CHAPTER 5B. PROVISIONS FOR TRAFFIC CONTROL DEVICES

Section 5B.01 Signs

Support:

01 Driving automation systems use sensors, algorithms, and processing to locate, read, and comprehend traffic signs and assist the human driver or AV in appropriately making vehicle operational decisions. Location, condition, uniformity, design characteristics, and consistent application all affect the ability of driving automation systems to perform these functions.

Standard:

02 **When scanning graphics (see Section 2A.04) of any type are used on a sign for support of driving automation systems, the scanning graphics shall not be visible to the human eye and the sign shall have no apparent loss of resolution or recognition for the road user.**

Guidance:

03 Agencies seeking to better accommodate driving automation systems to support AVs, while also potentially benefitting human drivers, should consider:

- *A. ~~Clearly associating~~ Associating the sign location and application with the displayed message to the specific lane or road to which it applies, such as with ~~in the case of~~ parallel roads or lanes with different speed limits or restrictions.*
- *B. The practice of sign and information spreading (see Section 2A.20) to limit the ~~amount of~~ information displayed in one location or on one sign to ~~minimize~~ reduce sign clutter.*
- *C. Signs with designs t~~hat are~~ otherwise not provided for in this Manual or the "Standard Highway Signs" publication(see Section 1A.05) are designed based on the standardized sign design practices and features as provided for in this Manual for the type of sign, the location, and the characteristics of the roadway on which it is used.*
- D. *The refresh rate of LEDs in the illuminated ~~portion~~ part of electronic-display signs to provide for greater consistency in driving automation system detection.*

Section 5B.02 Markings

Support:

01 Driving automation systems use sensors, algorithms, and processing to locate, read, and comprehend pavement markings. Location, condition, uniformity, design characteristics, and consistent application all have some effect on the ability of driving automation systems to perform this function. Certain pavement marking applications and practices have been shown through research to better support driving automation system technology, while also benefitting, or at least not detracting from, the performance of the human operator.

Guidance:

02 Agencies seeking to better accommodate driving automation system to support AVs, while also potentially benefitting human drivers, should consider:

- *A. Normal width longitudinal lines of at least 6 inches in width (see Section 3A.04).*
- *B. Edge lines of at least 6 inches in width (see Sections 3A.04 and 3B.09).*
- *C. Dotted edge line extensions along all entrance and exit ramps, all auxiliary lanes, and all tapers where a deceleration or auxiliary lane is added (see Section 3B.11).*
- *D. Chevron markings in the neutral areas of exit gores to distinguish them from travel lanes (see Section 3B.25).*
- *E. Raised pavement markers only as a supplement to, rather than as a substitute for, pavement markings (see Sections 3B.16 and 3B.17).*
- *F. Uniform contrast markings on light-colored pavements to create greater contrast (see Section 3A.03).*
- *G. Broken lines with uniform marking and gap length (see Section 3A.04).*

Section 5B.03 Highway Traffic Signals

Guidance:

01 *Agencies seeking to better accommodate driving automation systems to support AVs, while also potentially benefitting human drivers, should consider:*

- *A. Consistent signal face placement along corridors ~~with respect to~~ regarding overhead mounting versus post mounting on the side of the roadway (see Sections 4D.05 thru 4D.10).*
- *B. Consistent number of signal faces for approach lanes and the selection of signal indications and signal clusters along a corridor to promote uniform displays for identical or similar situations.*
- *C. The refresh rate of LED traffic signals to provide for greater consistency in driving automation system detection.*
- *D. Providing signal faces with backplates (see Section 4D.06) having retroreflective borders to enhance signal face conspicuity and detection by driving automation system sensors.*
- *E. Using FLASHING YELLOW ARROW signal indications for permissive turns.*

Support:

02 Signal faces that display a CIRCULAR GREEN indication and that are located over or directly in line with a mandatory turn lane can be less effective for driving automation systems to recognize as a traffic signal face controlling permissive turning movements.

03 Achieving uniformity along a corridor is desirable for driving automation systems, but can be challenging. Multiple options are available for traffic signal displays to allow design variations based on specific intersection variables such as available overhead clearance, utility conflicts, signal support design constraints, and other factors. V2I capabilities can complement driving automation system recognition of traffic signals to provide redundancy, and to improve reliability and accuracy.

Section 5B.04 Temporary Traffic Control

Guidance:

01 *Agencies seeking to better accommodate driving automation systems to support, while also potentially benefitting human drivers, in and through temporary traffic control (TTC) zones should consider:*

- *A. Consistent type, spacing, and mounting height of signs (see Sections 6B.04 and 6F.02).*
- *B. Use of the END ROAD WORK (G20-2) sign to establish the end of the TTC zone (see Section 6H.36).*
- *C. Wider retroreflective material on, or reduced spacing of, channelizing devices to better accommodate driving automation system sensors in nighttime and adverse weather conditions (see Chapter 6K).*
- *D. Continuous markings at the beginning of TTC zones and in lane transitions.*
- *E. Temporary raised pavement markers only as a supplement to, rather than as a substitute for, pavement markings (see Section 6J.03).*
- *F. Removal or obliteration of pavement markings that are no longer applicable as soon as ~~practicable~~ possible, for long-term stationary operations in the temporary traveled way (see Section 6J.01).*

Support:

02 Pavement markings ~~that are~~ not fully removed and pavement scarring are of particular concern as there can be misinterpretation by driving automation systems that can result in ~~erroneous~~ incorrect vehicle positioning in TTC zones.

03 V2I communications can complement driving automation systems recognition in TTC zones by communicating the presence of a TTC zone to vehicles.

04 Section 6J.01 describes the use of pavement markings in TTC zones and the removal or obliteration of existing pavement markings.

05 Section 6J.02 describes the use of temporary pavement markings in TTC zones.

Section 5B.05 Traffic Control for Highway-Rail and Highway-Light Rail Transit Grade Crossings

Guidance:

01 Agencies seeking to better accommodate driving automation systems to support AVs, while also potentially benefitting human drivers, at grade crossings should consider:

A. Consistent placement of signs and markings for passive and active grade crossings along a corridor to promote uniformity and to improve the ability of driving automation system technology to recognize grade crossings.

B. Removal of signs and pavement markings associated with grade crossings that are out of service (see Section 8A.09).

Support:

02 V2I communications can complement driving automation system recognition of grade crossings to improve reliability and accuracy, and to relay information on the arrival or presence of a train or LRT vehicle at a grade crossing.

Section 5B.06 Traffic Control for Bicycle Facilities

Guidance:

01 Agencies seeking to better accommodate driving automation systems to support AVs, while also potentially benefitting human road users, should consider:

A. Use of an END (R3-9dP) plaque with a BIKE LANE (R3-17) sign to indicate the end of a bicycle lane that is merging with other traffic (see Sections 2B.33 and 9B.04).

B. Use of Bicycle Lane Ends (W9-5) and Bicycle Merging (W9-5a) warning signs ~~in advance of~~ before the end of a bicycle lane and where a merging maneuver might occur (see Section 9C.07).

Support:

02 Bicycle facilities ~~that are~~ physically separated from motor vehicle traffic using vertical objects or vertical separation can facilitate detection ~~from~~ by driving automation system sensors (see Section 9E.07).