The 2020 Signing and Pavement Marking Manual is a joint effort between the Pima County Department of Transportation (PCDOT) and the City of Tucson Department of Transportation and Mobility (COT DTM) to provide Consultants, Contractors, Engineers and Department Staff guidelines for the design and placement of roadway signing and pavement markings. This manual is intended to provide consistent practices throughout the Tucson Metropolitan Area and unincorporated Pima County in accordance with the latest federal guidelines.

The 2020 Signing and Pavement Marking Manual supersedes all previous Pima County/City of Tucson signing and pavement marking manuals and shall remain in effect until reissued or updated.
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FOREWORD

This publication is intended to provide guidance in the design and installation of signing and pavement markings. The guidelines described in this edition are intended to provide the transportation professional with the information needed to make appropriate decisions regarding the use of traffic control devices for the reasonable, prudent, and legal road user.

The fact that new design values are presented herein does not imply that existing streets and highways are unsafe, nor does it mandate the initiation of improvement projects. The values contained herein are expected to generally provide more satisfactory design of new street and highway facilities, as well as for major modifications of existing facilities. Revisions to this manual will be documented, reviewed, and approved by the City/County Engineer, or their designee.

Deviations from this guideline are frequently necessary based upon engineering judgment. Sufficient flexibility is permitted to encourage independent designs tailored to particular situations.

The highway, vehicles, and individual users are all integral parts of transportation safety and efficiency. While this document primarily addresses traffic and design issues, a properly equipped and maintained vehicle along with the prudent and legal performance by the road user are also critically necessary for safe and efficient operation of the transportation system.

1 INTRODUCTION

1.1 Purpose

The Signing and Pavement Marking Manual is a joint effort between the Pima County Department of Transportation (PCDOT) and the City of Tucson Department of Transportation and Mobility (COT DTM) to provide consistent practices throughout the Tucson Metropolitan Area and unincorporated Pima County. The purpose of this manual is to provide a set of guidelines and practices for designers, engineers, and contactors to follow in the design and placement of signing and roadway pavement markings. This manual is intended to supplement the most recent edition of the Arizona Supplement to the Manual on Uniform Traffic Control Devices, the Manual on Uniform Traffic Control Devices, and the American Association of State Highway Transportation Officials guidance.
1.2 Application
This Manual provides a set of guidelines and practices for designers, engineers, maintenance staff, and contractors to follow for the design and placement of signing and pavement markings for typical roadway conditions. Items addressed in this manual are items that are not shall conditions outlined within the Arizona Supplement to the Manual on Uniform Traffic Control Devices (MUTCD) or the Manual on Uniform Traffic Control Devices. This Manual is a guide and should not be substituted for good engineering judgement and/or practical design.

2 DESIGN GUIDELINES

2.1 AASHTO Roadside Design Guidelines
Provides guidance based on established practices that are supplemented by recent research. This document is also intended to be a comprehensive reference manual to assist in administrative, planning, and education efforts pertaining to design formulation.

2.2 City of Tucson Engineering Plan Templates and Active Practice Guidelines
Standard Details and Guidelines for Roadway Engineering
COT Engineering Templates/Active Practice Guidelines

2.3 Functional Classification of Roadways
Roadway classifications are established by the Pima Association of Governments (PAG) per Federal Highway Administration requirements. The three main roadway classifications are arterial, collector, and local. Distinctions are also made between urban and rural development patterns and major and minor sub-classifications. Pima County roadway classifications are on Pima County Pima Maps

2.4 Manual of Approved Signs (MOAS)
The Arizona Manual of Approved Signs (MOAS) is the official list of highway traffic signs for use on state highways in the State of Arizona, and establishes standard codes and designations for Arizona specific signs. MOAS

2.5 Manual on Uniform Traffic Control Devices (MUTCD) / Arizona Supplement to the MUTCD.
The MUTCD is published by the Federal Highway Administration (FHWA). It defines the standards used by road managers nationwide to install and maintain traffic control devices on all public streets, highways, bikeways, and private roads open to public travel. The State of Arizona has developed and adopted a state supplement to the MUTCD. This supplement provides state specific guidelines and requirements. MUTCD  AZ Supplement to the MUTCD
2.6 **Pima Association of Governments Standard Specifications and Standard Details**
Pima County roadway improvements are to be constructed in accordance with the most recent version of the [PAG Specifications and Standard Details](#). Pima County details and specifications that differ from PAG details are located at [PCDOT Standard Details and Specifications](#).

2.7 **Pima County Roadway and Development Street Standards Manual**
The purpose of these standards is to inform roadway performance designs maximizing multi-modal mobility safety and infrastructure, return on investment while incorporating principles of complete streets and low impact development. These standards apply to public and private roadway construction, reconstruction, rehabilitation and connections thereto within unincorporated Pima County.

2.8 **Manual Hierarchy (Pima County)**
Manuals for Signing and Striping Design and Installation should be used in the following order:
- Arizona Supplement to the MUTCD
- MUTCD
- Pima County/City of Tucson Signing and Marking Manual
- PAG Standards and Specifications
- ADOT Guidelines

2.9 **Manual Hierarchy (City of Tucson)**
Manuals for Signing and Striping Design and Installation should be used in the following order:
- MUTCD
- Pima County/City of Tucson Signing and Marking Manual
- PAG Standards and Specifications
- ADOT Guidelines

At the time of publication of this Manual, the City of Tucson has completed the Draft *Street Design Guide* in support of its Complete Streets Policy. Where there may be conflicts or inconsistencies between the guidance provided in the *Street Design Guide* and this and/or other Manuals, practitioners should look to the City of Tucson *Street Design Guide* for guidance. Though, in all cases, engineering judgment should be used.
Raised Pavement Markers

- Non-Reflective RPM
  - Type A (White)
  - Type AY (Yellow)
  - Type AB (Black)

- One-Way Reflective RPM
  - Type G (White)
  - Type H (Yellow)

- Two-Way Reflective RPM
  - Type D (Yellow)
  - Type C (White, Red)
  - Type F (Blue, Blue)

Recessed Pavement Markers

Types C and D

Recessing Groove Details (PIMA COUNTY ONLY)

- Section A-A
- Section B-B
- Section C-C

NOTE:
1. The offset dimension of RPMs placed next to the solid line in a turn lane shall be 2" plus or minus 1/2". RPMs placed in gaps of lane lines or guide lines shall have no offset from the centerline of the striped lane.
2. For recessed markers, the depth and width of groove may be adjusted slightly to fit the physical dimensions of the type of marker shown on plans.
YSB Series Lines – Yellow Broken Lines

YSB4–D40 – 4" Yellow Solid Line & Yellow Broken Line with Type "D" RPMs at 40' Spacing.

YSB4–D40 (TWLTL) – 4" Yellow Solid Line & Yellow Broken Line with Type "D" RPMs at 40' Spacing.

YB Series Lines

YB4–D40 – 4" Yellow Broken Centerline with Type "D" RPMs at 40' Spacing.

YDS Series Lines – Yellow Double Solid Series Lines

YDS4–D40 – 4" Double Yellow Centerline with Type "D" RPMs at 40' spacing

Direction of Travel

Notes:
1. The offset dimension of RPMs placed next to the solid lines shall be 2" plus or minus 1/2". RPMs placed in gaps of lane lines or guide lines shall have no offset from the centerline of the striped lane.
2. RPM spacing may be reduced depending on the road geometry.

PCDOT/COT
SIGNING AND MARKING STANDARDS
Yellow Longitudinal Pavement Markings
(PIMA COUNTY)
YSB Series Lines – Yellow Broken Lines

YSB4–D40/D40 – 4" Yellow Solid Line & Yellow Broken Line with Type "D" RPMs at 40’ Spacing.

YSB4–D40/D40 (TWLTL) – 4" Yellow Solid Line & Yellow Broken Line with Type "D" RPMs at 40’ Spacing.

YB Series Lines

YB4–D40 – 4" Yellow Broken Centerline with Type "D" RPMs at 40’ Spacing.

YDS Series Lines – Yellow Double Solid Series Lines

YDS4–D40/D40 – 4" Double Yellow Centerline with Type "D" RPMs at 40’ spacing

Notes:
1. The offset dimension of RPMs placed next to the solid lines shall be 2” plus or minus 1/2”. RPMs placed in gaps of lane lines or guide lines shall have no offset from the centerline of the striped lane.
2. RPM spacing may be reduced depending on the road geometry.
**WB Series Lines – White Broken Lines**

**WB4-G40 – 4” White Broken Centerline with Type “G” RPMs at 40’ Spacing.**

**WB4-C40 – 4” White Broken Centerline with Type “C” RPMs at 40’ Spacing.**

**WS8-G20 – 8” White solid line with Type “G” RPMs at 20’ Spacing (If used shall be placed next to the white line in the Thru Travel Lane).** NOTE: Do not use RPMs along line at edges of bike lanes.

**WS8-C20 – 8” White solid line with Type “C” RPMs at 20’ Spacing (If used shall be placed next to the white line in the Thru Travel Lane).** NOTE: Do not use RPMs along line at edges of bike lanes.

**Direction of Travel**

**Notes:**
1. The offset dimension of RPMs placed next to the solid lines shall be 2” plus or minus 1/2”. RPMs placed in gaps of lane lines or guide lines shall have no offset from the centerline of the striped lane.
2. RPM spacing may be reduced depending on the road geometry

**Line Style Designation:** YDS4 - D40

**PCDOT/COT SIGNING AND MARKING STANDARDS**

**White Longitudinal Pavement Markings**

**ISSUED:**
DEC 2020

**REVISED:**

**SHEET NO.**
3.1.2
WG Series Lines — White Guide Lines (These details can also apply to YG Series Lines)

WG4 (2 X 6) — 4” White Guide Striping (2’ Stripe, 6’ Gap)

WG6 (2 X 6) — 6” White Guide Striping (2’ Stripe, 6’ Gap)

WG8 (2 X 6) — 8” White Guide Striping (2’ Stripe, 6’ Gap)

WG4 (3 X 9) — 4” White Guide Striping (3’ Stripe, 9’ Gap)

WG8 (3 X 9) — 8” White Guide Striping (3’ Stripe, 9’ Gap)
NOTES:

1. The bike symbol should be placed approximately 65 ft. (from crosswalk) from the crossroad, or other locations as needed. The frequency of the symbol is every half mile (City of Tucson) or quarter mile (Pima County) and after every major signalized intersection with a paved shoulder of 4 ft. or more.

2. 65 ft. ensures that turning vehicles do not damage the legends. Distance from intersection should take into consideration the presence of driveways and bus stops. Avoid placing legends where buses stop and dwell.

LEGEND

- Direction of Travel.
**DETAIL "A"**

White Edgeline with Paved Shoulder < 4’-0”

**DETAIL "B"**

White Edgeline with Paved Shoulder ≥ 4’-0”

**DETAIL "C" (COT USE ONLY)**

White Edgeline with On Street Parking

**NOTES:**

1. If there is a stop line, the edgeline will go to the stop line.
Crosswalk at Signalized Intersection

High Visibility Crosswalk (White)

High Visibility School Crosswalk (Yellow)

*Gap is measured from the inside edge to the inside edge of the crosswalk lines
Stop Line

WS – White Solid Line
(Width Determined by table below)

<table>
<thead>
<tr>
<th>Type of Control</th>
<th>*Speed Limit (MPH)</th>
<th>Stop Line Width</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stop</td>
<td>≤40</td>
<td>12”</td>
</tr>
<tr>
<td>Stop</td>
<td>≥45</td>
<td>24”</td>
</tr>
<tr>
<td>Traffic Signal</td>
<td>All</td>
<td>12”</td>
</tr>
<tr>
<td>HAWK</td>
<td>All</td>
<td>12”</td>
</tr>
</tbody>
</table>

* At non-signalized intersections the highest speed approach will determine the width of the stop line for all approaches.

Note:
1. Stop lines should be installed at:
   - All 4-Way stops (where approach street is striped)
   - All signalized intersections.

Yield Line

WS – White Solid

3” min
12” max

Direction of Travel

36”

24”
NOTES:

1. Use WS12 at intersections with stop sign or traffic signal control and with speed limits ≤ 40mph. Use WS24 at intersections with stop sign control and with approach speed limits ≥ 45 mph. If intersecting street have different speed limits, the higher speed limit controls.

2. Minimum distance between stop line and edgeline shall be 4 feet.

3. Stop lines may be placed parallel to the intersecting street at skewed intersections, if approved by the Engineer.

4. Stop lines should be placed to optimize sight distance whenever possible.

5. Stop lines shall be placed a minimum of 4 feet in advance of crosswalks and curb access ramps.

6. At multi-way stops, on striped roads only, the stop line shall be placed at sight visibility distance determined in field by the Engineer.

7. Stop Lines are not installed at residential streets (25 MPH) unless deemed necessary by the Engineer.
NOTE:

1. All arrows and legends shall be white.

2. Pavement Word, Symbol, and Arrow Marking should be installed in the center of the lane or shoulder. Merge Arrows should be installed as shown above and on the Lane Drop Detail with the appropriate increasing off-sets.

3. Merge right arrow mirrors merge left arrow.

4. See sheet 3.2.5 for arrow layout details.
Notes:

1. See Lane Drop Detail for location of tip of arrow in relation to lane line. Distance "X" from the arrow tip to lane line is 36" for first arrow, 24" for second arrow, and 12" for third arrow.
NOTE:

1. $D=20'$ for speed limit 25–40 mph.
2. $D=30'$ for speed limit > 45 mph.
3. Pavement Words should be installed in the center of the lane.
Lateral placement of markers is staggered such that the full face of each marker is visible to oncoming traffic.

6' Typical or Median width per plans

1' Clear (TDOT)
1'-2' Clear (PCDOT)
(See Notes 3 & 4)

**TYPE 1 MEDIAN NOSE**

Lateral placement of markers is staggered such that the full face of each marker is visible to oncoming traffic.

6' Typical or Median width per plans

1' Clear (TDOT)
1'-2' Clear (PCDOT)
(See Notes 3 & 4)

**TYPE 2 MEDIAN NOSE**

* Show a total of six RPMs along edgeline for each median type.

**NOTES:**

1. Half of the RPMs mounted on the median nose end shall be aimed at on-coming traffic and half shall be aimed at the cross-street approach left-turn movement in an alternating pattern, as shown.

2. A minimum of 6 RPMs shall be installed at equal spacing. Maximum spacing is 2'-0".

3. For City of Tucson, the offset of the median yellow edgeline from the face of curb is typically 1'-0".

4. For Pima County, the offset of the median yellow edgeline from the face of curb is typically 1'-0" for a median without a gutter pan, or 2'-0" for a median with a gutter pan.
Lateral placement of markers is staggered such that the full face of each marker is visible to oncoming traffic.

1. Clear (TDOT) 1'-2' Clear (PCDOT) (See Note 3 & 4)

6 Type H RPMs
Mount on Pavement

6' (Typ.)

1'- Clear (TDOT)
1'-2' Clear (PCDOT) (See Note 3 & 4)

TYPE 1 - TYPICAL MEDIAN END TREATMENT
NTS

Lateral placement of markers is staggered such that the full face of each marker is visible to oncoming traffic.

6 Type H RPMs
Mount on Pavement

6' (Typ.)

End of Radius

1'- Clear (TDOT)
1'-2' Clear (PCDOT) (See Note 3 & 4)

6 Type H RPM
Mount on top of curb (See Notes 1 & 2)

NOTES:

1. Half of the RPMs mounted on the median nose end shall be aimed at on-coming traffic and half shall be aimed at the cross-street approach left-turn movement in an alternating pattern, as shown.

2. A minimum of 6 RPMs shall be installed at equal spacing. Maximum spacing is 2'-0".

3. For City of Tucson, the offset of the median yellow edgeline from the face of curb is typically 1'-0".

4. For Pima County, the offset of the median yellow edgeline from the face of curb is typically 1'-0" for a median without a gutter pan, or 2'-0" for a median with a gutter pan.
Placement of Blue RPMs for Fire Hydrants

**TWO LANE STREET**

- Fire Hydrant (TYP)

**MULTI-LANE STREET**

(Install RPM in Left-Most Lane)

**TWO LANE STREET AT INTERSECTION**

**FOUR LANE STREET WITH TURN LANE AT INTERSECTION**

**CUL-DE-SAC INSTALLATION**

**FREEWAYS AND EXPRESSWAYS**

- Edgeline
- Median
- Shoulder
- R/W Fence
SINGLE POST FOUNDATION DETAIL IN CONCRETE

2" x 2" Post

Bolt Shall Be Perpendicular to Major or Critical Traffic Flow

NOTES:
1. For single post field splices, if the shortest post section is less than panel height, then splice shall be behind panel.

2. No bolts shall be permitted below the grade.
U-Channel Post (MAINTENANCE PURPOSES ONLY)

Base Post and Installation

Base Post
2" - 3" Taper

Varies to 12' - 0" (in 6" increments)

Sign Post

5/16" x 1 1/2" UNC Thread Grade 9 Cadmium Plated Hex. Head Allthread Bolt with Flat Washer, Lock Washer and Hex. Nut

Installation Pictorial

U-Channel Base Post
5/16" Dia. x 1/2"
UNC Threaded Grade 9 Cadmium Plated Hex with Head Bolt Flat Washer Lock Washer and Hex Nut

Sign Panel

Top View

U-Channel Post
3/4" Stainless or Galv. Steel Strap or Lock Buckle

Signal Pole or Push Button Post

Side View

U-Channel Post

Sign Panel
3/4" Stainless or Galv. Steel Strap or Lock Buckle

Signal Pole or Push Button Post

Cadmium Plated Hex Nut with Washer

3/8" x 3" Cadmium Plated Hex Head Bolt

Nylon Washer

Sign Panel to U-Channel Post
STREET NAME SIGN (METRO) MOUNTING HARDWARE

Astro Bracket (band on) AS–3004–48–PNC
Gusseted Tube 94” AB–0390–94–PNC
Sign Clamp 4” AB–0502–04–PNC
Pelco Brand or Approved Equal
Sign Installation on Signal/Light Pole
Band-Type Clamp (PIMA COUNTY)

Existing Pole

现有杆

Satinless or Galv. Steel - Lock Buckle
不锈钢或热镀锌钢- 锁扣

现有杆

Satinless or Galv. Steel Strap
不锈钢或热镀锌钢带

现有杆

Elevation at top of curb or edge of pavement
路边或路缘的顶部

Sign Panel
标志面板

Plated Washer
镀镍垫圈

1/2 in.
1/2 英寸

Existing Luminaire Pole
现有照明杆

Sign Bracket Spacing to Match Hole Spacing
标志支架间距与孔间距匹配

7'-0"
7'-0"

3"
3"
SIGN MOUNTING BRACKET INSTALLATION

TYPICAL INSTALLATION OF SIGN ON POLE MAST ARM

Existing Mast Arm

Existing Pole

Sign Panel

Plated Washer

\( \frac{3}{8} \) Stainless or Galv. Steel – Lock Buckle

\( \frac{5}{8} \) Stainless or Galv. Steel Strap

\( \frac{5}{16} \times \frac{5}{16} \) Plated Hex. Head Bolt and Hex Nut

Sign Bracket Spacing
to Match Hole Spacing

\( 4" \)

\( \frac{3}{8} " \)

\( 1 \frac{1}{2} " \)

\( \frac{5}{8} " \)

Elevation at top of curb or edge of pavement
* Exhibit 1 refers only signs mounted on poles that are of type of F, Q, or R.
EXHIBIT 2

Sign Mounting

Note: See Exhibit 3 for Sign Mounting Assembly Details

INSTALL WHITE REFLECTIVE SHEETING ON BRACING BARS

DIAM. 3/8" (Typ.)

6" STABILIZING ANGLE

6'-0" SHEETING ON STABILIZING ANGLE

1 1/2"

6" 5/8"

5"

DIAM. 3/8" (Typ.)

6'-0"

DIAM. 3/8" (Typ.)

6'-0"

N Street

Blvd

800 N

800 Blvd

N Street

TWO 12-IN BARS

BACK

FRONT

6-FT STABILIZING ANGLE

CITY OF TUCSON

ISSUED: DEC 2020

PCDOT/COT SIGNING AND MARKING STANDARDS

SIGN MOUNTING

(CITY OF TUCSON)

REVISED:

SHEET NO.

4.6c
EXHIBIT 3  
Sign Mounting Assembly  
Page 2 of 2 

1. 1.5"x1.5"x0.25" Stabilizing Angle  
2. 1.25"x0.25"x12" Bracing Bar  
3. 1.00"x1.00" Extender  
4. 1.5"x1.5"x0.1875" Aluminum Tubing  
5. 1.00"x1.00"x2.25" Connector  
6. Cradle  

Sign Mounting Assembly (CITY OF TUCSON)
Vertical Curbed Street

Through Street

Controlled Street

2'-0" Min. To FOC

Vertical Curb
Width ≥ 3'-0"

R1-1 or R1-2 & D3

Sidewalk

50' Max.

Wedged Curbed Street

Through Street

Controlled Street

1'-0" Min. To BOC

Wedged Curb
Width ≥ 3'-0"

R1-1 or R1-2 & D3

Sidewalk

50' Max.

NOTES:

1. This standard applies to both stop signs (R1-1) and yield signs (R1-2).
2. All signs to be placed in advance of curb access ramps.
Preferred Location (Std.)
Permitted Location as approved by the engineer

NOTES:

1. This standard applies to both stop signs (R1-1) and yield signs (R1-2).
2. The sign post should be a maximum of 15’ off the edge of pavement.
3. All signs to be placed in advance of curb access ramps.
Notes

1. This standard applies to all sign types with a square footage of less than 10 feet.

2. This standard also applies to non-curbed medians.

3. Refer to Section 4 for Sign Support Details.
Notes:

1. This standard applies to all sign types with a square footage of 10 s.f. or greater.

2. This standard also applies to non-curbed medians.

3. See Section 4 for Sign Support Details.
Notes:

1. The D3–2 is an advance street name sign with black letters on a yellow background.

2. The D3–2 is not extended beyond the W Series sign on the road side.

3. See Section 4 for Sign Support Details.
Notes:

1. Use 2’-0” to 6’-0” when walls, sidewalks, trees, or other obstructions will not allow installation within the preferred range of distances.
Notes:

1. This standard applies to any supplemental sign under any type of primary sign with a square footage of less than 10 feet.

2. This standard also applies to non-curbed medians.

3. See Section 4 for Sign Support Details.
Notes:

1. This standard applies to any supplemental sign under any type of primary sign with a square footage of 10 s.f. or greater.

2. This standard also applies to non-curbed medians.

3. See Section 4 for Sign Support Details.
Notes:

1. This standard applies to all sign types with square footage of less than 10 feet.

2. This standard also applies to curved medians.

3. See Section 4 for Sign Support Details.
Notes:

1. This standard applies to any and all sign types with square footage of less than 10 feet.

2. This standard also applies to curbed medians.

3. This standard applies with or without sidewalk.
6'-0" To 15'-0" Preferred
2'-0" To 6'-0" Permitted as noted

Edge of Traveled way

Rural

Urban

1'-0" Min.

2'-0" Min.

* Optional – Supplemental Plaque

D3

R1-1 or R1-2

D3

R1-1 or R1-2

BOC

Width ≥ 3'-0"

Concrete Wedge Curb

Concrete Vertical Curb

FOC

Sidewalk

Sidewalk

Note:
1. Use 2'-0" to 6'-0" when walls, sidewalks, trees or other obstructions will not allow installation within the preferred range of distances.
NOTES:

1. RPM placement begins at the start of the turn lane (direction of travel) and the number of RPMs depends on the length of the storage lanes.

2. Gore is optional for the City of Tucson. If it is used, and it is ≥6' wide, chevrons are required (See Sheet 9.5).

3. CITY OF TUCSON – One way signs on the minor street approaches shall be placed in lieu of keep right signs as shown in section 2B–40 of the MUTCD.
Notes

1. Typical placement is in target position for approaching vehicles.

2. Distance to the bottom of the sign R6–1(R) in the median shall be 5’–0” from the top of curb elevation.
NOTES:

1. If an object marker is used to mark an obstruction adjacent to the roadway, the edge of the object marker that is closest to the roadway shall be installed in line with the closest edge of the obstruction.

2. If a single object marker is used to mark an obstruction within the roadway, the object marker should be approximately centered on the center of the obstruction.

3. All dimensions are nominal, except as noted.
NOTES:
1. The option to be used is to be determined by engineering judgment, based on the road classification, speed limits, crash history, etc. For example, on a low volume road with a low speed limit, and minimal crash history, Option A would most likely apply. In contrast for a high volume road, with a higher speed limit, and more prominent crash history, Option C would most likely apply.

2. When changing W1-8 (chevron) signs to the OM1-3 signs, the number of OM1-3 signs should remain the same as the number of W1-8 signs being replaced.
**NOTES:**

1. The single green marker shall be used at the beginning of curb or guardrail.
2. The double green marker shall be used at the end of curb or guardrail.
3. Snow markers are installed on u-channel posts.
ISSUED:
DEC 2020

REVISED:

PCDOT/COT
SIGNING AND MARKING STANDARDS
Street Name Signs (D3-1 SN)
(PIMA COUNTY)

NOTES:
1. Legend, Abbreviations, Suffixes, and prefixes are to comply with Pima County Code 18.83.
2. Measurements are shown in inches.
3. Sign plates should be 6” in Height for signs facing approaches where the approach speed is 25 MPH or less or where the approach is controlled by a stop or yield sign. Sign plates should be 9” in height for signs facing approaches where the speed is greater than 25 MPH and the approach to the intersection is not controlled.
4. Sign plates are .08” aluminum with 1.5” radii.
5. Street name signs greater than 42” may be approved at the discretion of the Traffic Engineer.
6. The sign identification decal shall be 1.5” in diameter made of black UV resistant ink or film on clear pressure sensitive substrate. The identification detail shall be placed over the reflective sheeting, beneath the green overlay film, on the lower left hand corner of the sign. Detail shall be placed on all street name signs.
7. Sign sheeting shall be type XI or an equivalent.
8. Signs shall utilize the FHWA standard alphabet font series. See FHWA Standard Highway Signs and Markings Book for Design Details.
* Street Names containing descending letters such as "p" or "y" should be shifted vertically towards the top of the sign plate. For a 9” plate, the d value for the top margin should be 1” and the d value for the bottom margin should be 2”. For a 6” plate, the d value for the top margin should be 0.5” and the d value for the bottom margin should be 1.5”.

BACKGROUND - GREEN
LEGEND - WHITE
To be manufactured on (1) 15” sign plate

NOTES:

1. The 15” combination sign shall be manufactured with two separate sign plates. Each plate has legend on one side only.

2. This is a pair of matching single sided signs intended to be mounted back to back on opposing sides of a square sign post.

3. No outlet plaques should be installed in conjunction with street name signs on local roadways that intersect a collector or arterial where the no outlet condition exists.
NOTES:

1. Legends, Abbreviations, Suffixes, and prefixes are to comply with Pima County Code 18.83.
2. Measurements are shown in inches.
3. Sign plates are .08" aluminum with 1.5" radii.
4. All white borders are 0.75" on the outside edge.
5. Advance Street Name Warning Sign (W16-8P) applications are to use the same dimensions and font as this detail, but with no arrow, and a yellow background with black legend.
6. Sign sheeting shall be type XI or an equivalent.
7. Signs shall utilize the FHWA standard alphabet font series. See FHWA Standard Highway Signs and Markings Book for Design Details.
* Street Names containing descending letters such as "p" or "y" should be shifted vertically towards the top of the sign plate. The d value for the top margin should be 2.5" and the d value for the bottom margin should be 3.5".
NOTES:

1. Legends, Abbreviations, Suffixes, and prefixes are to comply with Pima County Code 18.83.

2. Measurements are shown in inches.

3. Sign plates are .08" aluminum with 1.5" radii.

4. All white borders are 1" on the outside edge.

5. Sign sheeting shall be Type XI or an equivalent.


* Street Names containing descending letters such as "p" or "y" should be shifted vertically towards the top of the sign plate. The h value for the top margin should be 3.5" and the h value for the bottom margin should be 4.5".

<table>
<thead>
<tr>
<th>a</th>
<th>b</th>
<th>c</th>
<th>d</th>
<th>e</th>
<th>f</th>
<th>g</th>
<th>h</th>
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<td>16</td>
<td>4C/D</td>
<td>2</td>
<td>8C/D</td>
<td>6C/D</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

BACKGROUND – GREEN
LEGEND – WHITE

FHWA SERIES FONT
SEE NOTE #6

LETTER HEIGHT
Typical Street Name Sign Legend

6" sign (major street name)

Cardinal direction of street alignment

"Ruthrauff Rd 4800 N"

The 100 block reference is in the cardinal direction perpendicular to street alignment.

9" sign (minor street name)

"Courtney Dr 1900 W"

Exceptions to Typical Street Name Sign Legend

A. For intersecting streets with the same cardinal direction.

B. For Cul-de-sacs where addresses are not visible from the street.

W Ruthrauff Rd

Intersection of W Ruthrauff Rd and W Scots Pine St

W Scots Pine St

Cul-de-sac

N Pontatoc Rd

NOTES:

1. A "NO OUTLET" sign plate may be required underneath the street name sign depending on length of Cul-de-sac.
* All done on "HWY C" unless: (HIROADC)
- 3-letters or less and all #’s use "HWY D" (HIROADEM)
- anything too long use "HWY B" (HIROADB)

**NO COMPRESSION OR STRETCHING!!**

### Standard Set-up

- 22nd St
  - 3" Hwy D 6x24
  - 4"
- Wilmot Rd
  - 3.75" Hwy C 6x24
  - 4"
- Highland Ave
  - 3.75" Hwy C 6x30
  - 4"
- Palo Verde Ave
  - 3.75" Hwy B 6x30
  - 4"

### Set-up for Speed Limit 30-40 M.P.H.

- 10th St
  - Hwy D 9x30
  - 6" 3"
- Highland Rd
  - Hwy C 9x36
  - 5" 3"
- Palo Verde Ave
  - Hwy B 9x42
  - 6" 5"

### Set-up for Speed Limit 45 and up M.P.H.

- Giachery Ave
  - Hwy C 9x36
  - 8" 3"
- Speedway Ave
  - Hwy C 9x42
  - 8" 3"
Sheeting Type: 3M Diamond Grade DG3 Reflective Sheeting
Color: WHITE

PLATE SIZE 18x96

NWC-WBT
FRONT PANEL

SEC-EBT
FRONT PANEL

BACK PANEL

S Pantano Rd 7900 E

S Pantano Rd 7900 E

S Pantano Pkwy 7900 E

S Pantano Pkwy 7900 E
Notes:
1. See Table 2C-4 of the Arizona Supplement to the MUTCD for Advance Placement Distance.
Note:
1. Refer to ADOT Traffic Safety for School Area Guidelines for length of solid approach stripe.
2. See Table 2C-4 of the AZ Supplement to the MUTCD for Advance Placement Distance.
WS8 Length = 300 ft - X ft
Typical both approaches
See Note #4

NOTES:
1. Flasher heads on mast arms should align with lane lines.
2. See Table 2C-4 of the Arizona Supplement to the MUTCD for Advance Placement Distance.
3. Use WS12 when speed limit is ≤ 40 mph and WS24 when speed limit is ≥ 45 mph.
4. Pavement circles shall be installed at a school crosswalk and in advance of a school crosswalk for each approach direction in accordance with the ADOT Traffic Safety for School Areas Guidelines.
5. The stop bar should not be located within a side street intersection.
A. Orta HAWK SCHOOL CROSSING (PIMA COUNTY)

WS8 Length = 300 ft = X ft
Typical both approaches
See Note #3

WS8 Length = 300 ft = X ft
Typical both approaches
See Note #4

NOTES:
1. Flasher heads on mast arms should align with lane lines.
2. See Table 2C-4 of the Arizona Supplement to the MUTCD for Advance Placement Distance.
3. Use WS12 when speed limit is ≤ 40 mph
   and WS24 when speed limit is ≥ 45 mph.
4. Pavement circles shall be installed at a school crosswalk and in advance of a school crosswalk for
each approach direction in accordance with the ADOT Traffic Safety for School Areas Guidelines.
5. The stop bar should not be located within a side street intersection.
NOTES:

1. Length L of WS8 between through lanes behind stop bars is 200’ if speed limit is <= 35 mph, or 280’ if speed limit is >= 40 mph.

2. Flasher heads on mast arms should align with lane lines. County standard is two heads on mast arm. City minimum standard is one flasher head on mast arm and one flasher head on signal pole. Dual heads on mast arm is optional for the City.

3. For posted speeds of 45 mph or greater, stopbars may be 24".

4. In school zones, use yellow high-visibility crosswalk.

5. In school zones, replace W11-2 and SPW03-2 with S1-1 and W16-9p.

6. In school zones, replace pole-mounted R10-23 with S1-1 and W16-7p assembly, and replace arm-mounted R10-23 with S1-1.
NOTES:

1. Length L of WS8 between through lanes behind stop bars is 200' if speed limit is <= 35 mph, or 280' if speed limit is >= 40 mph.

2. For posted speeds of 45 mph or greater, stopbars may be 24".

3. For plan for signing and signals, see sheet 6-4.2.

4. Curb access ramps shall be designed to accommodate bicycles when bicyclists are directed to sidewalk at the intersection.
BIKE HAWK TRAFFIC CONTROL ILLUMINATED SIGN ASSEMBLY

Bike Illuminated Sign, same size as pedestrian signal head

- Bike pushbutton
- R9-5 signs
- Type A signal pole

BIKE ILLUMINATED SIGN MESSAGES

- BIKES WAIT (orange)
- BIKES OK (white)

R9-3
18x18
(Optional)
(typ both corners)

R10-11
36x48
(optional)

150' MIN

1. For plan for pavement markings, see sheet 6-4.1.

NOTES:

Internally illuminated bike / ped crossing sign
Black on yellow, 96" x 18"

PCDOT/COT
SIGNING AND MARKING STANDARDS

ISSUED: DEC 2020

REVISED: 

Bike HAWK Crossing Signing and Signal Detail
(CITY OF TUCSON)

SHEET NO. 7.6
KEY:

SL – Storage Length (feet)

D – Distance between Arrows and Legends (feet)

CASE 1

\[ \text{SL} < 110' \quad D = \text{SL} - 36 \]

CASE 2

\[ 110' \leq \text{SL} \leq 200' \quad D = \frac{(\text{SL} - 144)}{2} \]

CASE 3

\[ 201' \leq \text{SL} \leq 300' \quad D = \frac{(\text{SL} - 52)}{3} \]

CASE 4

\[ \text{SL} > 300' \quad D = \frac{(\text{SL} - 132)}{2} \]

*Turn lane pavement markings for single left turn lanes should only be installed at the direction of the traffic engineer.

NOTES:

1. These details also apply to right-turn lanes.

2. For dual turn lanes, dimensions shall be the same for each lane.

3. SL dimension is from stop line to end of turn lane storage.
NOTES:
1. See Appendix A for storage and taper lengths.
2. See Sheet 8.1 for placement of arrows and onlys.
NOTES:
1. See Appendix A for storage and taper lengths.
2. See Sheet 8.1 for placement of arrows and onlys.
3. CITY OF TUCSON—For RPM placement within the COT see detail 3.1.1b.
NOTES:

1. City Of Tucson— For RPM placement within the COT, See detail 3.1.1b.
NOTES:

1. RPM placement begins at the start of the turn lane (direction of travel) and the number of RPMs depends on the length of the storage lanes.

2. See Appendix A for gap and storage lengths.

3. CITY OF TUCSON – For RPM placement within COT, see detail 3.1.1b.
NOTES:

1. If gore is greater than 6’ wide, chevrons are required.
2. See Appendix A for gap and storage lengths.
3. CITY OF TUCSON – For RPM placement within the COT, See Detail 3.1.1b.
NOTES:

1. RPM placement begins at the start of the turn lane (direction of travel) and the number of RPMs depends on the length of the storage lanes.

2. All white reflective RPMs where there is a raised median shall be Type C (White/Red) RPMs. The spacing of the Type C RPMs shall be every 20 feet on solid white lines (WS6–C20) and every 40 feet on broken white lines (WB4–C40).

3. Chevrons are required for gore areas greater than 6’ wide.

4. Medians shall be painted per the Median End Treatment Detail.

5. Typical offset of median yellow edge line from face of curb is 1’. If there is curb and gutter, the offset is 2’ from the face of curb or edge of pavement.


7. CITY OF TUCSON – One Way signs on the minor street approaches shall be placed in lieu of Keep Right signs as shown in Section 2B–40 of the MUTCD.
NOTES:
1. See Appendix A for taper length, gap, and storage.
2. CITY OF TUCSON – For RPM placement within COT, See detail 3.1.1b.
NOTES:

1. RPM placement begin at the start of the turn lane (direction of travel) and the number of RPMs depends on the length of the storage lanes.

2. All white reflective RPMs where there is a raised median shall be Type C (White/Red) RPMs. The spacing of the Type C RPMs shall be every 20 feet on solid white lines (WS8-C20) and every 40 feet on broken white lines (WB4-C40).

3. Chevrons are required for gore areas greater than 6’ wide.

4. Medians shall be painted per the Median and Treatment Detail.

5. Typical off-set of median yellow edge line from face of curb or edge of pavement is 1’. If there is curb and gutter, the off-set is 2’ from the face of curb or edge of pavement.

6. RPMs shall not be used on lane lines adjacent to bike lanes.

7. The tapered end of the gore shall be designed so that the width of the lane opening, A, equals the width of the turn lane.

8. Gore optional for City of Tucson.
NOTES:

1. All white reflective RPMs where there is a raised median shall be Type C (white/red) RPMs. The spacing of the Type C RPMs shall be every 20 feet for solid white lines and every 40 ft on broken white lines.

2. Guide stripe across turn bay opening (2x6) is intended for use on horizontal curves and in areas where extra guidance may be needed, as determined by the Engineer.

3. Chevrons are required for gore areas greater than 6’ wide.

4. Medians shall be painted per the Median End Treatment Detail.

5. CITY OF TUCSON – Signs regulating turning prohibition should be determined by the traffic engineer.

6. The Tapered end of the gore shall be designed so that the width of the lane opening, A, equals the width of the turn lane.

7. See Appendix A for storage, taper and reverse curve lengths.
NOTE:

1. Chevrons are required in gore areas ≥ 6' wide.

2. Recommended minimum radius for WG4(2x6) guide lines is 60 feet. Ensure 10ft minimum tangent section at both ends of guide lines.
NOTES:

1. All white reflective RPMs where there is a raised median shall be Type C (white/red) RPMs for a distance equal to the longest turn bay length (left or right). The spacing of the Type C RPMs shall be every 20 feet for solid white lines and every 40 ft on broken white lines.

2. Guide stripe across turn bay opening (2x6) is intended for use on horizontal curves and in areas where extra guidance may be needed, as determined by the Engineer.

3. Chevrons are required for gore areas greater than 6’ wide.

4. CITY OF TUCSON — Turn lane pavement markings for single left turn lanes should only be installed at the direction of the traffic engineer.

5. The tapered end of the gore shall be designed so that the width of the lane opening, A, equals the width of the turn lane.

6. See Appendix A for storage, taper and reverse curve lengths.

7. CITY OF TUCSON — Signs regulating turning prohibition should be determined by the traffic engineer.
Channelized Right-Turn Lane

- All bull noses shall be painted and RPM's installed per Detail 3.3.3.
- See Appendix A for storage and taper lengths.
- (PIMA COUNTY)–See Table 2C–4 of the Arizona Supplement to the MUTCD for Advance Placement Distance.
- (CITY of TUCSON)–See Table 2C–4 of the MUTCD for Advance Placement Distance.
Channelized Right-Turn Lane with Acceleration Lane

**NOTES:**

1. All bull noses shall be painted and RPM's installed per Detail 3.3.3.

2. See Appendix A for storage and taper lengths.

3. (PIMA COUNTY)—See Table 2C-4 of the Arizona Supplement to the MUTCD for Advance Placement Distance. (CITY OF TUCSON)—See Table 2C-4 of the MUTCD for Advance Placement Distance.
NOTES:

1. OMI-3 to be installed only in non-mountable splitter island.
2. Signs depicted apply to all approaches.
3. All RPMs should be aimed at oncoming traffic.
4. A minimum of 500' of double yellow striping shall be installed on all approaches (when applicable).
5. See sheet 8.14a for Splitter Island Striping Detail.
Notes:

1. Non-mountable splitter islands shall provide a 6’ minimum pedestrian refuge area with detectable warning strips in addition to the High Visibility Crosswalk.

2. Traversable splitter islands shall be striped with a High Visibility Crosswalk.

3. See Single Lane Roundabout detail for signing.
NOTES:
1. No Outlet plaques are to be installed dependent on configuration of subdivision.
2. PIMA COUNTY – For new construction, yield signs should only be placed on two approaches of a 4-legged intersection to establish right of way.
3. PIMA COUNTY – Stop Signs should be installed on local streets where they intersect with a higher classification roadway.
PROCEDURE ON ESTABLISHING NO-PASSING ZONES

This policy is intended for use when establishing no-passing zones on unmarked roads. To establish a no-passing zone, the 2-car procedure is to be used. This procedure consists of a trail car, and lead car, each car being properly equipped with radars, flashing lights and sighting targets adjustable for height. For this procedure, the targets (height of eye and height of object) are to be 3.5 feet above the pavement corresponding to the requirements of 2009 MUTCD Section 38.02. The target on the lead car must be visible up to 1200 feet away.

<table>
<thead>
<tr>
<th>85th percentile Speed (mph) or Posted Speed Limit +5 mph</th>
<th>Minimum Passing Sight Distance (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>25</td>
<td>450</td>
</tr>
<tr>
<td>30</td>
<td>500</td>
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<td>1100</td>
</tr>
<tr>
<td>70</td>
<td>1200</td>
</tr>
</tbody>
</table>

After the minimum passing sight distance is chosen from the table above, (See MUTCD, Table 3B–1) the procedure is begun by having the lead car layout a string line corresponding to the distance shown in the table above. While this is being done, the trail car remains stationary at the starting point. When the distance between the vehicles (measured with the string line) is correct, the lead car on command from the trail car begins to move forward. The trail car moves forward at the same rate using the string line to maintain proper spacing.

As the vehicles proceed to travel slowly ahead maintaining the proper spacing, should the lead car disappear from the view of the trail car, the command to stop is given by the trail car. Both cars then stop while the trail car driver marks the pavement. This is the beginning of the no-passing zone. The cars resume movement and when the lead car reappears, the command to stop is given and the trail car operator again marks the pavement ending the no-passing zone. When a no-passing zone is less than the 500 feet long, minor adjustments must be made to extend the no-passing zone to a minimum of 500 feet. If extended, the addition will be made at the beginning of the no-passing zone.

A check must be made to see that the distance between two consecutive no-passing zones is not less than 400 feet. When the distance between consecutive no-passing zones is less than 400 feet, the no-passing zones will be extended thus eliminating short and unsafe passing zones.

When layout is completed for one direction of travel, the procedure is then repeated for the opposite direction.

When both directions are complete the following conditions must have been satisfied before striping can proceed:

1. The beginning of the no-passing zone will be that point where the sight distance becomes less than required.
2. The end of the no-passing zone will be that point where the sight distance again becomes greater than required.
3. The no-passing zones shall not be shorter than 500 feet.

The distance between consecutive no-passing zones shall be at least 400 feet.

Special consideration must be given to "dips" in the roadway profile. Vehicles hidden in dips are not a normal driver expectancy and the unsuspecting passing motorist can be caught unaware when approaching these locations. To be safe, the approaches to dips should be preceded with no-passing zones except at those locations where vehicle identification is continuous under all circumstances.

Communications between vehicles during the 2-car procedure are to be conducted on a radio frequency that does not go through the repeater station. This can be done by using instruments equipped with hand held radios.

The foregoing procedure contains basic concepts pertaining to the 2-car procedure for laying out no-passing zones. A more complete and comprehensive discussion in ADOT’S Traffic Policy and Procedures Manual.
1. The No Passing Zones shall not be shorter than 500 feet.

2. The distance between consecutive no passing zones shall be a minimum of 400 feet.

3. CITY of TUCSON – For RPM placement within COT, see detail 3.1.1b.
NOTES:

1. This detail applies to all named roadways.
DETAIL 1 – SINGLE LEFT–TURN LANE TRANSITION

DETAIL 2 – DUAL LEFT–TURN LANE TRANSITION

NOTES:
1. See Appendix A for storage, gap and taper lengths.
2. CITY OF TUCSON – For RPM placement within COT, See detail 3.1.1b.
NOTES:
1. For diagonal hatching use YS12 or WS12 for ≤40 mph and YS24 or WS24 for speed limit ≥45 mph.

2. Diagonal hatching spacing shall be 20’ for ≤40 mph and 40’ for ≥45 mph, measured along roadway centerline.

3. If median is > 6’ wide, approaching diagonal hatching is required.

4. See Appendix A for taper, storage, and gap lengths.

5. CITY OF TUCSON – For RPM placement within COT see detail 3.1.1b.
NOTES:

1. For chevrons or diagonal hatching use YS12 or WS12 for  ≤ 40mph and YS24 or WS12 for ≥ 45mph.
2. Chevrons or diagonal hatching, spacing shall be 20’ for speed limit ≤40 mph and 80’ for speed limit ≥ 45 mph, measured along the roadway centerline and from the beginning of the approach taper.
3. The minimum no—passing zone length shall be 100’ on the departure and 500’ on the approach.
4. See Appendix A for approach taper lengths.
5. City of Tucson – For RPM pacement within COT, See detail 3.1.1b.
NOTES:

1. D is the distance from Taper Angle Point or PC to the W9-2 sign. D is the Advance Placement Distance for condition A in Table 2C-4 of the 2009 MUTCD AZ Supplement (Pima County) or the 2009 MUTCD (City of Tucson).

2. Design speed minus 5 mph may be substituted for posted speed limit.

3. Ensure that proper advance warning distance for signing is attained. If presence of intersections reduces pavement length, use available distance proportionally for merge arrow placement.

4. CITY OF TUCSON – Except for low-speed urban roadways, where curbs clearly define the roadway edge in the lane reduction transition, edge line markings should be installed from the location of the warning sign to beyond the beginning of the narrower roadway.

<table>
<thead>
<tr>
<th>Posted speed (mph)</th>
<th>Advance Placement Distance D (ft)</th>
<th>Merge arrow spacing, A (ft)</th>
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<td>325</td>
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<td>55</td>
<td>990</td>
<td>120</td>
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</tbody>
</table>

* Merge arrows will begin before W9-2 sign.

(City of Tucson Use)

<table>
<thead>
<tr>
<th>Posted speed (mph)</th>
<th>Advance Placement Distance D (ft)</th>
<th>Merge arrow spacing, A (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>25</td>
<td>250</td>
<td>40</td>
</tr>
<tr>
<td>30</td>
<td>325</td>
<td>40</td>
</tr>
<tr>
<td>35</td>
<td>400</td>
<td>40</td>
</tr>
<tr>
<td>40</td>
<td>475</td>
<td>80</td>
</tr>
<tr>
<td>45</td>
<td>550</td>
<td>80</td>
</tr>
<tr>
<td>50</td>
<td>625</td>
<td>80</td>
</tr>
<tr>
<td>55</td>
<td>700</td>
<td>120</td>
</tr>
</tbody>
</table>

(Pima County Use)
NOTES:

1. D is the distance from Taper Angle Point or PC to the W9−2 sign. D is the Advance Placement Distance for condition A in Table 2C−4 of the 2009 MUTCD AZ Supplement. (Pima County) or the 2009 MUTCD (City of Tucson).

2. Design speed minus 5 mph may be substituted for posted speed limit.

3. Ensure that proper advance warning distance for signing is attained. If presence of intersections reduces pavement length, use available distance proportionally for merge arrow placement.

4. CITY OF TUCSON – Except for low−speed urban roadways, where curbs clearly define the roadway edge in the lane reduction transition, edge line markings should be installed from the location of the warning sign to beyond the beginning of the narrower roadway.

<table>
<thead>
<tr>
<th>Posted speed (mph)</th>
<th>Advance Placement Distance D (ft)</th>
<th>Merge arrow spacing, A (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>25</td>
<td>325</td>
<td>40</td>
</tr>
<tr>
<td>30</td>
<td>460</td>
<td>40</td>
</tr>
<tr>
<td>35</td>
<td>565</td>
<td>40</td>
</tr>
<tr>
<td>40</td>
<td>670</td>
<td>80</td>
</tr>
<tr>
<td>45</td>
<td>775</td>
<td>80</td>
</tr>
<tr>
<td>50</td>
<td>885</td>
<td>80</td>
</tr>
<tr>
<td>55</td>
<td>990</td>
<td>120</td>
</tr>
</tbody>
</table>

* Merge arrows will begin before W9−2 sign. (City of Tucson Use)

<table>
<thead>
<tr>
<th>Posted speed (mph)</th>
<th>Advance Placement Distance D (ft)</th>
<th>Merge arrow spacing, A (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>25</td>
<td>250</td>
<td>40</td>
</tr>
<tr>
<td>30</td>
<td>325</td>
<td>40</td>
</tr>
<tr>
<td>35</td>
<td>400</td>
<td>40</td>
</tr>
<tr>
<td>40</td>
<td>475</td>
<td>80</td>
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<td>45</td>
<td>550</td>
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<tr>
<td>50</td>
<td>625</td>
<td>80</td>
</tr>
<tr>
<td>55</td>
<td>700</td>
<td>120</td>
</tr>
</tbody>
</table>

* (Pima County Use)
NOTES:

1. \( D_1 \) is the distance from the beginning of the turn lane to the W9-101L sign and length of WG6 (3x9) striping. \( D_1 \) is based on the 2009 Arizona Supplement to the MUTCD (City of Tucson) or the 2009 MUTCD (City of Tucson).

2. Design speed minus 5 mph may be substituted for posted speed limit.

3. \( D_2 \) is the beginning of the merge area for bicyclists to move leftward and continue straight through the intersection.

<table>
<thead>
<tr>
<th>Posted speed (mph)</th>
<th>Advance Placement Distance ( D_1 ) (ft)</th>
<th>Posted speed (mph)</th>
<th>Advance Placement Distance ( D_1 ) (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>25</td>
<td>325</td>
<td>25</td>
<td>250</td>
</tr>
<tr>
<td>30</td>
<td>460</td>
<td>30</td>
<td>325</td>
</tr>
<tr>
<td>35</td>
<td>565</td>
<td>35</td>
<td>400</td>
</tr>
<tr>
<td>40</td>
<td>670</td>
<td>40</td>
<td>475</td>
</tr>
<tr>
<td>45</td>
<td>775</td>
<td>45</td>
<td>550</td>
</tr>
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<td>50</td>
<td>885</td>
<td>50</td>
<td>625</td>
</tr>
<tr>
<td>55</td>
<td>990</td>
<td>55</td>
<td>700</td>
</tr>
</tbody>
</table>

(City of Tucson Use) (Pima County Use)

ISSUED: DEC 2020

PCDOT/COT SIGNING AND MARKING STANDARDS

REVISED:  

Right Trap Lane
The above sign assembly shall be installed per the advanced warning sign distance prior to the first speed hump for both directions of traffic.
1. The pointed end of the center white tape/paint shall end at approximately the top of the sloped section of table.

The above sign assembly shall be installed per the advanced warning sign distance prior to the first speed hump for both directions of traffic.
Typical Pavement Marking for Speed Humps (CITY OF TUCSON)

NOTES:
1. The pointed end of the center white tape/paint shall end at approximately the center of the speed hump.

LEGEND
- Direction of Travel.
CROSS SECTION C—C

CROSS SECTION D—D

NOTES:

1. The pointed end of the center white tape/paint shall end at approximately the center of the speed hump.
Typical Sign Placement for Local Streets w/ and w/o Speed Humps

* W/O Hump, Max. 250’
Note:
1. Typical placement of SRR04-10 is in target position for approaching vehicles.
2. CITY OF TUCSON - Refer to the COT engineering website for traffic circle details.
APPENDIX A

Thru Lane Shift/Left Turn Lane Taper Length

Symmetrical Widening - The preferred way of creating a left-turn lane is by widening the roadway on both sides equally as shown in Figure 1. This minimizes the amount of lateral shifting for through traffic. Taper lengths will be reduced by a proportional amount based on proportion of widening of each side. e.g., by 1/2 for symmetrical widening.

The taper length is determined by the formula:

\[ T = W \times S \text{ for speeds of 45 mph or greater} \]

and by

\[ T = \frac{(W \times S^2)}{60} \text{ for speeds under 45 mph} \]

where:

- \( T \) = Length of taper (FT)
- \( W \) = Horizontal offset (FT)
- \( S \) = Posted speed for existing roadways, or design speed for new or reconstructed roadways.

* See Sheet 3 for Gap and Storage Lengths

Figure 1. Symmetrical Widening
**Non-Symmetrical Widening**: In some instances it may be necessary to add the required widening to only one side of the roadway as shown in Figure 2. When widening to only one side, the taper length is determined by the formula:

\[ T = W \times S \] for speeds of 45 mph or greater

and by

\[ T = \frac{(W \times S^2)}{60} \] for speeds under 45 mph

where:

- \( T \) = Length of taper (FT)
- \( W \) = Horizontal offset (FT)
- \( S \) = Posted speed for existing roadways, or design speed for new or reconstructed roadways.

*See Sheet 3 for Gap and Storage Lengths

**Figure 2: Non Symmetrical Widening**
Right and Left Turn Lane Storage Lengths

A 95th percentile queue analysis should be used to determine right and left turn storage lengths. If values other than the 95th percentile are used, a justification shall be provided in the Traffic Study or a letter shall be submitted to the Engineer or their designee, for approval. Minimum storage lengths are provided below.

<table>
<thead>
<tr>
<th>MINIMUM LEFT &amp; RIGHT TURN LANE LENGTHS</th>
</tr>
</thead>
<tbody>
<tr>
<td>POSTED SPEED (MPH)</td>
</tr>
<tr>
<td>---------------------</td>
</tr>
<tr>
<td>40 OR LESS</td>
</tr>
<tr>
<td>45 OR MORE</td>
</tr>
</tbody>
</table>

Right Turn Lane Bay Taper Rates

<table>
<thead>
<tr>
<th>MINIMUM TURN BAY TAPER RATES</th>
</tr>
</thead>
<tbody>
<tr>
<td>POSTED SPEED (MPH)</td>
</tr>
<tr>
<td>---------------------</td>
</tr>
<tr>
<td>30 OR LESS</td>
</tr>
<tr>
<td>35 OR MORE</td>
</tr>
</tbody>
</table>

Left Turn Minimum Turn Bay Reverse Curve Taper Rates

<table>
<thead>
<tr>
<th>MINIMUM TURN BAY OPENINGS</th>
</tr>
</thead>
<tbody>
<tr>
<td>POSTED SPEED (MPH)</td>
</tr>
<tr>
<td>---------------------</td>
</tr>
<tr>
<td>25 - 35</td>
</tr>
<tr>
<td>40 - 45</td>
</tr>
<tr>
<td>50 - 55</td>
</tr>
</tbody>
</table>

Left Turn Lane Turn Bay Opening (No Reverse Curve)

<table>
<thead>
<tr>
<th>MINIMUM TURN BAY OPENINGS</th>
</tr>
</thead>
<tbody>
<tr>
<td>POSTED SPEED (MPH)</td>
</tr>
<tr>
<td>---------------------</td>
</tr>
<tr>
<td>25 – 35</td>
</tr>
<tr>
<td>40 – 45</td>
</tr>
<tr>
<td>50 – 55</td>
</tr>
</tbody>
</table>
APPENDIX B – DEFINITIONS

Edgeline: A solid continuous stripe used to delineate the left or right edge of roadway.

Edge of Pavement: The outside limit of the hard surface of the road intended for vehicular traffic.

Edge of Traveled Way: The stripe to the left or right of the portion of the roadway available for movement of vehicles exclusive of shoulders and auxiliary lanes.

Engineer: The jurisdiction’s transportation director or designee.

Longitudinal Markings: Markings installed parallel to traffic flow. Edge, lane, and centerline markings are longitudinal markings.

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.

Shoulder (Paved): The width outside the traffic lane.

Shoulder (Unpaved): The width from the edge of pavement to the intersection of the embankment slope, typically 8-10 feet.

Taper: The section of roadway used to move traffic laterally from one path to another.

Target Position: The location and angle for a sign that is best for viewing by an approaching vehicle such that if that vehicle continued in a straight line through an intersection or a curve that vehicle would run across this location.

Thru Edge: The outermost edges of the graded/maintained portion of a dirt road; the painted edge line of a striped roadway; or the edge of the pavement on a paved road without painted edge lines.

Transverse Markings: Type of striping consisting of stop bars, crosswalks, word legends, chevrons and other markings installed not parallel to traffic.
APPENDIX C - ABBREVIATIONS

AD  All directions: a description of tubular hazard markers and delineators
ADOT Arizona Department of Transportation
BOC Back of Curb
CL  Centerline
COT City of Tucson
EL  Edge line
EOP Edge of pavement
FOC Face of Curb
FHWA Federal Highway Administration
MOAS ADOT Manual of Approved Signs
PC  Point of curvature. The point where a straight section of road begins to curve
PCDOT Pima County Department of Transportation
PRC Point of Reverse Curvature
PT  Point of tangency. The point where a curved section of road becomes straight.
RPM Raised Pavement Marker
REFERENCES

ADOT Signing and Marking Standard Drawings


Arizona Supplement to the MUTCD

Traffic Engineering References | ADOT

City of Tucson Engineering

https://www.tucsonaz.gov/tdot/engineering

City of Tucson Traffic Engineering

https://www.tucsonaz.gov/tdot/traffic-engineering-division

Manual of Approved Signs


Manual on Uniform Traffic Control Devices

https://mutcd.fhwa.dot.gov/

Pima Association of Governments Specifications and Standard Details

http://apps.pagnet.org/standards specifications/

Pima County Department of Transportation Standard Details and Specifications

http://webcms.pima.gov/cms/one.aspx?portalId=169&pageId=63368

Pima Maps


Traffic Guidelines and Processes (TGP)

Traffic Guidelines and Processes - ADOT
### APPENDIX E

<table>
<thead>
<tr>
<th>REGULATORY SIGNS</th>
<th>FIRST LOCATION</th>
<th>URBAN</th>
<th>RURAL</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Speed Limit</strong></td>
<td>After a Major Intersection or Location of Speed Limit Change</td>
<td>1/2 Mile</td>
<td>2 Miles</td>
<td>4 Lane Divided (also place sign in median)</td>
</tr>
<tr>
<td><strong>Two Way Left Turn</strong></td>
<td>Beginning of TWLT Lane on arterials only</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td><strong>Preferential Lane Signs -- HOV Lane / Golf Cart Lane</strong></td>
<td>Beginning of zone</td>
<td>After a major intersection; then 600’ to 800’ spacing</td>
<td>---</td>
<td>---</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>WARNING SIGNS</th>
<th>FIRST LOCATION</th>
<th>URBAN</th>
<th>RURAL</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Horizontal Alignment -- Turn / Curve / Reverse Turn / Reverse Curve / Curve with Intersection / Winding Road (all with or without advisory speed plate)</strong></td>
<td>Placement per distances provided in Table 2C-4 of the (2009) Arizona Supplement to the MUTCD</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td><strong>Vertical Alignment -- Hill / Bump / Dip</strong></td>
<td>Placement per distances provided in Table 2C-4 of the (2009) Arizona Supplement to the MUTCD</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td><strong>One-Direction Large Arrow</strong></td>
<td>At or near the target position on the outside of a turn or curve within the drivers line of sight. Refer to MUTCD Table 2C-5</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td><strong>Chevron Alignment</strong></td>
<td>At or near the beginning of turn or curve</td>
<td>Repeat so that the road user has at least two chevron signs in view at all times spaced in accordance with MUTCD</td>
<td>Repeat so that the road user has at least two chevron signs in view at all times spaced in accordance with MUTCD</td>
<td>---</td>
</tr>
<tr>
<td><strong>Advance Traffic Control -- Stop Ahead / Yield Ahead / Signal Ahead</strong></td>
<td>Placement per distances provided in Table 2C-4 of the (2009) Arizona Supplement to the MUTCD</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td><strong>No Passing Zone</strong></td>
<td>Beginning of the no-passing section of the roadway, left side.</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td><strong>Emergency Vehicles</strong></td>
<td>Placement per distances provided in Table 2C-4 of the (2009) Arizona Supplement to the MUTCD</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td><strong>Crossing Signs -- Pedestrians / Bicyclists / Golf Carts</strong></td>
<td>Placement per distances provided in Table 2C-4 of the (2009) Arizona Supplement to the MUTCD</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>GUIDE SIGNS</td>
<td>FIRST LOCATION</td>
<td>URBAN</td>
<td>RURAL</td>
<td></td>
</tr>
<tr>
<td>-------------------------</td>
<td>--------------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>Marker/Scenic Route Plaque</td>
<td>Generally, 600 feet beyond major intersection</td>
<td>Approximately 5 miles</td>
<td>---</td>
<td></td>
</tr>
</tbody>
</table>

**Destination and Distance -**
For traffic generators such as City and Government Centers, MVD, Schools, etc (with arrow and mileage)

<table>
<thead>
<tr>
<th>(PIMA COUNTY ONLY) Advanced Street Name</th>
<th>In advance of all signalized intersections and in advance of all intersections on arterial roadways with exclusive turn lanes.</th>
<th>In advance of all signalized intersections and in advance of all intersections on arterial roadways with exclusive turn lanes.</th>
<th>---</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parking Area / Park and Ride</td>
<td>Generally, 200 to 600 feet in advance of the facility</td>
<td>---</td>
<td>---</td>
</tr>
</tbody>
</table>

**Mile Post**

<table>
<thead>
<tr>
<th>General Service - Lodging / Camping / Hospital / Emergency Medical Services / Tourist Information / Police / Etc</th>
<th>Generally, 200 to 600 feet in advance of the facility at the discretion of the jurisdiction</th>
<th>Additional signs may be installed at the discretion of the jurisdiction</th>
<th>Additional signs may be installed at the discretion of the jurisdiction</th>
</tr>
</thead>
</table>

**Recreational and Cultural Interest**

<p>| Generally, 200 to 600 feet in advance of the facility in the urban and suburban area and 1/4 mile in advance of the facility in the rural areas | Additional signs may be installed at the discretion of the jurisdiction | Additional signs may be installed at the discretion of the jurisdiction | --- |</p>
<table>
<thead>
<tr>
<th>Sign</th>
<th>Location</th>
<th>Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stop Signs (R1-1)</td>
<td>Intersection of a 25 mph roadway with a 25 mph roadway</td>
<td>30” x 30”</td>
</tr>
<tr>
<td>Stop Signs (R1-1)</td>
<td>All other locations</td>
<td>36” x 36”</td>
</tr>
<tr>
<td>Yield Signs (R1-2)</td>
<td>All</td>
<td>36” x 36” x 36”</td>
</tr>
<tr>
<td>Warning Signs</td>
<td>All</td>
<td>36” x 36”</td>
</tr>
</tbody>
</table>

* Refer to MUTCD for all other sign sizes. Signs may be upsized at the direction of the engineer.