

# Arizona Supplement to the Manual on Uniform Traffic Control Devices

for Streets and Highways  
2009 Edition



# ARIZONA SUPPLEMENT TO THE 2009 MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD)

- A Section of the MUTCD contained within the Arizona Supplement shall replace the corresponding Section in the MUTCD in its entirety.
- Tables and Figures of the MUTCD contained within the Arizona Supplement shall either replace the corresponding Table or Figure in the MUTCD in its entirety, or, if appended with an "AZ" suffix, supplement and append the existing Table or Figure in the MUTCD.
- If a Section, Table, or Figure from the MUTCD is not contained within this Supplement, the section in the MUTCD shall remain unchanged.

## Within the Arizona Supplement:

- Black text denotes content unchanged from the 2009 National MUTCD.
- Additions are noted in underline blue text.
- Deletions are noted in ~~strikeout red~~ text.

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## PART 1 - GENERAL

### CHAPTER 1A - GENERAL

#### Section 1A.09 of the National MUTCD is revised to read:

##### Section 1A.09 Engineering Study and Engineering Judgment

Support:

- 01 Definitions of an engineering study and engineering judgment are contained in Section 1A.13.

**Standard:**

- 02 **This Manual describes the application of traffic control devices, but shall not be a legal requirement for their installation.**

*Guidance:*

- 03 ~~*Early in the processes of location and design of roads and streets, engineers should coordinate such location and design with the design and placement of the traffic control devices to be used with such roads and streets.*~~
- 04 ~~*Jurisdictions, or owners of private roads open to public travel, with responsibility for traffic control that do not have engineers on their staffs who are trained and/or experienced in traffic control devices should seek engineering assistance from others, such as the State transportation agency, their county, a nearby large city, or a traffic engineering consultant.*~~

Support:

- 05 As part of the Federal-aid Program, each State is required to have a Local Technical Assistance Program (LTAP) and to provide technical assistance to local highway agencies. Requisite technical training in the application of the principles of the MUTCD is available from the State's Local Technical Assistance Program for needed engineering guidance and assistance.

*Guidance:*

- 06 *The decision to use a particular device at a particular location should be made on the basis of either an engineering study or the application of engineering judgment. Thus, while this Manual provides Standards, Guidance, and Options for design and application of traffic control devices, this Manual should not be considered a substitute for engineering judgment.*
- 07 *Engineering judgment should be exercised in the selection and application of traffic control devices, as well as in the location and design of the roads and streets that the devices complement. Jurisdictions with responsibility for traffic control that do not have engineers on their staffs should seek engineering assistance from others, such as ADOT, their County, a nearby large City, or a traffic engineering consultant.*

## Section 1A.11 of the National MUTCD is revised to read:

### Section 1A.11 Relation to Other Publications

#### Standard:

- 01 To the extent that they are incorporated by specific reference, the latest editions of the following publications, or those editions specifically noted, shall be a part of this Manual: “Standard Highway Signs and Markings” book (FHWA), [ADOT Manual of Approved Signs \(MOAS\)](#); and “Color Specifications for Retroreflective Sign and Pavement Marking Materials” (appendix to subpart F of Part 655 of Title 23 of the Code of Federal Regulations).

#### Support:

- 02 The “Standard Highway Signs and Markings” book includes standard alphabets and symbols and arrows for signs and pavement markings. [The MOAS contains Arizona-specific signs, and special Arizona-specific designs for signs already included in the MUTCD. Signs in the MOAS are intended for use as appropriate on all roadways and pathways in Arizona. The MOAS website is at <http://www.azdot.gov/highways/traffic/MOASStds.asp>.](#)
- 03 For information about the publications mentioned in Paragraph 1, visit the Federal Highway Administration’s MUTCD website at <http://mutcd.fhwa.dot.gov>, or write to the FHWA, 1200 New Jersey Avenue, SE, HOTO, Washington, DC 20590.
- 04 Other publications that are useful sources of information with respect to the use of this Manual are listed in this paragraph. See Page i of this Manual for ordering information for the following publications (later editions might also be available as useful sources of information):
1. “AAA School Safety Patrol Operations Manual,” 2006 Edition (American Automobile Association—AAA)
  2. “A Policy on Geometric Design of Highways and Streets,” 2004 Edition (American Association of State Highway and Transportation Officials—AASHTO)
  3. “Guide for the Development of Bicycle Facilities,” 1999 Edition (AASHTO)
  4. “Guide for the Planning, Design, and Operation of Pedestrian Facilities,” 2004 Edition (AASHTO)
  5. “Guide to Metric Conversion,” 1993 Edition (AASHTO)
  6. “Guidelines for the Selection of Supplemental Guide Signs for Traffic Generators Adjacent to Freeways,” 4th Edition/Guide Signs, Part II: Guidelines for Airport Guide Signing/Guide Signs, Part III: List of Control Cities for Use in Guide Signs on Interstate Highways,” Item Code: GSGLC-4, 2001 Edition (AASHTO)
  7. “Roadside Design Guide,” 2006 Edition (AASHTO)
  8. “Standard Specifications for Movable Highway Bridges,” 1988 Edition (AASHTO)
  9. “Traffic Engineering Metric Conversion Folders—Addendum to the Guide to Metric Conversion,” 1993 Edition (AASHTO)
  10. “2009 AREMA Communications & Signals Manual,” (American Railway Engineering & Maintenance-of-Way Association—AREMA)

11. "Changeable Message Sign Operation and Messaging Handbook (FHWA-OP-03-070)," 2004 Edition (Federal Highway Administration—FHWA)
12. "Designing Sidewalks and Trails for Access—Part 2—Best Practices Design Guide (FHWA-EP-01-027)," 2001 Edition (FHWA)
13. "Federal-Aid Highway Program Guidance on High Occupancy Vehicle (HOV) Lanes," 2001 (FHWA)
14. "Maintaining Traffic Sign Retroreflectivity," 2007 Edition (FHWA)
15. "Railroad-Highway Grade Crossing Handbook—Revised Second Edition (FHWA-SA-07-010)," 2007 Edition (FHWA)
16. "Ramp Management and Control Handbook (FHWA-HOP-06-001)," 2006 Edition (FHWA)
17. "Roundabouts-An Informational Guide, (FHWA-RD-00-067)," 2000 Edition (FHWA)
18. "Signal Timing Manual (FHWA-HOP-08-024)," 2008 Edition (FHWA)
19. "Signalized Intersections: an Informational Guide (FHWA-HRT-04-091)," 2004 Edition (FHWA)
20. "Travel Better, Travel Longer: A Pocket Guide to Improving Traffic Control and Mobility for Our Older Population (FHWA-OP-03-098)," 2003 Edition (FHWA)
21. "Practice for Roadway Lighting," RP-8, 2001 (Illuminating Engineering Society—IES)
22. "Safety Guide for the Prevention of Radio Frequency Radiation Hazards in the Use of Commercial Electric Detonators (Blasting Caps)," Safety Library Publication No. 20, July 2001 Edition (Institute of Makers of Explosives)
23. "American National Standard for High-Visibility Public Safety Vests," (ANSI/ISEA 207-2006), 2006 Edition (International Safety Equipment Association—ISEA)
24. "American National Standard for High-Visibility Safety Apparel and Headwear," (ANSI/ISEA 107-2004), 2004 Edition (ISEA)
25. "Manual of Traffic Signal Design," 1998 Edition (Institute of Transportation Engineers—ITE)
26. "Manual of Transportation Engineering Studies," 1994 Edition (ITE)
27. "Pedestrian Traffic Control Signal Indications," Part 1—1985 Edition; Part 2 (LED Pedestrian Traffic Signal Modules)—2004 Edition (ITE)
28. "Preemption of Traffic Signals Near Railroad Crossings," 2006 Edition (ITE)
29. "Purchase Specification for Flashing and Steady Burn Warning Lights," 1981 Edition (ITE)
30. "Traffic Control Devices Handbook," 2001 Edition (ITE)
31. "Traffic Detector Handbook," 1991 Edition (ITE)
32. "Traffic Engineering Handbook," 2009 Edition (ITE)
33. "Traffic Signal Lamps," 1980 Edition (ITE)
34. "Vehicle Traffic Control Signal Heads," Part 1—1985 Edition; Part 2 (LED Circular Signal Supplement)—2005 Edition; Part 3 (LED Vehicular Arrow Traffic Signal Supplement)—2004 Edition (ITE)
35. "Uniform Vehicle Code (UVC) and Model Traffic Ordinance," 2000 Edition (National Committee on Uniform Traffic Laws and Ordinances—NCUTLO)



36. "NEMA Standards Publication TS 4-2005 Hardware Standards for Dynamic Message Signs (DMS) With NTCIP Requirements," 2005 Edition (National Electrical Manufacturers Association—NEMA)
37. "Occupational Safety and Health Administration Regulations (Standards - 29 CFR), General Safety and Health Provisions - 1926.20," amended June 30, 1993 (Occupational Safety and Health Administration—OSHA)
38. "Accessible Pedestrian Signals—A Guide to Best Practices (NCHRP Web-Only Document 117A)," 2008 Edition (Transportation Research Board—TRB)
39. "Guidelines for Accessible Pedestrian Signals (NCHRP Web-Only Document 117B)," 2008 Edition (TRB)
40. "Highway Capacity Manual," 2000 Edition (TRB)
41. "Recommended Procedures for the Safety Performance Evaluation of Highway Features," (NCHRP Report 350), 1993 Edition (TRB)
42. "The Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities (ADAAG)," July 1998 Edition (The U.S. Access Board)

## Section 1A.13 of the National MUTCD is revised to read:

### Section 1A.13 Definitions of Headings, Words, and Phrases in this Manual

#### Standard:

- 01 When used in this Manual, the text headings of Standard, Guidance, Option, and Support shall be defined as follows:
- A. **Standard**—a statement of required, mandatory, or specifically prohibitive practice regarding a traffic control device. All Standard statements are labeled, and the text appears in bold type. The verb “shall” is typically used. The verbs “should” and “may” are not used in Standard statements. Standard statements are sometimes modified by Options. ~~Standard statements shall not be modified or compromised based on engineering judgment or engineering study.~~
  - B. **Guidance**—a statement of recommended, but not mandatory, practice in typical situations, with deviations allowed if engineering judgment or engineering study indicates the deviation to be appropriate. All Guidance statements are labeled, and the text appears in unbold type. The verb “should” is typically used. The verbs “shall” and “may” are not used in Guidance statements. Guidance statements are sometimes modified by Options.
  - C. **Option**—a statement of practice that is a permissive condition and carries no requirement or recommendation. Option statements sometime contain allowable modifications to a Standard or Guidance statement. All Option statements are labeled, and the text appears in unbold type. The verb “may” is typically used. The verbs “shall” and “should” are not used in Option statements.
  - D. **Support**—an informational statement that does not convey any degree of mandate, recommendation, authorization, prohibition, or enforceable condition. Support statements are labeled, and the text appears in unbold type. The verbs “shall,” “should,” and “may” are not used in Support statements.
- 02 Unless otherwise defined in this Section, or in other Parts of this Manual, words or phrases shall have the meaning(s) as defined in the most recent editions of the “Uniform Vehicle Code,” “AASHTO Transportation Glossary (Highway Definitions),” and other publications mentioned in Section 1A.11.
- 03 The following words and phrases, when used in this Manual, shall have the following meanings:
1. **Accessible Pedestrian Signal**—a device that communicates information about pedestrian signal timing in non-visual format such as audible tones, speech messages, and/or vibrating surfaces.
  2. **Accessible Pedestrian Signal Detector**—a device designated to assist the pedestrian who has visual or physical disabilities in activating the pedestrian phase.
  3. **Active Grade Crossing Warning System**—the flashing-light signals, with or without warning gates, together with the necessary control equipment used

- to inform road users of the approach or presence of rail traffic at grade crossings.
4. **Actuated Operation**—a type of traffic control signal operation in which some or all signal phases are operated on the basis of actuation.
  5. **Actuation**—initiation of a change in or extension of a traffic signal phase through the operation of any type of detector.
  6. **Advance Preemption**—the notification of approaching rail traffic that is forwarded to the highway traffic signal controller unit or assembly by the railroad or light rail transit equipment in advance of the activation of the railroad or light rail transit warning devices.
  7. **Advance Preemption Time**—the period of time that is the difference between the required maximum highway traffic signal preemption time and the activation of the railroad or light rail transit warning devices.
  8. **Advisory Speed**—a recommended speed for all vehicles operating on a section of highway and based on the highway design, operating characteristics, and conditions.
  9. **Alley**—a street or highway intended to provide access to the rear or side of lots or buildings in urban areas and not intended for the purpose of through vehicular traffic.
  10. **Altered Speed Zone**—a speed limit, other than a statutory speed limit, that is based upon an engineering study.
  11. **Approach**—all lanes of traffic moving toward an intersection or a midblock location from one direction, including any adjacent parking lane(s).
  12. **Arterial Highway (Street)**—a general term denoting a highway primarily used by through traffic, usually on a continuous route or a highway designated as part of an arterial system.
  13. **Attended Lane (Manual Lane)**—a toll lane adjacent to a toll booth occupied by a human toll collector who makes change, issues receipts, and perform other toll-related functions. Attended lanes at toll plazas typically require vehicles to stop to pay the toll.
  14. **Automatic Lane**—see Exact Change Lane.
  15. **Average Annual Daily Traffic (AADT)**—the total volume of traffic passing a point or segment of a highway facility in both directions for one year divided by the number of days in the year. Normally, periodic daily traffic volumes are adjusted for hours of the day counted, days of the week, and seasons of the year to arrive at average annual daily traffic.
  16. **Average Daily Traffic (ADT)**—the average 24 hour volume, being the total volume during a stated period divided by the number of days in that period. Normally, this would be periodic daily traffic volumes over several days, not adjusted for days of the week or seasons of the year.
  17. **Average Day**—a day representing traffic volumes normally and repeatedly found at a location, typically a weekday when volumes are influenced by employment or a weekend day when volumes are influenced by entertainment or recreation.
  18. **Backplate**—see Signal Backplate.

19. **Barrier-Separated Lane**—a preferential lane or other special purpose lane that is separated from the adjacent general-purpose lane(s) by a physical barrier.
20. **Beacon**—a highway traffic signal with one or more signal sections that operates in a flashing mode.
21. **Bicycle**— ~~a pedal-powered vehicle upon which the human operator sits.~~ A device, including a racing wheelchair, that is propelled by human power and on which a person may ride and that has either: (a) Two tandem wheels, either of which is more than sixteen inches in diameter. (b) Three wheels in contact with the ground, any of which is more than sixteen inches in diameter (ARS §28-101.6).
22. **Bicycle Facilities**—a general term denoting improvements and provisions that accommodate or encourage bicycling, including parking and storage facilities, and shared roadways not specifically defined for bicycle use.
23. **Bicycle Lane**—a portion of a roadway that has been designated for preferential or exclusive use by bicyclists by pavement markings and, if used, signs.
24. **Bikeway**—a generic term for any road, street, path, or way that in some manner is specifically designated for bicycle travel, regardless of whether such facilities are designated for the exclusive use of bicycles or are to be shared with other transportation modes.
25. **Buffer-Separated Lane**—a preferential lane or other special purpose lane that is separated from the adjacent general-purpose lane(s) by a pattern of standard longitudinal pavement markings that is wider than a normal or wide lane line marking. The buffer area might include rumble strips, textured pavement, or channelizing devices such as tubular markers or traversable curbs, but does not include a physical barrier.
26. **Cantilevered Signal Structure**—a structure, also referred to as a mast arm, that is rigidly attached to a vertical pole and is used to provide overhead support of highway traffic signal faces or grade crossing signal units.
27. **Center Line Markings**—the yellow pavement marking line(s) that delineates the separation of traffic lanes that have opposite directions of travel on a roadway. These markings need not be at the geometrical center of the pavement.
28. **Changeable Message Sign**—a sign that is capable of displaying more than one message (one of which might be a “blank” display), changeable manually, by remote control, or by automatic control. Electronic-display changeable message signs are referred to as Dynamic Message Signs in the National Intelligent Transportation Systems (ITS) Architecture and are referred to as Variable Message Signs in the National Electrical Manufacturers Association (NEMA) standards publication.
29. **Channelizing Line Markings**—a solid wide or double white line used to form islands where traffic in the same direction of travel is permitted on both sides of the island.
30. **Circular Intersection**—an intersection that has an island, generally circular in design, located in the center of the intersection where traffic passes to the

- right of the island. Circular intersections include roundabouts, rotaries, and traffic circles.
31. **Circulatory Roadway**—the roadway within a circular intersection on which traffic travels in a counterclockwise direction around an island in the center of the circular intersection.
  32. **Clear Storage Distance**—when used in Part 8, the distance available for vehicle storage measured between 6 feet from the rail nearest the intersection to the intersection stop line or the normal stopping point on the highway. At skewed grade crossings and intersections, the 6-foot distance shall be measured perpendicular to the nearest rail either along the center line or edge line of the highway, as appropriate, to obtain the shorter distance. Where exit gates are used, the distance available for vehicle storage is measured from the point where the rear of the vehicle would be clear of the exit gate arm. In cases where the exit gate arm is parallel to the track(s) and is not perpendicular to the highway, the distance is measured either along the center line or edge line of the highway, as appropriate, to obtain the shorter distance.
  33. **Clear Zone**—the total roadside border area, starting at the edge of the traveled way, that is available for an errant driver to stop or regain control of a vehicle. This area might consist of a shoulder, a recoverable slope, and/or a non-recoverable, traversable slope with a clear run-out area at its toe.
  34. **Collector Highway**—a term denoting a highway that in rural areas connects small towns and local highways to arterial highways, and in urban areas provides land access and traffic circulation within residential, commercial, and business areas and connects local highways to the arterial highways.
  35. **Concurrent Flow Preferential Lane**—a preferential lane that is operated in the same direction as the adjacent mixed flow lanes, separated from the adjacent general-purpose freeway lanes by a standard lane stripe, painted buffer, or barrier.
  36. **Conflict Monitor**—a device used to detect and respond to improper or conflicting signal indications and improper operating voltages in a traffic controller assembly.
  37. **Constant Warning Time Detection**—a means of detecting rail traffic that provides relatively uniform warning time for the approach of trains or light rail transit traffic that are not accelerating or decelerating after being detected.
  38. **Contiguous Lane**—a lane, preferential or otherwise, that is separated from the adjacent lane(s) only by a normal or wide lane line marking.
  39. **Controller Assembly**—a complete electrical device mounted in a cabinet for controlling the operation of a highway traffic signal.
  40. **Controller Unit**—that part of a controller assembly that is devoted to the selection and timing of the display of signal indications.
  41. **Conventional Road**—a street or highway other than a low-volume road (as defined in Section 5A.01), expressway, or freeway.
  42. **Counter-Flow Lane**—a lane operating in a direction opposite to the normal flow of traffic designated for peak direction of travel during at least a

- portion of the day. Counter-flow lanes are usually separated from the off-peak direction lanes by tubular markers or other flexible channelizing devices, temporary lane separators, or movable or permanent barrier.
43. **Crashworthy**—a characteristic of a roadside appurtenance that has been successfully crash tested in accordance with a national standard such as the National Cooperative Highway Research Program Report 350, “Recommended Procedures for the Safety Performance Evaluation of Highway Features.”
  44. **Crosswalk**—~~(a) that part of a roadway at an intersection included within the connections of the lateral lines of the sidewalks on opposite sides of the highway measured from the curbs or in the absence of curbs, from the edges of the traversable roadway, and in the absence of a sidewalk on one side of the roadway, the part of a roadway included within the extension of the lateral lines of the sidewalk at right angles to the center line; (b) any portion of a roadway at an intersection or elsewhere distinctly indicated as a pedestrian crossing by pavement marking lines on the surface, which might be supplemented by contrasting pavement texture, style, or color. That part of a roadway at an intersection included within the prolongations or connections of the lateral lines of the sidewalks on opposite sides of the highway measured from the curbs or, in absence of curbs, from the edges of the traversable roadway. (b) Any portion of a roadway at an intersection or elsewhere that is distinctly indicated for pedestrian crossing by lines or other markings on the surface (ARS §28-601.3).~~
  45. **Crosswalk Lines**—white (or yellow at school crossings in accordance with §ARS 28-797.C) pavement marking lines that identify a crosswalk.
  46. **Cycle Length**—the time required for one complete sequence of signal indications.
  47. **Dark Mode**—the lack of all signal indications at a signalized location. (The dark mode is most commonly associated with power failures, ramp meters, hybrid beacons, beacons, and some movable bridge signals.)
  48. **Delineator**—a retroreflective device mounted on the roadway surface or at the side of the roadway in a series to indicate the alignment of the roadway, especially at night or in adverse weather.
  49. **Design Vehicle**—the longest vehicle permitted by statute of the road authority (State or other) on that roadway.
  50. **Designated Bicycle Route**—a system of bikeways designated by the jurisdiction having authority with appropriate directional and informational route signs, with or without specific bicycle route numbers.
  51. **Detectable**—having a continuous edge within 6 inches of the surface so that pedestrians who have visual disabilities can sense its presence and receive usable guidance information.
  52. **Detector**—a device used for determining the presence or passage of vehicles or pedestrians.
  53. **Downstream**—a term that refers to a location that is encountered by traffic subsequent to an upstream location as it flows in an “upstream to downstream” direction. For example, “the downstream end of a lane line

- separating the turn lane from a through lane on the approach to an intersection” is the end of the lane line that is closest to the intersection.
54. **Dropped Lane**—a through lane that becomes a mandatory turn lane on a conventional roadway, or a through lane that becomes a mandatory exit lane on a freeway or expressway. The end of an acceleration lane and reductions in the number of through lanes that do not involve a mandatory turn or exit are not considered dropped lanes.
  55. **Dual-Arrow Signal Section**—a type of signal section designed to include both a yellow arrow and a green arrow.
  56. **Dynamic Envelope**—the clearance required for light rail transit traffic or a train and its cargo overhang due to any combination of loading, lateral motion, or suspension failure (see Figure 8B-8).
  57. **Dynamic Exit Gate Operating Mode**—a mode of operation where the exit gate operation is based on the presence of vehicles within the minimum track clearance distance.
  58. **Edge Line Markings**—white or yellow pavement marking lines that delineate the right or left edge(s) of a traveled way.
  59. **Electronic Toll Collection (ETC)**—a system for automated collection of tolls from moving or stopped vehicles through wireless technologies such as radio-frequency communication or optical scanning. ETC systems are classified as one of the following: (1) systems that require users to have registered toll accounts, with the use of equipment inside or on the exterior of vehicles, such as a transponder or barcode decal, that communicates with or is detected by roadside or overhead receiving equipment, or with the use of license plate optical scanning, to automatically deduct the toll from the registered user account, or (2) systems that do not require users to have registered toll accounts because vehicle license plates are optically scanned and invoices for the toll amount are sent through postal mail to the address of the vehicle owner.
  60. **Electronic Toll Collection (ETC) Account Only Lane**—a non-attended toll lane that is restricted to use only by vehicles with a registered toll payment account.
  61. **Emergency-Vehicle Hybrid Beacon**—a special type of hybrid beacon used to warn and control traffic at an unsignalized location to assist authorized emergency vehicles in entering or crossing a street or highway.
  62. **Emergency-Vehicle Traffic Control Signal**—a special traffic control signal that assigns the right-of-way to an authorized emergency vehicle.
  63. **End-of-Roadway Marker**—a device used to warn and alert road users of the end of a roadway in other than temporary traffic control zones.
  64. **Engineering Judgment**—the evaluation of available pertinent information, and the application of appropriate principles, provisions, and practices as contained in this Manual and other sources, for the purpose of deciding upon the applicability, design, operation, or installation of a traffic control device. Engineering judgment shall be exercised by an engineer, or by an individual working under the supervision of an engineer, through the application of procedures and criteria established by the engineer. Documentation of engineering judgment is not required.

- 65. Engineering Study**—the comprehensive analysis and evaluation of available pertinent information, and the application of appropriate principles, provisions, and practices as contained in this Manual and other sources, for the purpose of deciding upon the applicability, design, operation, or installation of a traffic control device. An engineering study shall be performed by an engineer, or by an individual working under the supervision of an engineer, through the application of procedures and criteria established by the engineer. An engineering study shall be documented.
- 66. Entrance Gate**—an automatic gate that can be lowered across the lanes approaching a grade crossing to block road users from entering the grade crossing.
- 67. Exact Change Lane (Automatic Lane)**—a non-attended toll lane that has a receptacle into which road users deposit coins totaling the exact amount of the toll. Exact Change lanes at toll plazas typically require vehicles to stop to pay the toll.
- 68. Exit Gate**—an automatic gate that can be lowered across the lanes departing a grade crossing to block road users from entering the grade crossing by driving in the opposing traffic lanes.
- 69. Exit Gate Clearance Time**—for Four-Quadrant Gate systems at grade crossings, the amount of time provided to delay the descent of the exit gate arm(s) after entrance gate arm(s) begin to descend.
- 70. Exit Gate Operating Mode**—for Four-Quadrant Gate systems at grade crossings, the mode of control used to govern the operation of the exit gate arms.
- 71. Expressway**—a divided highway with partial control of access.
- 72. Flagger**—a person who actively controls the flow of vehicular traffic into and/or through a temporary traffic control zone using hand-signaling devices or an Automated Flagger Assistance Device (AFAD).
- 73. Flasher**—a device used to turn highway traffic signal indications on and off at a repetitive rate of approximately once per second.
- 74. Flashing**—an operation in which a light source, such as a traffic signal indication, is turned on and off repetitively.
- 75. Flashing-Light Signals**—a warning device consisting of two red signal indications arranged horizontally that are activated to flash alternately when rail traffic is approaching or present at a grade crossing.
- 76. Flashing Mode**—a mode of operation in which at least one traffic signal indication in each vehicular signal face of a highway traffic signal is turned on and off repetitively.
- 77. Freeway**—a divided highway with full control of access.
- 78. Full-Actuated Operation**—a type of traffic control signal operation in which all signal phases function on the basis of actuation.
- 79. Gate**—an automatically-operated or manually-operated traffic control device that is used to physically obstruct road users such that they are discouraged from proceeding past a particular point on a roadway or pathway, or such that they are discouraged from entering a particular grade crossing, ramp, lane, roadway, or facility.



80. **Grade Crossing**—the general area where a highway and a railroad and/or light rail transit route cross at the same level, within which are included the tracks, highway, and traffic control devices for traffic traversing that area.
81. **Guide Sign**—a sign that shows route designations, destinations, directions, distances, services, points of interest, or other geographical, recreational, or cultural information.
82. **High-Occupancy Vehicle (HOV)**—a motor vehicle carrying at least two or more persons, including carpools, vanpools, and buses.
83. **Highway**—~~a general term for denoting a public way for purposes of vehicular travel, including the entire area within the right-of-way.~~ "Highway" or "Street" is the entire width between the boundary lines of every way if a part of the way is open to the use of the public for purposes of vehicular travel (ARS §28-101.52).
84. **Highway-Light Rail Transit Grade Crossing**—the general area where a highway and a light rail transit route cross at the same level, within which are included the light rail transit tracks, highway, and traffic control devices for traffic traversing that area.
85. **Highway-Rail Grade Crossing**—the general area where a highway and a railroad cross at the same level, within which are included the railroad tracks, highway, and traffic control devices for highway traffic traversing that area.
86. **Highway Traffic Signal**—a power-operated traffic control device by which traffic is warned or directed to take some specific action. These devices do not include power-operated signs, steadily-illuminated pavement markers, warning lights (see Section 6F.83), or steady burning electric lamps.
87. **HOV Lane**—any preferential lane designated for exclusive use by high-occupancy vehicles for all or part of a day—including a designated lane on a freeway, other highway, street, or independent roadway on a separate right-of-way.
88. **Hybrid Beacon**—a special type of beacon that is intentionally placed in a dark mode (no indications displayed) between periods of operation and, when operated, displays both steady and flashing traffic control signal indications.
89. **Inherently Low Emission Vehicle (ILEV)**—any kind of vehicle that, because of inherent properties of the fuel system design, will not have significant evaporative emissions, even if its evaporative emission control system has failed.
90. **In-Roadway Lights**—a special type of highway traffic signal installed in the roadway surface to warn road users that they are approaching a condition on or adjacent to the roadway that might not be readily apparent and might require the road users to slow down and/or come to a stop.
91. **Interchange**—a system of interconnecting roadways providing for traffic movement between two or more highways that do not intersect at grade.
92. **Interconnection**—when used in Part 8, the electrical connection between the railroad or light rail transit active warning system and the highway traffic signal controller assembly for the purpose of preemption.

93. **Intermediate Interchange**—an interchange with an urban or rural route that is not a major or minor interchange as defined in this Section.
94. **Intersection**—~~intersection is defined as follows:~~ The area embraced within the prolongation or connection of the lateral curb lines, or if none, the lateral boundary lines of the roadways of two highways that join one another at, or approximately at, right angles, or the area within which vehicles traveling on different highways joining at any other angle may come in conflict. If a highway includes two roadways thirty or more feet apart, each crossing of each roadway of the divided highway by an intersecting highway is a separate intersection. If the intersecting highway also includes two roadways thirty or more feet apart, each crossing of two roadways of the highways is a separate intersection (ARS §28-601.8).
- ~~(a) The area embraced within the prolongation or connection of the lateral curb lines, or if none, the lateral boundary lines of the roadways of two highways that join one another at, or approximately at, right angles, or the area within which vehicles traveling on different highways that join at any other angle might come into conflict.~~
- ~~(b) The junction of an alley or driveway with a roadway or highway shall not constitute an intersection, unless the roadway or highway at said junction is controlled by a traffic control device.~~
- ~~(c) If a highway includes two roadways that are 30 feet or more apart (see definition of Median), then every crossing of each roadway of such divided highway by an intersecting highway shall be a separate intersection.~~
- ~~(d) If both intersecting highways include two roadways that are 30 feet or more apart, then every crossing of any two roadways of such highways shall be a separate intersection.~~
- ~~(e) At a location controlled by a traffic control signal, regardless of the distance between the separate intersections as defined in (c) and (d) above:~~
- ~~(1) If a stop line, yield line, or crosswalk has not been designated on the roadway (within the median) between the separate intersections, the two intersections and the roadway (median) between them shall be considered as one intersection;~~
- ~~(2) Where a stop line, yield line, or crosswalk is designated on the roadway on the intersection approach, the area within the crosswalk and/or beyond the designated stop line or yield line shall be part of the intersection; and~~
- ~~(3) Where a crosswalk is designated on a roadway on the departure from the intersection, the intersection shall include the area extending to the far side of such crosswalk.~~
95. **Intersection Control Beacon**—a beacon used only at an intersection to control two or more directions of travel.
96. **Interval**—the part of a signal cycle during which signal indications do not change.
97. **Interval Sequence**—the order of appearance of signal indications during successive intervals of a signal cycle.

98. **Island**—a defined area between traffic lanes for control of vehicular movements, for toll collection, or for pedestrian refuge. It includes all end protection and approach treatments. Within an intersection area, a median or an outer separation is considered to be an island.
99. **Lane Drop**—see **Dropped Lane**.
100. **Lane Line Markings**—white pavement marking lines that delineate the separation of traffic lanes that have the same direction of travel on a roadway.
101. **Lane-Use Control Signal**—a signal face displaying indications to permit or prohibit the use of specific lanes of a roadway or to indicate the impending prohibition of such use.
102. **Legend**—see **Sign Legend**.
103. **Lens**—see **Signal Lens**.
104. **Light Rail Transit Traffic (Light Rail Transit Equipment)**—every device in, upon, or by which any person or property can be transported on light rail transit tracks, including single-unit light rail transit cars (such as streetcars and trolleys) and assemblies of multiple light rail transit cars coupled together.
105. **Locomotive Horn**—an air horn, steam whistle, or similar audible warning device (see 49 CFR Part 229.129) mounted on a locomotive or control cab car. The terms “locomotive horn,” “train whistle,” “locomotive whistle,” and “train horn” are used interchangeably in the railroad industry.
106. **Logo**—a distinctive emblem or trademark that identifies a commercial business and/or the product or service offered by the business.
107. **Longitudinal Markings**—pavement markings that are generally placed parallel and adjacent to the flow of traffic such as lane lines, center lines, edge lines, channelizing lines, and others.
108. **Louver**—see **Signal Louver**.
109. **Major Interchange**—an interchange with another freeway or expressway, or an interchange with a high-volume multi-lane highway, principal urban arterial, or major rural route where the interchanging traffic is heavy or includes many road users unfamiliar with the area.
110. **Major Street**—the street normally carrying the higher volume of vehicular traffic.
111. **Malfunction Management Unit**—same as **Conflict Monitor**.
112. **Managed Lane**—a highway lane or set of lanes, or a highway facility, for which variable operational strategies such as direction of travel, tolling, pricing, and/or vehicle type or occupancy requirements are implemented and managed in real-time in response to changing conditions. Managed lanes are typically buffer- or barrier-separated lanes parallel to the general-purpose lanes of a highway in which access is restricted to designated locations. There are also some highways on which all lanes are managed.
113. **Manual Lane**—see **Attended Lane**.
114. **Maximum Highway Traffic Signal Preemption Time**—the maximum amount of time needed following initiation of the preemption sequence for the highway traffic signals to complete the timing of the right-of-way transfer time, queue clearance time, and separation time.

- 115. Median**—the area between two roadways of a divided highway measured from edge of traveled way to edge of traveled way. The median excludes turn lanes. The median width might be different between intersections, interchanges, and at opposite approaches of the same intersection.
- 116. Minimum Track Clearance Distance**—for standard two-quadrant warning devices, the minimum track clearance distance is the length along a highway at one or more railroad or light rail transit tracks, measured from the highway stop line, warning device, or 12 feet perpendicular to the track center line, to 6 feet beyond the track(s) measured perpendicular to the far rail, along the center line or edge line of the highway, as appropriate, to obtain the longer distance. For Four-Quadrant Gate systems, the minimum track clearance distance is the length along a highway at one or more railroad or light rail transit tracks, measured either from the highway stop line or entrance warning device, to the point where the rear of the vehicle would be clear of the exit gate arm. In cases where the exit gate arm is parallel to the track(s) and is not perpendicular to the highway, the distance is measured either along the center line or edge line of the highway, as appropriate, to obtain the longer distance.
- 117. Minimum Warning Time**—when used in Part 8, the least amount of time active warning devices shall operate prior to the arrival of rail traffic at a grade crossing.
- 118. Minor Interchange**—an interchange where traffic is local and very light, such as interchanges with land service access roads. Where the sum of the exit volumes is estimated to be lower than 100 vehicles per day in the design year, the interchange is classified as local.
- 119. Minor Street**—the street normally carrying the lower volume of vehicular traffic.
- 120. Movable Bridge Resistance Gate**—a type of traffic gate, which is located downstream of the movable bridge warning gate, that provides a physical deterrent to vehicle and/or pedestrian traffic when placed in the appropriate position.
- 121. Movable Bridge Signal**—a highway traffic signal installed at a movable bridge to notify traffic to stop during periods when the roadway is closed to allow the bridge to open.
- 122. Movable Bridge Warning Gate**—a type of traffic gate designed to warn, but not primarily to block, vehicle and/or pedestrian traffic when placed in the appropriate position.
- 123. Multi-Lane**—more than one lane moving in the same direction. A multi-lane street, highway, or roadway has a basic cross-section comprised of two or more through lanes in one or both directions. A multi-lane approach has two or more lanes moving toward the intersection, including turning lanes.
- 124. Neutral Area**—the paved area between the channelizing lines separating an entrance or exit ramp or a channelized turn lane or channelized entering lane from the adjacent through lane(s).
- 125. Object Marker**—a device used to mark obstructions within or adjacent to the roadway.

- 126. Occupancy Requirement**—any restriction that regulates the use of a facility or one or more lanes of a facility for any period of the day based on a specified number of persons in a vehicle.
- 127. Occupant**—a person driving or riding in a car, truck, bus, or other vehicle.
- 128. Open-Road ETC Lane**—a non-attended lane that is designed to allow toll payments to be electronically collected from vehicles traveling at normal highway speeds. Open-Road ETC lanes are typically physically separated from the toll plaza, often following the alignment of the mainline lanes, with toll plaza lanes for cash toll payments being on a different alignment after diverging from the mainline lanes or a subset thereof.
- 129. Open-Road Tolling**—a system designed to allow electronic toll collection (ETC) from vehicles traveling at normal highway speeds. Open-Road Tolling might be used on toll roads or toll facilities in conjunction with toll plazas. Open-Road Tolling is also typically used on managed lanes and on toll facilities that only accept payment by ETC.
- 130. Open-Road Tolling Point**—the location along an Open-Road ETC lane at which roadside or overhead detection and receiving equipment are placed and vehicles are electronically assessed a toll.
- 131. Opposing Traffic**—vehicles that are traveling in the opposite direction. At an intersection, vehicles entering from an approach that is approximately straight ahead would be considered to be opposing traffic, but vehicles entering from approaches on the left or right would not be considered to be opposing traffic.
- 132. Overhead Sign**—a sign that is placed such that a portion or the entirety of the sign or its support is directly above the roadway or shoulder such that vehicles travel below it. Typical installations include signs placed on cantilever arms that extend over the roadway or shoulder, on sign support structures that span the entire width of the pavement, on mast arms or span wires that also support traffic control signals, and on highway bridges that cross over the roadway.
- 133. Parking Area**—a parking lot or parking garage that is separated from a roadway. Parallel or angle parking spaces along a roadway are not considered a parking area.
- 134. Passive Grade Crossing**—a grade crossing where none of the automatic traffic control devices associated with an Active Grade Crossing Warning System are present and at which the traffic control devices consist entirely of signs and/or markings.
- 135. Pathway**—a general term denoting a public way for purposes of travel by authorized users outside the traveled way and physically separated from the roadway by an open space or barrier and either within the highway right-of-way or within an independent alignment. Pathways include shared-use paths, but do not include sidewalks.
- 136. Pathway Grade Crossing**—the general area where a pathway and railroad or light rail transit tracks cross at the same level, within which are included the tracks, pathway, and traffic control devices for pathway traffic traversing that area.

137. Paved—a bituminous surface treatment, mixed bituminous concrete, or Portland cement concrete roadway surface that has both a structural (weight bearing) and a sealing purpose for the roadway.
138. Pedestrian—~~a person on foot, in a wheelchair, on skates, or on a skateboard.~~ Any person afoot. A person who uses an electric personal assistive mobility device or a manual or motorized wheelchair is considered a pedestrian unless the manual wheelchair qualifies as a bicycle. For the purposes of this definition, "motorized wheelchair" means a self propelled wheelchair that is used by a person for mobility (ARS §28-101.41).
139. Pedestrian Change Interval—an interval during which the flashing UPRAISED HAND (symbolizing DONT WALK) signal indication is displayed.
140. Pedestrian Clearance Time—the time provided for a pedestrian crossing in a crosswalk, after leaving the curb or shoulder, to travel to the far side of the traveled way or to a median.
141. Pedestrian Facilities—a general term denoting improvements and provisions made to accommodate or encourage walking.
142. Pedestrian Hybrid Beacon— a special type of hybrid beacon used to warn and control traffic at an unsignalized location to assist pedestrians in crossing a street or highway at a marked crosswalk.
143. Pedestrian Signal Head—a signal head, which contains the symbols WALKING PERSON (symbolizing WALK) and UPRAISED HAND (symbolizing DONT WALK), that is installed to direct pedestrian traffic at a traffic control signal.
144. Permissive Mode—a mode of traffic control signal operation in which left or right turns are permitted to be made after yielding to pedestrians, if any, and/or opposing traffic, if any. When a CIRCULAR GREEN signal indication is displayed, both left and right turns are permitted unless otherwise prohibited by another traffic control device. When a flashing YELLOW ARROW or flashing RED ARROW signal indication is displayed, the turn indicated by the arrow is permitted.
145. Physical Gore—a longitudinal point where a physical barrier or the lack of a paved surface inhibits road users from crossing from a ramp or channelized turn lane or channelized entering lane to the adjacent through lane(s) or vice versa.
146. Pictograph—a pictorial representation used to identify a governmental jurisdiction, an area of jurisdiction, a governmental agency, a military base or branch of service, a governmental-approved university or college, a toll payment system, or a government-approved institution.
147. Plaque—a traffic control device intended to communicate specific information to road users through a word, symbol, or arrow legend that is placed immediately adjacent to a sign to supplement the message on the sign. The difference between a plaque and a sign is that a plaque cannot be used alone. The designation for a plaque includes a “P” suffix.
148. Platoon—a group of vehicles or pedestrians traveling together as a group, either voluntarily or involuntarily, because of traffic signal controls, geometrics, or other factors.

149. **Portable Traffic Control Signal**—a temporary traffic control signal that is designed so that it can be easily transported and reused at different locations.
150. **Post-Mounted Sign**—a sign that is placed to the side of the roadway such that no portion of the sign or its support is directly above the roadway or shoulder.
151. **Posted Speed Limit**—a speed limit determined by law or regulation and displayed on Speed Limit signs.
152. **Preemption**—the transfer of normal operation of a traffic control signal to a special control mode of operation.
153. **Preferential Lane**—a highway lane reserved for the exclusive use of one or more specific types of vehicles or vehicles with at least a specific number of occupants.
154. **Pre-Signal**—traffic control signal faces that control traffic approaching a grade crossing in conjunction with the traffic control signal faces that control traffic approaching a highway-highway intersection beyond the tracks. Supplemental near-side traffic control signal faces for the highway-highway intersection are not considered pre-signals. Pre-signals are typically used where the clear storage distance is insufficient to store one or more design vehicles.
155. **Pretimed Operation**—a type of traffic control signal operation in which none of the signal phases function on the basis of actuation.
156. **Primary Signal Face**—one of the required or recommended minimum number of signal faces for a given approach or separate turning movement, but not including near-side signal faces required as a result of the far-side signal faces exceeding the maximum distance from the stop line.
157. **Principal Legend**—place names, street names, and route numbers placed on guide signs.
158. **Priority Control**—a means by which the assignment of right-of-way is obtained or modified.
159. **Private Road Open to Public Travel**—private toll roads and roads (including any adjacent sidewalks that generally run parallel to the road) within shopping centers, airports, sports arenas, and other similar business and/or recreation facilities that are privately owned, but where the public is allowed to travel without access restrictions. Roads within private gated properties (except for gated toll roads) where access is restricted at all times, parking areas, driving aisles within parking areas, and private grade crossings shall not be included in this definition.
160. **Protected Mode**—a mode of traffic control signal operation in which left or right turns are permitted to be made when a left or right GREEN ARROW signal indication is displayed.
161. **Public Road**—any road, street, or similar facility under the jurisdiction of and maintained by a public agency and open to public travel.
162. **Pushbutton**—a button to activate a device or signal timing for pedestrians, bicyclists, or other road users.
163. **Pushbutton Information Message**—a recorded message that can be actuated by pressing a pushbutton when the walk interval is not timing and that provides the name of the street that the crosswalk associated with that

- particular pushbutton crosses and can also provide other information about the intersection signalization or geometry.
164. **Pushbutton Locator Tone**—a repeating sound that informs approaching pedestrians that a pushbutton exists to actuate pedestrian timing or receive additional information and that enables pedestrians who have visual disabilities to locate the pushbutton.
  165. **Queue Clearance Time**—when used in Part 8, the time required for the design vehicle of maximum length stopped just inside the minimum track clearance distance to start up and move through and clear the entire minimum track clearance distance. If pre-signals are present, this time shall be long enough to allow the vehicle to move through the intersection, or to clear the tracks if there is sufficient clear storage distance. If a Four-Quadrant Gate system is present, this time shall be long enough to permit the exit gate arm to lower after the design vehicle is clear of the minimum track clearance distance.
  166. **Quiet Zone**—a segment of a rail line, with one or a number of consecutive public highway-rail grade crossings at which locomotive horns are not routinely sounded per 49 CFR Part 222.
  167. **Rail Traffic**—every device in, upon, or by which any person or property can be transported on rails or tracks and to which all other traffic must yield the right-of-way by law at grade crossings, including trains, one or more locomotives coupled (with or without cars), other railroad equipment, and light rail transit operating in exclusive or semi-exclusive alignments. Light rail transit operating in a mixed-use alignment, to which other traffic is not required to yield the right-of-way by law, is a vehicle and is not considered to be rail traffic.
  168. **Raised Pavement Marker**—a device mounted on or in a road surface that has a height generally not exceeding approximately 1 inch above the road surface for a permanent marker, or not exceeding approximately 2 inches above the road surface for a temporary flexible marker, and that is intended to be used as a positioning guide and/or to supplement or substitute for pavement markings.
  169. **Ramp Control Signal**—a highway traffic signal installed to control the flow of traffic onto a freeway at an entrance ramp or at a freeway-to-freeway ramp connection.
  170. **Ramp Meter**—see Ramp Control Signal.
  171. **Red Clearance Interval**—an interval that follows a yellow change interval and precedes the next conflicting green interval.
  172. **Regulatory Sign**—a sign that gives notice to road users of traffic laws or regulations.
  173. **Retroreflectivity**—a property of a surface that allows a large portion of the light coming from a point source to be returned directly back to a point near its origin.
  174. **Right-of-Way [Assignment]**—the permitting of vehicles and/or pedestrians to proceed in a lawful manner in preference to other vehicles or pedestrians by the display of a sign or signal indications.



175. **Right-of-Way Transfer Time**—when used in Part 8, the maximum amount of time needed for the worst case condition, prior to display of the track clearance green interval. This includes any railroad or light rail transit or highway traffic signal control equipment time to react to a preemption call, and any traffic control signal green, pedestrian walk and clearance, yellow change, and red clearance intervals for conflicting traffic.
176. **Road**—see Roadway.
177. **Road User**—a vehicle operator, bicyclist, or pedestrian, including persons with disabilities, within the highway or on a private road open to public travel.
178. **Roadway**—~~that portion of a highway improved, designed, or ordinarily used for vehicular travel and parking lanes, but exclusive of the sidewalk, berm, or shoulder even though such sidewalk, berm, or shoulder is used by persons riding bicycles or other human-powered vehicles. In the event a highway includes two or more separate roadways, the term roadway as used in this Manual shall refer to any such roadway separately, but not to all such roadways collectively.~~ That portion of a highway that is improved, designed or ordinarily used for vehicular travel, exclusive of the berm or shoulder. If a highway includes two or more separate roadways, roadway refers to any such roadway separately but not to all such roadways collectively (ARS §28-601.22).
179. **Roadway Network**—a geographical arrangement of intersecting roadways.
180. **Roundabout**—a circular intersection with yield control at entry, which permits a vehicle on the circulatory roadway to proceed, and with deflection of the approaching vehicle counter-clockwise around a central island.
181. **Rumble Strip**—a series of intermittent, narrow, transverse areas of rough-textured, slightly raised, or depressed road surface that extend across the travel lane to alert road users to unusual traffic conditions or are located along the shoulder, along the roadway center line, or within islands formed by pavement markings to alert road users that they are leaving the travel lanes.
182. **Rural Highway**—a type of roadway normally characterized by lower volumes, higher speeds, fewer turning conflicts, and less conflict with pedestrians.
183. **Safe-Positioned**—the positioning of emergency vehicles at an incident in a manner that attempts to protect both the responders performing their duties and road users traveling through the incident scene, while minimizing, to the extent practical, disruption of the adjacent traffic flow.
184. **School**—a public or private educational institution recognized by the State education authority for one or more grades K through 12 or as otherwise defined by the State.
185. **School Zone**—a designated roadway segment approaching, adjacent to, and beyond school buildings or grounds, or along which school related activities occur.
186. **Semi-Actuated Operation**—a type of traffic control signal operation in which at least one, but not all, signal phases function on the basis of actuation.

187. **Separate Turn Signal Face**—a signal face that exclusively controls a turn movement and that displays signal indications that are applicable only to the turn movement.
188. **Separation Time**—the component of maximum highway traffic signal preemption time during which the minimum track clearance distance is clear of vehicular traffic prior to the arrival of rail traffic.
189. **Shared Roadway**—a roadway that is officially designated and marked as a bicycle route, but which is open to motor vehicle travel and upon which no bicycle lane is designated.
190. **Shared Turn Signal Face**—a signal face, for controlling both a turn movement and the adjacent through movement, that always displays the same color of circular signal indication that the adjacent through signal face or faces display.
191. **Shared-Use Path**—a bikeway outside the traveled way and physically separated from motorized vehicular traffic by an open space or barrier and either within the highway right-of-way or within an independent alignment. Shared-use paths are also used by pedestrians (including skaters, users of manual and motorized wheelchairs, and joggers) and other authorized motorized and non-motorized users.
192. **Sidewalk**—~~that portion of a street between the curb line, or the lateral line of a roadway, and the adjacent property line or on easements of private property that is paved or improved and intended for use by pedestrians.~~ That portion of a street that is between the curb lines or the lateral lines of a roadway and the adjacent property lines and that is intended for the use of pedestrians (ARS §28-601.24).
193. **Sign**—any traffic control device that is intended to communicate specific information to road users through a word, symbol, and/or arrow legend. Signs do not include highway traffic signals, pavement markings, delineators, or channelization devices.
194. **Sign Assembly**—a group of signs, located on the same support(s), that supplement one another in conveying information to road users.
195. **Sign Illumination**—either internal or external lighting that shows similar color by day or night. Street or highway lighting shall not be considered as meeting this definition.
196. **Sign Legend**—all word messages, logos, pictographs, and symbol and arrow designs that are intended to convey specific meanings. The border, if any, on a sign is not considered to be a part of the legend.
197. **Sign Panel**—a separate panel or piece of material containing a word, symbol, and/or arrow legend that is affixed to the face of a sign.
198. **Signal Backplate**—a thin strip of material that extends outward from and parallel to a signal face on all sides of a signal housing to provide a background for improved visibility of the signal indications.
199. **Signal Coordination**—the establishment of timed relationships between adjacent traffic control signals.
200. **Signal Face**—an assembly of one or more signal sections that is provided for controlling one or more traffic movements on a single approach.

- 201. Signal Head**—an assembly of one or more signal faces that is provided for controlling traffic movements on one or more approaches.
- 202. Signal Housing**—that part of a signal section that protects the light source and other required components.
- 203. Signal Indication**—the illumination of a signal lens or equivalent device.
- 204. Signal Lens**—that part of the signal section that redirects the light coming directly from the light source and its reflector, if any.
- 205. Signal Louver**—a device that can be mounted inside a signal visor to restrict visibility of a signal indication from the side or to limit the visibility of the signal indication to a certain lane or lanes, or to a certain distance from the stop line.
- 206. Signal Phase**—the right-of-way, yellow change, and red clearance intervals in a cycle that are assigned to an independent traffic movement or combination of movements.
- 207. Signal Section**—the assembly of a signal housing, signal lens, if any, and light source with necessary components to be used for displaying one signal indication.
- 208. Signal System**—two or more traffic control signals operating in signal coordination.
- 209. Signal Timing**—the amount of time allocated for the display of a signal indication.
- 210. Signal Visor**—that part of a signal section that directs the signal indication specifically to approaching traffic and reduces the effect of direct external light entering the signal lens.
- 211. Signing**—individual signs or a group of signs, not necessarily on the same support(s), that supplement one another in conveying information to road users.
- 212. Simultaneous Preemption**—notification of approaching rail traffic is forwarded to the highway traffic signal controller unit or assembly and railroad or light rail transit active warning devices at the same time.
- 213. Special Purpose Road**—a low-volume, low-speed road that serves recreational areas or resource development activities.
- 214. Speed**—speed is defined based on the following classifications:
  - (a) **Average Speed**—the summation of the instantaneous or spot-measured speeds at a specific location of vehicles divided by the number of vehicles observed.
  - (b) **Design Speed**—a selected speed used to determine the various geometric design features of a roadway.
  - (c) **85<sup>th</sup>-Percentile Speed**—the speed at or below which 85 percent of the motor vehicles travel.
  - (d) **Operating Speed**—a speed at which a typical vehicle or the overall traffic operates. Operating speed might be defined with speed values such as the average, pace, or 85<sup>th</sup>-percentile speeds.
  - (e) **Pace**—the 10 mph speed range representing the speeds of the largest percentage of vehicles in the traffic stream.
- 215. Speed Limit**—the maximum (or minimum) speed applicable to a section of highway as established by law or regulation.

216. **Speed Limit Sign Beacon**—a beacon used to supplement a **SPEED LIMIT** sign.
217. **Speed Measurement Markings**—a white transverse pavement marking placed on the roadway to assist the enforcement of speed regulations.
218. **Speed Zone**—a section of highway with a speed limit that is established by law or regulation, but which might be different from a legislatively specified statutory speed limit.
219. **Splitter Island**—a median island used to separate opposing directions of traffic entering and exiting a roundabout.
220. **Station Crossing**—a pathway grade crossing that is associated with a station platform.
221. **Statutory Speed Limit**—a speed limit established by legislative action that typically is applicable for a particular class of highways with specified design, functional, jurisdictional and/or location characteristics and that is not necessarily displayed on Speed Limit signs.
222. **Steady (Steady Mode)**—the continuous display of a signal indication for the duration of an interval, signal phase, or consecutive signal phases.
223. **Stop Beacon**—a beacon used to supplement a **STOP** sign, a **DO NOT ENTER** sign, or a **WRONG WAY** sign.
224. **Stop Line**—a solid white pavement marking line extending across approach lanes to indicate the point at which a stop is intended or required to be made.
225. **Street**—see **Highway**.
226. **Supplemental Signal Face**—a signal face that is not a primary signal face but which is provided for a given approach or separate turning movement to enhance visibility or conspicuity.
227. **Symbol**—the approved design of a pictorial representation of a specific traffic control message for signs, pavement markings, traffic control signals, or other traffic control devices, as shown in the MUTCD.
228. **Temporary Traffic Control Signal**—a traffic control signal that is installed for a limited time period.
229. **Temporary Traffic Control Zone**—an area of a highway where road user conditions are changed because of a work zone or incident by the use of temporary traffic control devices, flaggers, uniformed law enforcement officers, or other authorized personnel.
230. **Theoretical Gore**—a longitudinal point at the upstream end of a neutral area at an exit ramp or channelized turn lane where the channelizing lines that separate the ramp or channelized turn lane from the adjacent through lane(s) begin to diverge, or a longitudinal point at the downstream end of a neutral area at an entrance ramp or channelized entering lane where the channelizing lines that separate the ramp or channelized entering lane from the adjacent through lane(s) intersect each other.
231. **Timed Exit Gate Operating Mode**—a mode of operation where the exit gate descent at a grade crossing is based on a predetermined time interval.
232. **Toll Booth**—a shelter where a toll attendant is stationed to collect tolls or issue toll tickets. A toll booth is located adjacent to a toll lane and is typically set on a toll island.

233. Toll Island—a raised island on which a toll booth or other toll collection and related equipment are located.
234. Toll Lane—an individual lane located within a toll plaza in which a toll payment is collected or, for toll-ticket systems, a toll ticket is issued.
235. Toll Plaza—the location at which tolls are collected consisting of a grouping of toll booths, toll islands, toll lanes, and, typically, a canopy. Toll plazas might be located on highway mainlines or on interchange ramps. A mainline toll plaza is sometimes referred to as a barrier toll plaza because it interrupts the traffic flow.
236. Toll-Ticket System—a system in which the user of a toll road receives a ticket from a machine or toll booth attendant upon entering a toll system. The ticket denotes the user’s point of entry and, upon exiting the toll system, the user surrenders the ticket and is charged a toll based on the distance traveled between the points of entry and exit.
237. Traffic—~~pedestrians, bicyclists, ridden or herded animals, vehicles, streetcars, and other conveyances either singularly or together while using for purposes of travel any highway or private road open to public travel.~~ Pedestrians, ridden or herded animals, vehicles and other conveyances either singly or together while using a highway for purposes of travel (ARS §28-601.28).
238. Traffic Control Device—a sign, signal, marking, or other device used to regulate, warn, or guide traffic, placed on, over, or adjacent to a street, highway, private road open to public travel, pedestrian facility, or shared-use path by authority of a public agency or official having jurisdiction, or, in the case of a private road open to public travel, by authority of the private owner or private official having jurisdiction.
239. Traffic Control Signal (Traffic Signal)—~~any highway traffic signal by which traffic is alternately directed to stop and permitted to proceed.~~ A device, whether manually, electrically or mechanically operated, by which traffic is alternately directed to stop and to proceed (ARS §28-601.29).
240. Train—one or more locomotives coupled, with or without cars, that operates on rails or tracks and to which all other traffic must yield the right-of-way by law at highway-rail grade crossings.
241. Transverse Markings—pavement markings that are generally placed perpendicular and across the flow of traffic such as shoulder markings; word, symbol, and arrow markings; stop lines; crosswalk lines; speed measurement markings; parking space markings; and others.
242. Traveled Way—the portion of the roadway for the movement of vehicles, exclusive of the shoulders, berms, sidewalks, and parking lanes.
243. Turn Bay—a lane for the exclusive use of turning vehicles that is formed on the approach to the location where the turn is to be made. In most cases where turn bays are provided, drivers who desire to turn must move out of a through lane into the newly formed turn bay in order to turn. A through lane that becomes a turn lane is considered to be a dropped lane rather than a turn bay.
244. Upstream—a term that refers to a location that is encountered by traffic prior to a downstream location as it flows in an “upstream to downstream”

- direction. For example, “the upstream end of a lane line separating the turn lane from a through lane on the approach to an intersection” is the end of the line that is furthest from the intersection.
245. **Urban Street**—a type of street normally characterized by relatively low speeds, wide ranges of traffic volumes, narrower lanes, frequent intersections and driveways, significant pedestrian traffic, and more businesses and houses.
246. **Vehicle**—~~every device in, upon, or by which any person or property can be transported or drawn upon a highway, except trains and light rail transit operating in exclusive or semi-exclusive alignments. Light rail transit equipment operating in a mixed-use alignment, to which other traffic is not required to yield the right-of-way by law, is a vehicle.~~ A device in, on or by which a person or property is or may be transported or drawn on a public highway, excluding devices moved by human power or used exclusively on stationary rails or tracks (ARS §28-101.57).
247. **Vibrotactile Pedestrian Device**—an accessible pedestrian signal feature that communicates, by touch, information about pedestrian timing using a vibrating surface.
248. **Visibility-Limited Signal Face or Visibility-Limited Signal Section**—a type of signal face or signal section designed (or shielded, hooded, or louvered) to restrict the visibility of a signal indication from the side, to a certain lane or lanes, or to a certain distance from the stop line.
249. **Walk Interval**—an interval during which the WALKING PERSON (symbolizing WALK) signal indication is displayed.
250. **Warning Beacon**—a beacon used only to supplement an appropriate warning or regulatory sign or marker.
251. **Warning Light**—a portable, powered, yellow, lens-directed, enclosed light that is used in a temporary traffic control zone in either a steady burn or a flashing mode.
252. **Warning Sign**—a sign that gives notice to road users of a situation that might not be readily apparent.
253. **Warrant**—a warrant describes a threshold condition based upon average or normal conditions that, if found to be satisfied as part of an engineering study, shall result in analysis of other traffic conditions or factors to determine whether a traffic control device or other improvement is justified. Warrants are not a substitute for engineering judgment. The fact that a warrant for a particular traffic control device is met is not conclusive justification for the installation of the device.
254. **Wayside Equipment**—the signals, switches, and/or control devices for railroad or light rail transit operations housed within one or more enclosures located along the railroad or light rail transit right-of-way and/or on railroad or light rail transit property.
255. **Wayside Horn System**—a stationary horn (or series of horns) located at a grade crossing that is used in conjunction with train-activated or light rail transit-activated warning systems to provide audible warning of approaching rail traffic to road users on the highway or pathway approaches to a grade

- crossing, either as a supplement or alternative to the sounding of a locomotive horn.**
- 256. Worker**—a person on foot whose duties place him or her within the right-of-way of a street, highway, or pathway, such as street, highway, or pathway construction and maintenance forces, survey crews, utility crews, responders to incidents within the street, highway, or pathway right-of-way, and law enforcement personnel when directing traffic, investigating crashes, and handling lane closures, obstructed roadways, and disasters within the right-of-way of a street, highway, or pathway.
- 257. Wrong-Way Arrow**—a slender, elongated, white pavement marking arrow placed upstream from the ramp terminus to indicate the correct direction of traffic flow. Wrong-way arrows are intended primarily to warn wrong-way road users that they are going in the wrong direction.
- 258. Yellow Change Interval**—the first interval following the green or flashing arrow interval during which the steady yellow signal indication is displayed.
- 259. Yield Line**—a row of solid white isosceles triangles pointing toward approaching vehicles extending across approach lanes to indicate the point at which the yield is intended or required to be made.

## PART 2 - SIGNS

### CHAPTER 2A - GENERAL

#### **Section 2A.06 of the National MUTCD is revised to read:**

##### **Section 2A.06 Design of Signs**

###### **Support:**

- 01 This Manual shows many typical standard signs and object markers approved for use on streets, highways, bikeways, and pedestrian crossings.
- 02 In the specifications for individual signs and object markers, the general appearance of the legend, color, and size are shown in the accompanying tables and illustrations, and are not always detailed in the text.
- 03 Detailed drawings of standard signs, object markers, alphabets, symbols, and arrows (see Figure 2D-2) are shown in the “Standard Highway Signs and Markings” book, Section 1A.11 contains information regarding how to obtain this publication.
- 04 The basic requirements of a sign are that it be legible to those for whom it is intended and that it be understandable in time to permit a proper response. Desirable attributes include:
  - A. High visibility by day and night; and
  - B. High legibility (adequately sized letters, symbols, or arrows, and a short legend for quick comprehension by a road user approaching a sign).
- 05 Standardized colors and shapes are specified so that the several classes of traffic signs can be promptly recognized. Simplicity and uniformity in design, position, and application are important.

###### **Standard:**

- 06 **The term legend shall include all word messages and symbol and arrow designs that are intended to convey specific meanings.**
- 07 **Uniformity in design shall include shape, color, dimensions, legends, borders, and illumination or retroreflectivity.**
- 08 **Standardization of these designs does not preclude further improvement by minor changes in the proportion or orientation of symbols, width of borders, or layout of word messages, but all shapes and colors shall be as indicated.**
- 09 **All symbols shall be unmistakably similar to, or mirror images of, the adopted symbol signs, all of which are shown in the “Standard Highway Signs and Markings” book (see Section 1A.11). Symbols and colors shall not be modified unless otherwise provided in this Manual. All symbols and colors for signs not shown in the “Standard Highway Signs and Markings” book shall follow the procedures for experimentation and change described in Section 1A.10.**

###### **Option:**

- 10 Although the standard design of symbol signs cannot be modified, the orientation of the symbol may be changed to better reflect the direction of travel, if appropriate.

###### **Standard:**



- 11 **Where a standard word message is applicable, the wording shall be as provided in this Manual.**
- 12 **In situations where word messages are required other than those provided in this Manual, the signs shall be of the same shape and color as standard signs of the same functional type.**

Option:

- 13 State and local highway agencies may develop special word message signs in situations where roadway conditions make it necessary to provide road users with additional regulatory, warning, or guidance information, such as when road users need to be notified of special regulations or warned about a situation that might not be readily apparent. Unlike colors that have not been assigned or symbols that have not been approved for signs, new word message signs may be used without the need for experimentation.

**Standard:**

- 14 **Except as provided in Paragraph 16 and except for the Carpool Information (D12-2) sign (see Section 2I.11), Internet addresses and e-mail addresses, including domain names and uniform resource locators (URL), shall not be displayed on any sign, supplemental plaque, sign panel (including logo sign panels on Specific Service signs), or changeable message sign.**

*Guidance:*

- 15 *Unless otherwise provided in this Manual for a specific sign, and except as provided in Paragraph 16, telephone numbers should be displayed in a numeral height large enough for adequate reading time. "Letter" or "mnemonic" type telephone numbers ~~of more than four characters~~ should not be displayed on any sign, supplemental plaque, sign panel (including logo sign panels on Specific Service signs), or changeable message sign.*

Option:

- 16 Internet addresses, e-mail addresses, or telephone numbers with more than four characters may be displayed on signs, supplemental plaques, sign panels, and changeable message signs ~~that are intended for viewing only by pedestrians, bicyclists, occupants of parked vehicles, or drivers of vehicles on low speed roadways~~ where engineering judgment indicates that ~~an area is available for drivers to stop out of the traffic flow to read~~ a driver will be capable of reading the message.

**Standard:**

- 17 **Pictographs (see definition in Section 1A.13) shall not be displayed on signs except as specifically provided in this Manual. Pictographs shall be simple, dignified, and devoid of any advertising. When used to represent a political jurisdiction (such as a State, county, or municipal corporation) the pictograph shall be the official designation adopted by the jurisdiction. When used to represent a college or university, the pictograph shall be the official seal adopted by the institution. Pictorial representations of university or college programs shall not be permitted to be displayed on a sign.**

## Section 2A.11 of the National MUTCD is revised to read:

### Section 2A.11 Dimensions

#### Support:

01 The “Standard Highway Signs and Markings” book (see Section 1A.11) prescribes design details for up to five different sizes depending on the type of traffic facility, including bikeways. Smaller sizes are designed to be used on bikeways and some other off-road applications. Larger sizes are designed for use on freeways and expressways, and can also be used to enhance road user safety and convenience on other facilities, especially on multi-lane divided highways and on undivided highways having five or more lanes of traffic and/or high speeds. The intermediate sizes are designed to be used on other highway types.

#### Standard:

02 **Except as provided in Paragraph 3, the sign dimensions prescribed in the sign size tables in the various Parts and Chapters in this Manual, and in-the “Standard Highway Signs and Markings” book (see Section 1A.11) shall be used unless engineering judgment determines that other sizes are appropriate. Except as provided in Paragraph 3, where engineering judgment determines that sizes smaller than the prescribed dimensions are appropriate for use, the sign dimensions shall not be less than the minimum dimensions specified in this Manual. The sizes shown in the Minimum columns that are smaller than the sizes shown in the Conventional Road columns in the various sign size tables in this Manual shall only be used on low-speed roadways, alleys, and private roads open to public travel where the reduced legend size would be adequate for the regulation or warning or where physical conditions preclude the use of larger sizes.**

#### Option:

03 For alleys locations with restrictive physical conditions and vehicle usage that limits installation of the ~~Minimum size sign (or the Conventional Road size sign if no Minimum size is shown)~~ sign size called for in the various Parts and Chapters in this Manual and in the MOAS, both the sign height and the sign width may be decreased ~~by up to 6 inches~~ based on engineering judgment.

#### Guidance:

04 *The sizes shown in the Freeway and Expressway columns in the various sign size tables in this Manual should be used on freeways and expressways, and for other higher-speed applications based upon engineering judgment, to provide larger signs for increased visibility and recognition.*

05 *The sizes shown in the Oversized columns in the various sign size tables in this Manual size should be used for those special applications where speed, volume, or other factors result in conditions where increased emphasis, improved recognition, or increased legibility is needed, as determined by engineering judgment or study.*

06 *Increases above the prescribed sizes should be used where greater legibility or emphasis is needed. If signs larger than the prescribed sizes are used, the overall sign dimensions should be increased in 6-inch increments.*

**Standard:**

- 07 **Where engineering judgment determines that sizes that are different than the prescribed dimensions are appropriate for use, standard shapes and colors shall be used and standard proportions shall be retained as much as practical.**

*Guidance:*

- 08 *When supplemental plaques are installed with larger sized signs, a corresponding increase in the size of the plaque and its legend should also be made. The resulting plaque size should be approximately in the same relative proportion to the larger sized sign as the conventional sized plaque is to the conventional sized sign.*

## Section 2A.13 of the National MUTCD is revised to read:

### Section 2A.13 Word Messages

#### Standard:

- 01 **Except as provided in Section 2A.06, all word messages shall use standard wording and letters as shown in this Manual and in the “Standard Highway Signs and Markings” book (see Section 1A.11).**

#### Guidance:

- 02 *Word messages should be as brief as **possible practical** and the lettering should be large enough to provide the necessary legibility distance. A minimum specific ratio of 1 inch of letter height per ~~30~~ **40** feet of legibility distance should be used.*
- 03 *Abbreviations (see Section 1A.15) should be kept to a minimum.*
- 04 *Word messages should not contain periods, apostrophes, question marks, ampersands, or other punctuation or characters that are not letters, numerals, or hyphens unless necessary to avoid confusion.*
- 05 *The solidus (slanted line or forward slash) is intended to be used for fractions only and should not be used to separate words on the same line of legend. Instead, a hyphen should be used for this purpose, such as “TRUCKS - BUSES.”*

#### Standard:

- 06 **Fractions shall be displayed with the numerator and denominator diagonally arranged about the solidus (slanted line or forward slash). The overall height of the fraction is measured from the top of the numerator to the bottom of the denominator, each of which is vertically aligned with the upper and lower ends of the solidus. The overall height of the fraction shall be determined by the height of the numerals within the fraction, and shall be 1.5 times the height of an individual numeral within the fraction.**

#### Support:

- 07 The “Standard Highway Signs and Markings” book (see Section 1A.11) contains details regarding the layouts of fractions on signs.

#### Guidance:

- 08 *When initials are used to represent an abbreviation for separate words (such as “U S” for a United States route), the initials should be separated by a space of between 1/2 and 3/4 of the letter height of the initials.*
- 09 *When an Interstate route is displayed in text form instead of using the route shield, a hyphen should be used for clarity, such as “I-50.”*

#### Standard:

- 10 **All sign lettering shall be in upper-case letters as provided in the “Standard Highway Signs and Markings” book (see Section 1A.11), unless otherwise provided in this Manual for a particular sign or type of message.**
- 11 **The sign lettering for names of places, streets, and highways shall be composed of a combination of lower-case letters with initial upper-case letters**

#### Support:

12 Letter height is expressed in terms of the height of an upper-case letter. For mixed-case legends (those composed of an initial upper-case letter followed by lower-case letters), the height of the lower-case letters is derived from the specified height of the initial upper-case letter based on a prescribed ratio. Letter heights for mixed-case legends might be expressed in terms of both the upper- and lower-case letters, or in terms of the initial upper-case letter alone. When the height of a lower-case letter is specified or determined from the prescribed ratio, the reference is to the nominal loop height of the letter. The term loop height refers to the portion of a lower-case letter that excludes any ascending or descending stems or tails of the letter, such as with the letters “d” or “q.” The nominal loop height is equal to the actual height of a non-rounded lower-case letter whose form does not include ascending or descending stems or tails, such as the letter “x.” The rounded portions of a lower-case letter extend slightly above and below the baselines projected from the top and bottom of such a non-rounded letter so that the appearance of a uniform letter height within a word is achieved. The actual loop height of a rounded lower-case letter is slightly greater than the nominal loop height and this additional height is excluded from the expression of the lower-case letter height.

**Standard:**

13 **When a mixed-case legend is used, the height of the lower-case letters shall be 3/4 of the height of the initial upper-case letter.**

14 **The unique letter forms for each of the Standard Alphabet series shall not be stretched, compressed, warped, or otherwise manipulated.**

Support:

15 Section 2D.04 contains information regarding the acceptable methods of modifying the length of a word for a given letter height and series

**Section 2A.18 of the National MUTCD is revised to read:****Section 2A.18 Mounting Height****Standard:**

- 01 **The provisions of this Section shall apply unless specifically stated otherwise for a particular sign or object marker elsewhere in this Manual.**

## Support:

- 02 The mounting height requirements for object markers are provided in Chapter 2C.
- 03 In addition to the provisions of this Section, information affecting the minimum mounting height of signs as a function of crash performance can be found in AASHTO's "Roadside Design Guide" (see Section 1A.11).

**Standard:**

- 04 **The minimum height, measured vertically from the bottom of the sign to the elevation of the near edge of the pavement, of signs installed at the side of the road in rural areas shall be 5 feet (see Figure 2A-2).**
- 05 **The minimum height, measured vertically from the bottom of the sign to the top of the curb, or in the absence of curb, measured vertically from the bottom of the sign to the elevation of the near edge of the traveled way, of signs installed at the side of the road in business, commercial, or residential areas where parking or pedestrian movements are likely to occur, or where the view of the sign might be obstructed, shall be 7 feet (see Figure 2A-2).**

## Option:

- 06 The height to the bottom of a secondary sign mounted below another sign may be 1 foot less than the height specified in Paragraphs 4 and 5.

**Standard:**

- 07 **The minimum height, measured vertically from the bottom of the sign to the sidewalk, of signs installed above sidewalks shall be 7 feet.**
- 08 **If the bottom of a secondary sign that is mounted below another sign is mounted lower than 7 feet above a pedestrian sidewalk or pathway (see Section 6D.02), the secondary sign shall not project more than 4 inches into the pedestrian facility.**

## Option:

- 09 Signs that are placed 30 feet or more from the edge of the traveled way may be installed with a minimum height of 5 feet, measured vertically from the bottom of the sign to the elevation of the near edge of the pavement.

**Standard:**

- 10 **Except as provided in Paragraph 13, directional signs on freeways and expressways shall be installed with a minimum height of 7 feet, measured vertically from the bottom of the sign to the elevation of the near edge of the pavement. All route signs, warning signs, and regulatory signs on freeways and expressways shall be installed with a minimum height of 7 feet, measured vertically from the bottom of the sign to the elevation of the near edge of the pavement. If a secondary sign is mounted below another sign on a freeway or**

**expressway, the major sign shall be installed with a minimum height of 8 feet and the secondary sign shall be installed with a minimum height of 5 feet, measured vertically from the bottom of the sign to the elevation of the near edge of the pavement.**

- 11 **Except as provided in Paragraph 13, where large signs having an area exceeding 50 square feet are installed on multiple breakaway posts, the clearance from the ground to the bottom of the sign shall be at least 7 feet.**

Option:

- 12 A route sign assembly consisting of a route sign and auxiliary signs (see Section 2D.31) may be treated as a single sign for the purposes of this Section.
- 13 The mounting height may be adjusted when supports are located near the edge of the right-of-way on a steep backslope in order to avoid the sometimes less desirable alternative of placing the sign closer to the roadway.

**Standard:**

- 14 **Overhead signs shall provide a vertical clearance of not less than 17 feet to the sign, light fixture, or sign bridge over the entire width of the pavement and shoulders except where the structure on which the overhead signs are to be mounted or other structures along the roadway near the sign structure have a lesser vertical clearance.**

Option:

- 15 If the vertical clearance of other structures along the roadway near the sign structure is less than 16 feet, the vertical clearance to an overhead sign structure or support may be as low as ~~1-foot higher than~~ the vertical clearance of the other structures in order to improve the visibility of the overhead signs.
- 16 In special cases it may be necessary to reduce the clearance to overhead signs because of substandard dimensions in tunnels and other major structures such as double-deck bridges.

Support:

- 17 Figure 2A-2 illustrates some examples of the mounting height requirements contained in this Section.

## CHAPTER 2B - REGULATORY SIGNS, BARRICADES, AND GATES

**Section 2B.03 of the National MUTCD is revised to read:**

### **Section 2B.03 Size of Regulatory Signs**

**Standard:**

01 **Except as provided in Section 2A.11, the sizes for regulatory signs shall be as shown in Table 2B-1.**

**Support:**

02 Section 2A.11 contains information regarding the applicability of the various columns in Table 2B-1.

**Standard:**

03 **Except as provided in Paragraphs 4 and 5, the minimum sizes for regulatory signs facing traffic on multi-lane conventional roads shall be as shown in the Multi-lane column of Table 2B-1.**

**Option:**

04 Where the posted speed limit is 35 mph or less on a multi-lane highway or street, other than for a STOP sign, the minimum size shown in the Single Lane column in Table 2B-1 may be used.

05 Where a regulatory sign, other than a STOP sign, is placed on the left-hand side of a multi-lane roadway in addition to the installation of the same regulatory sign on the right-hand side of the roadway, the size shown in the Single Lane column in Table 2B-1 may be used for both the sign on the right-hand side and the sign on the left-hand side of the roadway.

**Standard:**

06 **A minimum size of 36 x 36 inches shall be used for STOP signs that face multi-lane approaches.**

07 **Where side roads intersect a multi-lane street or highway that has a speed limit of 45 mph or higher, the minimum size of the STOP signs facing the side road approaches, even if the side road only has one approach lane, shall be 36 x 36 inches.**

08 **Where side roads intersect a multi-lane street or highway that has a speed limit of 40 MPH or lower, the minimum size of the STOP signs facing the side road approaches shall be as shown in the Single Lane or Multi-lane columns of Table 2B-1 based on the number of approach lanes on the side street approach.**

**Guidance:**

09 *The minimum sizes for regulatory signs facing traffic on exit and entrance ramps at major interchanges connecting an Expressway or Freeway with an Expressway or Freeway (see Section 2E.32A (a)) should be as shown in the column of Table 2B-1 that corresponds to the mainline roadway classification (Expressway or Freeway). If a*



*minimum size is not provided in the Freeway column, the minimum size in the Expressway column should be used. If a minimum size is not provided in the Freeway or Expressway Column, the size in the Oversized column should be used.*

- 10 *The minimum size for all regulatory signs facing traffic on exit and entrance ramps at interchanges other than with freeways and expressways (see Section 2E.32A (b), B and C) should be the regulatory sign size shown in Table 2B-1 Conventional Road Single Lane column for single lane ramps and Multi-lane column for multi-lane ramps.*

## Section 2B.10 of the National MUTCD is revised to read:

### Section 2B.10 STOP Sign or YIELD Sign Placement

#### Standard:

- 01 **The STOP or YIELD sign shall be installed on the near side of the intersection on the right-hand side of the approach to which it applies. When the STOP or YIELD sign is installed at this required location and the sign visibility is restricted, a Stop Ahead sign (see Section 2C.36) shall be installed in advance of the STOP sign or a Yield Ahead sign (see Section 2C.36) shall be installed in advance of the YIELD sign.**
- 02 **The STOP or YIELD sign shall be located as close as practical to the intersection it regulates, while optimizing its visibility to the road user it is intended to regulate.**
- 03 **Except as provided in paragraph 21, STOP signs and YIELD signs shall not be mounted on the same post.**
- 04 **No items other than inventory stickers, sign installation dates, and bar codes shall be affixed to the fronts of STOP or YIELD signs, and the placement of these items shall be in the border of the sign.**
- 05 **No items other than official traffic control signs, inventory stickers, sign installation dates, anti-vandalism stickers, and bar codes shall be mounted on the backs of STOP or YIELD signs.**
- 06 **No items other than retroreflective strips (see Section 2A.21) or official traffic control signs shall be mounted on the fronts or backs of STOP or YIELD signs supports.**

#### Guidance:

- 07 *STOP or YIELD signs should not be placed farther than 50 feet from the edge of the pavement of the intersected roadway (see Drawing F in Figure 2A-3).*
- 08 *A sign that is mounted back-to-back with a STOP or YIELD sign should stay within the edges of the STOP or YIELD sign. If necessary, the size of the STOP or YIELD sign should be increased so that any other sign installed back-to-back with a STOP or YIELD sign remains within the edges of the STOP or YIELD sign.*

#### Option:

- 09 Where drivers proceeding straight ahead must yield to traffic approaching from the opposite direction, such as at a one-lane bridge, a TO ONCOMING TRAFFIC (R1-2aP) plaque may be mounted below the YIELD sign.

#### Support:

- 10 Figure 2A-3 shows examples of some typical placements of STOP signs and YIELD signs.
- 11 Section 2A.16 contains additional information about separate and combined mounting of other signs with STOP or YIELD signs.

#### Guidance:

- 12 *Stop lines that are used to supplement a STOP sign should be located as described in Section 3B.16. Yield lines that are used to supplement a YIELD sign should be located as described in Section 3B.16.*
- 13 *Where there is a marked crosswalk at the intersection, the STOP sign should be installed in advance of the crosswalk line nearest to the approaching traffic.*
- 14 *Except at roundabouts, where there is a marked crosswalk at the intersection, the YIELD sign should be installed in advance of the crosswalk line nearest to the approaching traffic.*
- 15 *Where two roads intersect at an acute angle, the STOP or YIELD sign should be positioned at an angle, or shielded, so that the legend is out of view of traffic to which it does not apply.*
- 16 *If a raised splitter island is available on the left-hand side of a multi-lane roundabout approach, an additional YIELD sign should be placed on the left-hand side of the approach.*

**Option:**

- 17 If a raised splitter island is available on the left-hand side of a single lane roundabout approach, an additional YIELD sign may be placed on the left-hand side of the approach.
- 18 At wide-throat intersections or where two or more approach lanes of traffic exist on the signed approach, observance of the right-of-way control may be improved by the installation of an additional STOP or YIELD sign on the left-hand side of the road and/or the use of a stop or yield line. At channelized intersections or at divided roadways separated by a median, the additional STOP or YIELD sign may be placed on a channelizing island or in the median. An additional STOP or YIELD sign may also be placed overhead facing the approach at the intersection to improve observance of the right-of-way control.

**Standard:**

- 19 **More than one STOP sign or more than one YIELD sign shall not be placed on the same support facing in the same direction.**

**Option:**

- 20 For a yield-controlled channelized right-turn movement onto a roadway without an acceleration lane and for an entrance ramp onto a freeway or expressway without an acceleration lane, a NO MERGE AREA (W4-5P) supplemental plaque (see Section 2C.40) may be mounted below a Yield Ahead (W3-2) sign and/or below a YIELD (R1-2) sign when engineering judgment indicates that road users would expect an acceleration lane to be present.

**Option:**

- 21 STOP signs and YIELD signs may be placed on the same post if they control separate intersections.

**Support:**

- 22 The placement of the STOP sign will generally be in the vicinity of the point of where the drivers make their first stop and/or where the sign is most visible to approaching traffic.

## Section 2B.12 of the National MUTCD is revised to read:

### **Section 2B.12 In-Street and Overhead Pedestrian Crossing Signs (R1-6, R1-6a, R1-9, R1-9a)**

#### Option:

- 01 The In-Street Pedestrian Crossing (R1-6 or R1-6a) sign (see Figure 2B-2) or the Overhead Pedestrian Crossing (R1-9 or R1-9a) sign (see Figures 2B-2) may be used to remind road users of laws regarding right-of-way at an unsignalized pedestrian crosswalk. The legend STATE LAW may be displayed at the top of the R1-6, R1-6a, R1-9, and R1-9a signs, if applicable. On the R1-6 and R1-6a signs, the legends STOP or YIELD may be used instead of the appropriate STOP sign or YIELD sign symbol.
- 02 Highway agencies may develop and apply criteria for determining the applicability of In-Street Pedestrian Crossing signs.

#### Standard:

- 03 **If used, the In-Street Pedestrian Crossing sign shall be placed in the roadway at the crosswalk location on the center line, on a lane line, or on a median island. The In-Street Pedestrian Crossing sign shall not be post-mounted on the left-hand or right-hand side of the roadway.**
- 04 **If used, the Overhead Pedestrian Crossing sign shall be placed over the roadway at the crosswalk location.**
- 05 **An In-Street or Overhead Pedestrian Crossing sign shall not be placed in advance of the crosswalk to educate road users about the State law prior to reaching the crosswalk, nor shall it be installed as an educational display that is not near any crosswalk.**

#### Guidance:

- 06 *If an island (see Chapter 3I) is available, the In-Street Pedestrian Crossing sign, if used, should be placed on the island.*

#### Option:

- 07 If a Pedestrian Crossing (W11-2) warning sign is used in combination with an In-Street or an Overhead Pedestrian Crossing sign, the W11-2 sign with a diagonal downward pointing arrow (W16-7P) plaque may be post-mounted on the right-hand side of the roadway at the crosswalk location.

#### Standard:

- 08 **The In-Street Pedestrian Crossing sign and the Overhead Pedestrian Crossing sign shall not be used at signalized locations.**
- 09 **The STOP FOR legend shall only be used in States where the State law specifically requires that a driver must stop for a pedestrian in a crosswalk.**
- 10 **The In-Street Pedestrian Crossing sign shall have a black legend (except for the red STOP or YIELD sign symbols) and border on a white background, surrounded by an outer yellow or fluorescent yellow-green background area (see Figures 2B-2). The Overhead Pedestrian Crossing sign shall have a black legend and border on a yellow or fluorescent yellow-green background at the top of the**

**sign and a black legend and border on a white background at the bottom of the sign (see Figures 2B-2).**

- 11 **Unless the In-Street Pedestrian Crossing sign is placed on a physical island, the sign support shall be designed to bend over and then bounce back to its normal vertical position, when struck by a vehicle.**

Support:

- 12 The Provisions of Section 2A.18 concerning mounting height are not applicable for the In-Street Pedestrian Crossing sign.

**Standard:**

- 13 **The top of an In-Street Pedestrian Crossing sign shall be a maximum of 4 feet above the pavement surface. The top of an In-Street Pedestrian Crossing sign placed in an island shall be a maximum of 4 feet above the island surface.**

Option:

- 14 The In-Street Pedestrian Crossing sign may be used seasonally to prevent damage in winter because of plowing operations, and may be removed ~~at night~~ if the pedestrian activity at ~~night~~ specific times is minimal.
- 15 In-Street Pedestrian Crossing signs, Overhead Pedestrian Crossing signs, and Yield Here To (Stop Here For) Pedestrians signs may be used together at the same crosswalk.

## Section 2B.17 of the National MUTCD is revised to read:

### Section 2B.17 Higher Fines Signs and Plaque (R2-6P, R2-10, and R2-11)

#### Standard:

- 01 If increased fines are imposed for traffic violations within a designated zone of a roadway other than a state highway work zone or a school zone, a BEGIN HIGHER FINES ZONE (R2-10) sign (see Figure 2B-3) or a FINES HIGHER (R2-6P) plaque (see Figure 2B-3) shall be used to provide notice to road users. If used, the FINES HIGHER plaque shall be mounted below an applicable regulatory or warning sign in ~~a temporary traffic control zone, a school zone, or other~~ the applicable designated zone. If increased fines are imposed in a state highway work zone as defined in ARS §28-652, the signing shall be as defined in Section 6F.12. If increased fines are imposed in a school crossings with the erection of signs as prescribed by ARS §28-797, the signing shall be as defined in Section 7B.10.
- 02 If an R2-10 sign or an R2-6P plaque is posted to provide notice of increased fines for traffic violations, an END HIGHER FINES ZONE (R2-11) sign (see Figure 2B-3) shall be installed at the downstream end of the zone to provide notice to road users of the termination of the increased fines zone.

#### Guidance:

- 03 *If used, the BEGIN HIGHER FINES ZONE sign or FINES HIGHER plaque should be located at the beginning of the temporary traffic control zone, school zone, or other applicable designated zone and just beyond any interchanges, major intersections, or other major traffic generators.*

#### Standard:

- 04 **The Higher Fines signs and plaque shall have a black legend and border on a white rectangular background. All supplemental plaques mounted below the Higher Fines signs and plaque shall have a black legend and border on a white rectangular background.**

#### Guidance:

- 05 *Agencies should limit the use of the Higher Fines signs and plaque to locations ~~where work is actually underway, or to locations~~ where the roadway, shoulder, or other conditions, ~~including the presence of a school zone and/or a reduced school speed limit zone~~, require a speed reduction or extra caution on the part of the road user.*

#### Option:

- 06 Alternate legends such as BEGIN (or END) DOUBLE FINES ZONE may also be used for the R2-10 and R2-11 signs.
- 07 The legend FINES HIGHER on the R2-6P plaque may be replaced by FINES DOUBLE (R2-6aP), \$XX FINE (R2-6bP), or another legend appropriate to the specific regulation (see Figure 2B-3).
- 08 The following may be mounted below an R2-10 sign or R2-6P plaque:
- A. A supplemental plaque specifying the times that the higher fines are in effect (similar to the S4-1P plaque shown in Figure 7B-1), or

- B. A supplemental plaque **WHEN CHILDREN (WORKERS) ARE PRESENT**, or
- C. A supplemental plaque **WHEN FLASHING** (similar to the S4-4P plaque shown in Figure 7B-1) if used in conjunction with a yellow flashing beacon.

Support:

- 09 Section 6F.12 contains information regarding other signs and plaques associated with increased fines for traffic violations in temporary traffic control zones. Section 7B.10 contains information regarding other signs and plaques associated with increased fines for traffic violations in designated school zones.

**Section 2B.29 of the National MUTCD is revised to read:**

**Section 2B.29 PASS WITH CARE Sign (R4-2)**

*Guidance:*

- 01 ~~The PASS WITH CARE (R4-2) sign (see Figure 2B-10) should be installed at the downstream end of a no-passing zone if a DO NOT PASS sign has been installed at the upstream end of the zone.~~

Option:

- 02 The PASS WITH CARE (R4-2) sign (see Figure 2B-10) may be installed at the downstream end of a no-passing zone.



## Section 2B.39 of the National MUTCD is revised to read:

### Section 2B.39 Selective Exclusion Signs

Support:

- 01 Selective Exclusion signs (see Figure 2B-11) give notice to road users that State or local statutes or ordinances exclude designated types of traffic from using particular roadways or facilities.

**Standard:**

- 02 **If used, Selective Exclusion signs shall clearly indicate the type of traffic that is excluded.**

Support:

- 03 Typical exclusion messages include:
- A. NO MOTOR VEHICLES (R5-3),
  - B. NO COMMERCIAL VEHICLES (R5-4),
  - C. NO TRUCKS (VEHICLES) WITH LUGS (R5-5),
  - D. No Bicycles (R5-6),
  - E. NO NON-MOTORIZED TRAFFIC (R5-7),
  - F. NO MOTOR-DRIVEN CYCLES (R5-8),
  - G. No Pedestrians (R9-3),
  - H. No Skaters (R9-13),
  - I. No Equestrians (R9-14), and
  - J. No Hazardous Material (R14-3) (see Section 2B.62),

Option:

- 04 Appropriate combinations or groupings of these legends into a single sign, such as NO PEDESTRIANS BICYCLES MOTOR-DRIVEN CYCLES (R5-10a), or NO PEDESTRIANS OR BICYCLES (R5-10b) may be used.

*Guidance:*

- 05 *If an exclusion is governed by vehicle weight, a Weight Limit sign (see Section 2B.59) should be used instead of a Selective Exclusion sign.*
- 06 *If used on a ~~freeway or expressway~~ ramp to a freeway or expressway where pedestrian or bicycle travel is prohibited by law or regulation, the NO PEDESTRIANS OR BICYCLES (R5-10b) sign should be installed in a location where it is clearly visible to any pedestrian or bicyclist attempting to enter the limited access facility from a street intersecting the ~~exit~~ ramp. In locations where a freeway or expressway is accessed from a ramp from a roadway parallel to the freeway or expressway, the sign should be placed in a location that clearly indicates the prohibition applies only to the freeway or expressway or to the ramp.*
- 07 *The Selective Exclusion sign should be placed on the right-hand side of the roadway at an appropriate distance from the intersection so as to be clearly visible to all road users turning into the roadway that has the exclusion. The NO PEDESTRIANS (R5-10c) or No Pedestrian Crossing (R9-3) sign (see Section 2B.51) should be installed so as to be clearly visible to pedestrians who are at a location where an alternative route is available.*

Option:

- 08 The NO PEDESTRIANS (R5-10c) or No Pedestrian Crossing (R9-3) sign may also be used at underpasses or elsewhere where pedestrian facilities are not provided.
- 09 The NO TRUCKS (R5-2a) word message sign may be used as an alternate to the No Trucks (R5-2) symbol sign.
- 10 The AUTHORIZED VEHICLES ONLY (R5-11) sign may be used at median openings and other locations to prohibit vehicles from using the median opening or facility unless they have special permission (such as law enforcement vehicles or emergency vehicles) or are performing official business (such as highway agency vehicles).

**Section 2B.55 of the National MUTCD is revised to read:****Section 2B.55 Photo Enforced Signs and Plaques (R10-18, R10-19P, R10-19aP)**

Option:

- 01 A TRAFFIC LAWS PHOTO ENFORCED (R10-18) sign (see Figure 2B-3) may be installed at a jurisdictional boundary to advise road users that some of the traffic regulations within that jurisdiction are being enforced by photographic equipment.
- 02 A Photo Enforced (R10-19P) plaque or a PHOTO ENFORCED (R10-19aP) word message plaque (see Figure 2B-3) may be mounted below a regulatory sign to advise road users that the regulation is being enforced by photographic equipment.

**Standard:**

- 03 **If used below a regulatory sign, the Photo Enforced (R10-19P or R10-19aP) plaque shall be a rectangle with a black legend and border on a white background.**
- 04 Except as provided in paragraph 7, every local authority or agency within Arizona using a photo enforcement system shall adopt standards and specifications that indicate to a person operating a motor vehicle that a photo enforcement system is present and operational per ARS §28-1204. The standards and specifications shall include all of the following:
- A. At least two signs shall be placed in a location before a photo enforcement system. One sign shall be in a location that is approximately three hundred feet before the photo enforcement system. Placement of additional signs shall be more than three hundred feet before a photo enforcement system to provide reasonable notice to a person that a photo enforcement system is present and operational.
  - B. A sign that clearly states the posted speed limit shall be placed between the two signs prescribed by the above subsection (A).
  - C. Signs indicating a photo enforcement system shall be removed or covered when the photo enforcement system is no longer present or not operating.
- 05 Signs erected by a local authority or agency of this state as prescribed in this section shall contain a yellow warning notice and correlate with and as far as possible conform to the MUTCD.
- 06 During the time a vehicle containing photo enforcement equipment is being used to identify violators of articles 3 and 6 of Title 28, Chapter 3 of the Arizona Revised Statutes, the rear of the vehicle shall be clearly marked to indicate that the vehicle is functioning as a photo enforcement vehicle. This paragraph does not apply to a vehicle that does not contain a photo enforcement system and that is used by a law enforcement officer.
- 07 Paragraph 4 does not apply to a mobile photo enforcement vehicle during the time a mobile photo enforcement vehicle is deployed on streets with a posted speed limit of forty miles per hour or less.

## CHAPTER 2C - WARNING SIGNS AND OBJECT MARKERS

### Section 2C.04 of the National MUTCD is revised to read:

#### Section 2C.04 Size of Warning Signs

##### Standard:

- 01 **Except as provided in Section 2A.11, the sizes for warning signs shall be as shown in Table 2C-2.**

##### Support:

- 02 Section 2A.11 contains information regarding the applicability of the various columns in Table 2C-2.

##### Standard:

- 03 **Except as provided in Paragraph 5, the minimum size for all diamond-shaped warning signs facing traffic on a multi-lane conventional road where the posted speed limit is higher than 35 mph shall be 36 x 36 inches.**
- 04 **The minimum size for supplemental warning plaques that are not included in Table 2C-2 shall be as shown in Table 2C-3.**

##### Option:

- 05 If a diamond-shaped warning sign is placed on the left-hand side of a multi-lane roadway to supplement the installation of the same warning sign on the right-hand side of the roadway, the minimum size identified in the Single Lane column in Table 2C-2 may be used.
- 06 Signs and plaques larger than those shown in Tables 2C-2 and 2C-3 may be used (see Section 2A.11).

##### Guidance:

- 07 *The minimum size for all diamond-shaped warning signs facing traffic on exit and entrance ramps at major interchanges connecting an Expressway or Freeway with an Expressway or Freeway (see Section 2E.32(a)) should be the size identified in Table 2C-2 for the mainline roadway classification (Expressway or Freeway). If a minimum size is not provided in the Freeway Column, the Expressway size should be used. If a minimum size is not provided in the Freeway or the Expressway Column, the Oversized size should be used.*
- 08 *The minimum size for all warning signs facing traffic on exit and entrance ramps at interchanges other than with freeways and expressways (see Section 2E.32A (b), B and C) should be the sign size shown in Table 2C-2 Conventional Road Single Lane column for single lane ramps and Multi-lane column for multi-lane ramps.*

**Table 2C-4 of the National MUTCD is revised to read:**

**Table 2C-4. Guidelines for Advance Placement of Warning Signs**

Posted or 85th-Percentile Speed	Advance Placement Distance <sup>1</sup>								
	Condition A: Speed reduction and lane changing in heavy traffic <sup>2</sup>	Condition B: Deceleration to the listed advisory speed (mph) for the condition							
		0 <sup>3</sup>	10 <sup>4</sup>	20 <sup>4</sup>	30 <sup>4</sup>	40 <sup>4</sup>	50 <sup>4</sup>	60 <sup>4</sup>	70 <sup>4</sup>
20 mph	<del>225 ft</del> 175 ft	100 ft <sup>6</sup>	N/A <sup>5</sup>	—	—	—	—	—	—
25 mph	<del>325 ft</del> 250 ft	100 ft <sup>6</sup>	N/A <sup>5</sup>	N/A <sup>5</sup>	—	—	—	—	—
30 mph	<del>460 ft</del> 325 ft	100 ft <sup>6</sup>	N/A <sup>5</sup>	N/A <sup>5</sup>	—	—	—	—	—
35 mph	<del>565 ft</del> 400 ft	100 ft <sup>6</sup>	N/A <sup>5</sup>	N/A <sup>5</sup>	N/A <sup>5</sup>	—	—	—	—
40 mph	<del>670 ft</del> 475 ft	125 ft	100 ft <sup>6</sup>	100 ft <sup>6</sup>	N/A <sup>5</sup>	—	—	—	—
45 mph	<del>775 ft</del> 550 ft	175 ft	125 ft	100 ft <sup>6</sup>	100 ft <sup>6</sup>	N/A <sup>5</sup>	—	—	—
50 mph	<del>885 ft</del> 625 ft	250 ft	200 ft	175 ft	125 ft	100 ft <sup>6</sup>	—	—	—
55 mph	<del>990 ft</del> 700 ft	325 ft	275 ft	225 ft	200 ft	125 ft	N/A <sup>5</sup>	—	—
60 mph	<del>1,100 ft</del> 775 ft	400 ft	350 ft	325 ft	275 ft	200 ft	100 ft <sup>6</sup>	—	—
65 mph	<del>1,200 ft</del> 850 ft	475 ft	450 ft	400 ft	350 ft	275 ft	200 ft	100 ft <sup>6</sup>	—
70 mph	<del>1,250 ft</del> 925 ft	550 ft	525 ft	500 ft	450 ft	375 ft	275 ft	150 ft	—
75 mph	<del>1,350 ft</del> 1,000 ft	650 ft	625 ft	600 ft	550 ft	475 ft	375 ft	250 ft	100 ft <sup>6</sup>

~~The distances are adjusted for a sign legibility distance of 180 feet for Condition A.~~ The distances for Condition B have been adjusted for a sign legibility distance of 250 feet, which is appropriate for an alignment warning symbol sign. For Conditions A and B, warning signs with less than 6-inch legend or more than four words, a minimum of 100 feet should be added to the advance placement distance to provide adequate legibility of the warning sign.

<sup>2</sup> Typical conditions are locations where the road user must use extra time to adjust speed and change lanes in heavy traffic because of a complex driving situation. Typical signs are Merge and Right Lane Ends. The distances are determined by providing the driver a PRT of ~~14.0 to 14.5~~ 6.7 to 10.0 seconds plus 4.5 seconds for vehicle maneuvers (2000 Manual on Uniform Traffic Control Devices) (2004-AASHTO Policy, Exhibit 3-3, Decision Sight Distance, Avoidance Maneuver E) minus the legibility distance of 180 feet for the appropriate sign.

<sup>3</sup> Typical condition is the warning of a potential stop situation. Typical signs are Stop Ahead, Yield Ahead, Signal Ahead, and Intersection Warning signs. The distances are based on the 2004 AASHTO Policy,

Exhibit 3-1, Stopping Sight Distance, providing a PRT of 2.5 seconds, a deceleration rate of 11.2 feet/second<sup>2</sup>, minus the sign legibility distance of 180 feet.

<sup>4</sup> Typical conditions are locations where the road user must decrease speed to maneuver through the warned condition. Typical signs are Turn, Curve, Reverse Turn, or Reverse Curve. The distance is determined by providing a 2.5 second PRT, a vehicle deceleration rate of 10 feet/second<sup>2</sup>, minus the sign legibility distance of 250 feet.

<sup>5</sup> No suggested distances are provided for these speeds, as the placement location is dependent on site conditions and other signing. An alignment warning sign may be placed anywhere from the point of curvature up to 100 feet in advance of the curve. However, the alignment warning sign should be installed in advance of the curve and at least 100 feet from any other signs.

<sup>6</sup> The minimum advance placement distance is listed as 100 feet to provide adequate spacing between signs.

**Section 2C.26 of the National MUTCD is revised to read:****Section 2C.26 DEAD END/NO OUTLET Signs (W14-1, W14-1a, W14-2, W14-2a)**

Option:

- 01 The DEAD END (W14-1) sign (see Figure 2C-5) may be used at the entrance of a single road or street that terminates in a dead end or cul-de-sac. The NO OUTLET (W14-2) sign (see Figure 2C-5) may be used at the entrance to a road or road network from which there is no other exit.
- 02 DEAD END (W14-1a) or NO OUTLET (W14-2a) signs (see Figure 2C-5) may be used in combination with Street Name (D3-1) signs (see Section 2D.43) to warn turning traffic that the cross street ends in the direction indicated by the arrow. On low-speed residential streets, the W-14-1a (DEAD END) signs or the W-14-2a (NO OUTLET) signs may be substituted for the W14-1 or W14-2 signs based on engineering judgment.
- 03 At locations where the cross street does not have a name, the W14-1a or W14-2a signs may be used alone in place of a street name sign.

**Standard:**

- 04 **The DEAD END (W14-1a) and NO OUTLET (W14-2a) signs shall be horizontal rectangles with an arrow pointing to the left or right.**
- 05 **When the W14-1 or W14-2 sign is used, the sign shall be posted as near as practical to the entry point or at a sufficient advance distance to permit the road user to avoid the dead end or no outlet condition by turning at the nearest intersecting street.**
- 06 **The DEAD END (W14-1a) or NO OUTLET (W14-2a) signs shall not be used instead of the W14-1 or W14-2 signs where traffic can proceed straight through the intersection into the dead end street or no outlet area.**

**Section 2C.38 of the National MUTCD is revised to read:****Section 2C.38 ~~Reduced Speed Limit Ahead~~ Speed Reduction Signs (W3-5, W3-5a, W3-5aAZ)***Guidance:*

- 01 A ~~Reduced Speed Limit Ahead~~Speed Reduction (W3-5, ~~or~~ W3-5a, or W3-5aAZ) sign (see Figure 2C-7) should be used to inform road users of a reduced speed zone where the speed limit is being reduced by more than 10 mph, or where engineering judgment indicates the need for advance notice to comply with the posted speed limit ahead.

**Standard:**

- 02 If used, ~~Reduced Speed Limit Ahead~~ Speed Reduction signs shall be followed by a Speed Limit (R2-1) sign installed at the beginning of the zone where the speed limit applies.
- 03 The speed limit displayed on the ~~Reduced Speed Limit Ahead~~ Speed Reduction sign shall be identical to the speed limit displayed on the subsequent Speed Limit sign.

-



## CHAPTER 2D - GUIDE SIGNS - CONVENTIONAL ROADS

### Section 2D.30 of the National MUTCD is revised to read:

#### Section 2D.30 Junction Assembly

##### Standard:

- 01 A Junction assembly shall consist of a Junction auxiliary sign and a route sign. The route sign shall carry the number of the intersected or joined route.
- 02 The Junction assembly shall be installed in advance of every intersection where a numbered route is intersected or joined by another numbered route.

##### Guidance:

- 03 *In urban areas, the Junction assembly should be installed in the block preceding the intersection. In urban areas where speeds are low, the Junction assembly should not be installed more than 300 feet in advance of the intersection or at the distance shown on the auxiliary sign or assembly.*
- 04 *In rural areas, the Junction assembly should be installed at least 400 feet in advance of the intersection. In rural areas, the minimum distance between a Junction assembly and either a Destination sign or an Advance Route Turn assembly should be 200 feet or at the distance shown on the auxiliary sign or assembly.*
- 05 *Where speeds are high, greater spacings should be used.*

##### Option:

- 06 Where two or more routes are to be indicated, a single Junction auxiliary sign may be used for the assembly and all route signs grouped in a single mounting, or a Combination Junction (M2-2) sign (see Section 2D.14) may be used.

**Section 2D.53 of the National MUTCD is revised to read:****Section 2D.53 Signing of Named Highways**

Option:

- 01 Guide signs may contain street or highway names if the purpose is to enhance driver communication and guidance; however, they are to be considered as supplemental information to route numbers.

**Standard:**

- 02 **Highway names shall not replace official numeral designations.**
- 03 **Memorial names (see Section 2M.10) shall not appear on supplemental signs or on any other information sign on or along the highway or its intersecting routes, unless explicitly specified by a law, resolution, or ordinance approved by the elected governing body having authority over that roadway.**
- 04 **The use of route signs shall be restricted to signs officially used for guidance of traffic in accordance with this Manual and the “Purpose and Policy” statement of the American Association of State Highway and Transportation Officials that applies to Interstate and U.S. numbered routes (see Page i for AASHTO’s address).**

Option:

- 05 Unnumbered routes having major importance to proper guidance of traffic may be signed if carried out in accordance with the aforementioned policies. For unnumbered highways, a name to enhance route guidance may be used where the name is applied consistently throughout its length.

*Guidance:*

- 06 *Only one name should be used to identify any highway, whether numbered or unnumbered.*

## CHAPTER 2M - RECREATIONAL AND CULTURAL INTEREST AREA SIGNS

### Section 2M.10 of the National MUTCD is revised to read:

#### Section 2M.10 Memorial or Dedication Signing

##### Support:

- 01 Legislative bodies will occasionally adopt an act or resolution memorializing or dedicating a highway, bridge, or other component of the highway.

##### *Guidance:*

- 02 *Such memorial or dedication names should not appear on or along a highway, or be placed on bridges or other highway components. If a route, bridge, or highway component is officially designated as a memorial or dedication, and if notification of the memorial or dedication is to be made on the highway right-of-way, such notification should consist of installing a memorial or dedication marker in a rest area, scenic overlook, recreational area, or other appropriate location where parking is provided with the signing inconspicuously located relative to vehicle operations along the highway.*

##### Option:

- 03 If the installation of a memorial or dedication marker off the main roadway is not practical, memorial or dedication signs may be installed on the mainline.

##### *Guidance:*

- 04 *Memorial or dedication signs should have a white legend and border on a brown background.*

##### **Standard:**

- 05 **Where such memorial or dedication signs are installed on the mainline, (1) memorial or dedication names shall not appear on directional guide signs, (2) memorial or dedication signs shall not interfere with the placement of any other necessary signing, and (3) memorial or dedication signs shall not compromise the safety or efficiency of traffic flow. The memorial or dedication signing shall be limited to one sign at an appropriate location in each route direction, each as an independent sign installation.**
- 06 **Memorial or dedication signs shall be rectangular in shape. The legend displayed on memorial or dedication signs shall be limited to the name of the person or entity being recognized and a simple message preceding or following the name, such as “DEDICATED TO” or “Memorial Parkway.” Additional legend, such as biographical information, shall not be displayed on memorial or dedication signs. Decorative or graphical elements, pictographs, logos, or symbols shall not be displayed on memorial or dedication signs unless explicitly specified by a law, resolution, or ordinance approved by the elected governing body having authority over that roadway.**

07 **All letters and numerals displayed on memorial or dedication signs shall be as provided in the “Standard Highway Signs and Markings” book (see Section 1A.11). The route number or officially mapped name of the highway shall not be displayed on the memorial or dedication sign.**

08 **Memorial or dedication names shall not appear on supplemental signs or on any other information sign on or along the highway or its intersecting routes.**

Option:

09 The lettering for the name of the person or entity being recognized may be composed of a combination of lower-case letters with initial upper-case letters.

*Guidance:*

10 *Freeways and expressways should not be signed as memorial or dedicated highways.*

Support:

11 Named highways are officially designated and shown on official maps and serve the purpose of providing route guidance, primarily on unnumbered highways. A highway designated as a memorial or dedication is not considered to be a named highway. Section 2D.53 contains provisions for the signing of named highways.

## PART 3 - MARKINGS

### CHAPTER 3B - PAVEMENT AND CURB MARKINGS

#### Section 3B.09 of the National MUTCD is revised to read:

##### Section 3B.09 Lane-Reduction Transition Markings

###### Support:

- 01 Lane-reduction transition markings are used where the number of through lanes is reduced because of narrowing of the roadway or because of a section of on-street parking in what would otherwise be a through lane. Lane-reduction transition markings are not used for lane drops.

###### Standard:

- 02 **Except as provided in Paragraph 3, where pavement markings are used, lane-reduction transition markings shall be used to guide traffic through transition areas where the number of through lanes is reduced, as shown in Figure 3B-14. On two-way roadways, no-passing zone markings shall be used to prohibit passing in the direction of the convergence, and shall continue through the transition area.**

###### Option:

- 03 On **low-speed** urban roadways where curbs clearly define the roadway edge in the lane-reduction transition, or where a through lane becomes a parking lane, the edge line and/or delineators shown in Figure 3B-14 may be omitted as determined by engineering judgment.

###### Guidance:

- 04 *For roadways having a posted or statutory speed limit of 45 mph or greater, the transition taper length for a lane-reduction transition should be computed by the formula  $L = WS$ . For roadways where the posted or statutory speed limit is less than 45 mph, the formula  $L = WS^2/60$  should be used to compute the taper length.*

###### Support:

- 05 Under both formulas, L equals the taper length in feet, W equals the width of the offset distance in feet, and S equals the 85<sup>th</sup>-percentile speed or the posted or statutory speed limit, whichever is higher.

###### Guidance:

- 06 *Where observed speeds exceed posted or statutory speed limits, longer tapers should be used.*

###### Option:

- 07 On new construction, where no posted or statutory speed limit has been established, the design speed may be used in the transition taper length formula.

###### Guidance:

- 08 *Lane line markings should be discontinued one-quarter of the distance between the Lane Ends sign (see Section 2C.42) and the point where the transition taper begins.*

09 *Except as provided in Paragraph 3 for ~~low-speed~~ urban roadways, the edge line markings shown in Figure 3B-14 should be installed from the location of the Lane Ends warning sign to beyond the beginning of the narrower roadway.*

Support:

10 Pavement markings at lane-reduction transitions supplement the standard signs. See Section 3B.20 for provisions regarding use of lane-reduction arrows.

**Section 3B.25 of the National MUTCD is revised to read:****Section 3B.25 Speed Hump Markings****Standard:**

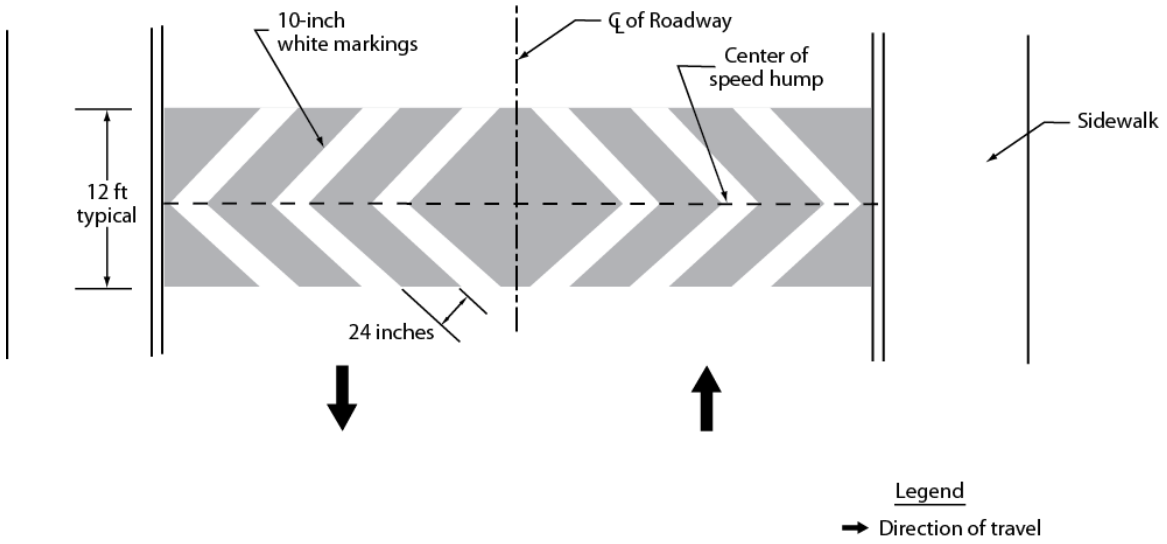
01 **If speed hump markings are used, they shall be a series of white markings placed on a speed hump to identify its location. If markings are used for a speed hump that does not also function as a crosswalk or speed table, the markings shall comply with Option A, B, or C shown in Figure 3B-29. If markings are used for a speed hump that also functions as a crosswalk or speed table, the markings shall comply with Option A or B shown in Figure 3B-30, except as noted in Paragraph 2.**

**Option:**

02 Chevron markings placed perpendicular to the traveled roadway (i.e. sideways chevron markings) on the speed hump (see Figure 3B-29AZ) may be used to identify its location.

Figure 3B-29AZ is appended to Figure 3B-29 of the National MUTCD:

**Figure 3B-29AZ. Pavement Markings for Speed Humps Without Crosswalks (Arizona)**





## PART 4 HIGHWAY TRAFFIC SIGNALS

### CHAPTER 4B - TRAFFIC CONTROL SIGNALS - GENERAL

#### **Section 4B.03 of the National MUTCD is revised to read:**

##### **Section 4B.03 Advantages and Disadvantages of Traffic Control Signals**

Support:

- 01 When properly used, traffic control signals are valuable devices for the control of vehicular and pedestrian traffic. They assign the right-of-way to the various traffic movements and thereby profoundly influence traffic flow.
- 02 Traffic control signals that are properly designed, located, operated, and maintained will have one or more of the following advantages:
- A. They provide for the orderly movement of traffic.
  - B. They increase the traffic-handling capacity of the intersection if:
    - 1. Proper physical layouts and control measures are used, and
    - 2. The signal operational parameters are reviewed and updated (if needed) on a regular basis (as engineering judgment determines that significant traffic flow and/or land use changes have occurred) to maximize the ability of the traffic control signal to satisfy current traffic demands.
  - C. They reduce the frequency and severity of certain types of crashes, especially right-angle collisions.
  - D. They are coordinated to provide for continuous or nearly continuous movement of traffic at a definite speed along a given route under favorable conditions.
  - E. They are used to interrupt heavy traffic at intervals to permit other traffic, vehicular or pedestrian, to cross.
- 03 Traffic control signals are often considered a panacea for all traffic problems at intersections. This belief has led to traffic control signals being installed at many locations where they are not needed, adversely affecting the safety and efficiency of vehicular, bicycle, and pedestrian traffic.
- 04 Traffic control signals, even when justified by traffic and roadway conditions, can be ill-designed, ineffectively placed, improperly operated, or poorly maintained. Improper or unjustified traffic control signals can result in one or more of the following disadvantages:
- A. Excessive delay,
  - B. Excessive disobedience of the signal indications,
  - C. Increased use of less adequate routes as road users attempt to avoid the traffic control signals, and

D. Significant increases in the frequency of collisions (especially rear-end collisions).

05 Traffic control devices, including signals, offer potential advantages and disadvantages. Engineering judgment as defined in Section 1A.09 is needed to weigh the advantages and disadvantages, and compare to existing conditions to determine if changes are appropriate.

## CHAPTER 4F. PEDESTRIAN HYBRID BEACONS

### Section 4F.01 of the National MUTCD is revised to read:

#### Section 4F.01 Application of Pedestrian Hybrid Beacons

##### Support:

- 01 A pedestrian hybrid beacon is a special type of hybrid beacon used to warn and control traffic at an unsignalized location to assist pedestrians in crossing a street or highway at a marked crosswalk.

##### Option:

- 02 A pedestrian hybrid beacon may be considered for installation to facilitate pedestrian crossings at a location that does not meet traffic signal warrants (see Chapter 4C), or at a location that meets traffic signal warrants under Sections 4C.05 and/or 4C.06 but a decision is made to not install a traffic control signal. [Agencies may develop warrants or guidelines for the installation of Pedestrian Hybrid Beacons on roadways under their jurisdiction.](#)

##### Standard:

- 03 **If used, pedestrian hybrid beacons shall be used in conjunction with signs and pavement markings to warn and control traffic at locations where pedestrians enter or cross a street or highway. A pedestrian hybrid beacon shall only be installed at a marked crosswalk.**

##### Guidance:

- 04 *If one of the signal warrants of Chapter 4C is met and a traffic control signal is justified by an engineering study, and if a decision is made to install a traffic control signal, it should be installed based upon the provisions of Chapters 4D and 4E.*
- 05 *If a traffic control signal is not justified under the signal warrants of Chapter 4C and if gaps in traffic are not adequate to permit pedestrians to cross, or if the speed for vehicles approaching on the major street is too high to permit pedestrians to cross, or if pedestrian delay is excessive, the need for a pedestrian hybrid beacon should be considered on the basis of an engineering study that considers [one or more of the following](#): major-street volumes, speeds, widths, and gaps in conjunction with pedestrian volumes, walking speeds, and delay. [The engineering study should be based on guidelines established by the agency for installation of pedestrian hybrid beacon.](#)*
- 06 *For a major street where the posted or statutory speed limit or the 85<sup>th</sup>-percentile-speed is 35 mph or less, the need for a pedestrian hybrid beacon should be considered if the engineering study finds that the plotted point representing the vehicles per hour on the major street (total of both approaches) and the corresponding total of all pedestrians crossing the major street for 1 hour (any four consecutive 15-minute periods) of an average day falls above the applicable curve in Figure 4F-1 for the length of the crosswalk.*
- 07 *For a major street where the posted or statutory speed limit or the 85<sup>th</sup>-percentile speed exceeds 35 mph, the need for a pedestrian hybrid beacon should be considered if the engineering study finds that the plotted point representing the vehicles per hour on*

*the major street (total of both approaches) and the corresponding total of all pedestrians crossing the major street for 1 hour (any four consecutive 15-minute periods) of an average day falls above the applicable curve in Figure 4F-2 for the length of the crosswalk.*

- 08 *For crosswalks that have lengths other than the four that are specifically shown in Figures 4F-1 and 4F-2, the values should be interpolated between the curves.*

## Section 4F.02 of the National MUTCD is revised to read:

### Section 4F.02 Design of Pedestrian Hybrid Beacons

#### Standard:

- 01 Except as otherwise provided in this Section, a pedestrian hybrid beacon shall meet the provisions of Chapters 4D and 4E.
- 02 A pedestrian hybrid beacon face shall consist of three signal sections, with a CIRCULAR YELLOW signal indication centered below two horizontally aligned CIRCULAR RED signal indications (see Figure 4F-3).
- 03 When an engineering study finds that installation of a pedestrian hybrid beacon is justified, then:
- A. At least two pedestrian hybrid beacon faces shall be installed for each approach of the major street,
  - B. A stop line shall be installed for each approach to the crosswalk,
  - C. A pedestrian signal head conforming to the provisions set forth in Chapter 4E shall be installed at each end of the marked crosswalk, and
  - D. The pedestrian hybrid beacon shall be pedestrian actuated.

#### Guidance:

- 04 When an engineering study finds that installation of a pedestrian hybrid beacon is justified, then:
- ~~A. The pedestrian hybrid beacon should be installed at least 100 feet from side streets or driveways that are controlled by STOP or YIELD signs,~~
  - ~~A.B.~~ Parking and other sight obstructions should be prohibited for at least 100 feet in advance of and at least 20 feet beyond the marked crosswalk, or site accommodations should be made through curb extensions or other techniques to provide adequate sight distance,
  - ~~B.C.~~ The installation should include suitable standard signs and pavement markings, and
  - ~~C.D.~~ If installed within a signal system, Consideration should be given to coordination of the pedestrian hybrid beacon within a signal system. should be coordinated.
- 05 On approaches having posted or statutory speed limits or 85<sup>th</sup>-percentile speeds in excess of 35 mph and on approaches having traffic or operating conditions that would tend to obscure visibility of roadside hybrid beacon face locations, both of the minimum of two pedestrian hybrid beacon faces should be installed over the roadway.
- 06 On multi-lane approaches having a posted or statutory speed limits or 85<sup>th</sup>-percentile speeds of 35 mph or less, either a pedestrian hybrid beacon face should be installed on each side of the approach (if a median of sufficient width exists) or at least one of the pedestrian hybrid beacon faces should be installed over the roadway.
- 07 A pedestrian hybrid beacon should comply with the signal face location provisions described in Sections 4D.11 through 4D.16.

#### Standard:

- 08 A CROSSWALK STOP ON RED (symbolic circular red) (R10-23) sign (see Section 2B.53) shall be mounted adjacent to a pedestrian hybrid beacon face on

**each major street approach. If an overhead pedestrian hybrid beacon face is provided, the sign shall be mounted adjacent to the overhead signal face.**

Option:

- 09 A Pedestrian (W11-2) warning sign (see Section 2C.50) with an AHEAD (W16-9P) supplemental plaque may be placed in advance of a pedestrian hybrid beacon. A warning beacon may be installed to supplement the W11-2 sign. [The Bicycle \(W11-1\), Bicycle/Pedestrian \(W11-15\), or Trail Crossing \(W11-15a\) warning signs may be used when appropriate.](#)

*Guidance:*

- 10 *If a warning beacon supplements a [W11-1, W11-2, W11-15, or W11-15a](#) warning sign in advance of a pedestrian hybrid beacon, it should be programmed to flash only when the pedestrian hybrid beacon is not in the dark mode.*

**Standard:**

- 11 **If a warning beacon is installed to supplement the W11-2 sign, the design and location of the warning beacon shall comply with the provisions of Sections 4L.01 and 4L.03.**

**Section 4F.03 of the National MUTCD is revised to read:****Section 4F.03 Operation of Pedestrian Hybrid Beacons****Standard:**

- 01 Pedestrian hybrid beacon indications shall be dark (not illuminated) during periods between actuations.
- 02 Upon actuation by a pedestrian, a pedestrian hybrid beacon face shall display a flashing CIRCULAR yellow signal indication, followed by a steady CIRCULAR yellow signal indication, followed by both steady CIRCULAR RED signal indications during the pedestrian walk interval, followed by alternating flashing CIRCULAR RED signal indications during the pedestrian clearance interval (see Figure 4F-3). Upon termination of the pedestrian clearance interval, the pedestrian hybrid beacon faces shall revert to a dark (not illuminated) condition.
- 03 Except as provided in Paragraph 4, the pedestrian signal heads shall continue to display a steady UPRAISED HAND (symbolizing DONT WALK) signal indication when the pedestrian hybrid beacon faces are either dark or displaying flashing or steady CIRCULAR yellow signal indications. The pedestrian signal heads shall display a WALKING PERSON (symbolizing WALK) signal indication when the pedestrian hybrid beacon faces are displaying steady CIRCULAR RED signal indications. The pedestrian signal heads shall display a flashing UPRAISED HAND (symbolizing DONT WALK) signal indication when the pedestrian hybrid beacon faces are displaying alternating flashing CIRCULAR RED signal indications. Upon termination of the pedestrian clearance interval, the pedestrian signal heads shall revert to a steady UPRAISED HAND (symbolizing DONT WALK) signal indication.

**Option:**

- 04 Where the pedestrian hybrid beacon is installed adjacent to a roundabout to facilitate crossings by pedestrians with visual disabilities and an engineering study determines that pedestrians without visual disabilities can be allowed to cross the roadway without actuating the pedestrian hybrid beacon, the pedestrian signal heads may be dark (not illuminated) when the pedestrian hybrid beacon faces are dark.

**Guidance:**

- 05 *The duration of the flashing yellow interval should be determined by engineering judgment.*

**Standard:**

- 06 **The duration of the steady yellow change interval shall be determined using engineering practices.**

**Guidance:**

- 07 *The steady yellow interval should have a minimum duration of 3 seconds and a maximum duration of 6 seconds (see Section 4D.26). The longer intervals should be reserved for use on approaches with higher speeds.*
- 08 *If used with a pedestrian signal head that does not have a concurrent vehicular phase, the pedestrian change interval (flashing UPRAISED HAND) should be set to be*

*approximately 4 seconds less than the required pedestrian clearance time (see Section 4E.06) and an additional clearance interval (during which a steady UPRAISED HAND is displayed) should be provided prior to the start of the conflicting vehicular phase.*



## PART 6 TEMPORARY TRAFFIC CONTROL

### CHAPTER 6B - FUNDAMENTAL PRINCIPLES

#### **Section 6B.01 of the National MUTCD is revised to read:**

##### **Section 6B.01 Fundamental Principles of Temporary Traffic Control**

###### **Support:**

- 01 Construction, maintenance, utility, and incident zones can all benefit from TTC to compensate for the unexpected or unusual situations faced by road users. When planning for TTC in these zones, it can be assumed that it is appropriate for road users to exercise caution. Even though road users are assumed to be using caution, special care is still needed in applying TTC techniques.
- 02 Special plans preparation and coordination with transit, other highway agencies, law enforcement and other emergency units, utilities, schools, and railroad companies might be needed to reduce unexpected and unusual road user operation situations.
- 03 During TTC activities, commercial vehicles might need to follow a different route from passenger vehicles because of bridge, weight, clearance, or geometric restrictions. Also, vehicles carrying hazardous materials might need to follow a different route from other vehicles. The Hazardous Materials and National Network signs are included in Sections 2B.62 and 2B.63, respectively.
- 04 Experience has shown that following the fundamental principles of Part 6 will assist road users and help protect workers in the vicinity of TTC zones.

###### **Guidance:**

- 05 *Road user and worker safety and accessibility in TTC zones should be an integral and high-priority element of every project from planning through design and construction. Similarly, maintenance and utility work should be planned and conducted with the safety and accessibility of all motorists, bicyclists, pedestrians (including those with disabilities), and workers being considered at all times. If the TTC zone includes a grade crossing, early coordination with the railroad company or light rail transit agency should take place.*

###### **Support:**

- 06 Formulating specific plans for TTC at traffic incidents is difficult because of the variety of situations that can arise.

###### **Guidance:**

- 07 *The following are the seven fundamental principles of TTC:*
  1. *General plans or guidelines should be developed to provide safety for motorists, bicyclists, pedestrians, workers, enforcement/emergency officials, and equipment, with the following factors being considered:*

- A. *The basic safety principles governing the design of permanent roadways and roadsides should also govern the design of TTC zones. The goal should be to route road users through such zones using roadway geometrics, roadside features, and TTC devices as nearly as possible comparable to those for normal highway situations.*
- B. *A TTC plan, in detail appropriate to the complexity of the work project or incident, should be prepared and understood by all responsible parties before the site is occupied. Any changes in the TTC plan should be approved by an official who is knowledgeable (for example, trained and/or certified) in proper TTC practices.*
2. *Road user movement should be inhibited as little as practical, based on the following considerations:*
  - A. *TTC at work and incident sites should be designed on the assumption that drivers will only reduce their speeds if they clearly perceive a need to do so (see Section 6C.01).*
  - B. *Frequent and abrupt changes in geometrics such as lane narrowing, dropped lanes, or main roadway transitions that require rapid maneuvers, should be avoided.*
  - C. *Work should be scheduled in a manner that minimizes the need for lane closures or alternate routes, while still getting the work completed quickly and the lanes or roadway open to traffic as soon as possible.*
  - D. *Attempts should be made to reduce the volume of traffic using the roadway or freeway to match the restricted capacity conditions. Road users should be encouraged to use alternative routes. For high-volume roadways and freeways, the closure of selected entrance ramps or other access points and the use of signed diversion routes should be evaluated.*
  - E. *Bicyclists and pedestrians, including those with disabilities, should be provided with access and reasonably safe passage through the TTC zone.*
  - F. *If work operations permit, lane closures on high-volume streets and highways should be scheduled during off-peak hours. Night work should be considered if the work can be accomplished with a series of short-term operations.*
  - G. *Early coordination with officials having jurisdiction over the affected cross streets and providing emergency services should occur if significant impacts to roadway operations are anticipated.*
3. *Motorists, bicyclists, and pedestrians should be guided in a clear and positive manner while approaching and traversing TTC zones and incident sites. The following principles should be applied:*
  - A. *Adequate warning, delineation, and channelization should be provided to assist in guiding road users in advance of and through the TTC zone or incident site by using proper pavement marking, signing, or other devices that are effective under varying conditions. Providing information that is in usable formats by pedestrians with visual disabilities should also be considered.*
  - B. *TTC devices inconsistent with intended travel paths through TTC zones should be removed or covered. However, in intermediate-term stationary, short-term, and mobile operations, where visible permanent devices are inconsistent with intended travel paths, devices that highlight or emphasize*

- the appropriate path should be used. Providing traffic control devices that are accessible to and usable by pedestrians with disabilities should be considered.*
- C. *Flagging procedures, when used, should provide positive guidance to road users traversing the TTC zone.*
4. *To provide acceptable levels of operations, routine day and night inspections of TTC elements should be performed as follows:*
    - A. *Individuals who are knowledgeable (for example, trained and/or certified) in the principles of proper TTC should be assigned responsibility for safety in TTC zones. The most important duty of these individuals should be to check that all TTC devices of the project are consistent with the TTC plan and are effective for motorists, bicyclists, pedestrians, and workers.*
    - B. *As the work progresses, temporary traffic controls and/or working conditions should be modified, if appropriate, in order to provide mobility and positive guidance to the road user and to provide worker safety. The individual responsible for TTC should have the authority to halt work until applicable or remedial safety measures are taken.*
    - C. *TTC zones should be carefully monitored under varying conditions of road user volumes, light, and weather to check that applicable TTC devices are effective, clearly visible, clean, and in compliance with the TTC plan.*
    - D. *When warranted, an engineering study should be made (in cooperation with law enforcement officials) of reported crashes occurring within the TTC zone. Crash records in TTC zones should be monitored to identify the need for changes in the TTC zone.*
  5. *Attention should be given to the maintenance of roadside safety during the life of the TTC zone by applying the following principles:*
    - A. *To accommodate run-off-the-road incidents, disabled vehicles, or emergency situations, unencumbered roadside recovery areas or clear zones should be provided where practical.*
    - B. *Channelization of road users should be accomplished by the use of pavement markings, signing, and crashworthy, detectable channelizing devices.*
    - C. *Work equipment, workers' private vehicles, materials, and debris should be stored in such a manner to reduce the probability of being impacted by run-off-the-road vehicles.*
  6. *Each person whose actions affect TTC zone safety, from the upper-level management through the field workers, should receive training appropriate to the job decisions each individual is required to make. Only those individuals who are trained in proper TTC practices and have a basic understanding of the principles (established by applicable standards and guidelines, including those of this Manual) should supervise the selection, placement, and maintenance of TTC devices used for TTC zones and for incident management.*
  7. *Good public relations should be maintained by applying the following principles:*
    - A. *The needs of all road users should be assessed such that appropriate advance notice is given and clearly defined alternative paths are provided.*

- B. *The cooperation of the various news media should be sought in publicizing the existence of and reasons for TTC zones because news releases can assist in keeping the road users well informed.*
- C. *The needs of abutting property owners, residents, and businesses should be assessed and appropriate accommodations made.*
- D. *The needs of emergency service providers (law enforcement, fire, and medical) should be assessed and appropriate coordination and accommodations made.*
- E. *The needs of railroads and transit should be assessed and appropriate coordination and accommodations made.*
- F. *The needs of operators of commercial vehicles such as buses and large trucks should be assessed and appropriate accommodations made.*

**Standard:**

- 08 **Before any new detour or temporary route is opened to traffic, all necessary signs shall be in place.**
- 09 **All TTC devices shall be removed as soon as practical when they are no longer needed. When work is suspended for short periods of time, TTC devices that are no longer appropriate shall be removed or covered.**

Support:

- 10 The State of Arizona and local jurisdictions maintain policy and/or procedure manuals that describe optional methods of controlling traffic within work zones. These manuals may be used in conjunction with Part 6 of the MUTCD.
- 11 Examples of differences in traffic control application in work zones in urban areas with lower speeds include:
  - 1. Shadow vehicles are typically not necessary, and can aggravate congestion.
  - 2. Vehicle mounted crash attenuators are typically not necessary, and can be counter-productive by lengthening the exposure of large vehicles at intersections.
  - 3. Traffic control devices and lighting on breakaway and frangible supports in areas with pedestrian activity can create hazards due to debris and exposed electrical wires if struck by errant vehicles.
  - 4. Crash cushions and temporary barriers are not typically appropriate.
  - 5. Adding additional signs above those specified in the MUTCD is typically not appropriate nor needed, and can distract from more-critical warning or guidance.

## CHAPTER 6F - TEMPORARY TRAFFIC CONTROL ZONE DEVICES

### Section 6F.12 of the National MUTCD is revised to read:

#### Section 6F.12 Work Zone and Higher Fines Signs and Plaques

Option:

- 01 A WORK ZONE (G20-5aP) plaque (see Figure 6F-3) may be mounted above a Speed Limit sign to emphasize that a reduced speed limit is in effect within a TTC zone. An END WORK ZONE SPEED LIMIT (R2-12) sign (see Figure 6F-3) may be installed at the downstream end of the reduced speed limit zone.

Guidance:

- 02 Except as noted in Paragraph 6, a BEGIN HIGHER FINES ZONE (R2-10) sign (see Figure 6F-3) should be installed at the upstream end of a work zone where increased fines are imposed for traffic violations, and an END HIGHER FINES ZONE (R2-11) sign (see Figure 6F-3) should be installed at the downstream end of the work zone.

Option:

- 03 Alternate legends such as BEGIN (or END) DOUBLE FINES ZONE may also be used for the R2-10 and R2-11 signs.
- 04 A FINES HIGHER, FINES DOUBLE, or \$XX FINE plaque (see Section 2B.17 and Figure 6F-3) may be mounted below the Speed Limit sign if increased fines are imposed for traffic violations within the TTC zone.
- 05 Individual signs and plaques for work zone speed limits and higher fines may be combined into a single sign or may be displayed as an assembly of signs and plaques.

**Standard:**

- 06 **Double fine signs in state highway work zones as defined in ARS §28-652 and §28-710 shall be placed only when workers are present in the double fine area, and shall be removed when workers are not present in the double fine area. Existing speed limit signs in the double fine area shall be covered when these signs are visible.**

Guidance:

- 07 If used, Double Fine signing in state highway work zones should conform to Figure SA-12 of the ADOT Traffic Control Design Guidelines.

Option:

- 08 The speed limit in the double fine area may be the same as the speed limit of the adjacent work zone or roadway.

## CHAPTER 6G - TYPE OF TEMPORARY TRAFFIC CONTROL ZONE ACTIVITIES

### Section 6G.01 of the National MUTCD is revised to read:

#### Section 6G.01 Typical Applications

##### Support:

- 01 Each TTC zone is different. Many variables, such as location of work, highway type, geometrics, vertical and horizontal alignment, intersections, interchanges, road user volumes, road vehicle mix (buses, trucks, and cars), and road user speeds affect the needs of each zone. The goal of TTC in work zones is safety with minimum disruption to road users. The key factor in promoting TTC zone safety is proper judgment.
- 02 Typical applications (TAs) of TTC zones are organized according to duration, location, type of work, and highway type. Table 6H-1 is an index of these typical applications. These typical applications include the use of various TTC methods, but do not include a layout for every conceivable work situation.
- 03 Well-designed TTC plans for planned special events will likely be developed from a combination of treatments from several of the typical applications.

##### Guidance:

- 04 *For any planned special event that will ~~have an impact~~ have a significant impact on traffic flow or operations on ~~the traffic on~~ any street or highway, a TTC plan should be developed in conjunction with and be approved by the agency or agencies that have jurisdiction over the affected roadways.*
- 05 *Typical applications should be altered, when necessary, to fit the conditions of a particular TTC zone.*

##### Option:

- 06 Other devices may be added to supplement the devices shown in the typical applications, while others may be deleted. The sign spacings and taper lengths may be increased to provide additional time or space for driver response.

##### Support:

- 07 Decisions regarding the selection of the most appropriate typical application to use as a guide for a specific TTC zone require an understanding of each situation. Although there are many ways of categorizing TTC zone applications, the four factors mentioned earlier (work duration, work location, work type, and highway type) are used to characterize the typical applications illustrated in Chapter 6H.

## PART 7 TRAFFIC CONTROL FOR SCHOOL AREAS

### CHAPTER 7 - GENERAL

#### **Section 7A.01 of the National MUTCD is revised to read:**

##### **Section 7A.01 Need for Standards**

###### **Support:**

- 01 Regardless of the school location, the best way to achieve effective traffic control is through the uniform application of realistic policies, practices, and standards developed through engineering judgment or studies.
- 02 Pedestrian safety depends upon public understanding of accepted methods for efficient traffic control. This principle is especially important in the control of pedestrians, bicycles, and other vehicles in the vicinity of schools. Neither pedestrians on their way to or from school nor other road users can be expected to move safely in school areas unless they understand both the need for traffic controls and how these controls function for their benefit.
- 03 Procedures and devices that are not uniform might cause confusion among pedestrians and other road users, prompt wrong decisions, and contribute to crashes. To achieve uniformity of traffic control in school areas, comparable traffic situations need to be treated in a consistent manner. Each traffic control device and control method described in Part 7 fulfills a specific function related to specific traffic conditions.
- 04 A uniform approach to school area traffic controls assures the use of similar controls for similar situations, which promotes appropriate and uniform behavior on the part of motorists, pedestrians, and bicyclists.
- 05 A school traffic control plan permits the orderly review of school area traffic control needs, and the coordination of school/pedestrian safety education and engineering measures. Engineering measures alone do not always result in the intended change in student and road user behavior.

###### **Guidance:**

- 06 *A school route plan for each school serving elementary to high school students should be prepared in order to develop uniformity in the use of school area traffic controls and to serve as the basis for a school traffic control plan for each school.*
- 07 *The school route plan, developed in a systematic manner by the school, law enforcement, and traffic officials responsible for school pedestrian safety, should consist of a map (see Figure 7A-1) showing streets, the school, existing traffic controls, established school walk routes, and established school crossings.*

08 *The type(s) of school area traffic control devices used, either warning or regulatory, should be related to the volume and speed of vehicular traffic, street width, and the number and age of the students using the crossing.*

09 *School area traffic control devices should be included in a school traffic control plan.*

Support:

10 Reduced speed limit signs for school areas and crossings are included in this Manual solely for the purpose of standardizing signing for these zones and not as an endorsement of mandatory reduced speed zones.

11 “School” and “school zone” are defined in Section 1A.13.

12 [The Arizona Traffic Safety for School Areas Guidelines define school area traffic control for kindergarten through 8th grade.](#)



**Section 7A.02 of the National MUTCD is revised to read:****Section 7A.02 School Routes and Established School Crossings**

Support:

- 01 To establish a safer route to and from school for schoolchildren the application of planning criterion for school walk routes might make it necessary for children to walk an indirect route to an established school crossing located where there is existing traffic control and to avoid the use of a direct crossing where there is no existing traffic control.

*Guidance:*

- 02 *School walk routes should be planned to take advantage of existing traffic controls.*
- 03 *The following factors should be considered when determining the feasibility of requiring children to walk a longer distance to a crossing with existing traffic control:*
- A. The availability of adequate sidewalks or other pedestrian walkways to and from the location with existing control,*
  - B. The number of students using the crossing,*
  - C. The age levels of the students using the crossing, and*
  - D. The total extra walking distance.*

Support:

- 04 The Arizona Traffic Safety for School Areas Guidelines define school area traffic control for kindergarten through 8th grade.

**Section 7A.04 of the National MUTCD is revised to read:****Section 7A.04 Scope****Standard:**

- 01 **Part 7 sets forth basic principles and prescribes standards that shall be followed in the design, application, installation, and maintenance of all traffic control devices (including signs, signals, and markings) and other controls (including adult crossing guards) required for the special pedestrian conditions in school areas.**

**Support:**

- 02 Sections 1A.01 and 1A.08 contain information regarding unauthorized devices and messages. Sections 1A.02 and 1A.07 contain information regarding the application of standards. Section 1A.05 contains information regarding the maintenance of traffic control devices. Section 1A.08 contains information regarding placement authority for traffic control devices. Section 1A.09 contains information regarding engineering studies and the assistance that is available to jurisdictions that do not have engineers on their staffs who are trained and/or experienced in traffic control devices.
- 03 Provisions contained in Chapter 2A and Section 2B.06 are applicable in school areas.
- 04 Part 3 contains provisions regarding pavement markings that are applicable in school areas.
- 05 Part 4 contains provisions regarding highway traffic signals that are applicable in school areas. The School Crossing signal warrant is described in Section 4C.06.

**Option:**

- 06 In-roadway signs for school traffic control areas may be used consistent with the requirements of the Arizona Traffic Safety for School Areas Guidelines.

**Support:**

- 07 Provisions discussed in Part 2 are also applicable in school areas, except where described differently under ARS §28-797.

## CHAPTER 7B. SIGNS

### Section 7B.01 of the National MUTCD is revised to read:

#### Section 7B.01 Size of School Signs

##### Standard:

- 01 Except as provided in Section 2A.11, and where not addressed by ARS §28-797 for 15 mph School Crossings, the sizes of signs and plaques to be used on conventional roadways in school areas shall be as shown in Tables 7B-1 and 7B-1AZ.
- 02 The sizes in the Conventional Road column shall be used unless engineering judgment determines that a minimum or oversized sign size would be more appropriate.
- 03 The sizes in the Minimum column shall be used only where traffic volumes are low and speeds are 30 mph or lower, as determined by engineering judgment.
- 04 The sizes in the Oversized column shall be used on expressways.

##### Guidance:

- 05 *The sizes in the Oversized column should be used on roadways that have four or more lanes with posted speed limits of 40 mph or higher.*

##### Option:

- 06 The sizes in the Oversized column may also be used at other locations that require increased emphasis, improved recognition, or increased legibility.
- 07 Signs and plaques larger than those shown in Tables 7B-1 and 7B-1AZ may be used (see Section 2A.11).

##### Support:

- 08 The Arizona Traffic Safety for School Areas Guidelines define school area traffic control for kindergarten through 8th grade.

**Table 7B-1AZ is appended to Table 7B-1 of the National MUTCD:****Table 7B-1AZ. School Area Sign and Plaque Sizes (Arizona)**

Sign	Sign Designation	Section	Conventional Road	Minimum	Oversized
<a href="#">Stop When Children in Crosswalk</a>	<a href="#">S2-101</a>	<a href="#">7B.04</a>	<a href="#">24 x 30</a>	<a href="#">20 x 30</a>	=
<a href="#">No Passing 15 MPH Fines Double School in Session</a>	<a href="#">S4-101</a>	<a href="#">7B.04</a>	<a href="#">24 x 30</a>	<a href="#">20 x 30</a>	=

- Note: 1. Larger sizes may be used when appropriate  
 2. Dimensions are shown in inches and are shown as width x height  
 3. Minimum sign sizes for multi-lane conventional roads shall be as shown in the Conventional Road column

**Section 7B.03 of the National MUTCD is revised to read:**

**Section 7B.03 Position of Signs**

Support:

01 Sections 2A.16 and 2A.17 contain provisions regarding the placements and locations of signs.

02 Section 2A.19 contains provisions regarding the lateral offsets of signs.

Option:

03 In-roadway signs for school traffic control areas may be used consistent with the requirements of Sections 2B.12, 7B.11, ~~and~~ 7B.12, [and the Arizona Traffic Safety for School Areas Guidelines.](#)

**Section 7B.04 of the National MUTCD is revised to read:**

**Section 7B.04 Height of Signs**

Support:

- 01 Section 2A.18 contains provisions regarding the mounting height of signs.
- 02 Mounting heights for portable signs used at school crossings, such as the STOP WHEN CHILDREN IN CROSSWALK sign (S2-101) and NO PASSING 15 MPH FINES DOUBLE SCHOOL IN SESSION (S4-101) sign, are found in the Arizona Traffic Safety for School Areas Guidelines.

**Section 7B.05 of the National MUTCD is revised to read:**

**Section 7B.05 Installation of Signs**

Support:

01 Section 2A.16 [and the Arizona Traffic Safety for School Areas Guidelines](#) contain provisions regarding the installation of signs

**Section 7B.09 of the National MUTCD is revised to read:****Section 7B.09 School Zone Sign (S1-1) and Plaques (S4-3P, S4-7P) and END SCHOOL ZONE Sign (S5-2)****Standard:**

01 **If a school zone has been designated under State or local statute a School (S1-1) sign (see Figure 7B-1) shall be installed to identify the beginning point(s) of the designated school zone (see Figure 7B-2).**

**Option:**

02 A School Zone (S1-1) sign may be supplemented with a SCHOOL (S4-3P) plaque (see Figure 7B-1).

03 A School Zone (S1-1) sign may be supplemented with an ALL YEAR (S4-7P) plaque (see Figure 7B-1) if the school operates on a 12-month schedule.

04 The downstream end of a designated school zone may be identified with an END SCHOOL ZONE (S5-2) sign (see Figures 7B-1 and 7B-2).

05 If a school zone is located on a cross street in close proximity to the intersection, a School Zone (S1-1) sign with a supplemental arrow (W16-5P or W16-6P) plaque may be installed on each approach of the street or highway to warn road users making a turn onto the cross street that they will encounter a school zone soon after making the turn.

06 [A School Zone \(S1-1\) sign may be used in other locations in accordance with the Arizona Traffic Safety for School Areas Guidelines.](#)

**Support:**

07 [It is not desirable to post END SCHOOL ZONE \(S5-2\) signs at locations where a school crossing as defined in ARS §28-797 exists, as the 15 MPH speed zone established by ARS §28-701, when portable school signs are in place, ends at the crosswalk.](#)

08 [It is not desirable to post an END SCHOOL ZONE \(S5-2\) sign or a Speed Limit \(R2-1\) sign immediately downstream from the school crosswalk, as it may encourage drivers to accelerate sooner.](#)

**Standard:**

09 [If a school crossing as defined in ARS §28-797 has been established, a School \(S1-1\) sign should be placed in advance of the school crossing per the Arizona Traffic Safety for School Areas Guidelines.](#)



## Section 7B.10 of the National MUTCD is revised to read:

### Section 7B.10 Higher Fines Zone Signs (R2-10, R2-11) and Plaques

#### Standard:

- 01 Where increased fines are imposed for traffic violations within a designated school zone other than a designated school crossing in accordance with ARS §28-797, a BEGIN HIGHER FINES ZONE (R2-10) sign (see Figure 7B-1) or a FINES HIGHER (R2-6P), FINES DOUBLE (R2-6aP), or \$XX FINE (R2-6bP) plaque (see Figure 2B-3) shall be installed as a supplement to the School Zone (S1-1) sign to identify the beginning point of the higher fines zone (see Figures 7B-2 and 7B-3). When increased fines are imposed for traffic violations within a designated school crossing in accordance with ARS §28-797, a portable NO PASSING 15 MPH FINES DOUBLE SCHOOL IN SESSION (S4-101) sign shall be placed to identify the beginning point of the higher fine zone, while a portable STOP WHEN CHILDREN IN CROSSWALK (S2-101) sign shall be placed to identify the end point of the higher fine zone and no other signs shall be required.

#### Option:

- 02 Where appropriate, one of the following plaques may be mounted below the sign that identifies the beginning point of the higher fines zone:
- A. An S4-1P plaque (see Figure 7B-1) specifying the times that the higher fines are in effect,
  - B. A WHEN CHILDREN ARE PRESENT (S4-2P) plaque (see Figure 7B-1), or
  - C. A WHEN FLASHING (S4-4P) plaque (see Figure 7B-1) if used in conjunction with a yellow flashing beacon.

#### Standard:

- 03 Where a BEGIN HIGHER FINES ZONE (R2-10) sign or a FINES HIGHER (R2-6P) plaque supplementing a School Zone (S1-1) sign is posted to notify road users of increased fines for traffic violations, an END HIGHER FINES ZONE (R2-11) sign (see Figure 7B-1) or an END SCHOOL ZONE (S5-2) sign shall be installed at the downstream end of the zone to notify road users of the termination of the increased fines zone (see Figures 7B-2 and 7B-3).

**Section 7B.11 of the National MUTCD is revised to read:****Section 7B.11 School Advance Crossing Assembly****Standard:**

- 01 **The School Advance Crossing assembly (see Figure 7B-1) shall consist of a School (S1-1) sign supplemented with an AHEAD (W16-9P) plaque or an XX FEET (W16-2P or W16-2aP) plaque.**
- 02 **Except as provided in Paragraph 3, a School Advance Crossing assembly shall be used in advance (see Table 2C-4 for advance placement guidelines) of the first School Crossing assembly (see Section 7B.12) that is encountered in each direction as traffic approaches a school crosswalk (see Figure 7B-4).**

**Option:**

- 03 The School Advance Crossing assembly may be omitted (see Figure 7B-5) where a School Zone (S1-1) sign (see Section 7B.09) is installed to identify the beginning of a school zone in advance of the School Crossing assembly, or at locations where a school crossing as defined in ARS §28-797 exists.
- 04 If a school crosswalk is located on a cross street in close proximity to an intersection, a School Advance Crossing assembly with a supplemental arrow (W16-5P or W16-6P) plaque may be installed on each approach of the street or highway to warn road users making a turn onto the cross street that they will encounter a school crosswalk soon after making the turn.
- 05 A 12-inch reduced size in-street School (S1-1) sign (see Figure 7B-6), installed in compliance with the mounting height and special mounting support requirements for In-Street Pedestrian Crossing (R1-6 or R1-6a) signs (see Section 2B.12), may be used in advance of a school crossing to supplement the post-mounted school warning signs. A 12 x 6-inch reduced size AHEAD (W16-9P) plaque may be mounted below the reduced size in-street School (S1-1) sign.

**Section 7B.12 of the National MUTCD is revised to read:****Section 7B.12 School Crossing Assembly****Standard:**

- 01 **If used, the School Crossing assembly (see Figure 7B-1) shall be installed at the school crossing (see Figures 7B-4 and 7B-5), or as close to it as possible, and shall consist of a School (S1-1) sign supplemented with a diagonal downward pointing arrow (W16-7P) plaque to show the location of the crossing.**
- 02 **The School Crossing assembly shall not be used at crossings other than those adjacent to schools and those on established school pedestrian routes.**
- 03 **The School Crossing assembly shall not be installed on approaches controlled by a STOP or YIELD sign.**

**Option:**

- 04 The In-Street Pedestrian Crossing (R1-6 or R1-6a) sign (see Section 2B.12 and Figure 7B-6) or the In-Street Schoolchildren Crossing (R1-6b or R1-6c) sign (see Figure 7B-6) may be used at unsignalized school crossings. If used at a school crossing, a 12 x 4-inch SCHOOL (S4-3P) plaque (see Figure 7B-6) may be mounted above the sign. The STATE LAW legend on the R1-6 series signs may be omitted.
- 05 The Overhead Pedestrian Crossing (R1-9 or R1-9a) sign (see Section 2B.12 and Figure 2B-2) may be modified to replace the standard pedestrian symbol with the standard schoolchildren symbol and may be used at unsignalized school crossings. The STATE LAW legend on the R1-9 series signs may be omitted.
- 06 A 12-inch reduced size in-street School (S1-1) sign (see Figure 7B-6) may be used at an unsignalized school crossing instead of the In-Street Pedestrian Crossing (R1-6 or R1-6a) or the In-Street Schoolchildren Crossing (R1-6b or R1-6c) sign. A 12 x 6-inch reduced size diagonal downward pointing arrow (W16-7P) plaque may be mounted below the reduced size in-street School (S1-1) sign.

**Standard:**

- 07 **If an In-Street Pedestrian Crossing sign, an In-Street Schoolchildren Crossing sign, or a reduced size in-street School (S1-1) sign is placed in the roadway, the sign support shall comply with the mounting height and special mounting support requirements for In-Street Pedestrian Crossing (R1-6 or R1-6a) signs (see Section 2B.12).**
- 08 **The In-Street Pedestrian Crossing sign, the In-Street Schoolchildren Crossing sign, the Overhead Pedestrian Crossing sign, and the reduced size in-street School (S1-1) sign shall not be used at signalized locations.**

**Option:**

- 09 School Crossing assemblies may be omitted at locations where a school crossing as defined in ARS §28-797 exists.

## Section 7B.15 of the National MUTCD is revised to read:

### Section 7B.15 School Speed Limit Assembly (S4-1P, S4-2P, S4-3P, S4-4P, S4-6P, S5-1) and END SCHOOL SPEED LIMIT Sign (S5-3)

#### Standard:

- 01 A School Speed Limit assembly (see Figure 7B-1) or a School Speed Limit (S5-1) sign (see Figure 7B-1) shall be used to indicate the speed limit where a reduced school speed limit zone has been established based upon an engineering study or where a reduced school speed limit is specified for such areas by statute. The School Speed Limit assembly or School Speed Limit sign shall be placed at or as near as practical to the point where the reduced school speed limit zone begins (see Figures 7B-3 and 7B-5).
- 02 If a reduced school speed limit zone within a designated school crossing has been established in accordance with ARS §28-797, a portable NO PASSING 15 MPH FINES DOUBLE SCHOOL IN SESSION (S4-101) sign shall be placed to identify the beginning point of the reduced speed zone, while a portable STOP WHEN CHILDREN IN CROSSWALK (S2-101) sign shall be placed to identify the end point of the reduced speed zone. No other sign shall be required. If other types of reduced school speed limit zones have been established, a School (S1-1) sign shall be installed in advance (see Table 2C-4 for advance placement guidelines) of the first School Speed Limit sign assembly or S5-1 sign that is encountered in each direction as traffic approaches the reduced school speed limit zone (see Figures 7B-3 and 7B-5).
- 03 Where increased fines are imposed for traffic violations within a ~~reduced school speed limit zone, a FINES HIGHER (R2-6P), FINES DOUBLE (R2-6aP), or \$XX FINE (R2-6bP) plaque (see Figure 2B-3) shall be installed as a supplement to the reduced school speed limit sign to notify road users~~ designated school crossing in accordance with ARS §28-797, a portable NO PASSING 15 MPH FINES DOUBLE SCHOOL IN SESSION (S4-101) sign shall be placed to identify the beginning point of the higher fine zone.
- 04 Except as provided in Paragraphs 5 and 17, the downstream end of an authorized and posted reduced school speed limit zone shall be identified with an END SCHOOL SPEED LIMIT (S5-3) sign (see Figures 7B-1 and 7B-5).

#### Option:

- 05 If a reduced school speed limit zone ends at the same point as a higher fines zone, an END SCHOOL ZONE (S5-2) sign may be used instead of a combination of an END HIGHER FINES ZONE (R2-11) sign and an END SCHOOL SPEED LIMIT (S5-3) sign.
- 06 A standard Speed Limit sign showing the speed limit for the section of highway that is downstream from the authorized and posted reduced school speed limit zone may be mounted on the same post above the END SCHOOL SPEED LIMIT (S5-3) sign or the END SCHOOL ZONE (S5-2) sign.

#### Guidance:

07 *The beginning point of a reduced school speed limit zone should be at least 200 feet in advance of the school grounds, a school crossing, or other school related activities; however, this 200-foot distance should be increased if the reduced school speed limit is 30 mph or higher.*

**Standard:**

08 **The School Speed Limit assembly shall be either a fixed-message sign assembly or a changeable message sign.**

09 **The fixed-message School Speed Limit assembly shall consist of a top plaque (S4-3P) with the legend SCHOOL, a Speed Limit (R2-1) sign, and a bottom plaque (S4-1P, S4-2P, S4-4P, or S4-6P) indicating the specific periods of the day and/or days of the week that the special school speed limit is in effect (see Figure 7B-1).**

**Option:**

10 Changeable message signs (see Chapter 2L and Section 6F.60) may be used to inform drivers of the school speed limit. If the sign is internally illuminated, it may have a white legend on a black background. Changeable message signs with flashing beacons may be used for situations where greater emphasis of the special school speed limit is needed.

*Guidance:*

11 *Even though it might not always be practical because of special features to make changeable message signs conform in all respects to the standards in this Manual for fixed-message signs, during the periods that the school speed limit is in effect, their basic shape, message, legend layout, and colors should comply with the standards for fixed-message signs.*

12 *A confirmation light or device to indicate that the speed limit message is in operation should be considered for inclusion on the back of the changeable message sign.*

**Standard:**

13 **Fluorescent yellow-green pixels shall be used when the “SCHOOL” message is displayed on a changeable message sign for a school speed limit.**

**Option:**

14 Changeable message signs may use blank-out messages or other methods in order to display the school speed limit only during the periods it applies.

15 Changeable message signs that display the speed of approaching drivers (see Section 2B.13) may be used in a school speed limit zone.

16 A Speed Limit Sign Beacon (see Section 4L.04) also may be used, with a WHEN FLASHING legend, to identify the periods that the school speed limit is in effect.

**Support:**

17 It is not desirable to post END SCHOOL ZONE (S5-2) or END HIGHER FINES ZONE (R2-11) signs at locations where a school crossing as defined in ARS §28-797 exists, as the 15 MPH speed zone established in ARS §28-701, when portable school signs are in place, ends at the crosswalk.

- 18 It is not desirable to post an END SCHOOL ZONE (S5-2) sign, END HIGHER FINES ZONE (R2-11) sign, or Speed Limit (R2-1) sign immediately downstream from the school crosswalk, as it may encourage drivers to accelerate sooner.

**Section 7B.16 of the National MUTCD is revised to read:****Section 7B.16 Reduced School Speed Limit Ahead Sign (S4-5, S4-5a)***Guidance:*

- 01 *A Reduced School Speed Limit Ahead (S4-5, S4-5a) sign (see Figure 7B-1) should be used to inform road users of a reduced speed zone where the speed limit is being reduced by more than 10 mph, or where engineering judgment indicates that advance notice would be appropriate.*

**Standard:**

- 02 **If used, the Reduced School Speed Limit Ahead sign shall be followed by a School Speed Limit sign or a School Speed Limit assembly.**
- 03 **The speed limit displayed on the Reduced School Speed Limit Ahead sign shall be identical to the speed limit displayed on the subsequent School Speed Limit sign or School Speed Limit assembly.**

*Guidance:*

- 04 *The Reduced School Speed Limit Ahead sign (S4-5, S4-5a) should not be used at locations where a school crossing as defined in ARS §28-797 exists.*

## CHAPTER 7C - MARKINGS

### Section 7C.02 of the National MUTCD is revised to read:

#### Section 7C.02 Crosswalk Markings

##### Guidance:

- 01 *Crosswalks should be marked at all intersections on established routes to a school where there is substantial conflict between motorists, bicyclists, and student movements; where students are encouraged to cross between intersections; where students would not otherwise recognize the proper place to cross; or where motorists or bicyclists might not expect students to cross (see Figure 7A-1).*
- 02 *Crosswalk lines should not be used indiscriminately. An engineering study considering the factors described in Section 3B.18 should be performed before a marked crosswalk is installed at a location away from a traffic control signal or an approach controlled by a STOP or YIELD sign.*
- 03 *Because non-intersection school crossings are generally unexpected by the road user, warning signs (see Sections 7B.11 and 7B.12) should be installed for all marked school crosswalks at non-intersection locations. Adequate visibility of students by approaching motorists and of approaching motorists by students should be provided by parking prohibitions or other appropriate measures.*

##### Support:

- 04 Section 3B.18 contains provisions regarding the placement and design of crosswalks, and Section 3B.16 contains provisions regarding the placement and design of the stop lines and yield lines that are associated with them. Provisions regarding the curb markings that can be used to establish parking regulations on the approaches to crosswalks are contained in Section 3B.23.

##### Standard:

- 05 School crosswalk markings installed at school crossings established in accordance with ARS §28-797 shall be yellow. Yellow crosswalk lines shall be not less than 10 inches in width.

##### Option:

- 06 Lane lines in advance of school crosswalks may be made solid to discourage passing and to provide additional notice that a crosswalk may exist ahead. On two-lane streets, a solid or broken yellow centerline may be added.



# **PART 8**

## **TRAFFIC CONTROL FOR RAILROAD AND LIGHT RAIL CROSSINGS**

### **CHAPTER 8B - SIGNS AND MARKINGS**

**Section 8B.04 of the National MUTCD is revised to read:**

**Section 8B.04 Crossbuck Assemblies with YIELD or STOP Signs at Passive Grade Crossings**

**Standard:**

- 01 A grade crossing Crossbuck Assembly shall consist of a Crossbuck (R15-1) sign, and a Number of Tracks (R15-2P) plaque if two or more tracks are present, that complies with the provisions of Section 8B.03, and either a YIELD (R1-2) or STOP (R1-1) sign installed on the same support, except as provided in Paragraph 8. If used at a passive grade crossing, a YIELD or STOP sign shall be installed in compliance with the provisions of Part 2, Section 2B.10, and Figures 8B-2 and 8B-3.
- 02 At all public highway-rail grade crossings that are not equipped with the active traffic control systems that are described in Chapter 8C, except crossings where road users are directed by an authorized person on the ground to not enter the crossing at all times that an approaching train is about to occupy the crossing, a Crossbuck Assembly shall be installed on the right-hand side of the highway on each approach to the highway-rail grade crossing.
- 03 If a Crossbuck sign is used on a highway approach to a public highway-LRT grade crossing that is not equipped with the active traffic control systems that are described in Chapter 8C, a Crossbuck Assembly shall be installed on the right-hand side of the highway on each approach to the highway-LRT grade crossing.
- 04 Where restricted sight distance or unfavorable highway geometry exists on an approach to a grade crossing that has a Crossbuck Assembly, or where there is a one-way multi-lane approach, an additional Crossbuck Assembly shall be installed on the left-hand side of the highway.
- 05 A YIELD sign shall be the default traffic control device for Crossbuck Assemblies on all highway approaches to passive grade crossings unless an engineering study performed by the regulatory agency or highway authority having jurisdiction over the roadway approach determines that a STOP sign is appropriate in accordance with ARS §28-852.

*Guidance:*

- 06 *The use of STOP signs at passive grade crossings should be limited to unusual conditions where requiring all highway vehicles to make a full stop is deemed essential by an engineering study. Among the factors that should be considered in the*

*engineering study are the line of sight to approaching rail traffic (giving due consideration to seasonal crops or vegetation beyond both the highway and railroad or LRT rights-of-ways), the number of tracks, the speeds of trains or LRT equipment and highway vehicles, and the crash history at the grade crossing.*

**Support:**

- 07 Sections 8A.02 and 8A.03 contain information regarding the responsibilities of the highway agency and the railroad company or LRT agency regarding the selection, design, and operation of traffic control devices placed at grade crossings.

**Option:**

- 08 If a YIELD or STOP sign is installed for a Crossbuck Assembly at a grade crossing, it may be installed on the same support as the Crossbuck sign or it may be installed on a separate support at a point where the highway vehicle is to stop, or as near to that point as practical, but in either case, the YIELD or STOP sign is considered to be a part of the Crossbuck Assembly.

**Standard:**

- 09 **If a YIELD or STOP sign is installed on an existing Crossbuck sign support, the minimum height, measured vertically from the bottom of the YIELD or STOP sign to the top of the curb, or in the absence of curb, measured vertically from the bottom of the YIELD or STOP sign to the elevation of the near edge of the traveled way, shall be 4 feet (see Figure 8B-2).**
- 10 **If a Crossbuck Assembly is installed on a new sign support (see Figure 8B-2) or if the YIELD or STOP sign is installed on a separate support (see Figure 8B-3), the minimum height, measured vertically from the bottom of the YIELD or STOP sign to the top of the curb, or in the absence of curb, measured vertically from the bottom of the YIELD or STOP sign to the elevation of the near edge of the traveled way, shall be 7 feet if the Crossbuck Assembly is installed in an area where parking or pedestrian movements are likely to occur.**

*Guidance:*

- 11 *If a YIELD or STOP sign is installed for a Crossbuck Assembly at a grade crossing on a separate support than the Crossbuck sign (see Figure 8B-3), the YIELD or STOP sign should be placed at a point where the highway vehicle is to stop, or as near to that point as practical, but no closer than 15 feet measured perpendicular from the nearest rail.*

**Support:**

- 12 The meaning of a Crossbuck Assembly that includes a YIELD sign is that a road user approaching the grade crossing needs to be prepared to decelerate, and when necessary, yield the right-of-way to any rail traffic that might be occupying the crossing or might be approaching and in such close proximity to the crossing that it would be unsafe for the road user to cross.
- 13 Certain commercial motor vehicles and school buses are required to stop at all grade crossings in accordance with 49 CFR 392.10 even if a YIELD sign (or just a Crossbuck sign) is posted.
- 14 The meaning of a Crossbuck Assembly that includes a STOP sign is that a road user approaching the grade crossing must come to a full and complete stop not less than 15 feet short of the nearest rail, and remain stopped while the road user determines

if there is rail traffic either occupying the crossing or approaching and in such close proximity to the crossing that the road user must yield the right-of-way to rail traffic. The road user is permitted to proceed when it is safe to cross.

**Standard:**

- 15 **A vertical strip of retroreflective white material, not less than 2 inches in width, shall be used on each Crossbuck support at passive grade crossings for the full length of the back of the support from the Crossbuck sign or Number of Tracks plaque to within 2 feet above the ground, except as provided in Paragraph 16.**

Option:

- 16 The vertical strip of retroreflective material may be omitted from the back sides of Crossbuck sign supports installed on one-way streets.
- 17 If a YIELD or STOP sign is installed on the same support as the Crossbuck sign, a vertical strip of red (see Section 2A.21) or white retroreflective material that is at least 2 inches wide may be used on the front of the support from the YIELD or STOP sign to within 2 feet above the ground.

**Standard:**

- 18 **If a Crossbuck sign support at a passive grade crossing does not include a YIELD or STOP sign (either because the YIELD or STOP sign is placed on a separate support or because a YIELD or STOP sign is not present on the approach), a vertical strip of retroreflective white material, not less than 2 inches in width, shall be used for the full length of the front of the support from the Crossbuck sign or Number of Tracks plaque to within 2 feet above the ground.**
- 19 **At all grade crossings where YIELD or STOP signs are installed, Yield Ahead (W3-2) or Stop Ahead (W3-1) signs shall also be installed if the criteria for their installation in Section 2C.36 is met.**

Support:

- 20 Section 8B.28 contains provisions regarding the use of stop lines or yield lines at grade crossings.

## **CHAPTER 8C - FLASHING-LIGHT SIGNALS, GATES, AND TRAFFIC CONTROL SIGNALS**

### **Section 8C.01 of the National MUTCD is revised to read:**

#### **Section 8C.01 Introduction**

##### **Support:**

- 01 Active traffic control systems inform road users of the approach or presence of rail traffic at grade crossings. These systems include four-quadrant gate systems, automatic gates, flashing-light signals, traffic control signals, actuated blank-out and variable message signs, and other active traffic control devices.
- 02 A composite drawing (see Figure 8C-1) shows a post-mounted flashing-light signal (two light units mounted in a horizontal line), a flashing-light signal mounted on an overhead structure, and an automatic gate assembly.

##### **Option:**

- 03 Post-mounted and overhead flashing-light signals may be used separately or in combination with each other as determined by an engineering study. Also, flashing-light signals may be used without automatic gate assemblies, as determined by an engineering study.

##### **Standard:**

- 04 **The meaning of flashing-light signals and gates shall be as stated in the “Uniform Vehicle Code” (see Sections 11-701 and 11-703 of the UVC), which is available from the National Committee on Uniform Traffic Laws and Ordinances (see Page i for the address).**
- 05 **Location and clearance dimensions for flashing-light signals and gates shall be as shown in Figure 8C-1.**
- 06 **When there is a curb, a horizontal offset of at least 2 feet shall be provided from the face of the vertical curb to the closest part of the signal or gate arm in its upright position. When a cantilevered-arm flashing-light signal is used, the vertical clearance shall be at least 17 feet above the crown of the highway to the lowest point of the signal unit.**
- 07 **Where there is a shoulder, but no curb, a horizontal offset of at least 2 feet from the edge of a paved or surfaced shoulder shall be provided, with an offset of at least 6 feet from the edge of the traveled way.**
- 08 **Where there is no curb or shoulder, the minimum horizontal offset shall be 6 feet from the edge of the traveled way.**

##### **Guidance:**

- 09 *Equipment housings (controller cabinets) should have a lateral offset of at least 30 feet from the edge of the highway, and where railroad or LRT property and conditions allow, at least 25 feet from the nearest rail.*

- 10 *If a pedestrian route is provided, sufficient clearance from supports, posts, and gate mechanisms should be maintained for pedestrian travel.*
- 11 *When determined by an engineering study, a lateral escape route to the right of the highway in advance of the grade crossing traffic control devices should be kept free of guardrail or other ground obstructions. Where guardrail is not deemed necessary or appropriate, barriers should not be used for protecting signal supports.*
- 12 *The same lateral offset and roadside safety features should apply to flashing-light signal and automatic gate locations on both the right-hand and left-hand sides of the roadway.*

Option:

- 13 In industrial or other areas involving only low-speed highway traffic or where signals are vulnerable to damage by turning truck traffic, guardrail may be installed to provide protection for the signal assembly.

Guidance:

- 14 *Where both traffic control signals and flashing-light signals (with or without automatic gates) are in operation at the same highway-LRT grade crossing, the operation of the devices should be coordinated to avoid any display of conflicting signal indications.*

Support:

- 15 LRT typically operates through grade crossings in semi-exclusive and mixed-use alignments at speeds between 10 and 65 mph.
- 16 When LRT speed is cited in this Part, it refers to the maximum speed at which LRT equipment is permitted to traverse a particular grade crossing.

Option:

- 17 Where LRT vehicles operate in a mixed-use alignment controlled by vehicular traffic control devices as defined in Parts 2 and 4, the devices in Chapter 8C need not be used.