

Designing for Consistency: Matching Applications to Scenarios in the Use of Pavement Markings and Delineation

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Summary

Effective traffic control devices (TCDs) must be selected such that specific applications are matched to specific scenarios matching geometric designs. In addition, it is critical that the intended message is conveyed in a clear and simple way.

Geometric design plays an important role in the application of TCDs within a system. In recent practice, two trends have emerged that threaten the “readability” of geometric design features and dilute the meaning and effectiveness of TCDs. On one hand, TCDs with a single meaning are being used across locations with differing geometric design characteristics. On the other hand, locations with identical or similar geometric design characteristics are being treated with TCDs that vary by location. Both of these misapplications of TCDs violate the key principle of driver expectancy.

The paper identifies field cases of TCD misapplication, assesses the influence of geometric design in the selection of TCDs, and proposes model guidelines for geometric design processes and TCD implementation for practitioners who wish to achieve TCD consistency with geometric design.

Common Errors

While implementation of more standard pavement marking practices is specified in the MUTCD, situations not directly specified require practitioners with extensive experience in traffic control device design to apply pavement markings appropriately. In many cases, public and private sector practitioners who are tasked with designing TCDs do not apply them appropriately, creating situations that run contrary to conventional practices and human factors principles.

Some common errors include the following:

- Insufficient distinction between patterns for dotted extension lines and dotted lane lines
- Patterns of reflective pavement markers that are not progressive
- Use of white pavement markings and delineators on the left side of one-way facilities
- Use of yellow pavement markings between travel lanes moving in the same direction
- Incorrect use of angled transverse markings when chevron markings are required
- Broadening usage of pavement marking patterns, such as the use of dotted lane lines in areas where there is not a full-width lane
- Erratic usage of pavement marking patterns, such as the use of dotted extension lines in places where dotted lane lines would be appropriate

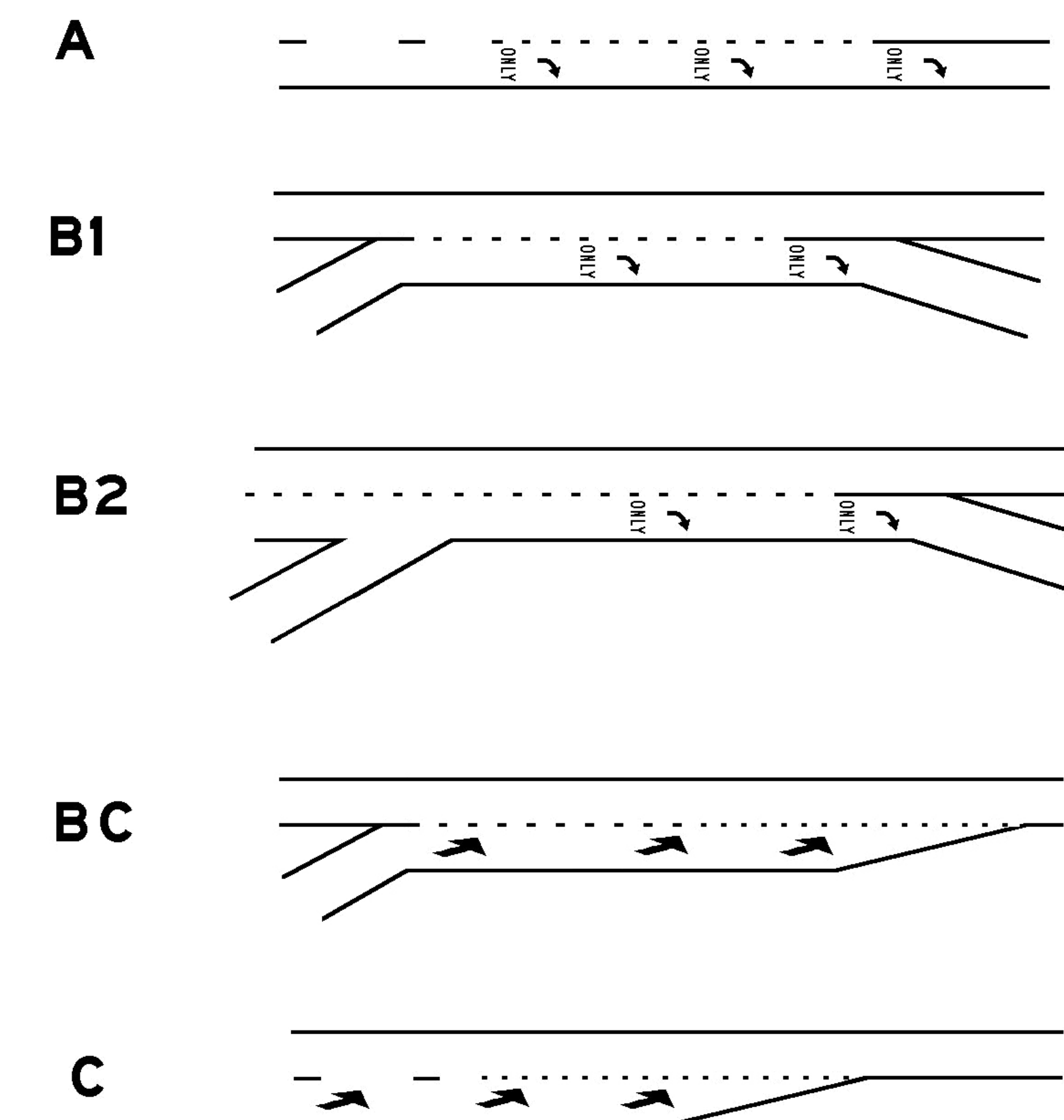
Discussion of Effective Pavement Marking Practices

Pattern	Typical Dimension	Use
Broken Lane Line	10' LINE / 30' SPACE 3.3-m LINE / 9.9-m SPACE	separates two continuing lanes
Dotted Lane Line	3' LINE / 12' SPACE 0.9-m LINE / 3.6-m SPACE	separates a continuing lane from a non-continuing lane subject to a downstream mandatory movement
Dotted Extension	2' LINE / 6' SPACE 0.6-m LINE / 1.8-m SPACE	separates a full-width lane from an area of transition, such as a lane development taper for a turn lane, a lane reduction taper, or between turning lanes within an intersection
Solid Line	SOLID	separates a continuing lane from a non-travel lane such as a shoulder or, when wider, separates a continuing lane from a non-continuing auxiliary lane such as a turn lane or other mandatory movement lane or separates lanes designed for restricted use
Double Solid Line	SOLID	separates lanes where crossing from either side is prohibited
Solid Line with Broken or Dotted Lane Line	MIXED	separates lanes where crossing from one side is permitted but crossing from the solid side is prohibited

Pavement Marking Patterns and Uses

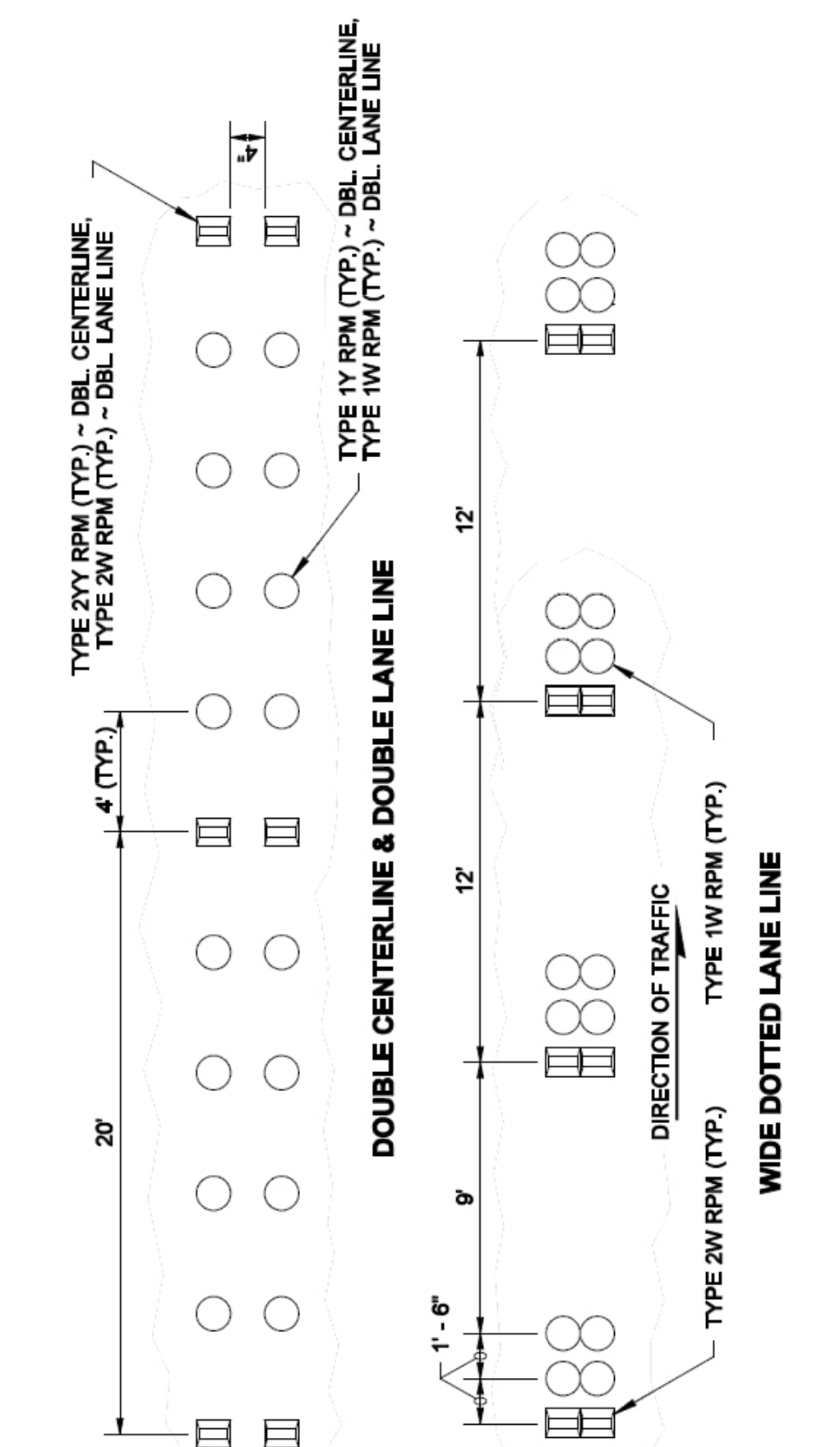


Solid lane lines used between thru lanes on intersection approaches can cause confusion when applied indiscriminately. In this photograph, a solid line is placed between two through lanes, leading to a question on the use of the right lane and even the center lane.



Dotted extension lines provide positive guidance through intersections and along tapered areas. This photograph illustrates how placement and color of a dotted extension line can cause confusion regarding the use of the lane to the left of the line, the left turn lane from the photo at the left.

The use of the **dotted lane line** (typically a 1 m line with a 4 m space) for the scenarios in both Depiction B1 and Depiction BC, in the figure to the left, could cause confusion over the means of termination of the lane entering a motorway. An alternate pattern for scenario BC is advisable.



These markings, detailed in a Washington State DOT Standard Plan, illustrate the problem of erratic application of **raised reflective pavement markings**. The reflectors (called out as “Type 1W RPM”) are spaced at a shorter longitudinal distance for the less restrictive marking pattern on the right, which is the dotted lane line; the double solid line marking on the left appears to be a more permissive marking based on marker spacing.

Recommendations

Research Needs

Research on various applications could provide assistance in identifying the most appropriate practices where multiple options are available, providing for consistency.

Technical Training

Technical training and certifications programs may improve consistency in TCD application, particularly with regard to integrating geometric design and pavement markings.

Documentation and Standards Recommendations

Provide information in the traffic design manuals (such as the MUTCD) such that applications and scenarios are identified clearly, using specific examples. Some agencies accomplish this through the use of Standard Plans for marking applications.