



National Association of
City Transportation Officials

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Subject: MUTCD Interim Approval for Red / Terra Cotta Color Pavement

The purpose of this letter is to request that FHWA issue an Interim Approval (IA) for the use of red color transit lanes under the MUTCD, and to suggest language for such an Interim Approval. We request prompt action on transit lanes, just as FHWA streamlined the process of implementing road safety projects by issuing MUTCD Interim Approvals for bike boxes, two-stage bicycle turn queue boxes, and an updated pedestrian safety signal warrant.

Members of NACTO's Transit Street Design Committee, which has recommended the language below, include the engineering practitioners and public officials responsible for nearly all ongoing and completed experiments on red color transit lanes in the United States. These professionals have expressed 1) a need for flexibility in approved color accommodating red and terra cotta options to support existing state-level regulatory variation and practice, and 2) options that accommodate color in areas in which turns are permitted, as is found in IA-14 for the use of green color. Since color is used primarily to increase the conspicuity of existing regulations, these variations are appropriate.

This Interim Approval would provide guidance for the use of red / terra cotta pavement treatments as an optional supplement to existing transit lane signs and markings standards. Doing so would provide regulatory relief to Denver and other U.S. cities and states, many of which are faced with the expense of additional experimentation on a treatment for which they and others have successfully experimented.

Proposed language is provided in the attached brief. This language is based on the NCUTCD's proposed revisions to MUTCD Chapter 3G (adopted in June 2014), with explanations of proposed updates. These updates reflect the existing use of red color transit lanes. This proposal would provide a moderate degree of flexibility in the details of how red color is permitted to be used, and is consistent with existing MUTCD requirements for lane lines, bus lane signs, and other standards.

Thank you for your consideration and time in this important matter. Please feel free to contact us at lbailey@nacto.org, aaron@nacto.org, and matthew@nacto.org with any questions.

Sincerely,

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Red Color Transit Lanes

I. Proposed Interim Approval Text

NACTO recommends that the following text to be adopted through an MUTCD Interim Approval by FHWA. This text is based on the [NCUTCD recommendation](#) for revisions to Section 3G- Color Pavement. Changes from that proposal are discussed in footnotes. Much of the additional text has been provided for consistency with IA-14, the MUTCD Interim Approval for Optional Use of Green Colored Pavement for Bike Lanes, issued in 2011.

Plain text is as proposed by the NCUTCD. **Bold** text is used for shall/should/may statements including those proposed by the NCUTCD. New text is [underlined in blue](#). Deleted text is struck through in [red](#).

Allowable Uses for Red Color Pavement:

[Support:](#) ~~Option:~~

Red colored pavement **may** be installed [within transit lanes¹, transit stops or stations, or other](#) facilities where transit vehicles have priority over other traffic, to enhance the conspicuity of [these](#) locations. ~~These public~~ [For](#) the purpose of color application, [“transit vehicles” may be defined by the roadway owner, and may](#) include buses, taxis, streetcars, trolleys, light rail trains, [or](#) rapid transit fleets.

Standard:

Red colored pavement **shall** [only be installed as a supplement to the other pavement markings that are required for the designation of transit lanes, as outlined in Chapter 3D, or as a supplement to other pavement markings used to designate transit stops or stations or other transit facilities.](#)

~~Regulatory signs shall be used to establish the allowable use of the lane, area, or location where red colored pavement is applied. Regulatory signs shall also be used if vehicles will be allowed to enter the lane to turn.~~

Guidance:

If used, red colored pavement ~~should~~ **shall** be applied only in transit lanes [and in other areas or](#) locations where general-purpose or private motor vehicle traffic is generally prohibited to travel in, queue, wait, idle, or otherwise occupy the lane area or location where red colored pavement is used, [except to momentarily cross a transit lane to access parking lanes or driveways.² Red colored pavement may be installed for the entire area of a transit lane, transit stop or station or other transit facility or only for a portion \(or portions\) of these areas. Red colored pavement may be installed behind standard word, symbol, and arrow pavement markings within a transit lane to enhance the conspicuity of these markings.](#)

~~Travel lanes used by public transit vehicles and other modes should not use red colored pavement.~~

[Option:](#)

[Red color pavement may be used on lanes where part-time use by private motor vehicles for travel or parking is permitted.³](#)

¹ **Explanation:** “Transit lane” refers to any preferential lane that permits transit vehicles.

² **Explanation:** existing transit lanes permit parking access.

³ **Explanation:** The 2014 NCUTCD language did not specifically discuss the fact that motor vehicles can be permitted at off-peak

² **Explanation:** existing transit lanes permit parking access.

³ **Explanation:** The 2014 NCUTCD language did not specifically discuss the fact that motor vehicles can be permitted at off-peak times or at night, or that parking can be permitted at off-peak times, though these are common operations for red transit lanes. It is important to provide this option to implementing jurisdictions. Importantly, the NACTO Committee determined that it was necessary to strike lines 228-229 of the NCUTCD recommended text, [“Travel lanes used by public transit vehicles and other modes should not use red colored pavement,”](#) as this text is ambiguous and seems to contradict the remaining guidance.

Option:

Where transit lanes use dotted white lane lines to indicate where crossing is encouraged, intermittent red color **may** be used adjacent to **dotted** white lines to permit non-transit vehicles into the transit lane, where general traffic is permitted to enter into and proceed for a short distance in the transit-only lane, including at the approach to an intersection where turns are permitted from the transit-only lane, or where private motor vehicles must cross the transit lane to access a left- or right-turn lane.⁴



Above: An offset transit lane in San Francisco, before and after red color implementation, showing BUS ONLY text with a solid white stripe at the left side of the transit lane in the 'before' image, and BUS TAXI ONLY text with white stripes on both sides of the lane in the after image. Red bars connecting dashed/broken white lines can also be seen at the intersection approach, where right turning vehicles are permitted to enter the bus lane. (Source: SFMTA).

⁴ **Alternate text based on IA-14:** If a pair of dotted lines is used to extend a transit lane across the beginning of a turn bay where drivers who desire to turn must cross the transit lane when moving out of the through lane in order to turn, red colored pavement may be installed between these lines as a supplement to the lines. The red colored pavement may be installed for the entire length of the transit lane extension or for only a portion (or portions) of the transit lane extension. The pattern of the red colored pavement may be dotted in a manner that matches the pattern of the dotted white lines, thus filling in only the areas that are directly between a pair of dotted white line segments that are on opposite sides of the transit lane extension.

II. Red Transit Lanes at a Glance

Red transit lanes have been successfully experimented upon for more than a decade, in cities across the United States. As rapid bus projects have expanded in the US, there are now over 100 lane miles of red color transit lanes nationwide. The New York City Department of Transportation successfully experimented on red color transit lanes beginning in 2006, FHWA extended the experiment in 2011, and New York now has over 70 miles of red color transit lanes. Chicago has implemented four miles of red transit lanes, and San Francisco has studied thirteen miles of red transit lanes. Denver, CO and Washington, DC, have shorter ongoing experiments, showing that red transit lanes have value in cities of a variety of sizes.

Red color has a large benefit in reducing blockages of transit lanes and increasing bus lane usage by buses. Both unauthorized vehicles and stopped vehicle blockages decrease when red color transit lanes are implemented. Red color substantially reduced the number of unauthorized vehicles driving in transit lanes by 51% in San Francisco, by 55% in New York, and by 60% in Chicago. Chicago observed an 88% decrease in bus blockages by unauthorized vehicles in the bus lane after implementing red color in existing transit lanes. In New York City, a large-sample study found that after accounting for other variables, red color bus lanes were used almost 50% more frequently by buses than bus lanes without red color, providing a benefit even when blockage numbers were similar.

Drivers understand how to use the red color lanes. Across all experiments, private drivers understood that they *could* drive in the lanes at times when the transit-only restriction was *not* in effect. Several experiments independently found that drivers had no difficulty understanding that they *could* legally park at curbside when the red transit lane was offset from the curb. And drivers understood that right turns were to be made by entering the shared bus-and-right-turn-only intersection approach area delineated by a broken white lane line and *either* solid red color, dashed red color, or no red color.

Red color is practical. The experiments used a variety of durable color materials, in a wide variety of local weather conditions. New York City tested friction performance extensively on several materials, and subsequent wide-scale implementation has shown that friction and color can be preserved on roadway surfaces over several years, even under the heavy wear of high-volume bus routes. Materials used include thermoplastic, modified spray epoxy, and methyl methacrylate.



Red color transit lane in Washington, DC.

III. Experiments

Experiments with published findings cover nearly 100 lane-miles of red color transit lanes in multiple sites in three cities, spanning more than a decade of on-the-ground experience. These are referred to below as the ‘three major experiments’. Smaller experiments are ongoing in other cities.

In addition, at least three other US jurisdictions have existing red transit lanes, all of which are consistent with the use and language described in this brief. In addition, several cities have communicated with NACTO to express concern that experimentation would delay a project, resulting in transit lane implementation without red color.

All three major experiments were conducted in challenging conditions, often where traffic congestion is present for a large span of the day. These conditions included downtown streets and major arterial streets with high volume of bus transit vehicles.

Experiments included several configurations, including curbside transit lanes and offset transit lanes adjacent to curbside parking. Experiments covered sites in which red color was added to existing transit lanes, as well as sites in which new bus lanes were implemented with red color.

City	Years of Study	Sites Studied	Total Lane Miles of Red Transit Lanes	Experiment Number
New York, NY ⁵	2007-Present	6	74	Multiple
San Francisco, CA ⁶	2013-2017	3	13	FHWA 9(03)-18 (E) CTCDC 12-18
Chicago, IL	2015-Present	3	4	3 (09)-23 (E)
Washington, D.C.	2015 – Present	1	0.35	3(09)-36
Seattle, WA	2016 – Present	10	3.24	-
Denver, CO	2017 – Present	1	0.9	3(09)-44
Santa Rosa, CA	2017 – Present	-	-	3(09)-45

⁵ See attached: NYCDOT Letter *Re: 3-198 (Ex) Colored Pavement for Bus Lanes – NY City*

⁶ See attached: *SFMTA Red Transit Lanes Final Evaluation Report*

Conclusions

The above experiments found that red color transit lanes are more effective and more easily understood than transit lanes without red color, and documented several major benefits. Findings are described below. Reports from the first four of these experiments are also attached.

Red Color Reduces Unauthorized Use of Transit Lanes:

- Red color substantially reduced the number of unauthorized vehicles driving in transit lanes by 51% in San Francisco, by 55% in New York, and by 60% in Chicago.
- Bus conflicts (blockages of the transit lane when a bus was present) were reduced by 88% in Chicago.
- Parking and/or standing in the red transit lane were nearly eliminated in Chicago, and reduced by 30% in New York *without new enforcement*.⁷

Red Transit Lane Operations Were Understood by Drivers

- Red color did not increase the number of drivers turning across the bus lane from the second travel lane. Across all experiments, evidence showed that drivers understood that right turns were still to be made from the rightmost lane. In San Francisco, 91% turned from the correct right-most location. Turns from the second lane occurred during congested conditions, indicating these turns were a result of frustration rather than misunderstanding the markings.⁸

Experiments covered a variety of right-turn configurations. Most experiments included sites that allow turns from the curbside or offset transit lane in a short, approximately 30' to 100' intersection approach with a broken/dashed white lane line. At some sites, dashed red color bars at the same interval as the dashed white lane lines were used for this shared bus-and-right-turn intersection approach. In some sites, no red color is used adjacent to a dashed-lane-line intersection approach. In some sites, a right turn lane was adjacent to the through transit lane, both with and without red dashed color in the merge section where right-turn traffic crosses the bus lane. All four right-turn configurations were successful.

Legal Parking was not Impacted by the Use of Red Color:

- Drivers understood that parking was still permitted on the curb adjacent to a floating/offset red bus lane, and that they were permitted to cross the red transit lane to park. All three major experiments found that, where curbside parking was allowed adjacent to an offset transit lanes, legal parking was not impacted by the use of color.

⁷ Combination of results for standing and parking (15.7 + 1.4 = 17.1 average incidents Before; 10.2 + 1.8 = 12 average incidents After.

⁸ See page 19-20 of *SFMTA Red Transit Lanes Final Evaluation Report*. 30 + 115 = 145 vehicles turning from correct lane at two sites, 10+5 vehicles turning from second lane. (9% of 160 turned incorrectly.)

SFMTA compared metered parking occupancy adjacent to offset bus lanes, and found no change or a slight increase in occupancy after red color implementation.

Legal off-peak use by private vehicles was not impacted by the use of Red Color

- Red color experiments for daytime-only and peak-only transit lanes have been successful. These part-time red color transit lanes were used appropriately, and increased compliance by drivers during their hours of operation.

Authorized Vehicles:

- Bus-and-Taxi-Only lanes were included in the San Francisco multi-site experiment, and were found to be effective. The inclusion of taxis as authorized transit vehicles did not impact the effectiveness of the red color in decreasing unauthorized vehicle use. Approval language should therefore support a variety of authorized users and uses, to be determined by the local jurisdiction.