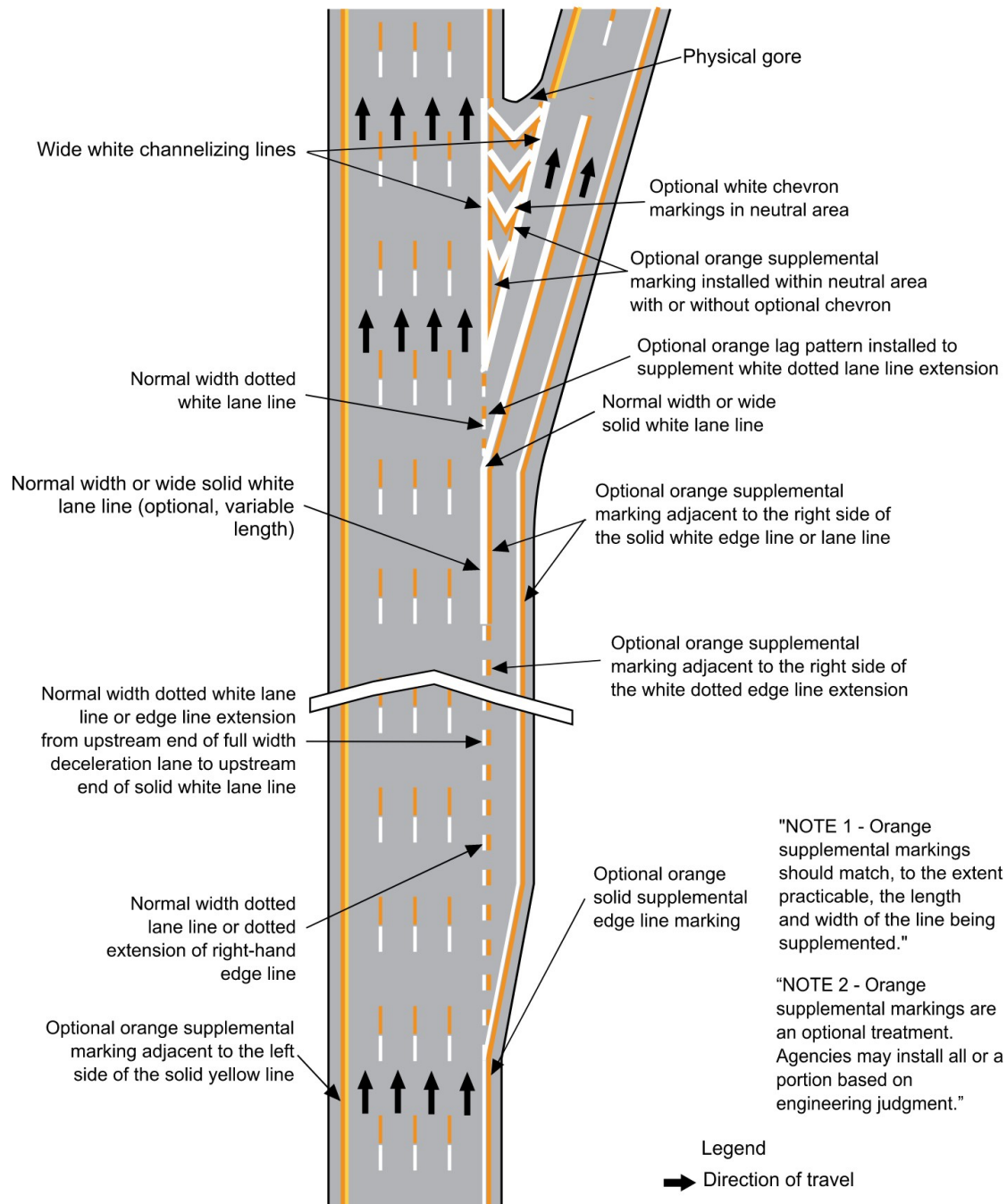


Figure 4. Orange Supplemental Marking Application for Exit Ramp Markings



Background:

Congress granted the U.S. Secretary of Transportation authority to establish national standards for traffic control devices in the 1966 Highway Safety Act. The FHWA, as part of the 1971 MUTCD, officially designated orange as the color for roadway construction. A half-century later, U.S. motorists ubiquitously recognize and equate the color “orange” to signify a roadway work zone. Chapter 3A of the 11th MUTCD Edition contains provisions regarding pavement marking colors and permitted use. Yellow and white pavement markings are standard regulatory colors. Blue may be applied as a supplemental marking for parking spaces designated for use by persons with disabilities. Purple may be applied as a supplemental marking to identify toll plaza approach lanes restricted to electronic toll collection (ETC). Chapter 3F contains provisions specifying how purple pavement markings may be used to supplement yellow and white longitudinal markings. Black markings are permitted to enhance yellow or white markings and to provide contrast on light colored pavements.

In 2013, FHWA granted Wisconsin DOT permission to experiment with orange longitudinal pavement markings for use within temporary traffic control zones. The Wisconsin DOT experiment used orange as a stand-alone color. The experiment sought to determine if orange would improve conspicuity during winter months when snow and salt diminished motorist recognition of white lane markings. The Kentucky Transportation Cabinet and the North Texas Tollway Authority (NTTA) also were permitted to experiment with orange as a stand-alone TTC zone treatment. In 2020, Caltrans was granted permission to experiment with orange markings as a supplemental marking in TTC zones. Michigan DOT installed stand-alone orange markings in 2022 to permit evaluation by machine vision ADAS and AV technology developers. In 2023, Washington State DOT and Indiana DOT received permission to install orange markings as a supplemental marking.

Agencies across the United States are showing increased interest in using orange as a supplemental marking to increase work zone lane recognition. The experiments conducted by Michigan DOT determined that machine vision systems can recognize orange markings. Developers of more advanced ADAS and AV system technologies expressed a strong preference for orange as a supplemental marking, especially on highway applications. Human surveys and discussions with machine vision system developers affirm that the orange supplemental markings assist in recognizing TTC zone lane configurations and decreased the likelihood of confusion due to ghost markings or from crack seal treatments. In experiments where orange was used as a stand-alone treatment, respondents expressed concerns related to a lack of visibility at night.

Research on Orange Marking Supplemental TTC Color:

The request to issue an Interim Approval is based on the results of experiments conducted by multiple agencies. Research from Indiana DOT (Effectiveness of Contrast Markings on Roadways and Orange Markings in Work Zones, Williamson, Lin, 2023), Caltrans (Orange Contrasted Temporary Pavement Delineation in Construction Zones, Linke, White, Yen, 2025), and Washington State DOT (Temporary Orange Contrast Markings Manual of Uniform Traffic Control Devices Experimentation, Davis, Haapala, Lintz, Nathan, 2024) indicate that orange supplemental pavement markings in TTC zones significantly improve safety by increasing driver awareness, lowering speeds, and enhancing lane guidance, with Indiana reporting a 74% reduction in lane departure crashes. Findings from Caltrans and WSDOT pilot studies further show improved visibility, particularly after dark, with high driver acceptance. Experiments of orange as a supplemental pavement marking demonstrated strong road user preference. Nearly 90% of motorists surveyed indicated that orange supplemental pavement markings increased awareness of the work zone. Large majorities of surveyed motorists indicated that orange supplemental markings increased awareness of their operational speed and improved their ability to stay within the TTC zone designated lane. Eight in 10 motorists surveyed in Indiana said that the orange supplemental marking was more visible than either the white or yellow markings.

Agencies that installed orange markings as a supplemental or contrast treatment reported a strong preference for orange marking benefits in the initial stages of TTC zone application. In multi-stage TTC zone highway situations, orange contrast treatments increased conspicuity and reduced motorist

confusion often attributable to maintenance-related pavement treatments or from the installation and removal of previous temporary marking patterns. In Washington State, surveyed 85% of motorists responded that orange markings “increased their awareness” within the work zone. Nearly 90% of Washington State motorists surveyed, “wanted to see orange striping used more in work zones.”

The daytime and nighttime chromaticity requirements were developed based on independent material testing submitted to Future Labs-KTA (paint and coatings laboratory) by nine different material manufacturers. Accelerated weather testing in accordance with ASTM G154 – 23 Standard Practices for Operating Fluorescent Ultraviolet (UV) Lamp Apparatus for Exposure of Materials. Samples were exposed for a total of 144 hours with rotation after 72 hours. The daytime orange chromaticity requirements are identical to the orange color found in Table 1 to Appendix to Part 655, Subpart F- Daytime Color Specification Limits for Retroreflective Material with CIE 2o Standard Observer and 45/0 (0/45) Geometry and CIE Standard Illuminant D65. The Nighttime chromaticity requirements are designed to minimize color shift towards yellow.

The Interim Approval for the use of orange as a supplemental pavement marking does not create a new mandate compelling its use but allows agencies to install orange supplemental pavement marking treatments, pending official MUTCD rulemaking, to enhance the conspicuity of TTC zones.

Conditions of Interim Approval:

The FHWA is requested to issue a memorandum stating that FHWA grants Interim Approval to any jurisdiction that submits a written request to the Office of Transportation Operations for the optional use of orange supplemental pavement markings on freeway and expressway TTC zones. A State may request Interim Approval for all jurisdictions in that State. Jurisdictions using orange colored pavement markings under this Interim Approval must agree to comply with the technical conditions detailed below, maintain an inventory list of all locations where orange colored pavement markings are installed, and to comply with Item D in Paragraph 10 of Section 1B.07 of the MUTCD 11th Edition, which requires:

“An agreement to restore the site(s) of the Interim Approval to a condition that complies with the provisions in this Manual within three months following the issuance of a Final Rule on this traffic control device; and terminate use of the device or application installed under the interim approval at any time that it determines significant safety concerns are directly or indirectly attributable to the device or application. The FHWA’s Office of Transportation Operations has the right to terminate the Interim Approval at any time if there is an indication of safety concerns.”

The use of orange lane markings as a supplemental traffic control device with yellow or white markings on freeways and expressways should be optional and available for use within TTC zones as described in Section 6B.02 and as described above. Orange should receive interim approval for use as an approved standard supplemental color under Section 3A.03 Colors.

1. General Conditions:

The use of orange as a pavement marking supplemental color is optional. If an agency opts to use orange colored pavement markings under this Interim Approval, the following design and installation requirements shall apply, and shall take precedence over any conflicting provisions of the MUTCD.

2. Allowable Uses:

The optional use of orange pavement marking supplemental color is restricted to TTC zones installed on freeways and expressways.

Design of Orange Colored Pavement Markings:

- a. The daytime chromaticity coordinates¹ for the color used for orange pavement markings is as follows:

1		2		3		4	
X	Y	X	Y	X	Y	X	Y
0.558	0.352	0.636	0.364	0.570	0.429	0.506	0.404

- b. The nighttime chromaticity coordinates² for the color used for orange pavement markings is as follows:

1		2		3		4	
X	Y	X	Y	X	Y	X	Y
0.520	0.405	0.575	0.425	0.600	0.400	0.525	0.375

- c. When used to supplement edge lines, orange markings should be placed immediately adjacent to the outside of the edge lines (See Figure 2).
- d. When used to supplement solid lane lines, orange markings should be placed immediately adjacent to the right side of the solid lane lines (See Figure 3).
- e. When used to supplement broken lane lines, orange markings should be placed in a lag pattern (See Figure 1).
- f. When used to supplement dotted lines, orange markings should be placed in either a lag pattern or immediately adjacent to the right side of the dotted lines (See Figure 4).
- g. Orange markings should match, to the extent practicable, the width and length of the markings they supplement. When supplementing a wide or double line, a normal width orange marking may be used.
- h. Orange markings shall be retroreflective.

Additional Information:

- Effectiveness of Contrast Markings on Roadways and Orange Markings in Work Zones, Williamson, M., & Lin, P. (2023). (Joint Transportation Research Program Publication No. FHWA/IN/JTRP-2023/27); West Lafayette, IN: Purdue.
- Orange Supplemental ed Temporary Pavement Delineation in Construction Zones, Barbara Linke, Wilderich White, Kin Yen, Felicia Fashanu, Nathan Byrd, University of California, Davis (UCD), Department of Mechanical & Aerospace Engineering, 09/30/2023.
- Temporary Orange Contrast Markings Manual on Uniform Traffic Control Device Experimentation, Scott Davis, Steve Haapala, Fredrick Lintz, Emily Nathan, 10/2025.

¹ Title 23, Chapter 1, Subchapter G, Table 1, Appendix to Part 655, Subpart F-Daytime Color Specification Limits for Retroreflective Material with CIE 2° Standard Observer and 45/0 (0/45) Geometry and CIE Standard Illuminant D₆₅.

² Title 23, Chapter 1, Subchapter G, Table 2 to Appendix Part 655, Subpart F-Nighttime Color Specification Limits for Retroreflective Material with CIE 2° Standard Observer and Observation Angle of 0.33°, Entrance Angle of + 5° and CIE Standard Illuminant A.