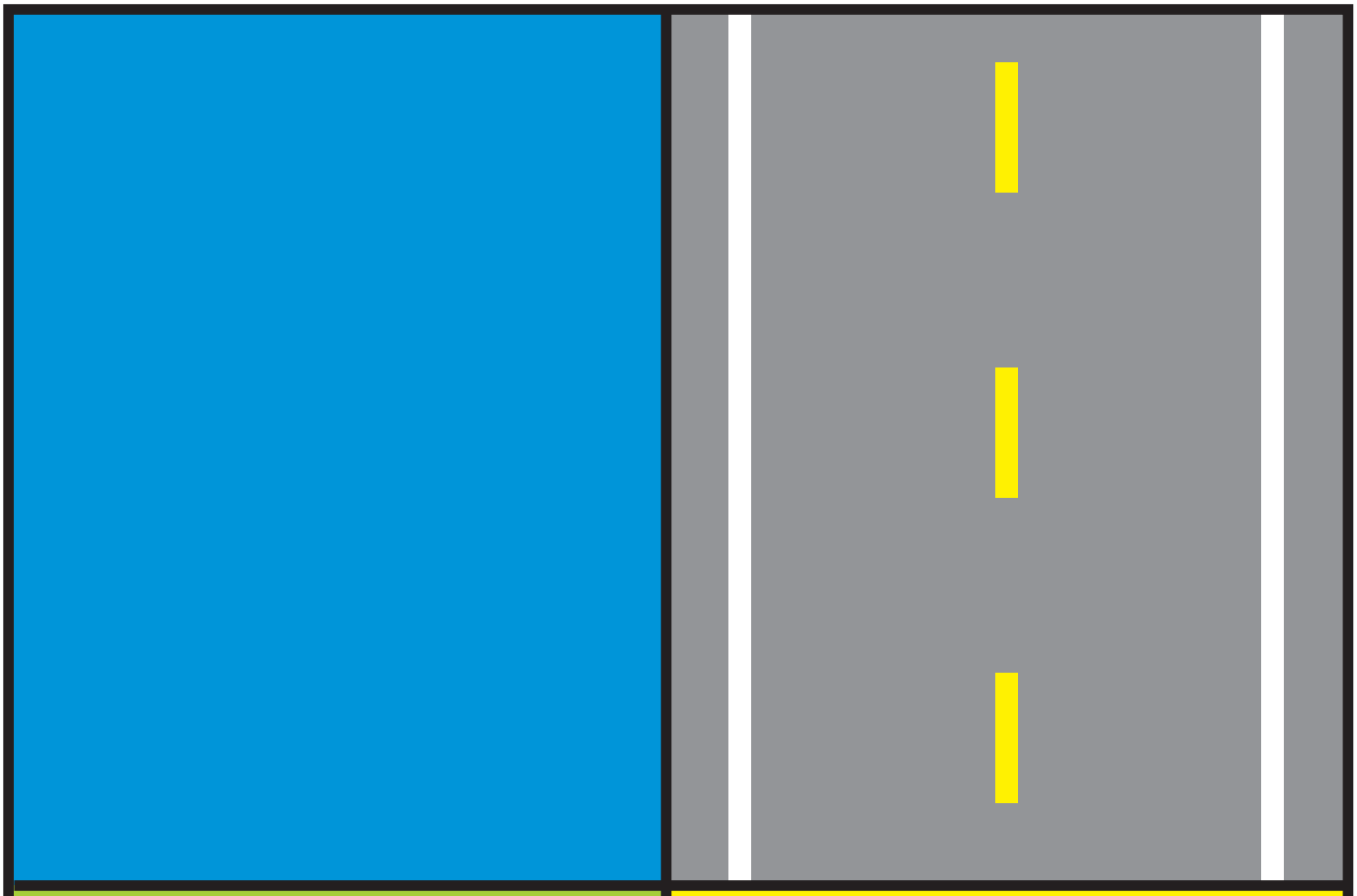


Pavement Marking Manual

Maricopa County
Department of Transportation

Introduction

This manual contains illustrations of pavement markings approved for use on the Maricopa County Highway and Road System.

The information contained in this manual at the time of original publication was consistent with the latest edition of the Manual on Uniform Traffic Control Devices (MUTCD), U.S. Department of Transportation, Federal Highway Administration as supplemented by the Arizona Department of Transportation.

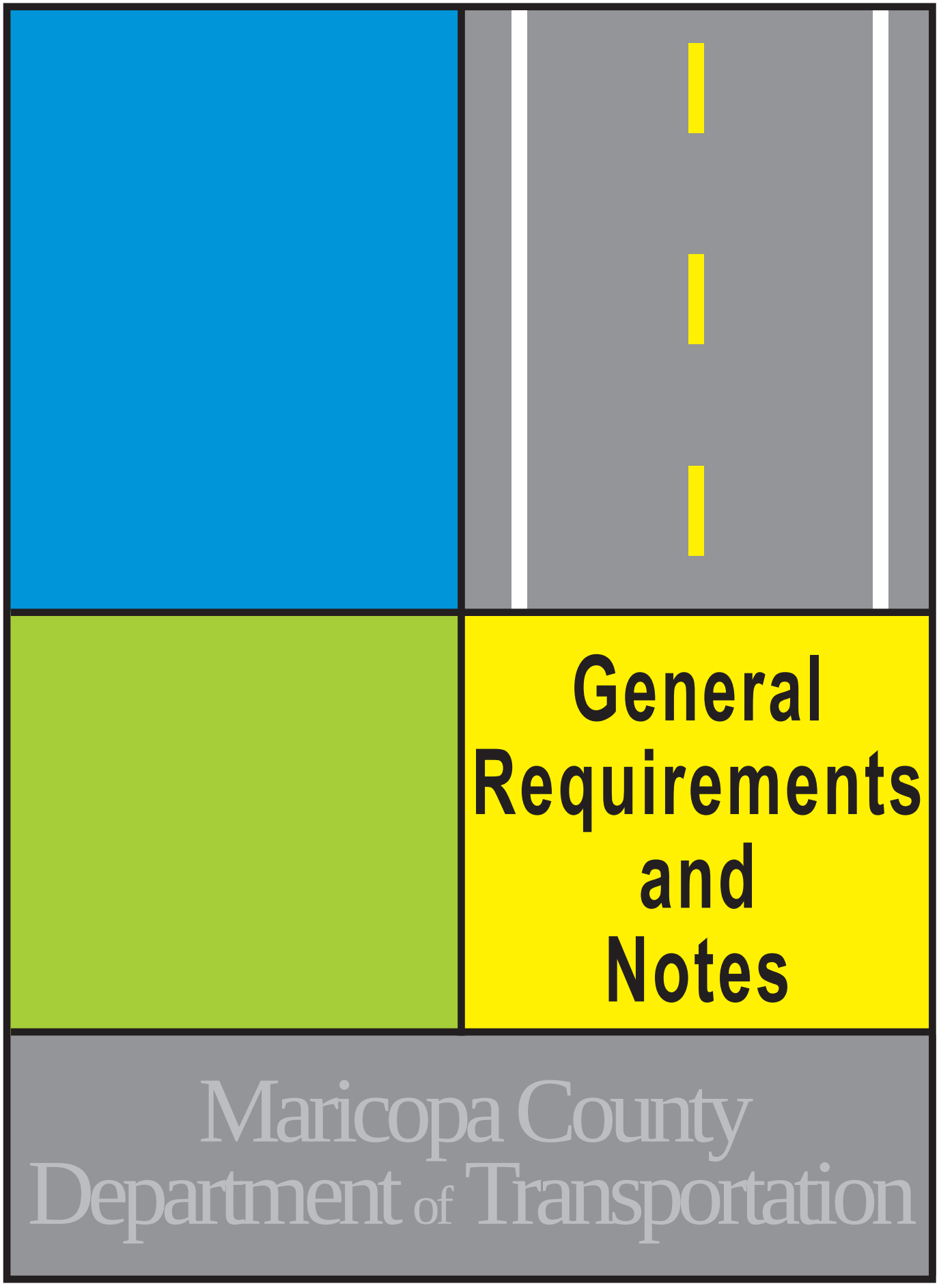
The intent of this manual is to establish standard details that will be used by County, consultant, and contractor personnel when laying out pavement markings or preparing engineering plans.

Users of this manual are encouraged to submit changes for review. Comments should be referenced to the specific standard detail. Reasons should be provided for each comment to ensure complete understanding. All comments will be reviewed and if appropriate, incorporated into the manual when updated.

Any questions regarding use of the standard details in this manual should be referred to the Maricopa County Department of Transportation, Traffic Engineering Branch.

Nicolaas Swart, P.E.
County Traffic Engineer

Date 7/8/2005



General Requirements and Notes

Maricopa County
Department of Transportation

General Requirements for Striping Plans

(Information for Contractors)

I. Any project located fully or partially within Maricopa County jurisdiction shall require a striping plan to be submitted to MCDOT for approval.

II. All pavement markings shall be in compliance with the Manual on Uniform Traffic Control Devices (MUTCD) as supplemented by the Arizona Department of Transportation, and this Maricopa County Department of Transportation Striping Manual. Any deviation shall require the specific approval of the County Traffic Engineer.

III. When the **final** approved plans are submitted include:

- Striping plans: Submit a separate set of striping plans. Scale to be no less than 1"=40'.
- A compact disk in MicroStation format: **.dgn**.
- A redline copy of the last traffic review comments.
- Final hard copy of the plans.

IV. Show the existing roadway conditions, including the entire right-of-way width. Show how the proposed project accesses to the existing roadway.

V. Show the existing roadway and striping 500 feet (minimum) prior to the beginning of this project and for 500 feet (minimum) beyond the end of this project.

VI. Show the existing striping in dashed lines (line wt. 0) and proposed striping in solid lines (line wt. 1). Dimension all lane widths (12', 14', etc.) and the length of all left-turn/right-turn lanes, (100', 160', etc.). All existing/proposed striping on the plans are to be exactly as they exist in the field, i.e., 10' line/30' gap.

VII. Identify and show stationing for all accesses, excluding single residential access, i.e., roadways, commercial strip centers, emergency facilities, schools, post office, hospitals, etc.

VIII. Dimension and show all City Limits & County Right-of-Way.

IX. Show all advance traffic signal loops in the pavement (where applicable). This is critical in producing striping plans.

General Notes To Be Written On The Striping Plans
(Information for Contractors)

1. It shall be the responsibility of the contractor to provide a MCDOT approved traffic control plan and all temporary traffic control devices necessary for the safety of the public and the workers before any striping layout begins.

2. Contractor to spot the entire project before striping. Contractor to call Maricopa County Department of Transportation Project Inspector, to make arrangements for inspection prior to applying pavement marking. The permanent pavement marking plans may be modified as directed by the engineer. ANY STRIPING APPLIED BEFORE LAYOUT APPROVAL BY INSPECTOR SHALL BE SUBJECT TO REMOVAL AND RESTRIPING AT THE CONTRACTOR'S EXPENSE.

3. All no passing zones shown are subject to change in the field by the County's Traffic Engineer, or his representative. Striping quantities could vary.

4. All striping will be done in approved thermoplastic materials. Crosswalks, stop bars, holding bars, railroad markings, and arrows shall be installed with a thickness of ninety (90) mils. All longitudinal lines, such as lane lines, edge lines, center lines and taper lines shall be installed with a thickness of sixty (60) mils. Striping in paint, if approved shall be installed with a thickness of fifteen (15) mils.

5. Raised pavement markers will be installed on the new pavement if raised pavement markers are currently existing within this project.

6. When striping obliteration is necessary, it shall be accomplished by waterblasting or other approved methods. If the removal of the striping causes a depression of ½ inch or greater in depth of the pavement surface, the contractor shall seal the area with slurry per M.A.G. Standard Specification 715, type I. Painting over striping **does not** constitute stripe obliteration. Striping obliteration may go beyond designated project limits. Striping obliteration shall extend as needed to allow appropriate matching of the new striping with the existing striping.

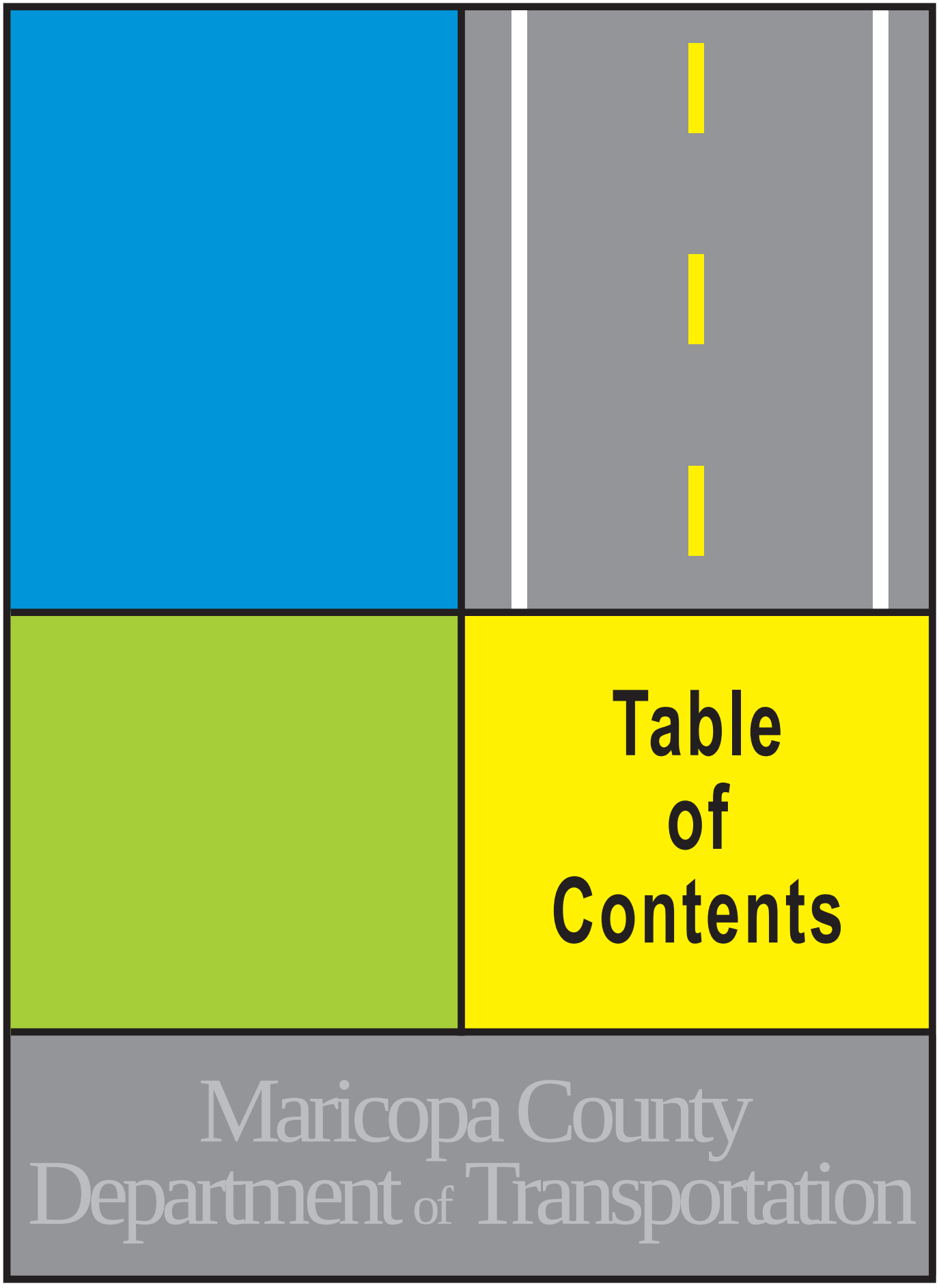


Table of Contents

Maricopa County Department of Transportation

Table of Contents

CHAPTER 1
PAVEMENT MARKING APPLICATIONS 1

General 1-1
Policies and Procedures 1-2

CHAPTER 2
PLAN SYMBOLS 2

Plan Symbol Coding 2-1
Retroreflective and Non-Retroreflective
Raised Pavement Markers 2-2
Raised Pavement Marker Types 2-3
Yellow Plan Symbols 2-4
Yellow Plan Symbols with RPMs 2-5
White Plan Symbols 2-7
White Plan Symbols with RPMs 2-8

CHAPTER 3
STANDARD ROADWAY CROSS SECTIONS 3

Placement of Pavement Markings on Standard
Roadway Cross Sections 3-1
Rural Principal Arterial 3-2
Rural Minor Arterial 3-3
Rural Major Collector 3-4
Rural Minor Collector 3-5
Rural Local Road 3-6
Roadway for Industrial/Commercial Subdivisions 3-7
Urban Principal Arterial 3-8
Urban Minor Arterial 3-9
Urban Major Collector 3-10
Urban Major Collector with Widened Section for Parking 3-11
Urban Minor Collector 3-12
Urban Frontage Road 3-13
Urban Local Road Residential 3-14

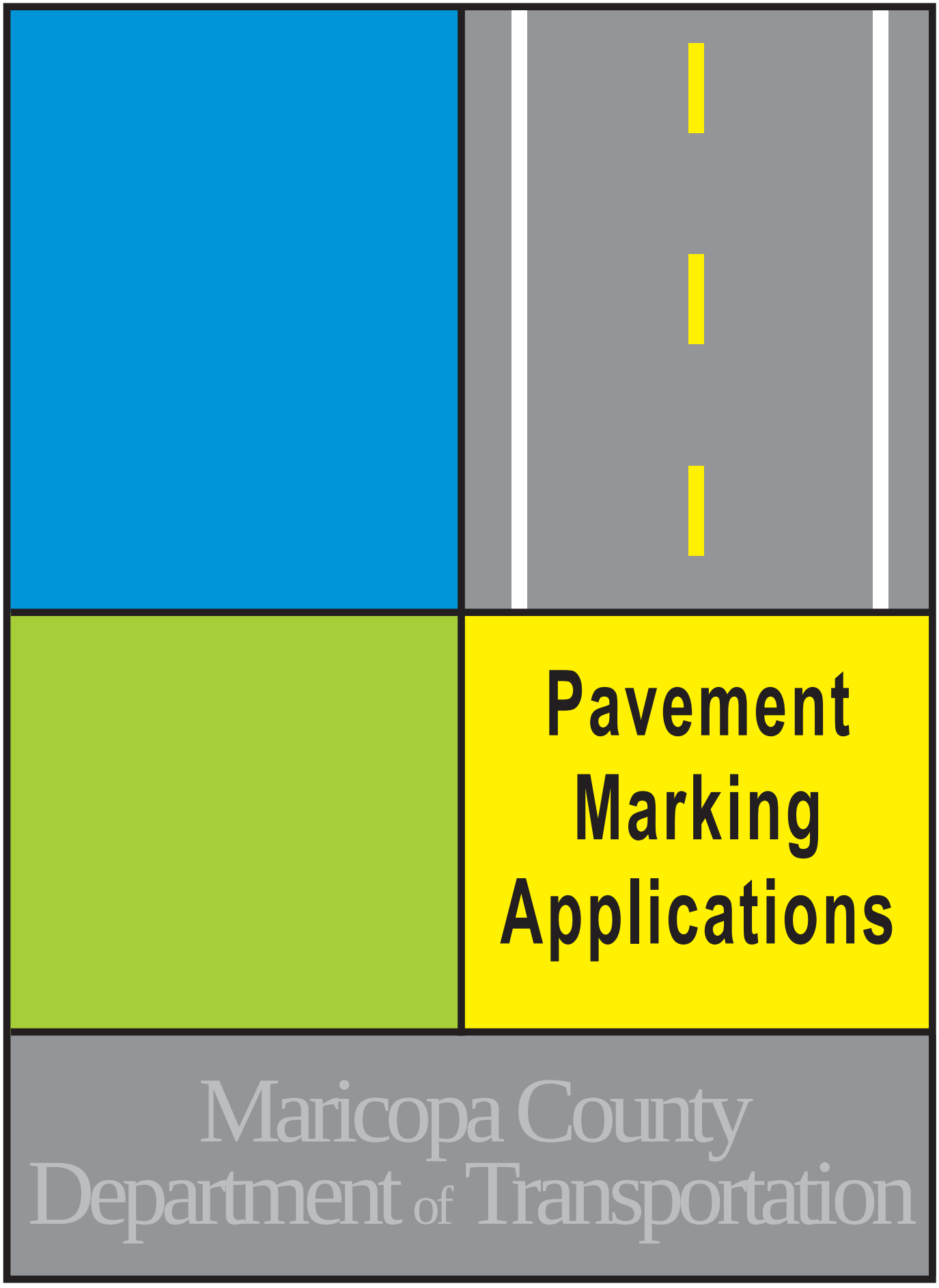
CHAPTER 4

STANDARD PAVEMENT MARKINGS 4

Center Lines and Edge Lines 4-1
No Passing Zones (for Roadway Segments) 4-2
No Passing Zones (Arterial/Collector) 4-3
Pavement Marking Extensions Through Intersections 4-4
Lane Reduction Transition and Signs 4-5
Channelizing Lines (change in pavement width) 4-6
Center Two-way Left Turn Lanes (minor cross street) 4-7
Center Two-way Left Turn Lanes (major cross street) 4-8
Median Island 4-9
Standard Crosswalk and Stop Lines 4-10
High Visibility Dual-Ramp Crosswalk and Stop Lines 4-11
Retrofit of existing Crosswalks and Stop Lines (for ADA ramps) 4-12
Standard Arrows 4-13
Turn Lane Markings 4-14
Curb Markings for Raised Medians (medians 6 feet and under in width) 4-15
Curb Markings for Raised Medians and Islands (medians over 6 feet in width) 4-16
Raised Pavement Markers Supplementing No Passing Zones (for roadway segments) 4-17
Pavement Markings for Uncurbed Medians 4-18
Raised Pavement Markers Supplementing Center Lines and Edge Lines 4-19
Raised Pavement Markers Supplementing Median Islands 4-20
Raised Pavement Markers Supplementing Turn Lane Markings 4-21
Rumble Strips 4-22
Bridge and Barrier Marker Placement 4-23
Bike Lane Markings 4-24
Bike Lanes (2-way low right turn volumes) 4-25
Mandatory Right Turn Only Lane from Thru Lane 4-26
Mandatory Right Turn Only Lane from Thru Lane (with Bike Lane) 4-27
Bike Lane (right turn only lane) 4-28
Bike Lane (Parking Lane Becomes Right Turn Only Lane With Bike Lane Striping) 4-29
Bike Lane (Right Lane Becomes Right Turn Only Lane) 4-30
Bike Lanes (with Left Turn Area, Heavy Turn Volumes, Parking, One-Way Traffic or Divided Highway) 4-31
Railroad Crossing (Without Gates and Flashing Lights) 4-32

CHAPTER 4
STANDARD PAVEMENT MARKINGS, continued

Railroad Crossings (With Gates and Flashing Lights) 4-33
School Crosswalks (2 lane – 2 way) 4-34
School Crosswalk (Multi Lane – 2 way) 4-35
Speed Humps (with Curb and Gutter) 4-36
Speed Humps (without Curb and Gutter) 4-37
Speed Table (without Curb and Gutter) 4-38
Yield Line Layouts 4-39
Roundabouts (with One Lane) 4-40
Roundabouts (with Crosswalks and Medians) 4-41
Typical Handicap Parking Space and Typical Parking Space 4-42



Pavement Marking Applications

Maricopa County Department of Transportation

1.1 General

Pavement markings are used to convey traffic control information to a driver. Pavement markings may be used alone or to supplement other traffic control devices, such as signs and traffic signals. Be sure that the appropriate signs and signal controls are used in conjunction with markings where intended. All pavement markings must be visible at night. Any markings that are no longer applicable may create confusion and shall be removed.

1.2 Policies and Procedures

The County has established a number of pavement marking policies and programs using thermoplastic, paint, retroreflective and non-retroreflective raised pavement markers. Any person preparing pavement marking plans and/or installing pavement markings on the Maricopa County Department of Transportation Roadway System shall contact MCDOT, Traffic Engineering Branch to:

1) Obtain pavement marking plan approval.

2) Determine pavement marking materials and specifications including use of RPMs.

3) Schedule inspection and receive inspection approval prior to pavement marking application.

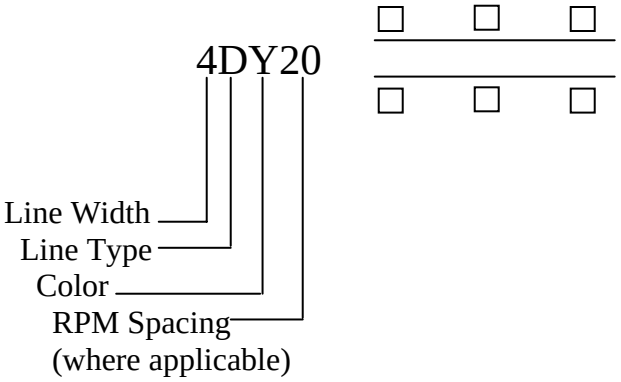
Plan Symbols

Maricopa County
Department of Transportation

2.1 Plan Symbol Coding

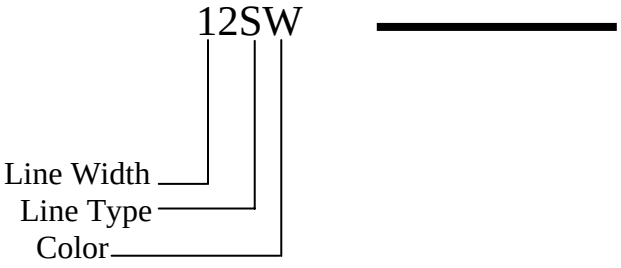
The MUTCD categorizes pavement markings as longitudinal, or tranverse markings. Longitudinal markings include: center lines, lane lines, edge lines, and dotted lines. Tranverse markings include: diagonal lines, stop lines, crosswalk lines, arrows, legends, and symbols. The meaning of these longitudinal and tranverse markings are denoted by their color, line type, line width, and the pavement marking pattern. The following examples outline the plan symbol coding.

Example 1



4" Solid Double Yellow Line
with Type 'D' RPM's @ 20' Spacing

Example 2



12" Solid White Line

The plan symbol codes are attached for reference and used throughout this document. These plan symbol codes simplify the pavement marking standard details. The plan symbols shall be used when preparing pavement marking plans.

2.2 Retroreflective and Non-Retroreflective Raised Pavement Markers

Retroreflective and non-retroreflective pavement markers are used to supplement pavement markings and conform to the color of the marking which they supplement. Retroreflective pavement markers are designed to be visible as mono-directional or bi-directional. The spacing is dependent on the speed and/or curvature of the roadway. MCDOT Traffic Engineering follows standard convention for plan symbols. These plan symbols are included for reference.

RAISED PAVEMENT MARKER TYPES

LEGEND:

Type A = White (non reflective)

Type AY = Yellow (non reflective)

Type D = Yellow, two-way (reflective)

Type G = Clear, one-way (reflective)

Type H = Yellow, one-way (reflective)

Type J = White, dagmar (reflective)

Type JY = Yellow, dagmar (reflective)

Bridge Abutment (yellow)

Bridge Abutment (white)

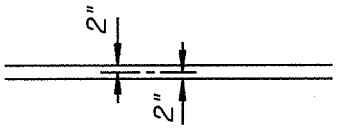
Blue, two-way (reflective)

GENERAL NOTES:

Raised pavement markers shall be placed so that the reflective face of the marker is facing and perpendicular to traffic.

YELLOW PLAN SYMBOLS

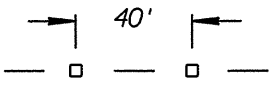
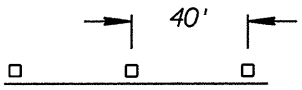
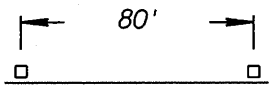
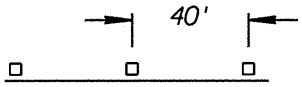
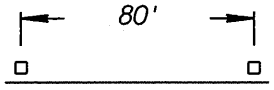
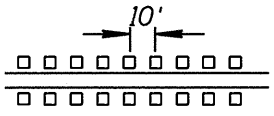
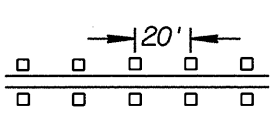
LEGEND:

4BY		4" Broken yellow line with a 10' line segment and a 30' gap
4SY		4" Solid yellow line
4SBY		4" Double yellow line, one solid, one broken with a 10' line segment and a 30' gap
4DY		4" Solid double yellow line
4DTY		4" Dashed yellow line with a 2' line segment and a 4' gap
8DTY		8" Dashed yellow line with a 2' line segment and a 4' gap
12SY		12" Solid yellow line
24SY		24" Solid yellow line

YELLOW PLAN SYMBOLS WITH RAISED PAVEMENT MARKERS

(continued on next page)

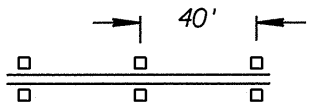
LEGEND:

4BY40		4" Broken yellow line with a 10' line segment and a 30' gap, with type 'D' RPMs @ 40' spacing
4SY40		4" Solid yellow line with type 'D' RPMs @ 40' spacing (for curved and tapered sections of roadway)
4SY80		4" Solid yellow line with type 'D' RPMs @ 80' spacing (for straight sections of roadway)
4SYH40		4" Solid yellow line with type 'H' RPMs @ 40' spacing with dirt median.
4SYH80		4" Solid yellow line with type 'H' RPMs @ 80' spacing for straight sections of roadway with dirt medians
4DY10		4" Solid double yellow line with type 'D' RPMs @ 10' spacing
4DY20		4" Solid double yellow line with type 'D' RPMs @ 20' spacing

YELLOW PLAN SYMBOLS WITH RAISED PAVEMENT MARKERS (continued from previous page)

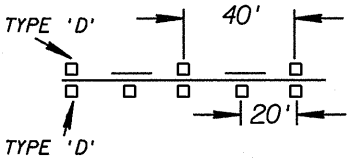
LEGEND:

4DY40



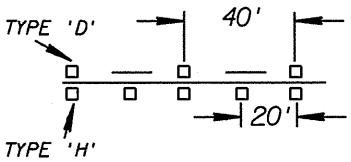
4" Solid double yellow line with type 'D' RPMs @ 40' spacing

4SBYM



4" Double yellow line, one solid, one broken with a 10' line segment and a 30' gap with type 'D' RPMs @ a 20' spacing (solid), type 'D' RPMs @ 40' spacing (broken)

4SBYM
N.P.Z.



4" Double yellow line, one solid, one broken with a 10' line segment and a 30' gap, with type 'H' RPMs @ a 20' spacing (solid) type 'D' RPMs @ a 40' spacing (broken)

4DTY12

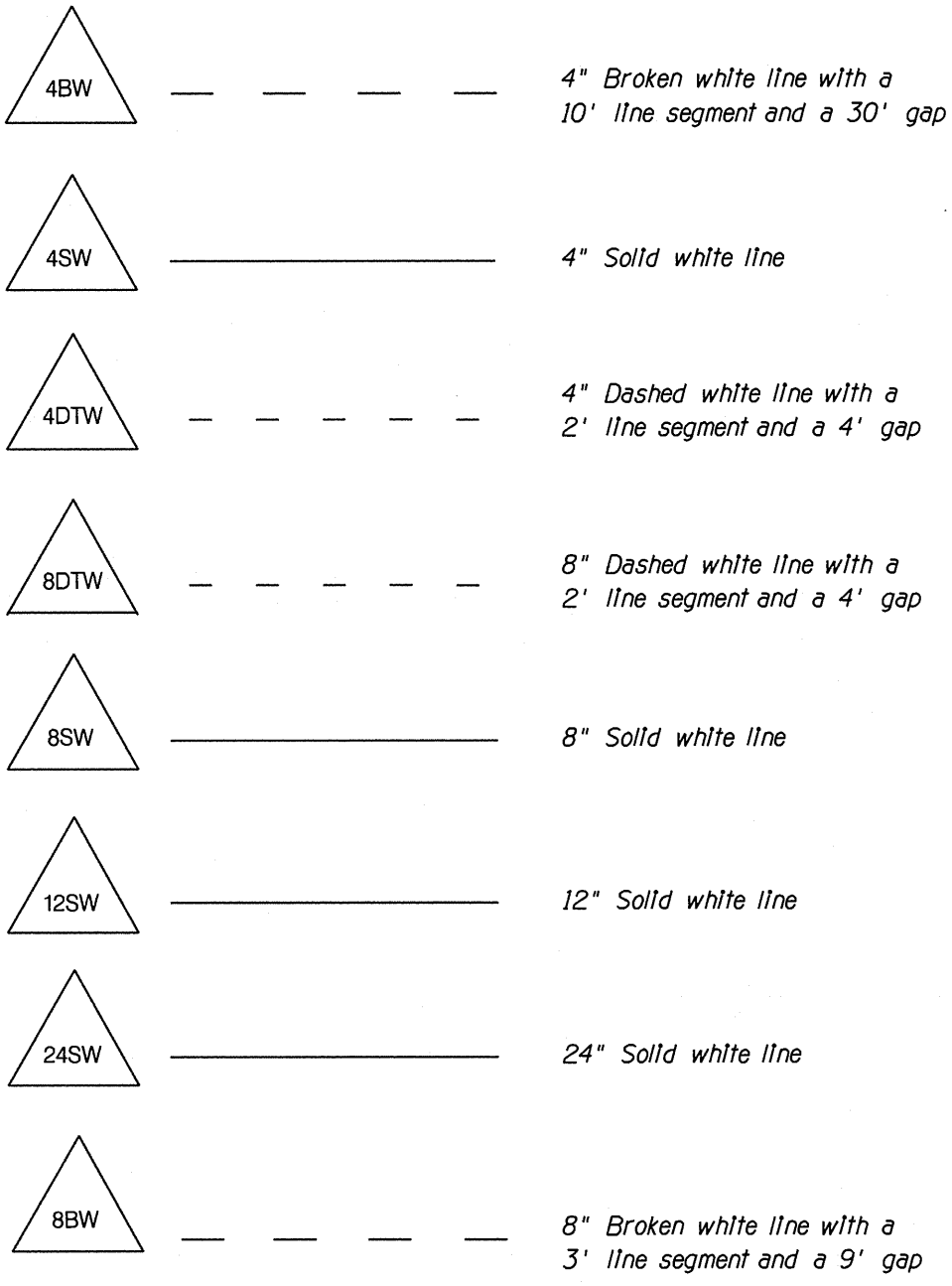
4" Dashed yellow line with a 2' line segment and a 4' gap with Type 'D' RPMs @ 12' spacing.

8DTY12

8" Dashed yellow line with a 2' line segment and a 4' gap

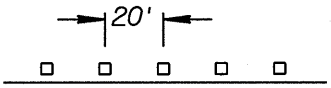
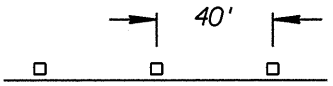
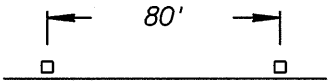
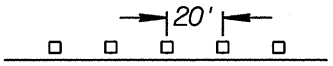
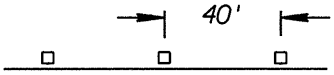
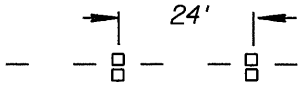
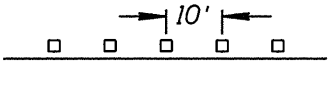
WHITE PLAN SYMBOLS

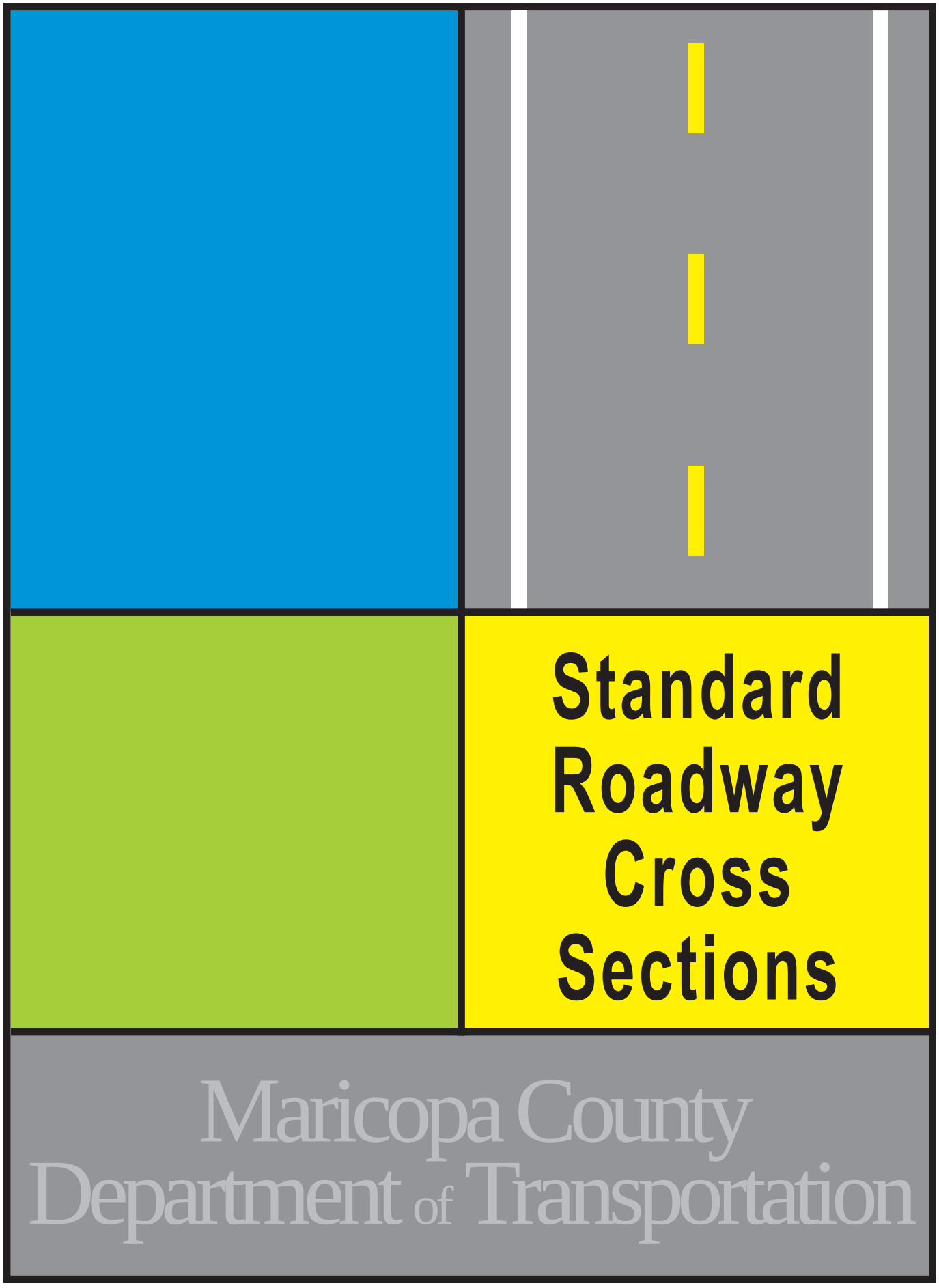
LEGEND:



WHITE PLAN SYMBOLS WITH RAISED PAVEMENT MARKERS

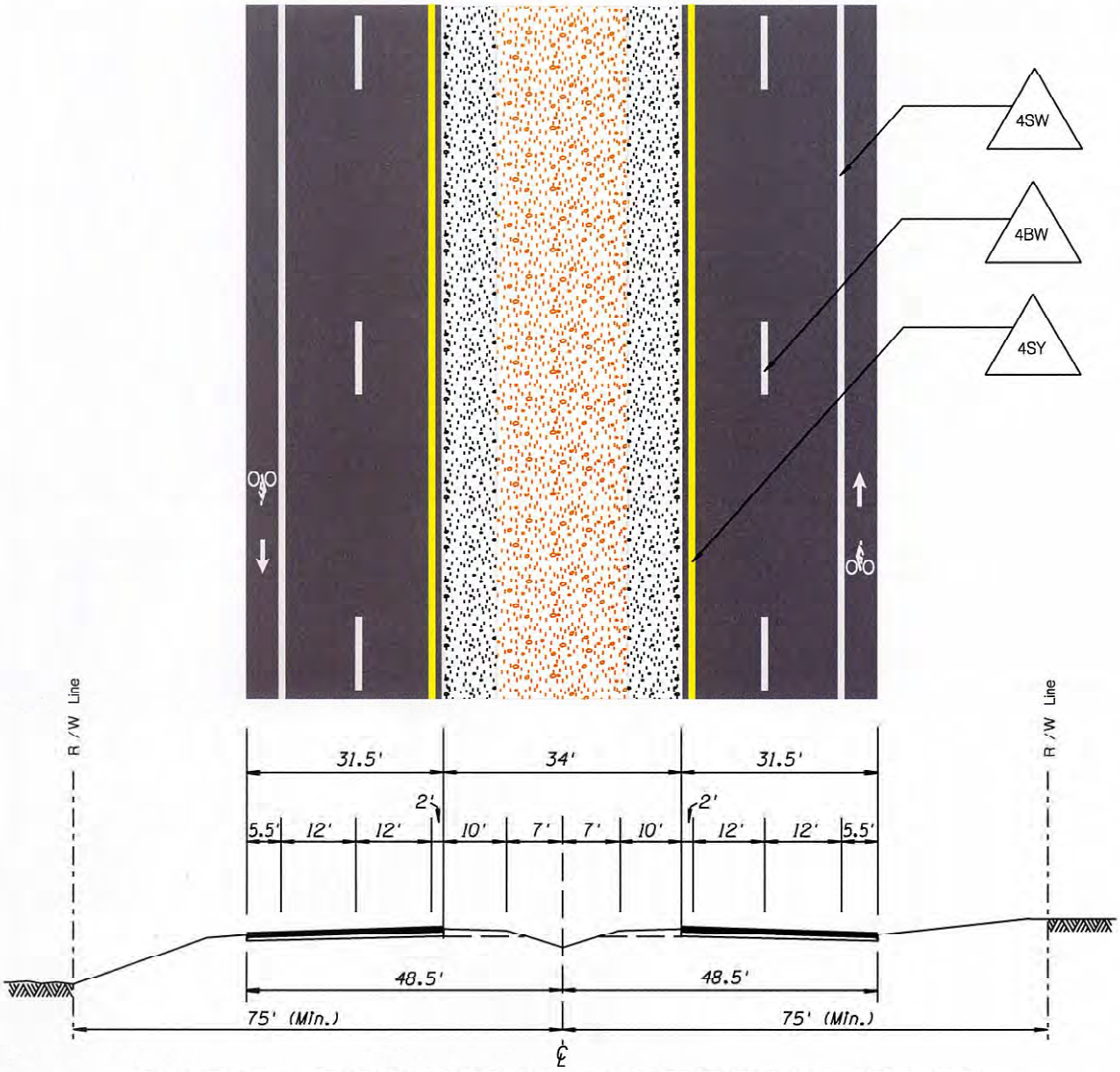
LEGEND:

4DTW12		4" Dashed white line with a 2' line segment and a 4' gap
8DTW12		8" Dashed white line with a 2' line segment and a 4' gap
4BW40		4" Broken white line with a 10' line segment and a 30' gap with type 'G' RPMs @ 40' spacing
4SW20		4" Solid white line with type 'G' RPMs @ 20' spacing
4SW40		4" Solid white line with type 'G' RPMs @ 40' spacing
4SW80		4" Solid white line with type 'G' RPMs @ 80' spacing
8SW20		8" Solid white line with type 'G' RPMs @ 20' spacing
8SW40		8" Solid white line with type 'G' RPMs @ 40' spacing
8BW24		8" Broken white line with a 3' line segment and a 9' gap with two type 'A' RPMs @ 24' spacing
8SW10		8" Solid white line with type 'G' RPMs @ 10' spacing


Standard
Roadway
Cross
Sections
Maricopa County
Department of Transportation

3.1 Placement of Pavement Markings on Standard Roadway Cross Sections

The following standard cross sections, by functional classification, are from the MCDOT Roadway Design Manual, Chapter 5, Geometric Design Standards. These standard details are intended to illustrate the typical pavement markings associated with each roadway classification standard cross section. Where existing roadway pavement widths do not allow pavement marking per these standards, reference should be made to the MCDOT Roadway Design Manual and/or discussed with a representative from MCDOT Traffic Engineering Branch prior to plan preparation or actual pavement marking.



RURAL PRINCIPAL ARTERIAL ROAD

(not to scale)

GENERAL NOTES:

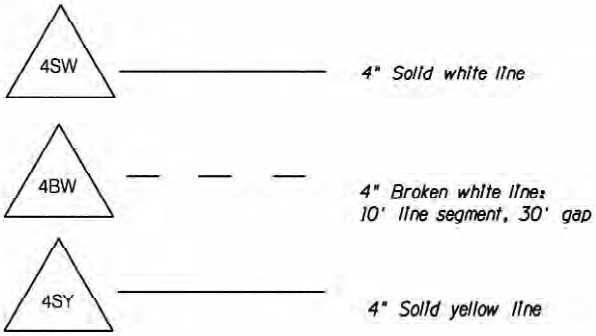
1. Cross-sections are per the functional classifications designated in the MCDOT Roadway Design Manual, Chapter 5.1.

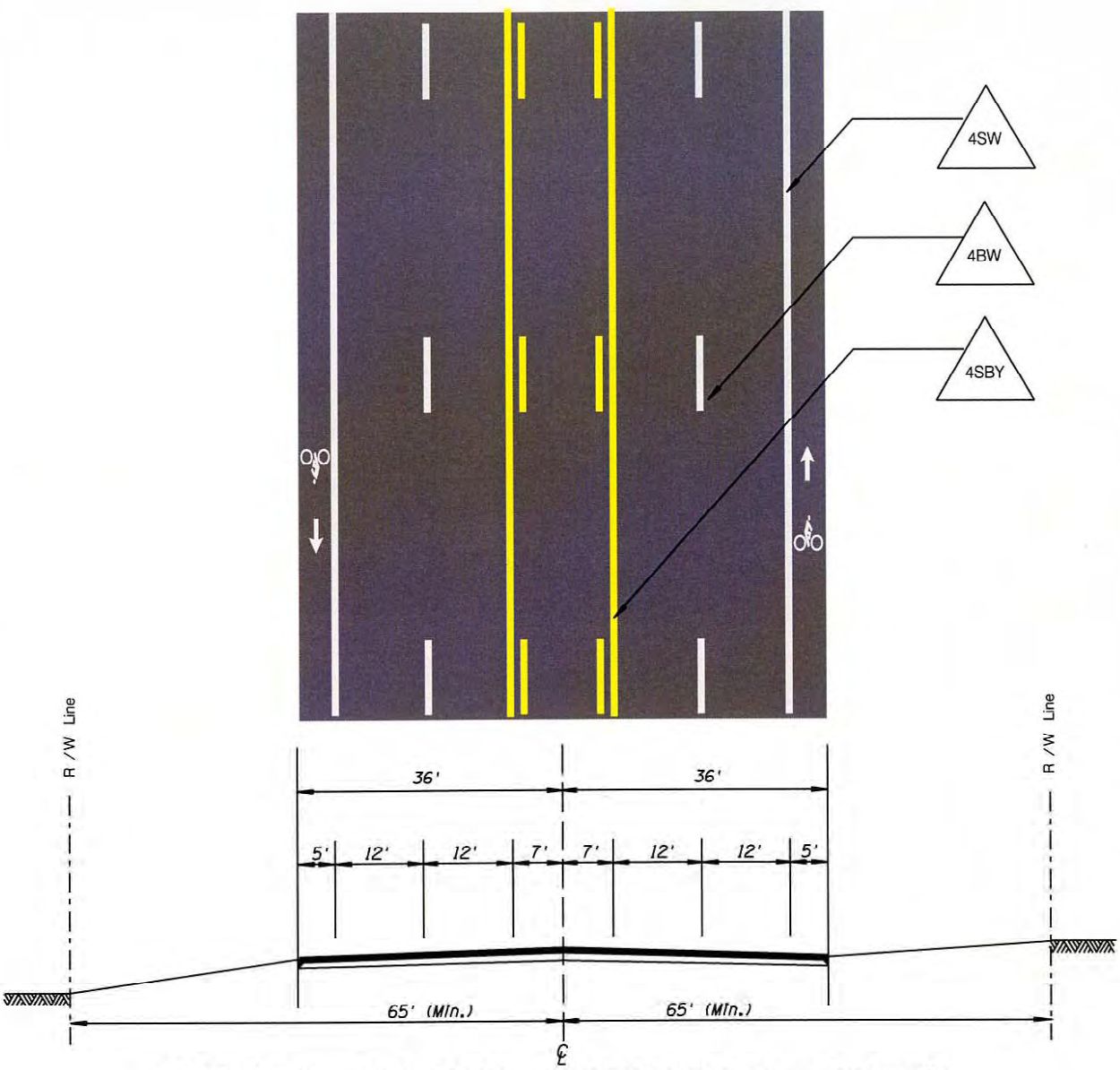
2. Where Roadway conditions do not permit use of this standard, alternate treatment shall be approved by the County Traffic Engineer or his designated representative.

3. All striping dimensions shall be to center of stripe.

4. Final layout and/or field adjustments of pavement marking shall be approved by the County Traffic Engineer or his designated representative.

LEGEND:





RURAL MINOR ARTERIAL ROAD

(not to scale)

GENERAL NOTES:

1. Cross-sections are per the functional classifications designated in the MCDOT Roadway Design Manual, Chapter 5.1.

2. Where Roadway conditions do not permit use of this standard, alternate treatment shall be approved by the County Traffic Engineer or his designated representative.

3. All striping dimensions shall be to center of stripe.

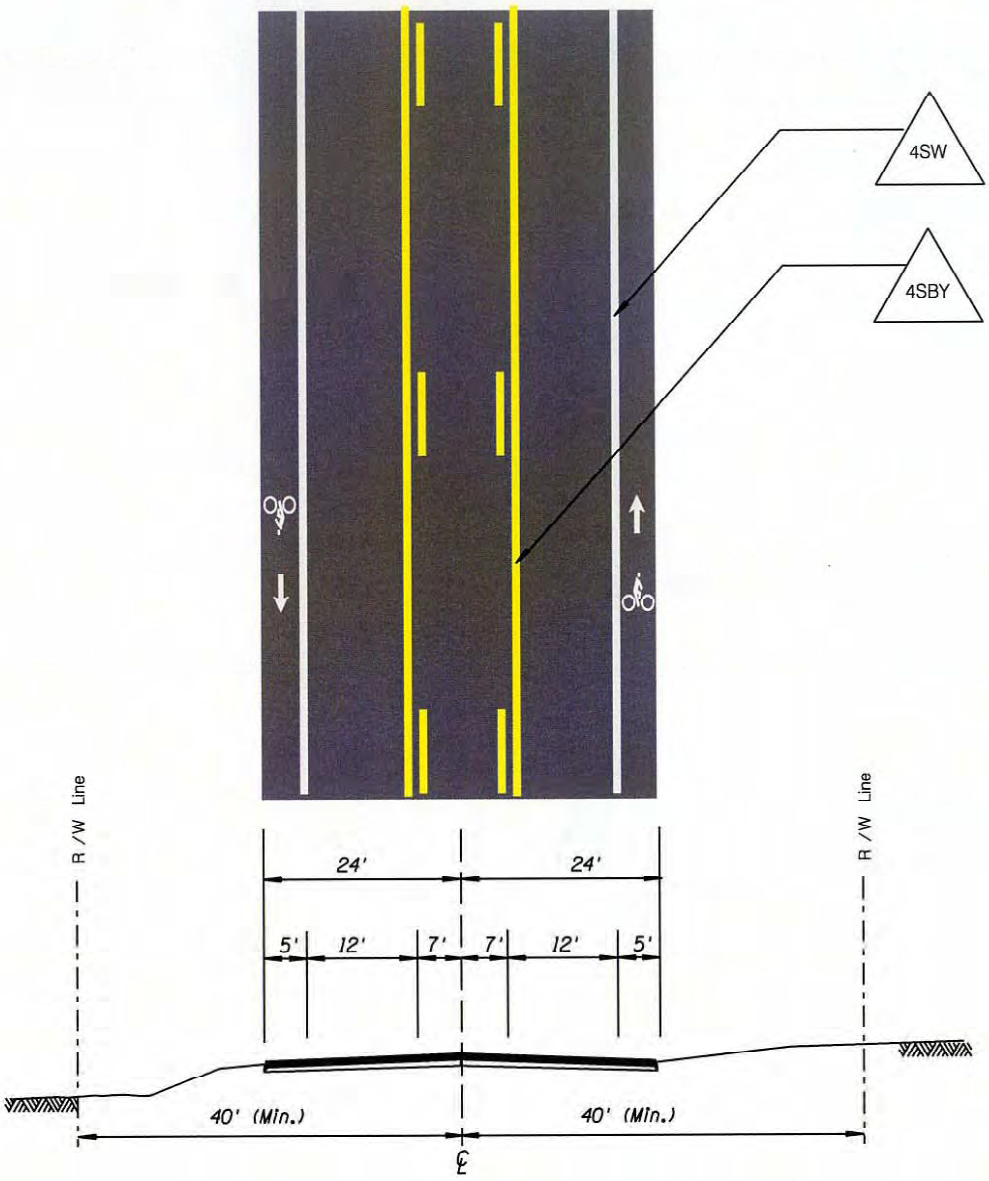
4. Final layout and/or field adjustments of pavement marking shall be approved by the County Traffic Engineer or his designated representative.

LEGEND:

4SW — 4" Solid white line

4BW — 4" Broken white line: 10' line segment, 30' gap

4SBY — 4" Double yellow line, one solid, one broken with a 10' line segment and a 30' gap.



RURAL MAJOR COLLECTOR ROAD

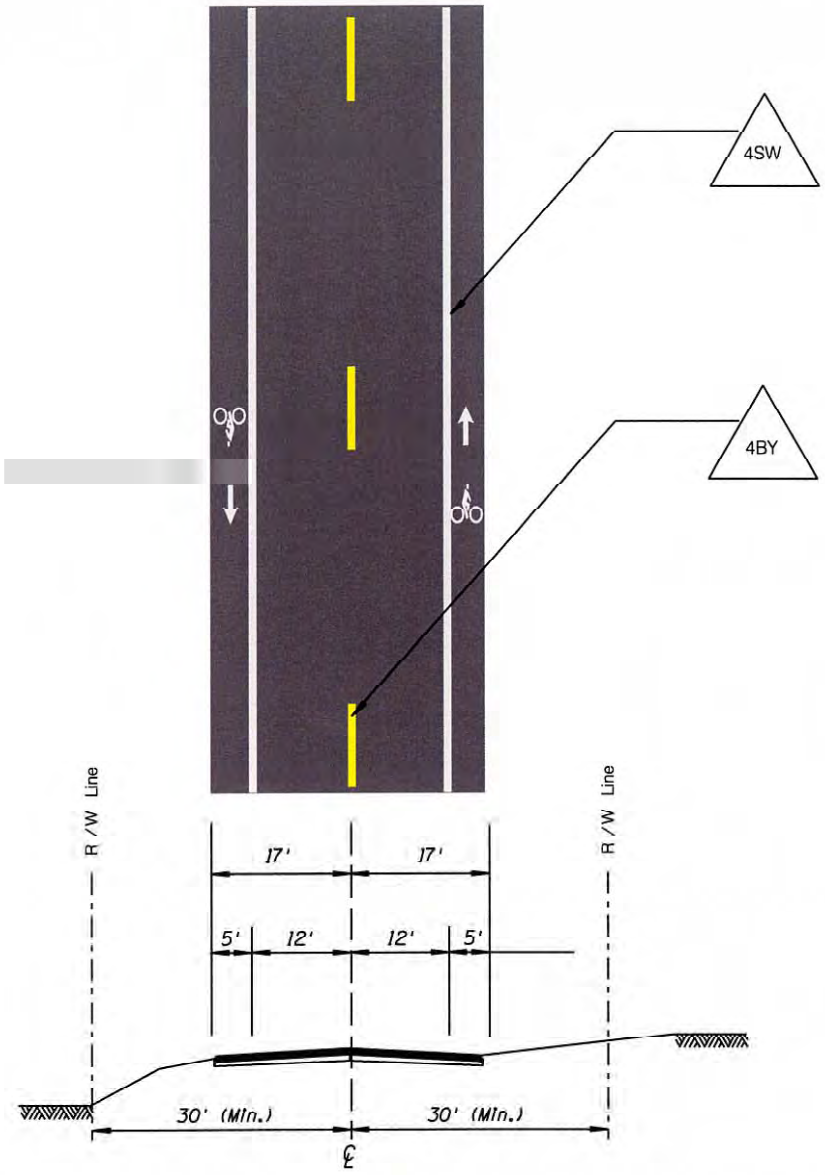
(not to scale)

GENERAL NOTES:

1. Cross-sections are per the functional classifications designated in the MCDOT Roadway Design Manual, Chapter 5.1.
2. Where Roadway conditions do not permit use of this standard, alternate treatment shall be approved by the County Traffic Engineer or his designated representative.
3. All striping dimensions shall be to center of stripe.
4. Final layout and/or field adjustments of pavement marking shall be approved by the County Traffic Engineer or his designated representative.
5. For information on: Clear Zones, Intersections, Geometric Design and Access Control reference the MCDOT Roadway Design Manual.

LEGEND:

4SW	———	4" Solid white line
4SBY	— — — ———	4" Double yellow line, one solid, one broken with a 10' line segment and a 30' gap



RURAL MINOR COLLECTOR ROAD

(not to scale)

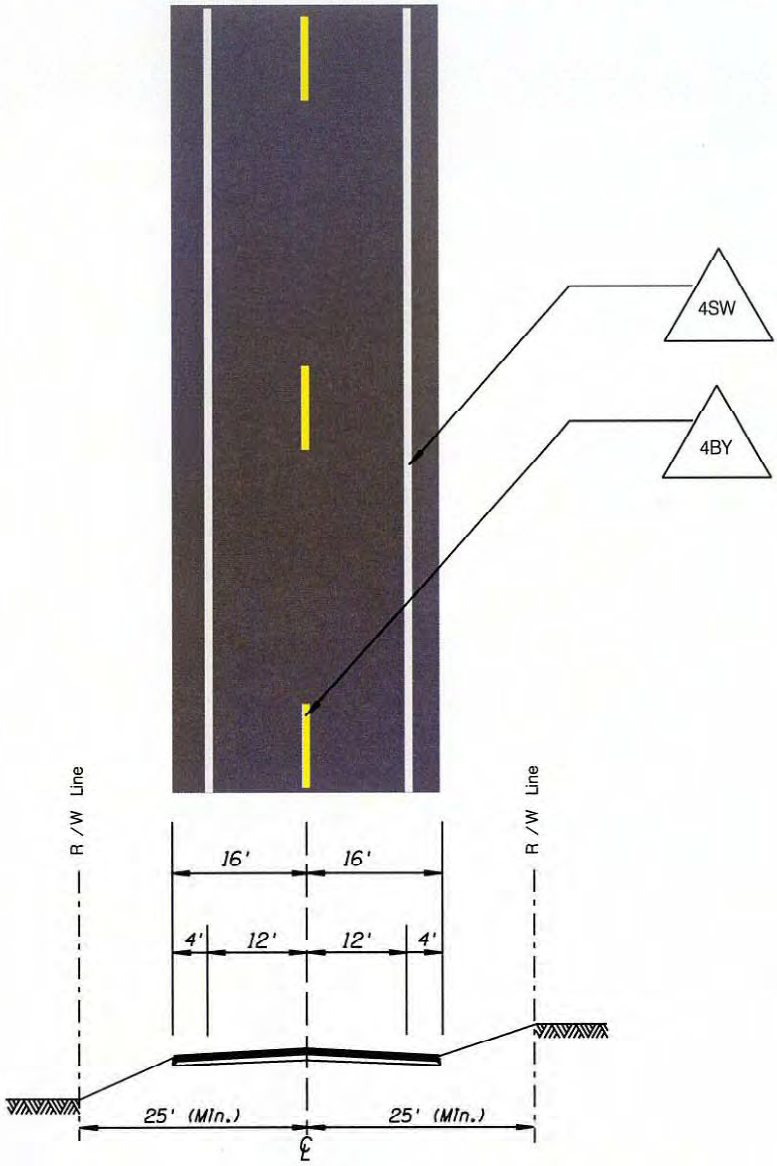
GENERAL NOTES:

1. Cross-sections are per the functional classifications designated in the MCDOT Roadway Design Manual, Chapter 5.1.
2. Where Roadway conditions do not permit use of this standard, alternate treatment shall be approved by the County Traffic Engineer or his designated representative.
3. All striping dimensions shall be to center of stripe.
4. Final layout and/or field adjustments of pavement marking shall be approved by the County Traffic Engineer or his designated representative.
5. For information on: Clear Zones, Intersections, Geometric Design and Access Control reference the MCDOT Roadway Design Manual.

LEGEND:

4SW — 4" Solid white line

4BY — 4" Broken yellow line with a 10' line segment and a 30' gap.



RURAL LOCAL ROADS

(not to scale)

GENERAL NOTES:

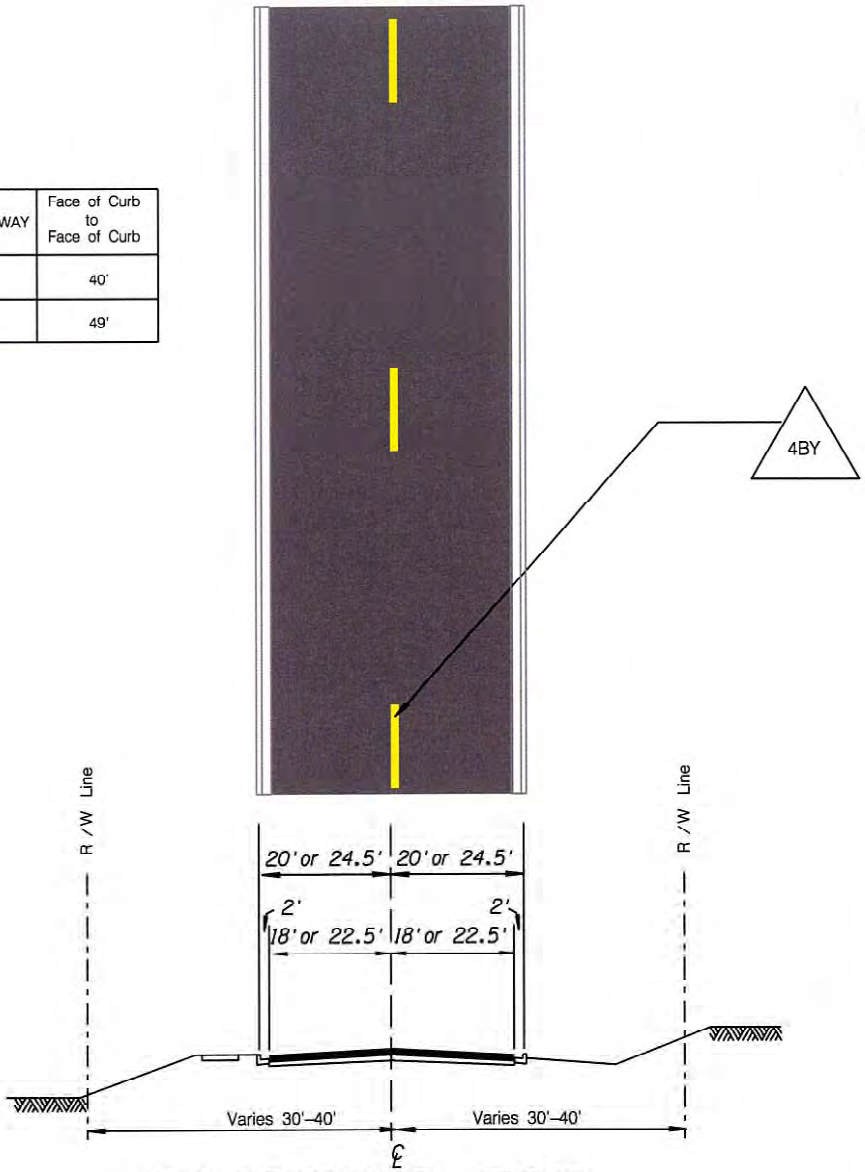
1. Cross-sections are per the functional classifications designated in the MCDOT Roadway Design Manual, Chapter 5.1.
2. Where Roadway conditions do not permit use of this standard, alternate treatment shall be approved by the County Traffic Engineer or his designated representative.
3. All striping dimensions shall be to center of stripe.
4. Final layout and/or field adjustments of pavement marking shall be approved by the County Traffic Engineer or his designated representative.
5. For information on: Clear Zones, Intersections, Geometric Design and Access Control reference the MCDOT Roadway Design Manual.
6. Striping of Rural Local Roads shall be approved by the County Traffic Engineer or his designated representative.

LEGEND:

4SW — 4" Solid white line

4BY — — — 4" Broken yellow line with a 10' line segment and a 30' gap.

	RIGHT-OF-WAY	Face of Curb to Face of Curb
LOCAL	60'	40'
COLLECTOR	80'	49'



ROADWAYS FOR INDUSTRIAL/COMMERCIAL SUBDIVISIONS

(not to scale)

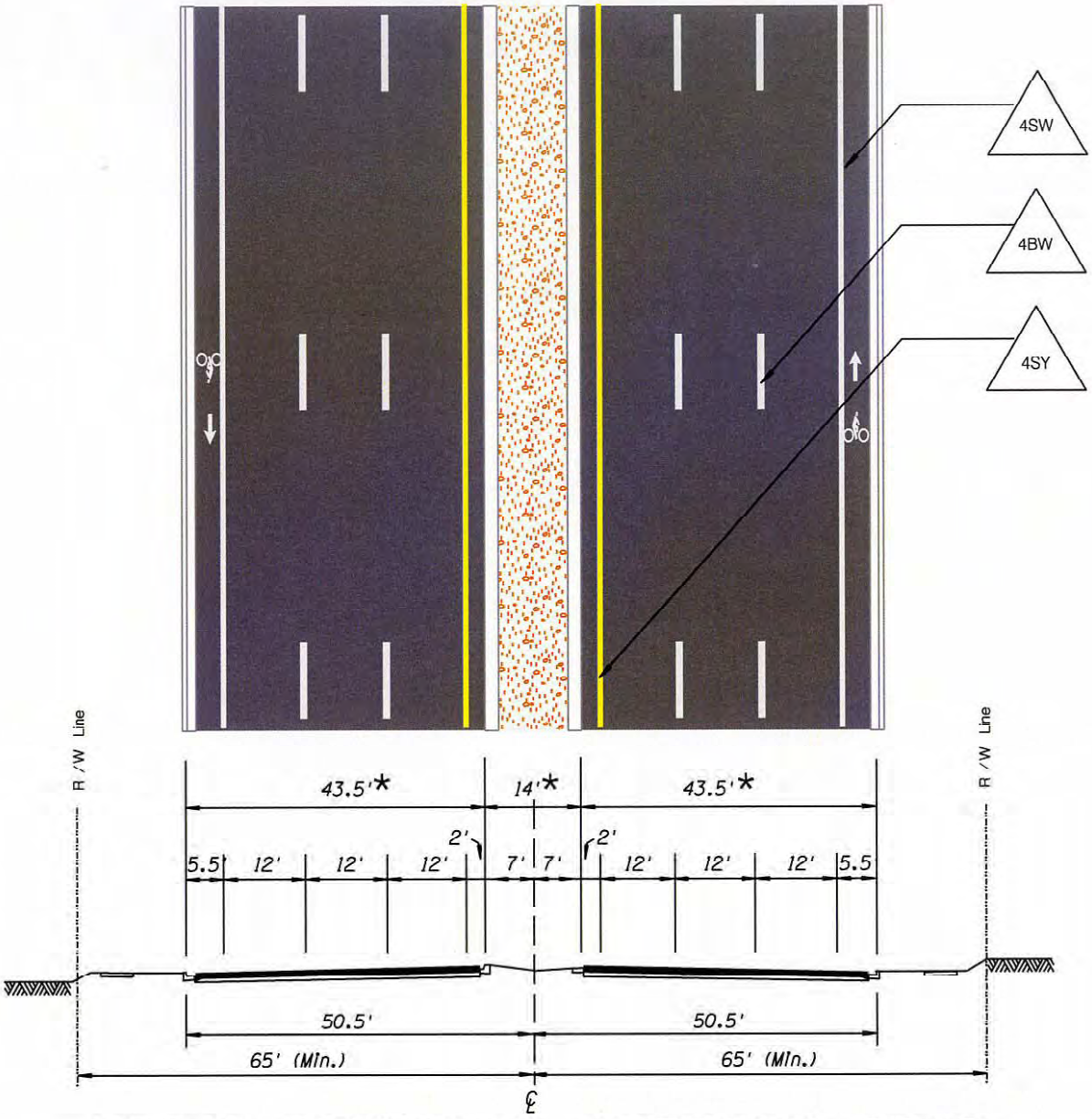
GENERAL NOTES:

1. Cross-sections are per the functional classifications designated in the MCDOT Roadway Design Manual, Chapter 5.1.
2. Where Roadway conditions do not permit use of this standard, alternate treatment shall be approved by the County Traffic Engineer or his designated representative.
3. All striping dimensions shall be to center of stripe.
4. Final layout and/or field adjustments of pavement marking shall be approved by the County Traffic Engineer or his designated representative.
5. For information on: Clear Zones, Intersections, Geometric Design and Access Control reference the MCDOT Roadway Design Manual.

LEGEND:

4SW — 4" Solid white line

4BY — — — 4" Broken yellow line with a 10' line segment and a 30' gap.



URBAN PRINCIPAL ARTERIAL ROAD

(not to scale)

GENERAL NOTES:

1. Cross-sections are per the functional classifications designated in the MCDOT Roadway Design Manual, Chapter 5.1.
2. Where Roadway conditions do not permit use of this standard, alternate treatment shall be approved by the County Traffic Engineer or his designated representative.
3. All striping dimensions shall be to center of stripe.
4. Final layout and/or field adjustments of pavement marking shall be approved by the County Traffic Engineer or his designated representative.
5. For information on: Clear Zones, Intersections, Geometric Design and Access Control reference the MCDOT Roadway Design Manual.

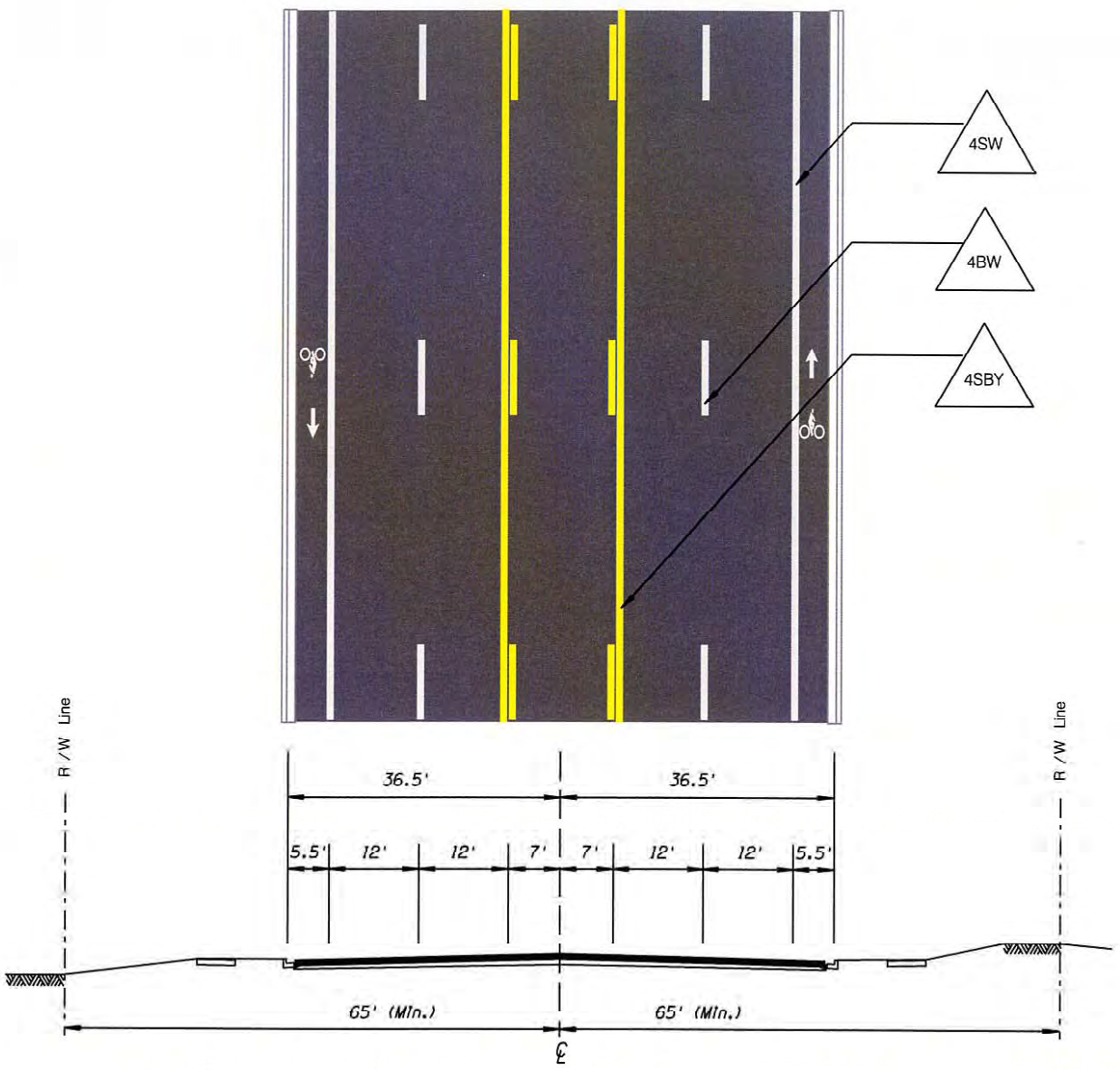
* Dimension measured to face of curb.

LEGEND:

4SW — 4" Solid white line

4BW — 4" Broken white line with a 10' line segment and a 30' gap

4SY — 4" Solid yellow line



URBAN MINOR ARTERIAL ROAD

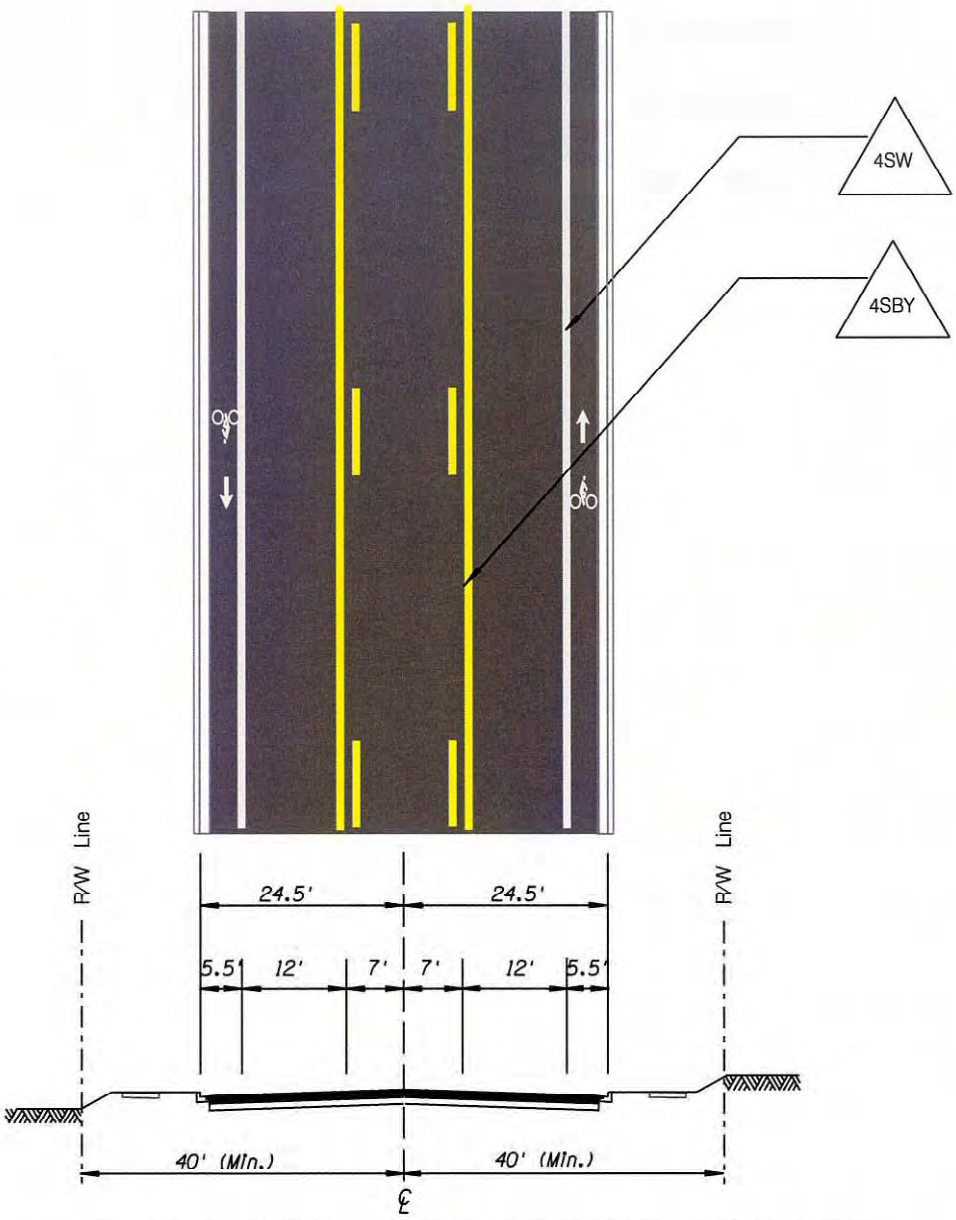
(not to scale)

GENERAL NOTES:

1. Cross-sections are per the functional classifications designated in the MCDOT Roadway Design Manual, Chapter 5.1.
2. Where Roadway conditions do not permit use of this standard, alternate treatment shall be approved by the County Traffic Engineer or his designated representative.
3. All striping dimensions shall be to center of lines.
4. Final layout and/or field adjustments of pavement marking shall be approved by the County Traffic Engineer or his designated representative.
5. For information on: Clear Zones, Intersections, Geometric Design and Access Control reference the MCDOT Roadway Design Manual.

LEGEND:

4SW	———	4" Solid white line
4BW	— — —	4" Broken white line with a 10' line segment and a 30' gap
4SBY	— — — ———	4" Double yellow line, one solid, one broken with a 10' line segment and a 30' gap



URBAN MAJOR COLLECTOR ROAD

(not to scale)

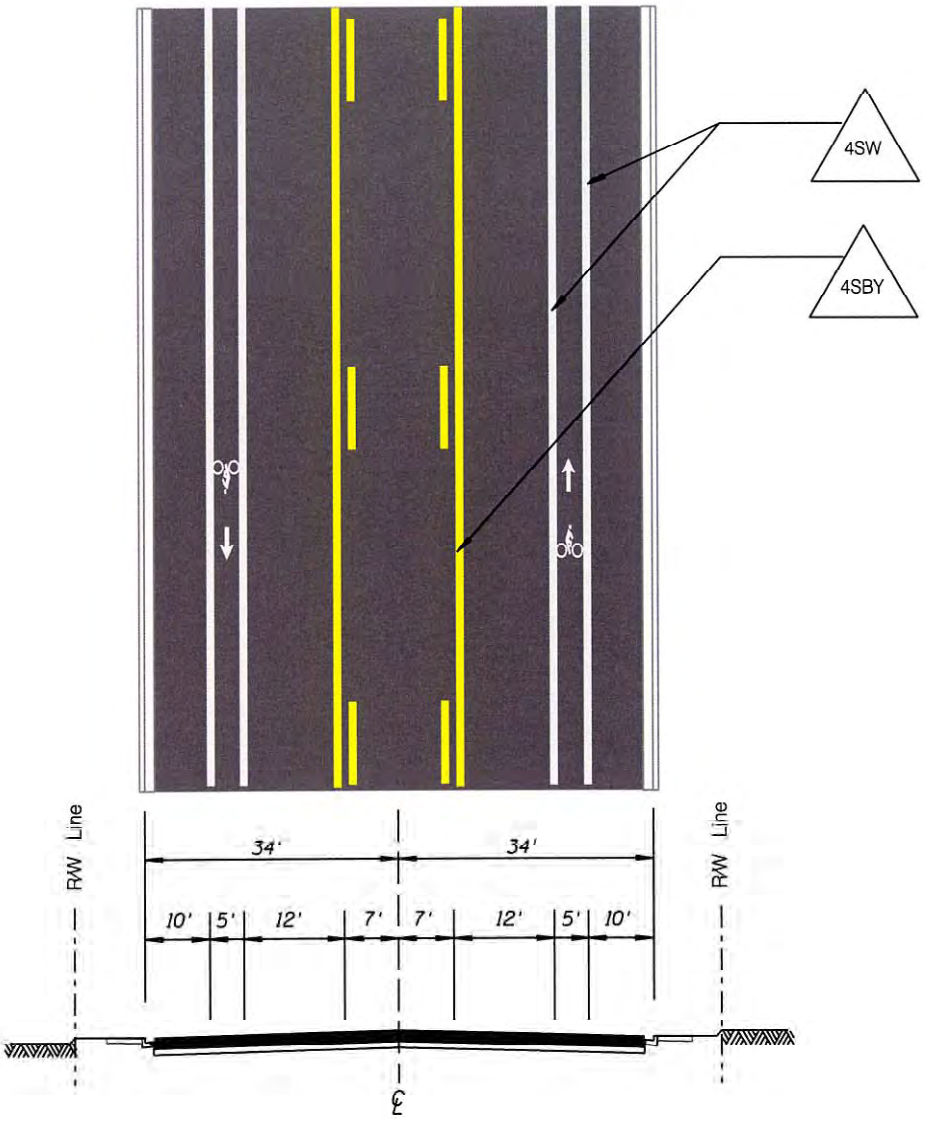
GENERAL NOTES:

1. Cross-sections are per the functional classifications designated in the MCDOT Roadway Design Manual, Chapter 5.1.
2. Where Roadway conditions do not permit use of this standard, alternate treatment shall be approved by the County Traffic Engineer or his designated representative.
3. All striping dimensions shall be to center of stripe.
4. Final layout and/or field adjustments of pavement marking shall be approved by the County Traffic Engineer or his designated representative.
5. For information on: Clear Zones, Intersections, Geometric Design and Access Control reference the MCDOT Roadway Design Manual.

LEGEND:

4SW — 4" Solid white line

4SBY — 4" Broken yellow line with a 10' line segment and a 30' gap.



URBAN MAJOR COLLECTOR ROAD

(with WIDENED SECTION FOR PARKING)

(not to scale)

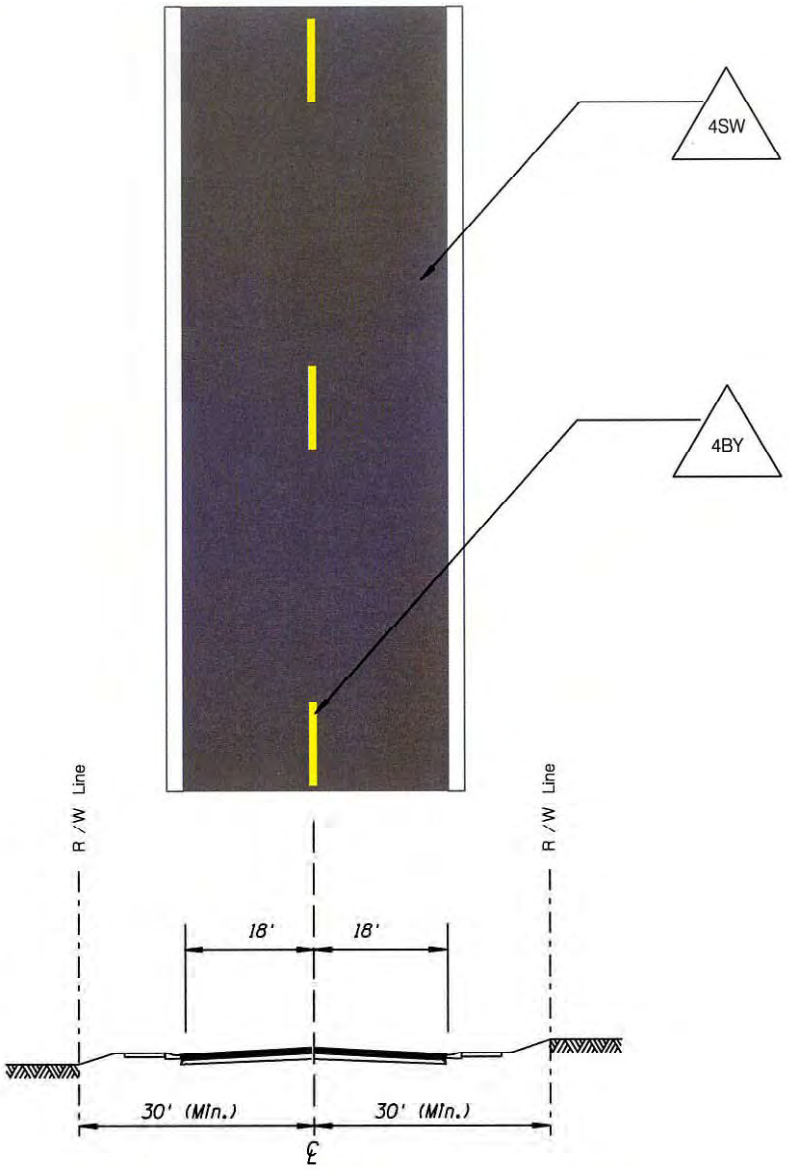
GENERAL NOTES:

1. Cross-sections are per the functional classifications designated in the MCDOT Roadway Design Manual, Chapter 5.1.
2. Where Roadway conditions do not permit use of this standard, alternate treatment shall be approved by the County Traffic Engineer or his designated representative.
3. All striping dimensions shall be to center of stripe.
4. Final layout and/or field adjustments of pavement marking shall be approved by the County Traffic Engineer or his designated representative.
5. For information on: Clear Zones, Intersections, Geometric Design and Access Control reference the MCDOT Roadway Design Manual.

LEGEND:

4SW — 4" Solid white line

4SBY — 4" Broken yellow line with a 10' line segment and a 30' gap.



URBAN MINOR COLLECTOR ROADS

(not to scale)

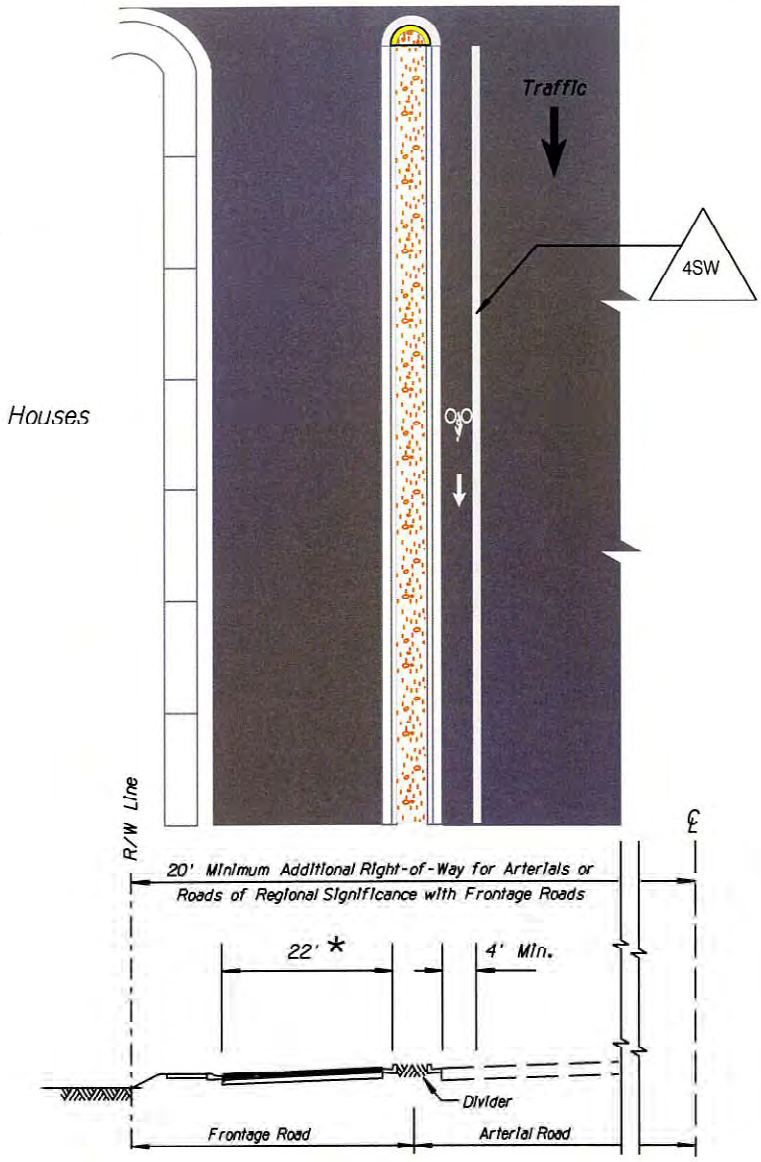
GENERAL NOTES:

1. Cross-sections are per the functional classifications designated in the MCDOT Roadway Design Manual, Chapter 5.1.
2. Where Roadway conditions do not permit use of this standard, alternate treatment shall be approved by the County Traffic Engineer or his designated representative.
3. All striping dimensions shall be to center of stripe.
4. Final layout and/or field adjustments of pavement marking shall be approved by the County Traffic Engineer or his designated representative.
5. For information on: Clear Zones, Intersections, Geometric Design and Access Control reference the MCDOT Roadway Design Manual.

LEGEND:

4BY — — — 4" Broken yellow line with a 10' line segment and a 30' gap.

4SW ——— 4" Solid white line



URBAN FRONTAGE ROAD

(not to scale)

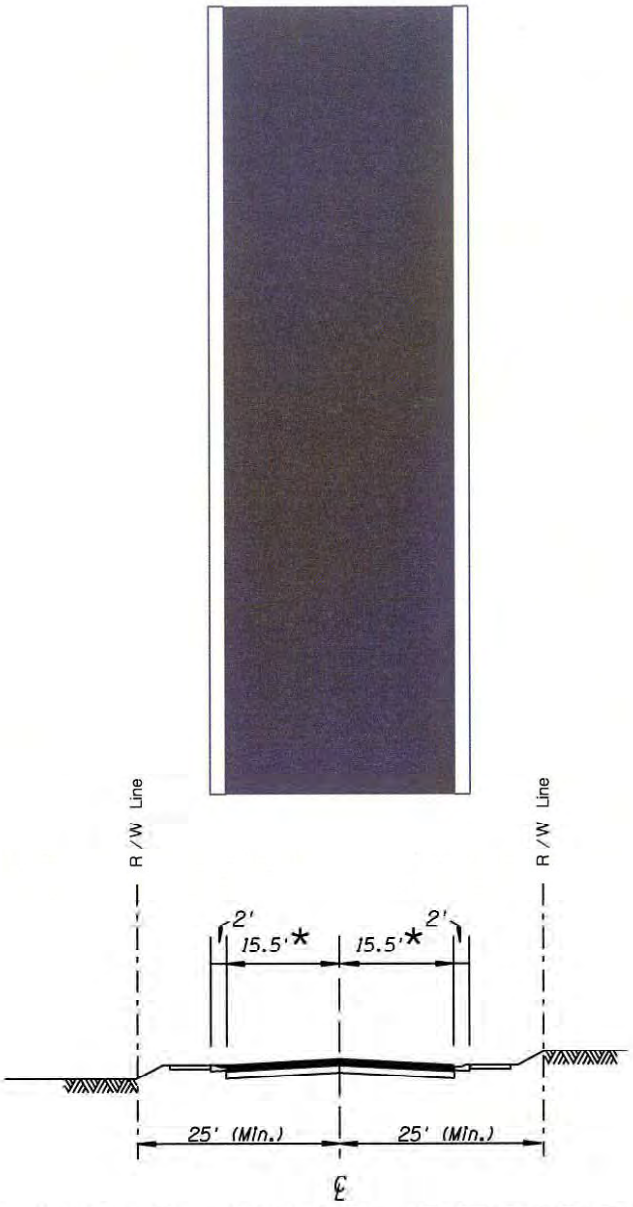
GENERAL NOTES:

1. Cross-sections are per the functional classifications designated in the MCDOT Roadway Design Manual, Chapter 5.1.
2. Where Roadway conditions do not permit use of this standard, alternate treatment shall be approved by the County Traffic Engineer or his designated representative.
3. All striping dimensions shall be to center of stripe.
4. For information on: Clear Zones, Intersections, Geometric Design and Access Control reference the MCDOT Roadway Design Manual.
5. No striping on frontage road unless directed by Traffic Engineer.

*Dimension measured to face of curb.

LEGEND:

4SW — 4" Solid white line



URBAN LOCAL ROAD RESIDENTIAL

(not to scale)

GENERAL NOTES:

1. Cross-sections are per the functional classifications designated in the MCDOT Roadway Design Manual, Chapter 5.1.

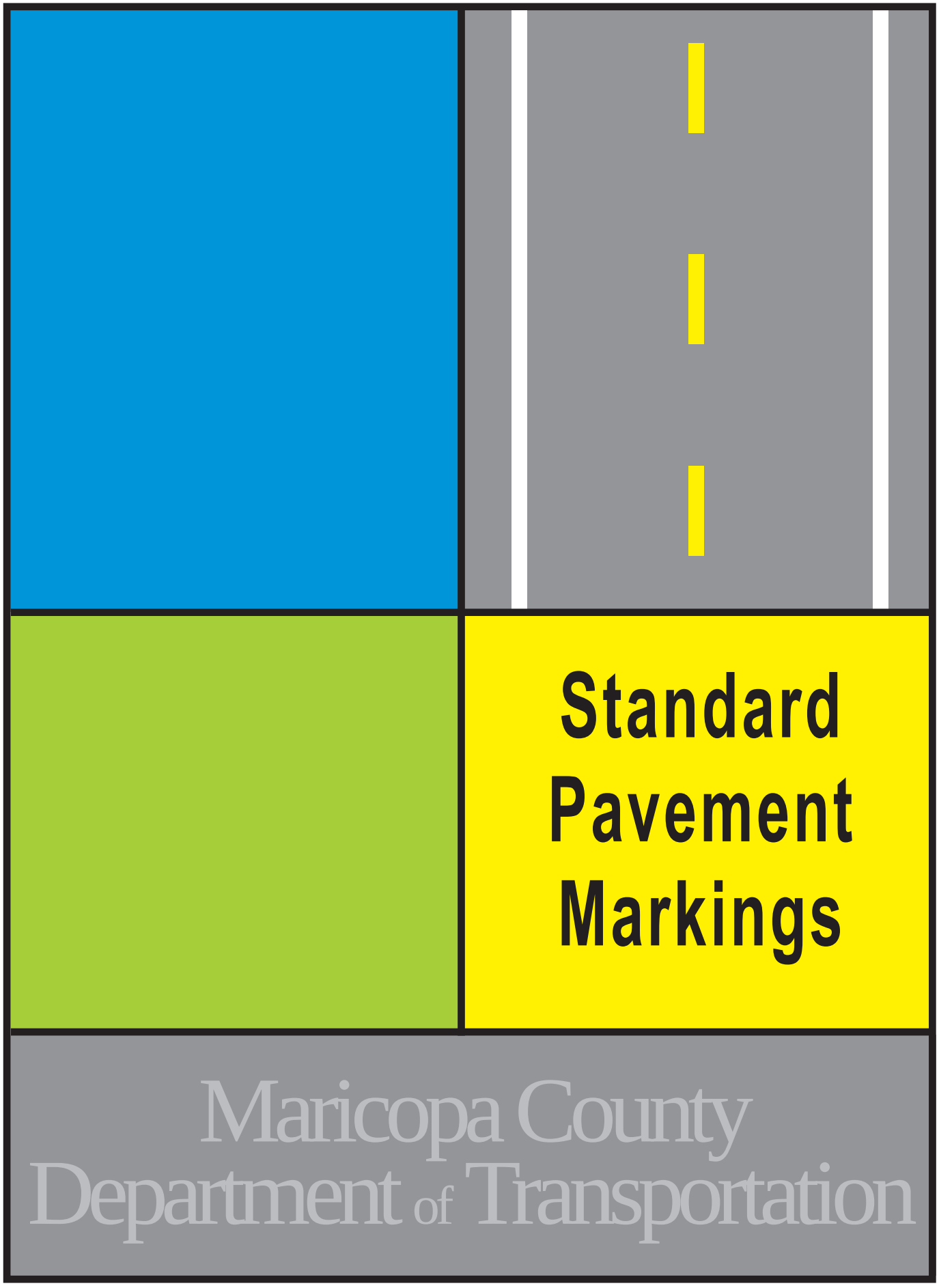
2. Where Roadway conditions do not permit use of this standard, alternate treatment shall be approved by the County Traffic Engineer or his designated representative.

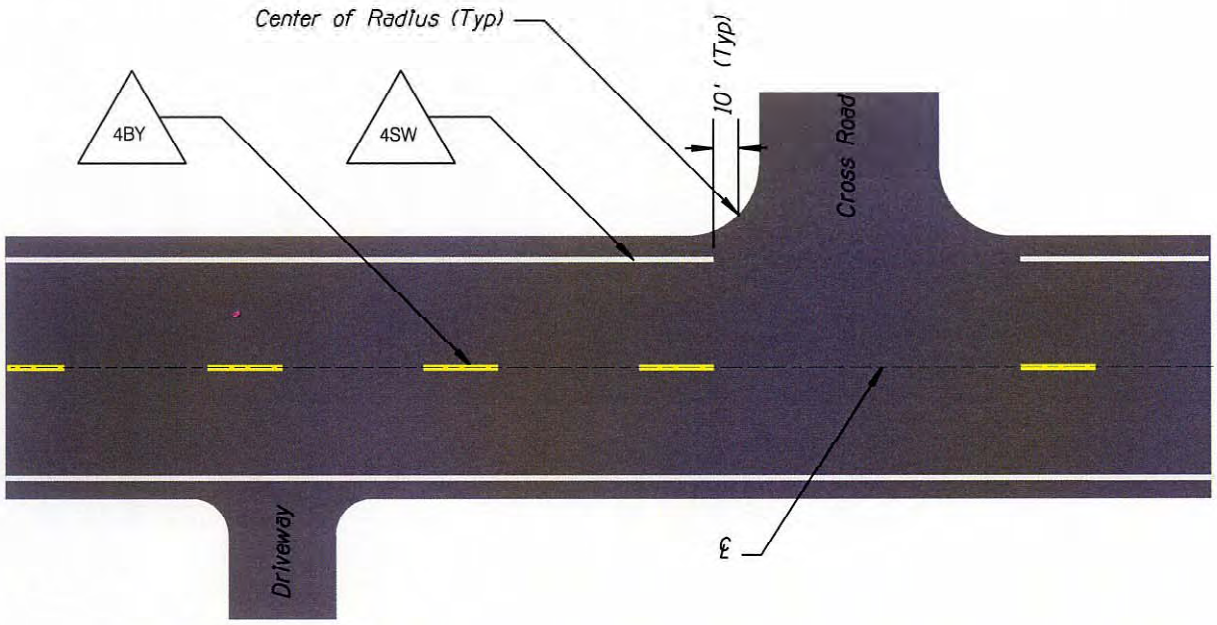
3. Final layout and/or field adjustments of pavement marking shall be approved by the County Traffic Engineer or his designated representative.

4. For information on: Clear Zones, Intersections, Geometric Design and Access Control reference the MCDOT Roadway Design Manual.

5. No striping on residential roads unless directed by Traffic Engineer or his designated representative.

*Dimension measured to face of curb.


Standard
Pavement
Markings
Maricopa County
Department of Transportation



CENTER LINES & EDGE LINES

(not to scale)

GENERAL NOTES:

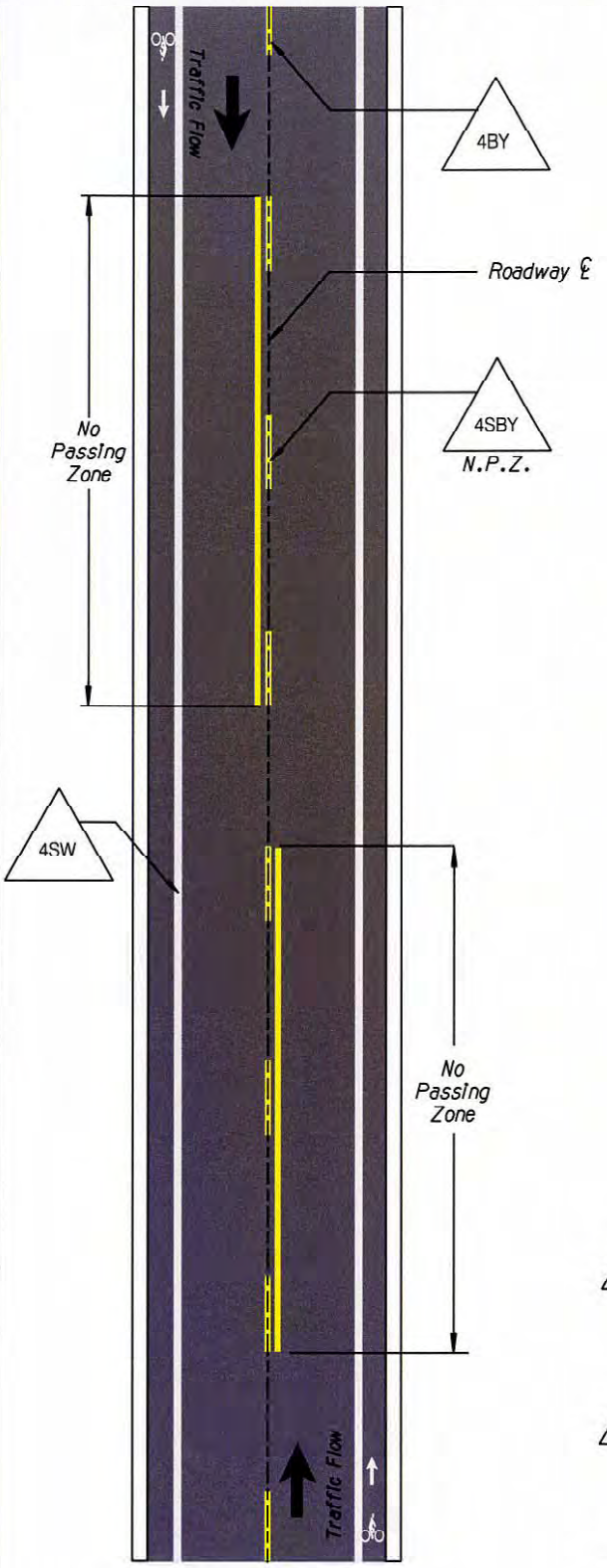
1. All striping will be from center of stripe to center of stripe.

2. Edge line striping shall not be broken for driveways.

LEGEND:

4SW — 4" Solid white line

4BY — — — 4" Broken yellow line with a 10' line segment and a 30' gap



NO PASSING ZONES

(For Roadway Segments)

(not to scale)

GENERAL NOTES:

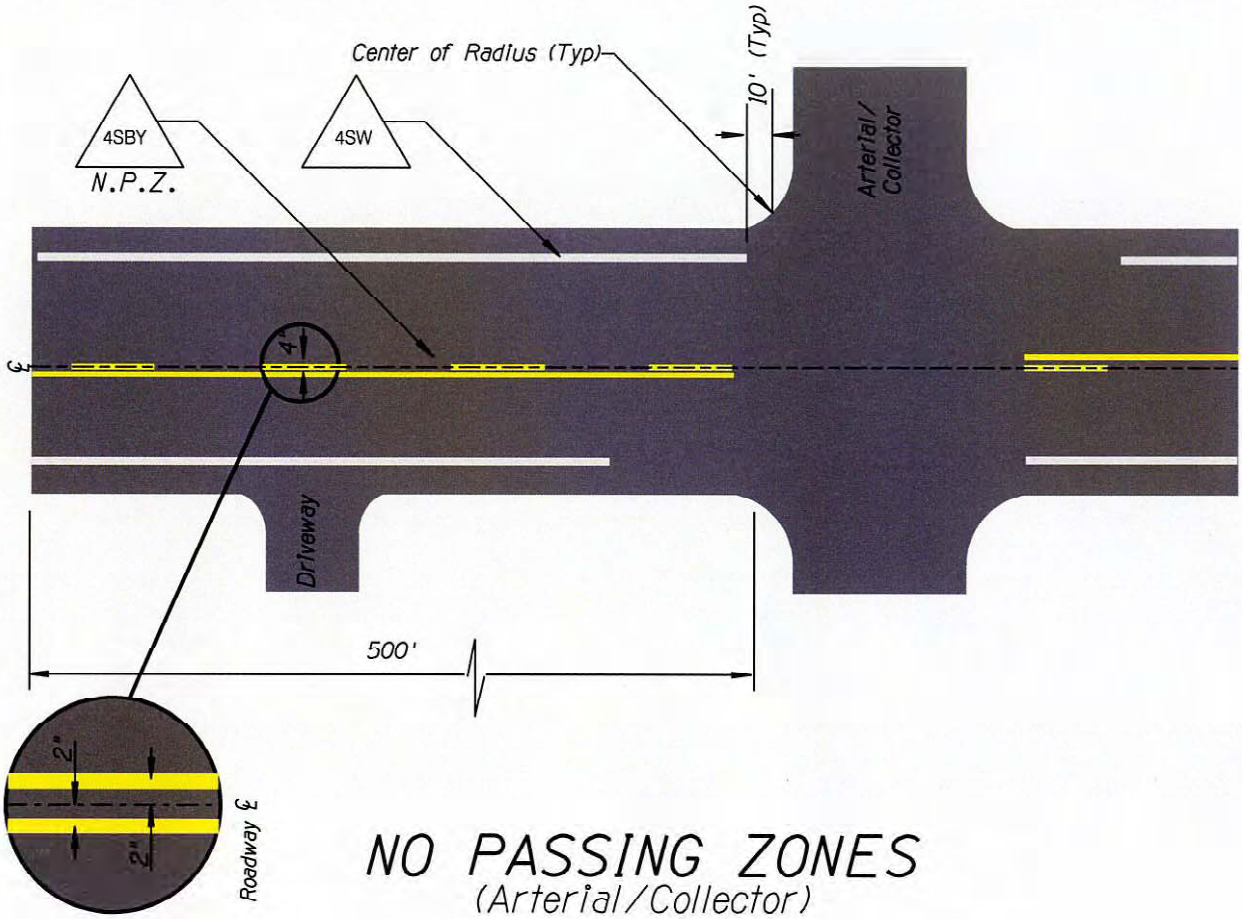
1. NPZ's shall be installed per MUTCD guidelines. Final layout of NPZ shall be checked by the County Traffic Engineer or his representative.

LEGEND:

4SW — 4" Solid white line

4BY — 4" Broken yellow line with a 10' line segment and a 30' gap.

4SBY N.P.Z. — 4" Double yellow line, one solid, one broken with a 10' line segment and a 30' gap



NO PASSING ZONES

(Arterial/Collector)

(not to scale)

GENERAL NOTES:

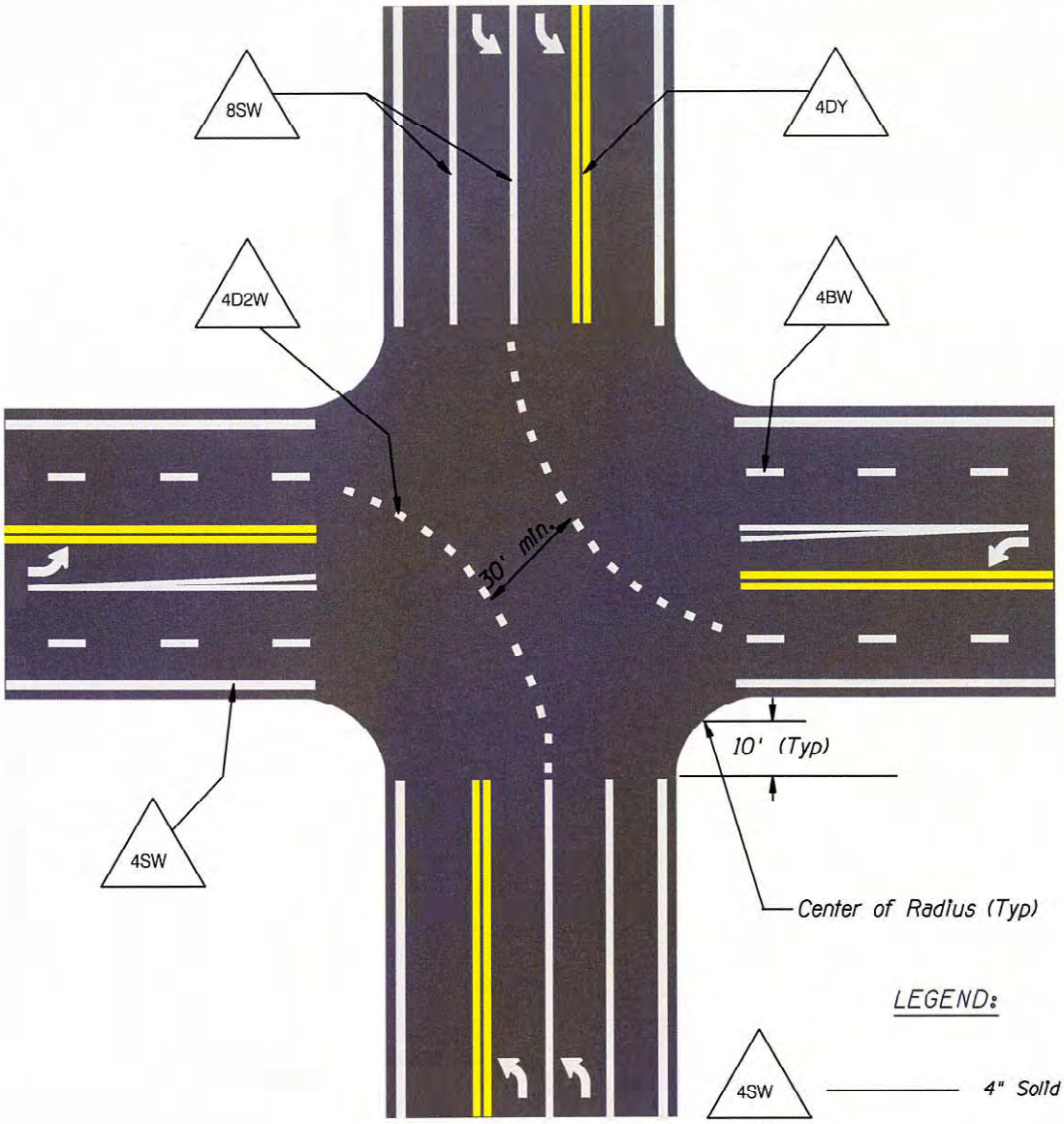
1. NPZ's shall be installed per MUTCD guidelines. Final layout of NPZ shall be checked by the County Traffic Engineer or his representative.

2. Installation of NPZs approaching collectors shall be determined by the County Traffic Engineer or his designated representative.

LEGEND:

4SW — 4" Solid white line

4SBY N.P.Z. — 4" Double yellow line one solid, one broken with a 10' line segment and a 30' gap

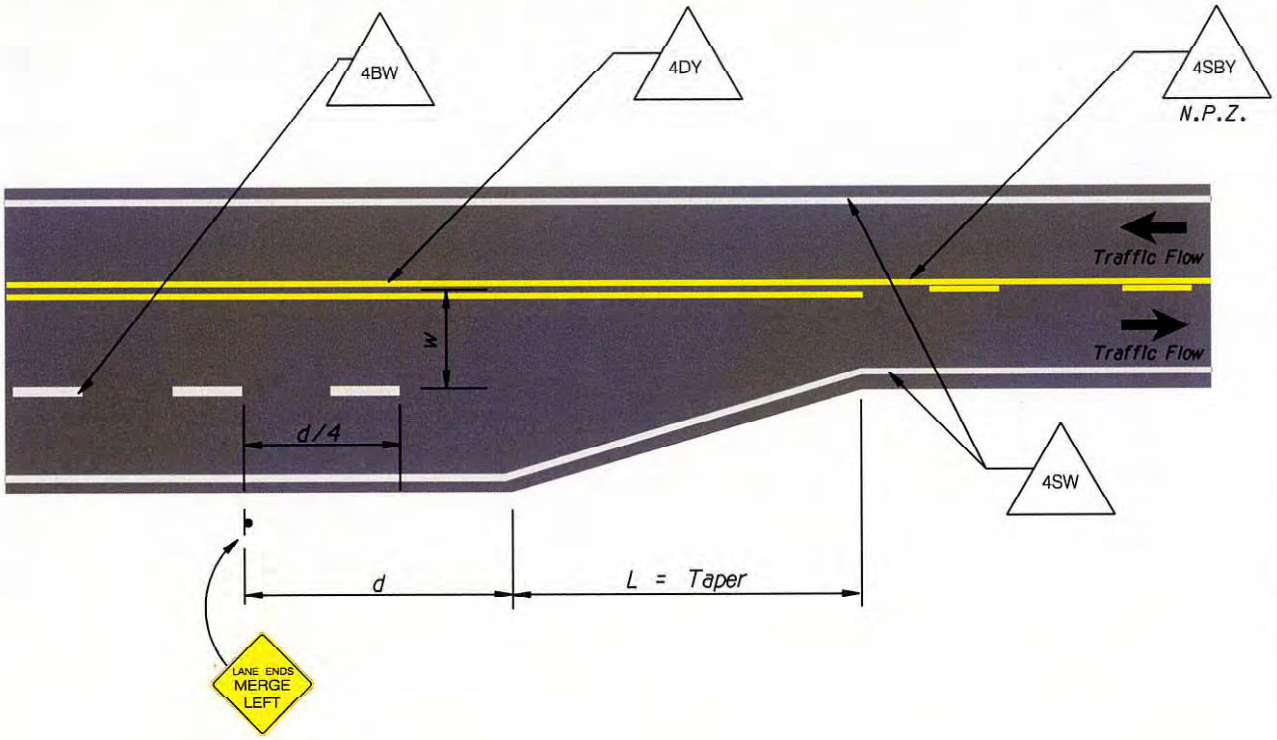


PAVEMENT MARKING EXTENSIONS THROUGH INTERSECTIONS

(not to scale)

LEGEND:

- 4SW — 4" Solid white line
- 8SW — 8" Solid white line
- 4DY — 4" Solid double yellow
- 4D2W — 4" Dashed white line with a 2' line segmen and a 4' gap
- 4BW — 4" Broken white line with a 10' line segment and a 30' gap



LANE REDUCTION TRANSITION AND SIGNS

(not to scale)

GENERAL NOTES:

L = Length in feet

S = 85th percentile speed
(On new construction the design speed may be used)

W = Offset in feet

d = Advance warning sign distance
(See Section 2C.05/MUTCD)

$L = \frac{WS^2}{60}$ - For speeds less than 45 mph

L = S x W - For speeds 45 mph or greater

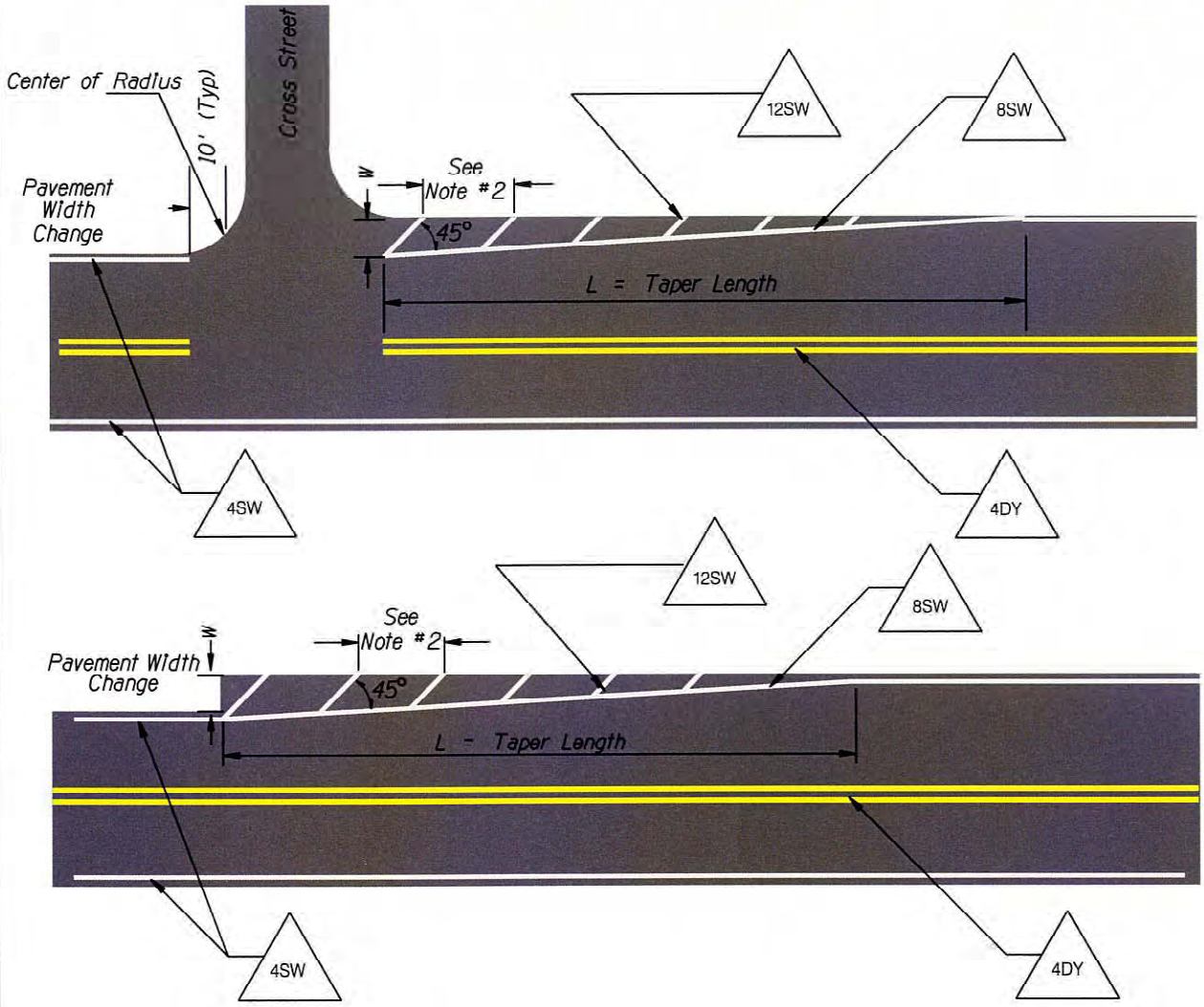
LEGEND:

4SW — 4" Solid white line

4BW — 4" Broken white line with a 10' line segment and a 30' gap

4SBY N.P.Z. — 4" Double yellow line, one solid, one broken with a 10' line segment and a 30' gap

4DY — 4" Solid double yellow line



CHANNELIZING LINES

(Change in Pavement Width)

(not to scale)

GENERAL NOTES:

1. Changes in pavement width may require pavement marking channelization.
2. Spacing of cross-hatching shall correspond with posted speed limit of road, not to exceed 50'.

L = Length in feet

S = 85th percentile speed (On new construction the design speed may be used)

W = Offset in feet

$L = \frac{WS^2}{60}$ - For speeds less than 45 mph

L = S x W - For speeds 45 mph or greater

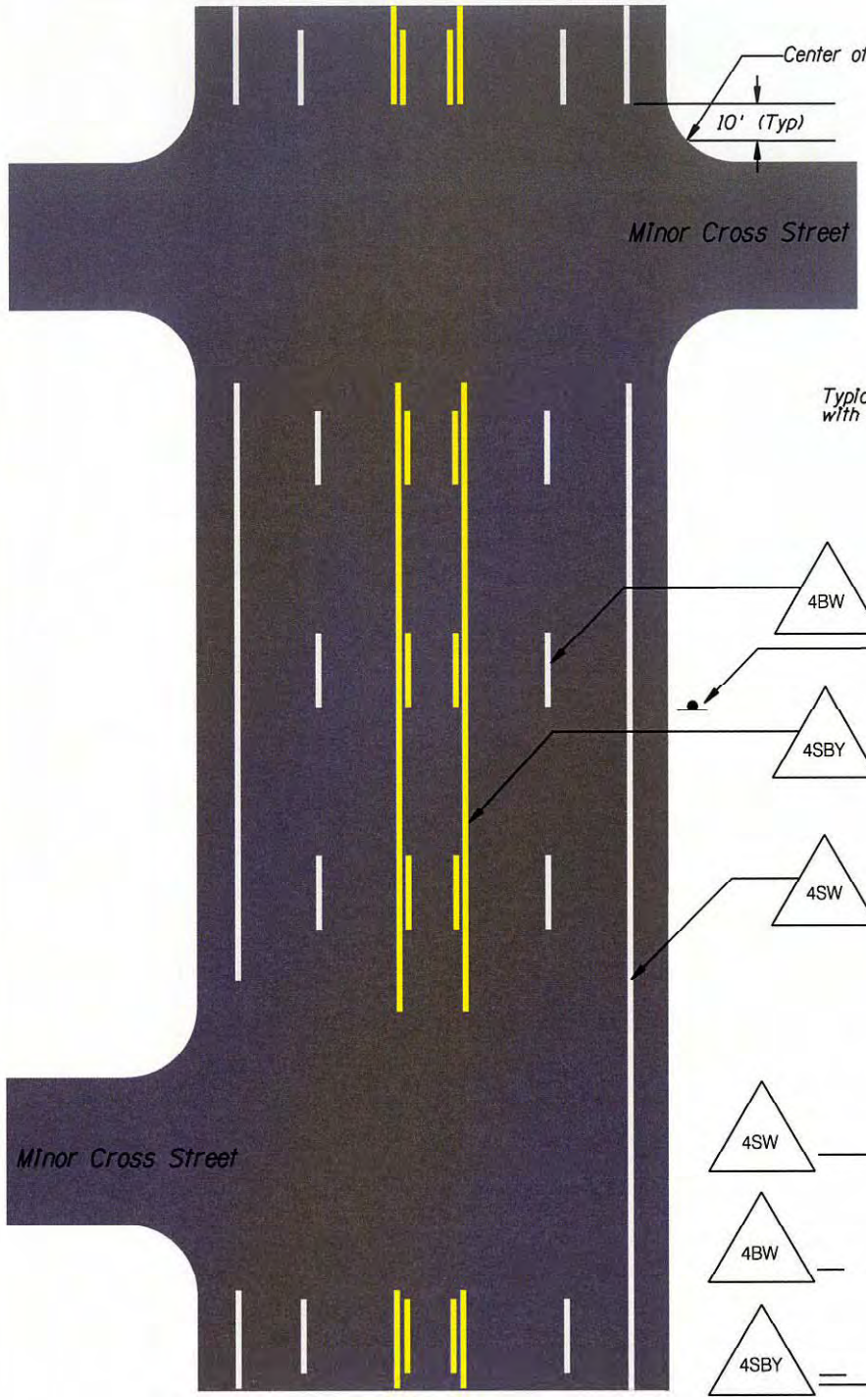
LEGEND:

12SW — 12" Solid white line

8SW — 8" Solid white line

4SW — 4" Solid white line

4DY — 4" Solid double yellow line



GENERAL NOTES:

Typical striping layout for minor cross streets with low left turn volumes

LEGEND:

4SW — 4" Solid white line

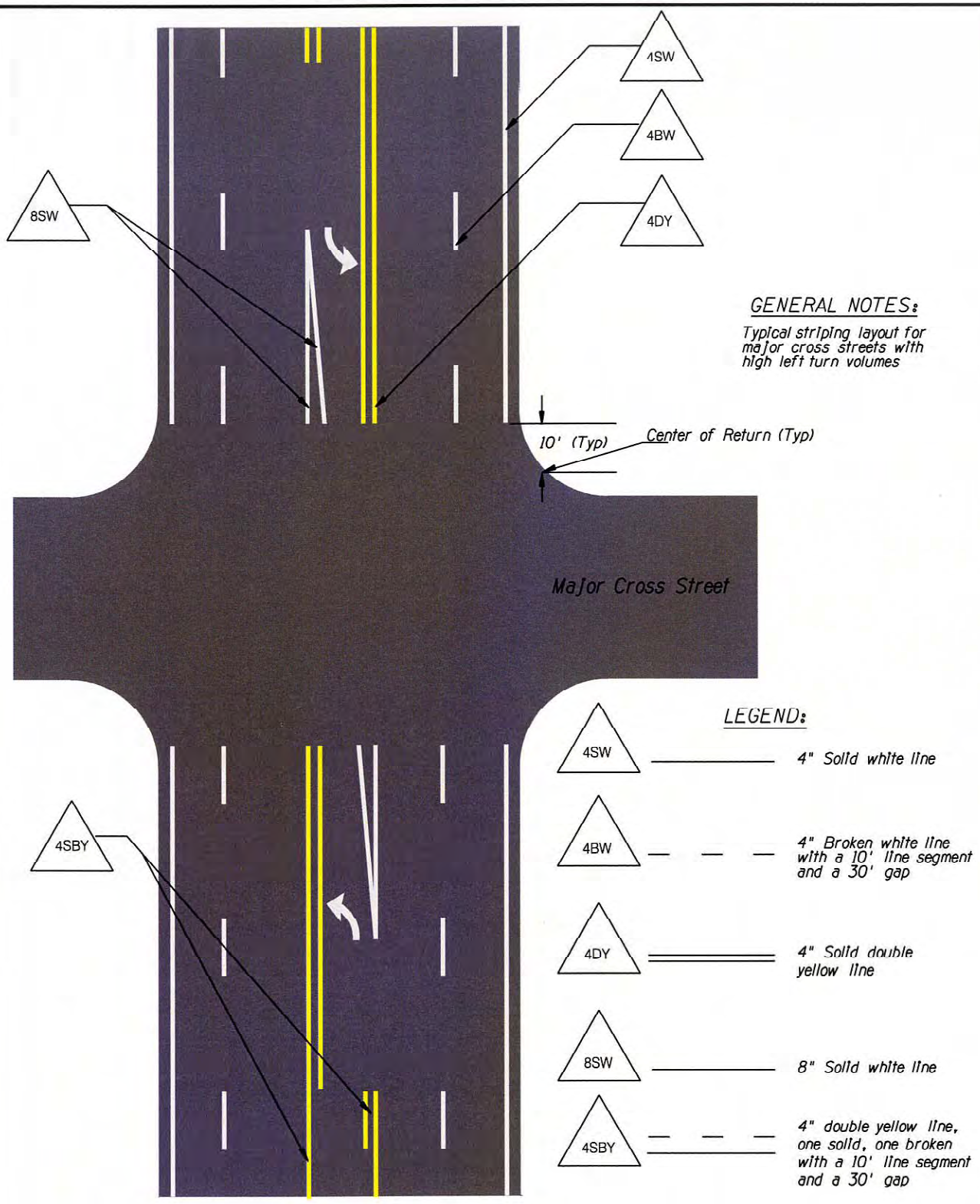
4BW — 4" Broken white line and a 30' gap with a 10' line segment

4SBY — 4" Double yellow line, one solid, one broken with a 10' line segment and a 30' gap

CENTER TWO-WAY LEFT TURN LANES

(With Minor Cross Street)

(not to scale)



GENERAL NOTES:

Typical striping layout for major cross streets with high left turn volumes

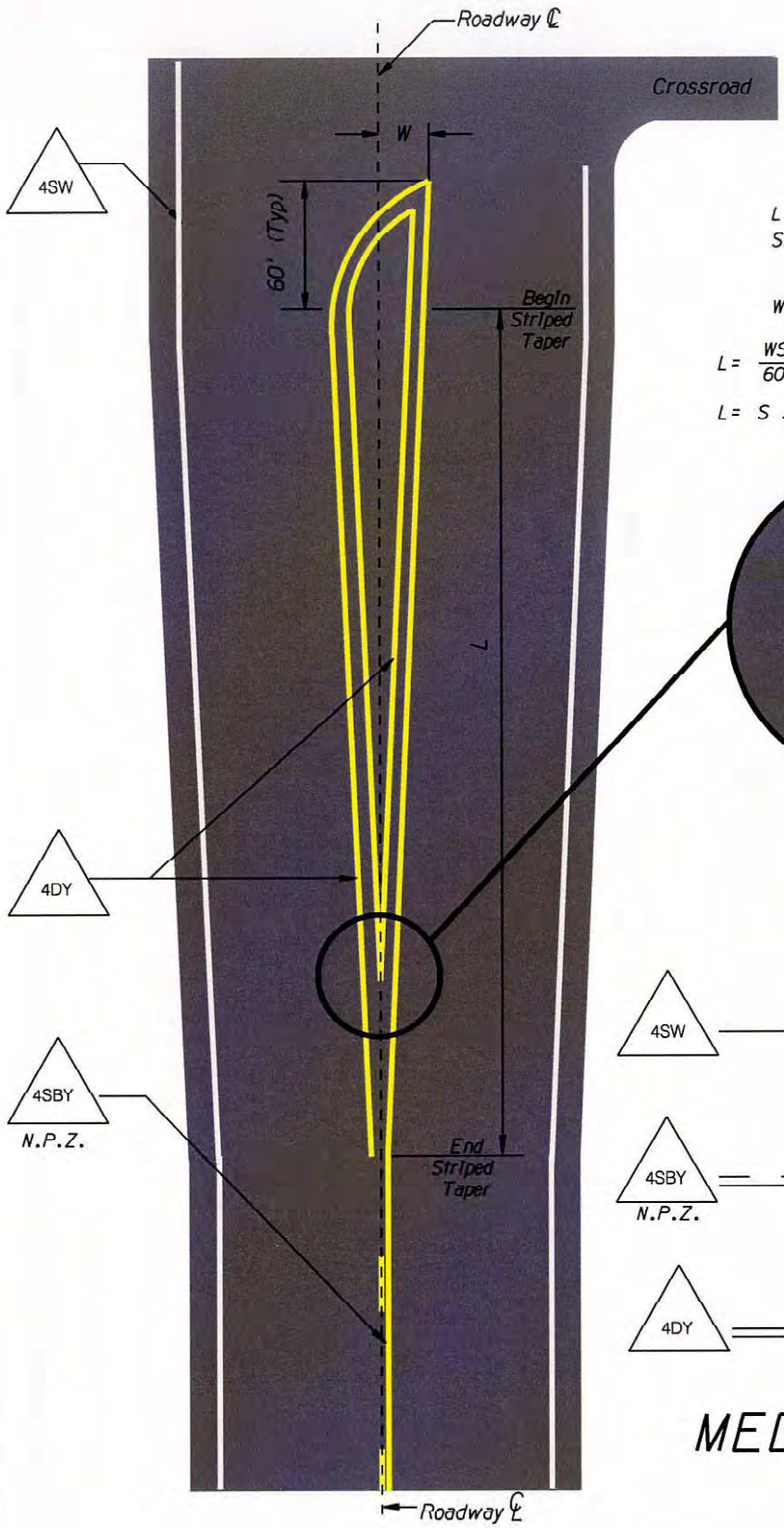
LEGEND:

4SW	4" Solid white line
4BW	4" Broken white line with a 10' line segment and a 30' gap
4DY	4" Solid double yellow line
8SW	8" Solid white line
4SBY	4" double yellow line, one solid, one broken with a 10' line segment and a 30' gap

CENTER TWO-WAY LEFT TURN LANES

(With Major Cross Street)

(not to scale)



GENERAL NOTES:

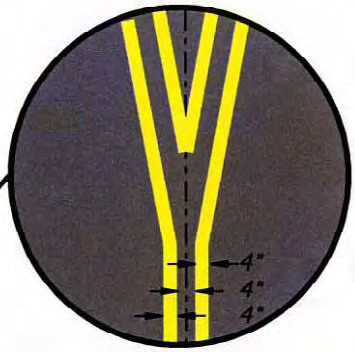
L = Length in feet

S = 85th percentile speed (On new construction the design speed may be used)

W = Offset in feet

$L = \frac{WS^2}{60}$ - For speeds less than 45 mph

L = S x W - For speeds 45 mph or greater



LEGEND:

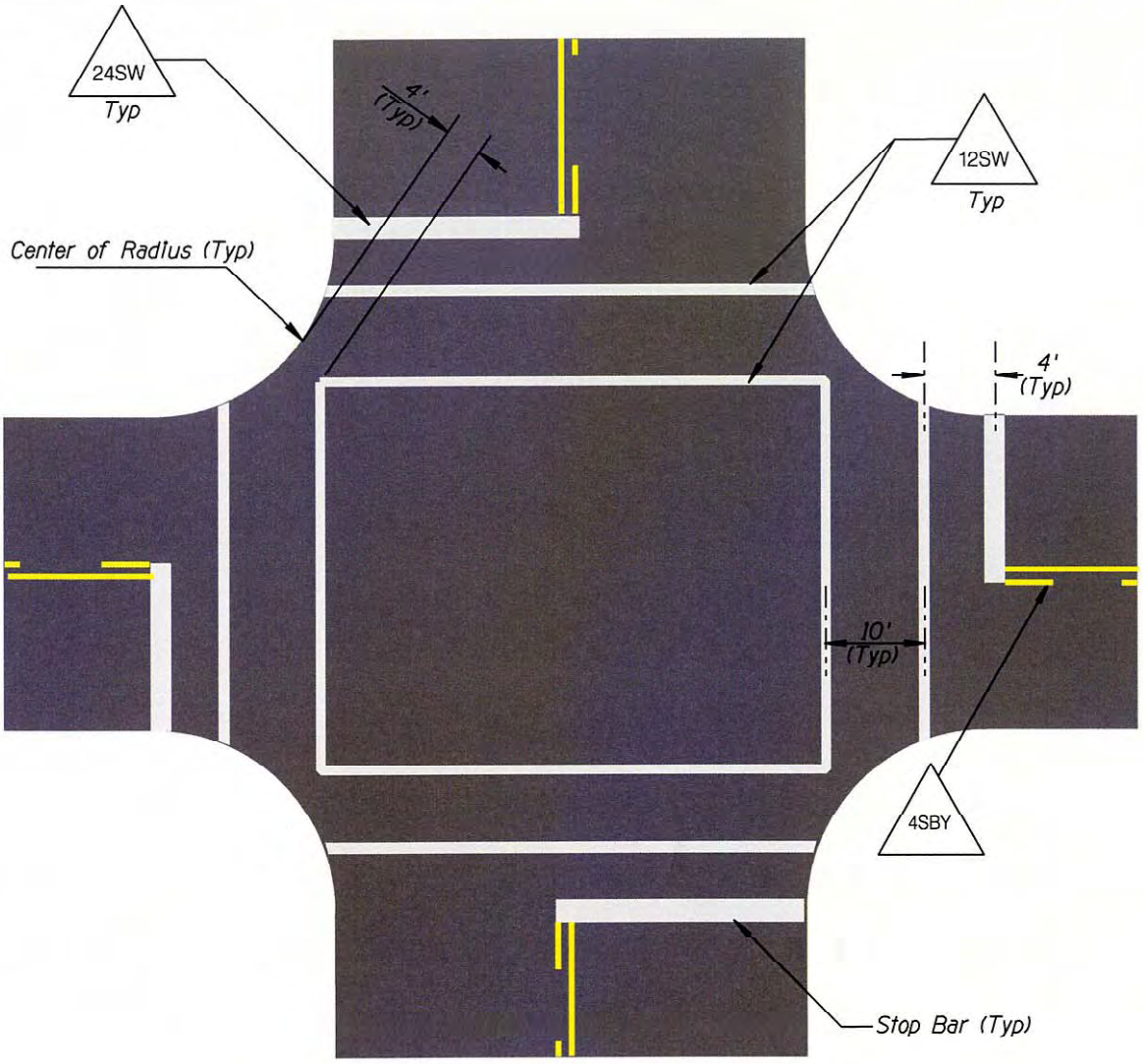
4SW — 4" Solid white line

4SBY N.P.Z. — 4" Double yellow line, one solid, one broken with a 10' line segment and a 30' gap

4DY — 4" Solid double yellow line

MEDIAN ISLANDS

(not to scale)



STANDARD CROSSWALK AND STOP LINES

(not to scale)

GENERAL NOTES:

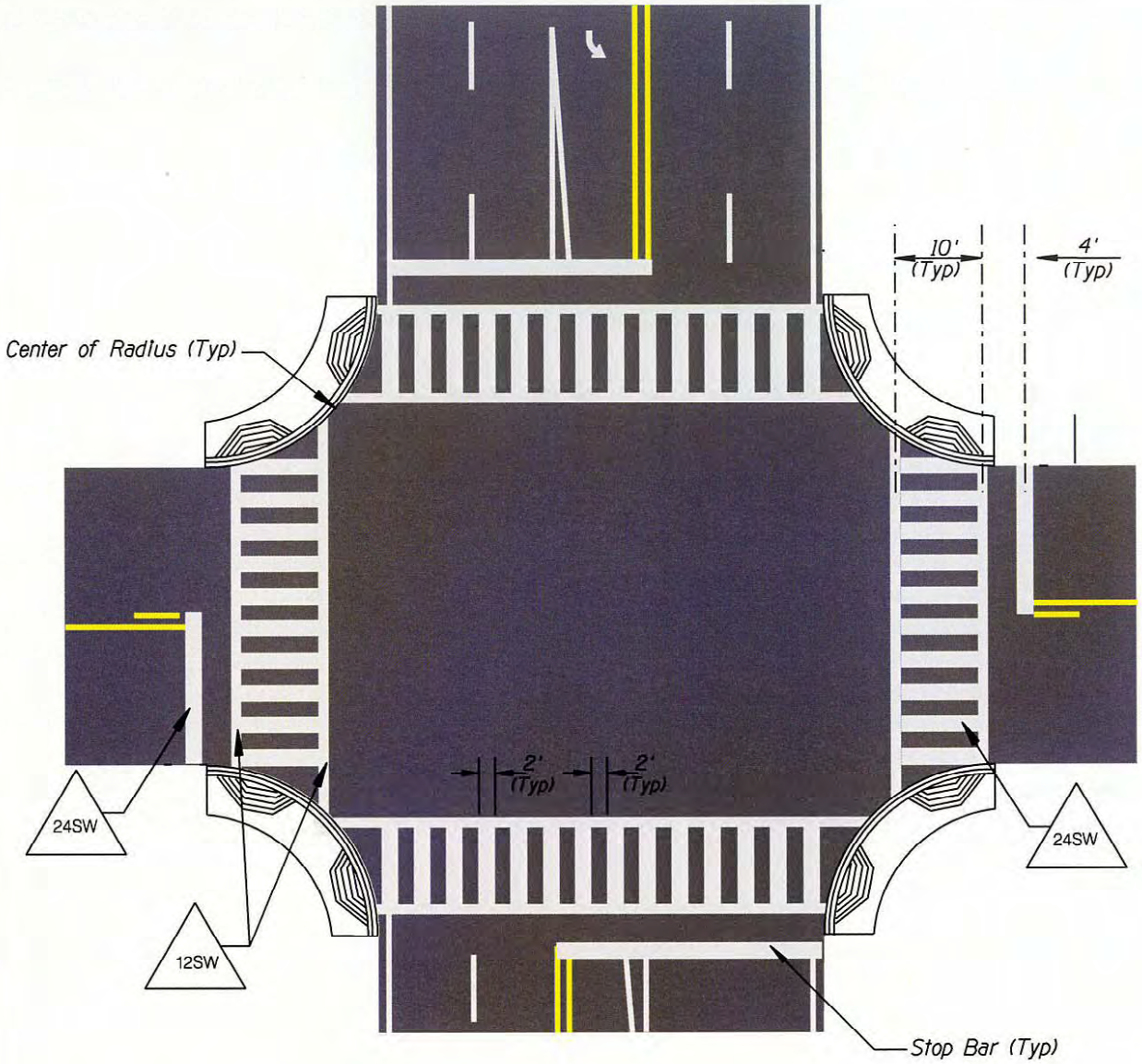
1. Marked crosswalks shall be installed at signalized and 4-way stop intersections as designated by the County Traffic Engineer or his representative.

2. All new crosswalks shall be installed based on an engineering study.

3. All striping will be from center of stripe to center of stripe.

LEGEND:

12SW Typ	12" Solid white line (typical)
24SW Typ	24" Solid white line (typical)
4SBY	4" Double yellow line, one solid, one broken with a 10' line segment and a 30' gap



HIGH VISIBILITY DUAL-RAMP CROSSWALK AND STOP LINES

(not to scale)

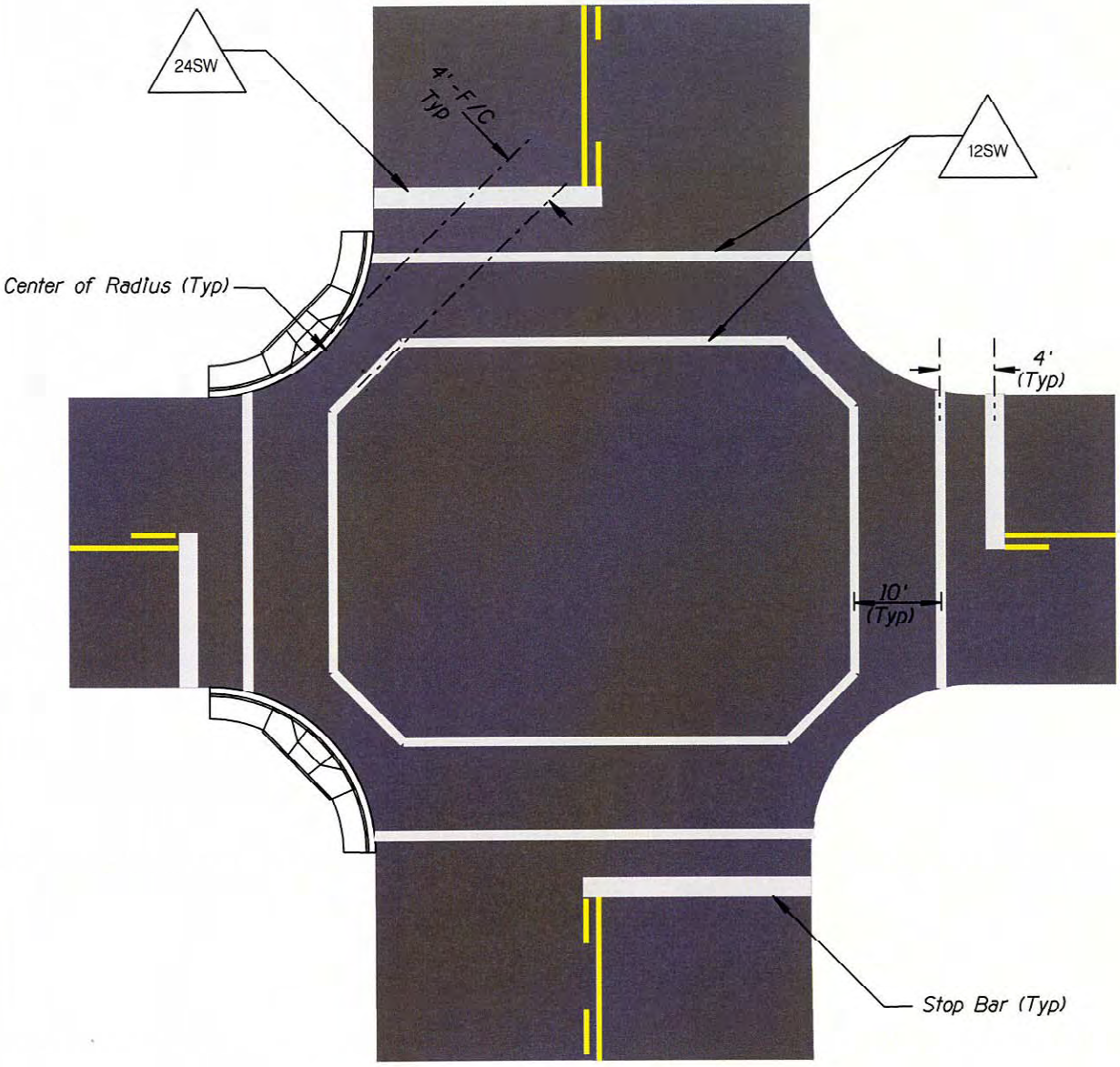
GENERAL NOTES:

1. All new crosswalks shall be installed based on an engineering study.
2. All high visibility crosswalks shall be approved by the County Traffic Engineer or his designated representative.
3. All striping will be from center of stripe to center of stripe

LEGEND:

12SW — 12" Solid white line

24SW — 24" Solid white line



RETROFIT OF EXISTING CROSSWALKS AND STOP LINES

(For A.D.A. Ramps)

(not to scale)

GENERAL NOTES:

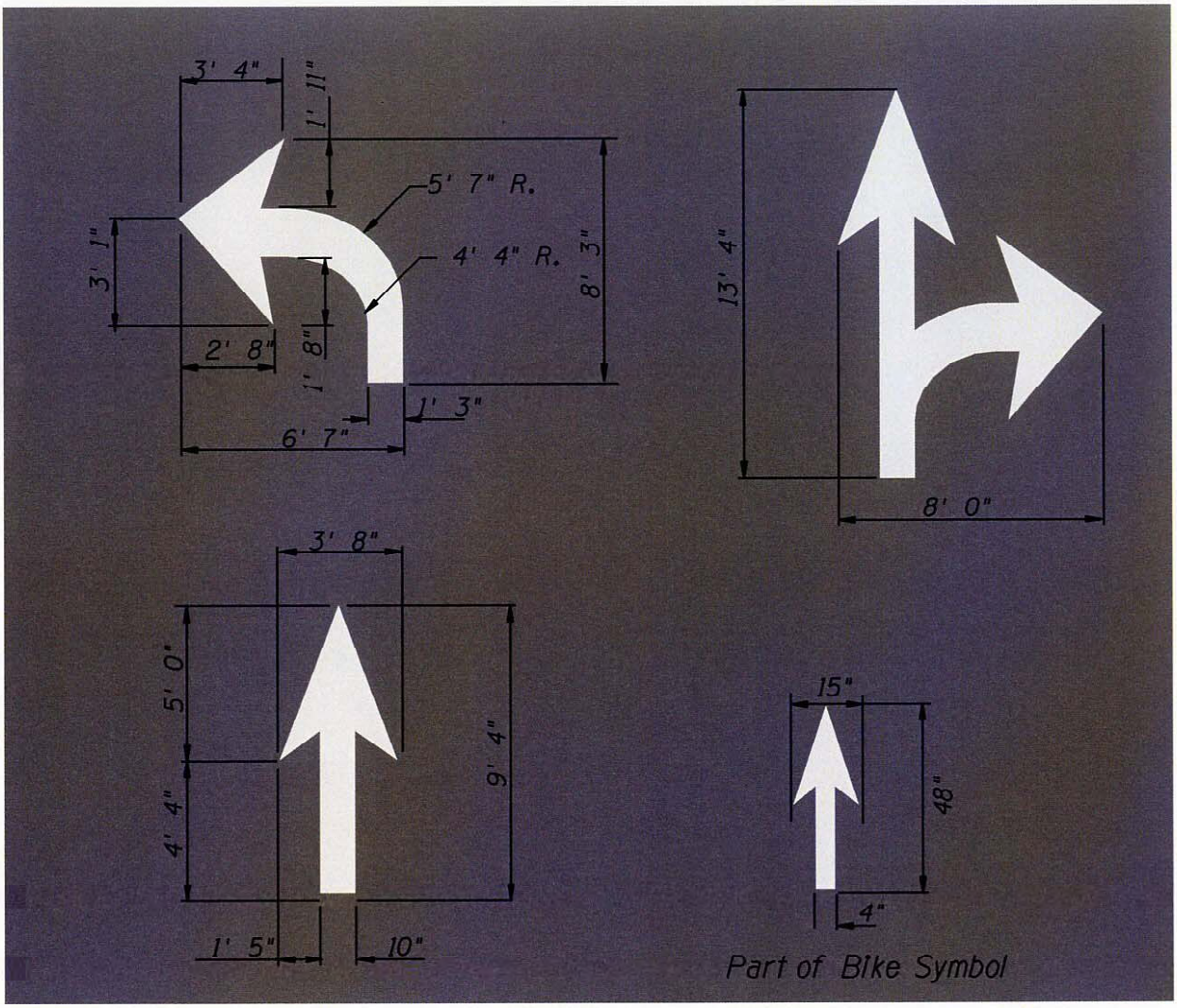
1. Marked crosswalks shall be installed at signalized intersections which include pedestrian signal indications.

2. All new crosswalk installation shall be installed based on an engineering study.

LEGEND:

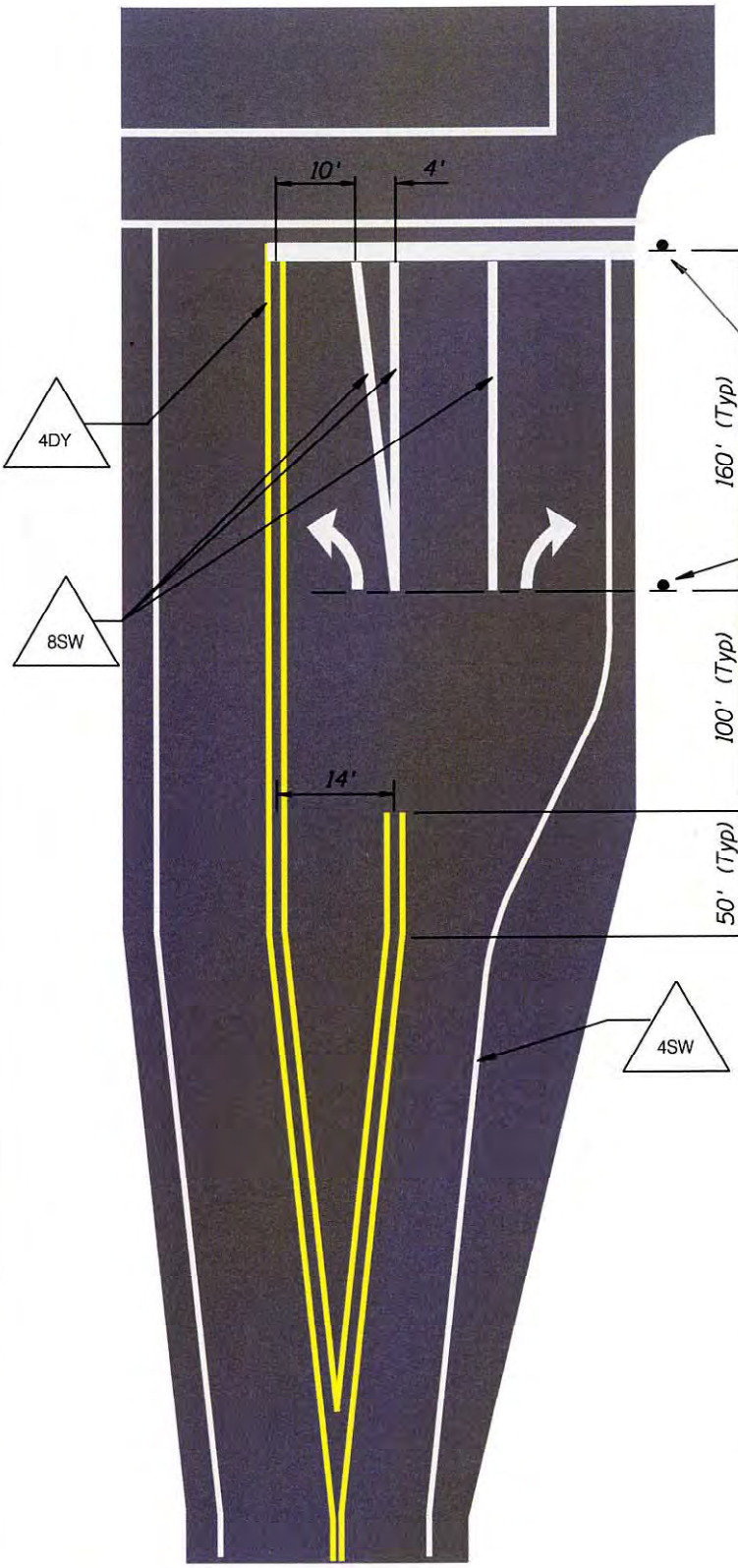
12SW — 12" Solid white line

24SW — 24" Solid white line



STANDARD ARROWS

(not to scale)



TURN LANE MARKINGS

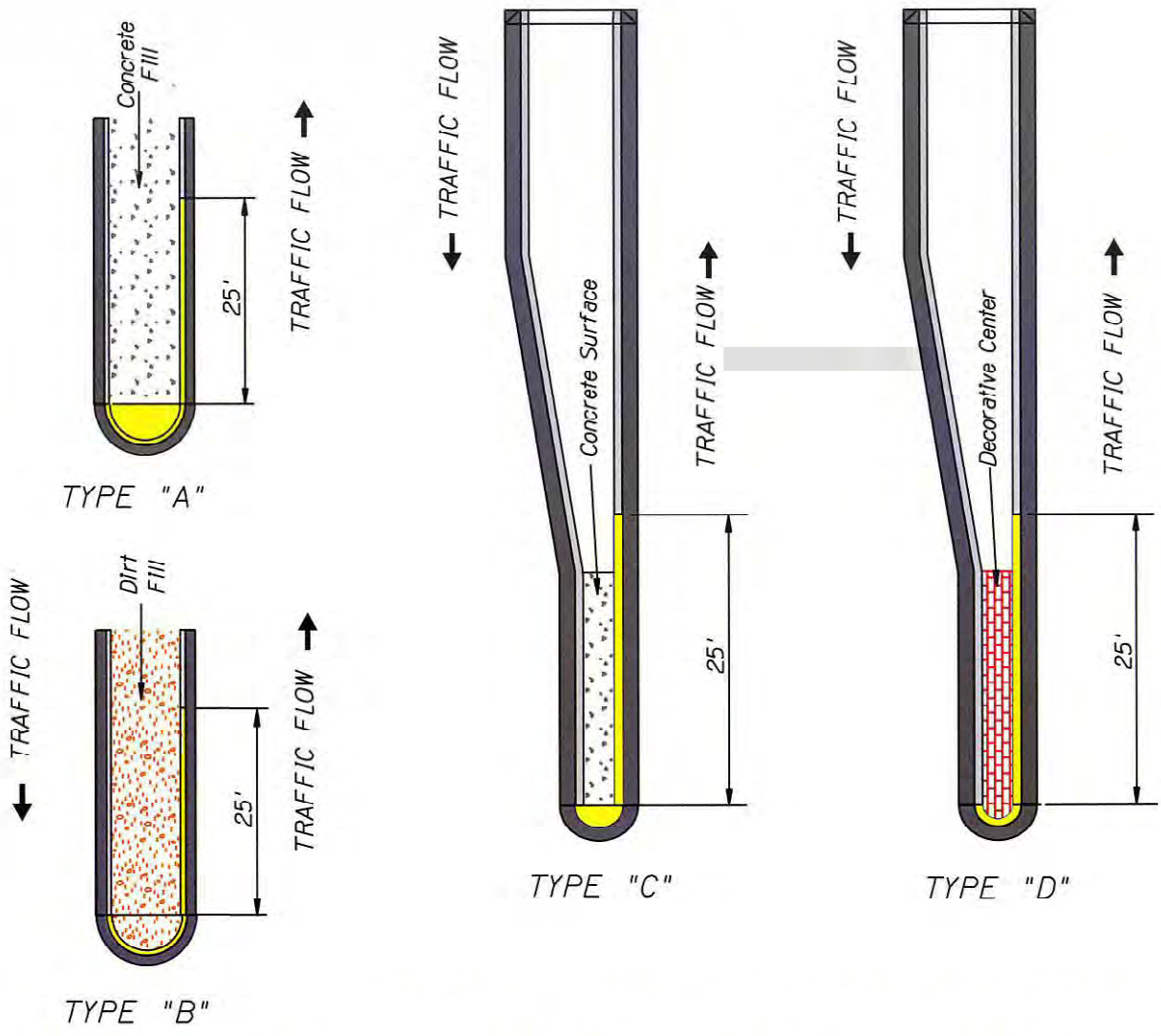
(not to scale)

GENERAL NOTES:

1. Arrow to be located in the center of the lane opening, at the beginning of the turn lane.
2. For turn lanes over 160' in length, an additional arrow may be installed.

LEGEND:

4DY	4" Solid double yellow line
8SW	8" Solid white line
4SW	4" Solid white line



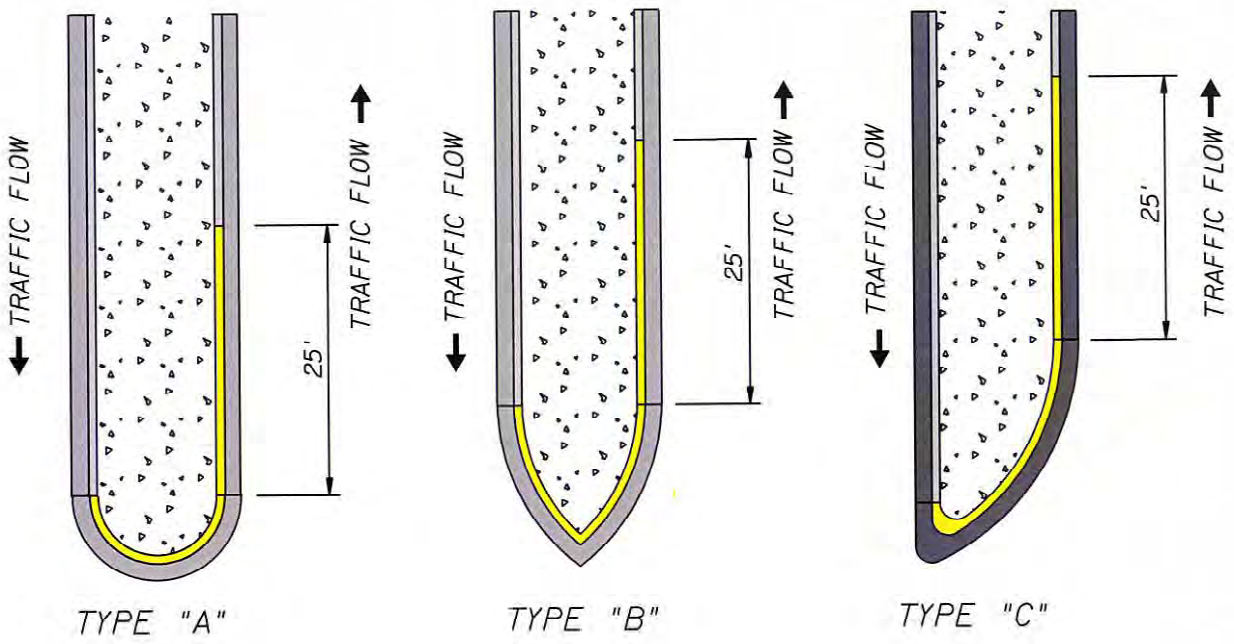
CURB MARKINGS FOR RAISED MEDIANS

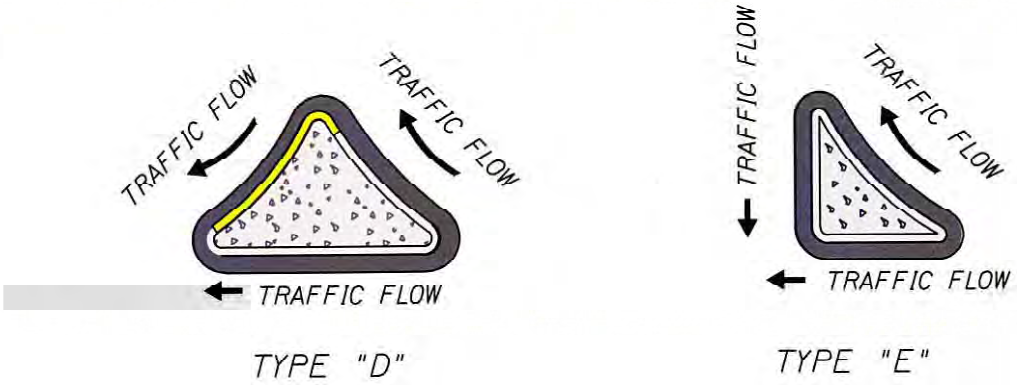
(For Medians 6 Feet And Under In Width)

(not to scale)

GENERAL NOTES:

1. Paint top and vertical face of curb yellow as indicated for type A, B, C & D.





CURB MARKINGS FOR RAISED MEDIANS AND ISLANDS

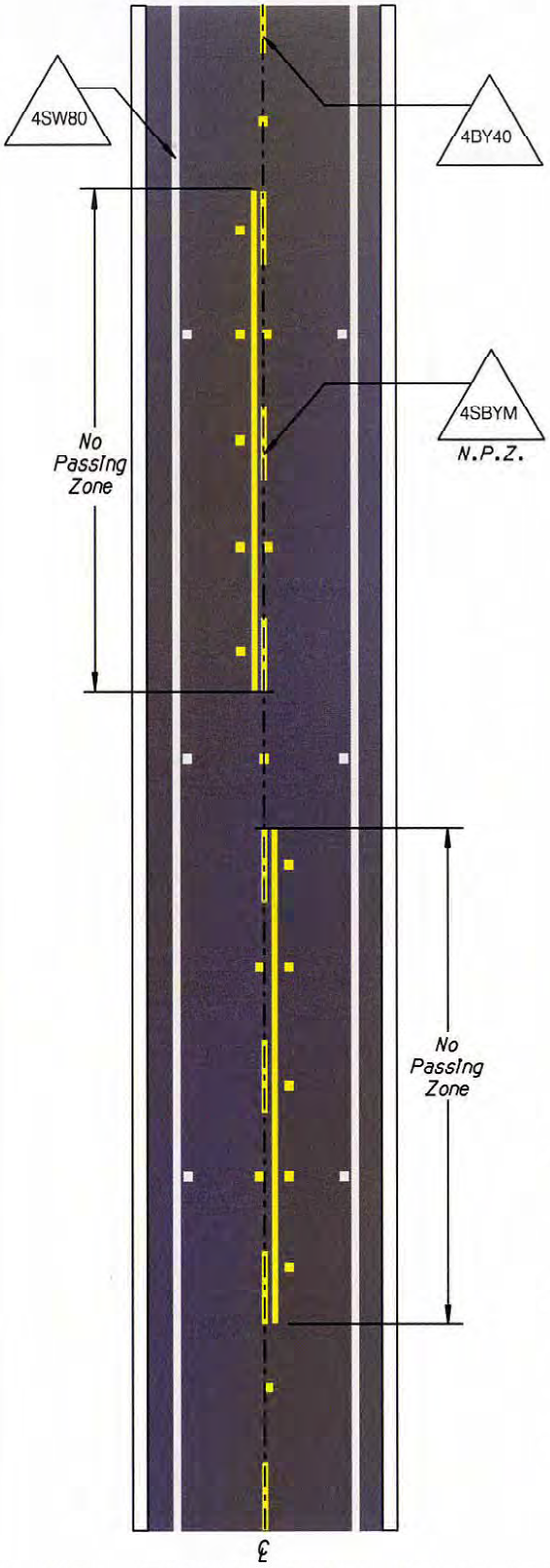
(For Medians Over 6 Feet In Width)

(not to scale)

GENERAL NOTES:

1. Paint top and vertical face of curb yellow as indicated for type A, B & C.

2. Paint top and vertical face of curb white and yellow as indicated for type D & E.



RAISED PAVEMENT MARKERS SUPPLEMENTING NO PASSING ZONES

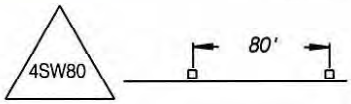
(For Roadway Segments)

(not to scale)

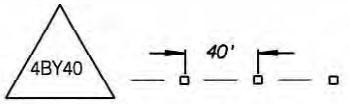
GENERAL NOTES:

1. NPZs shall be installed per MUTCD guidelines. Final layout of NPZ shall be checked by the County Traffic Engineer or his representative.

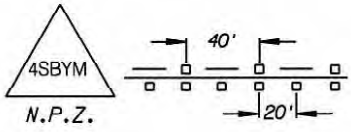
LEGEND:



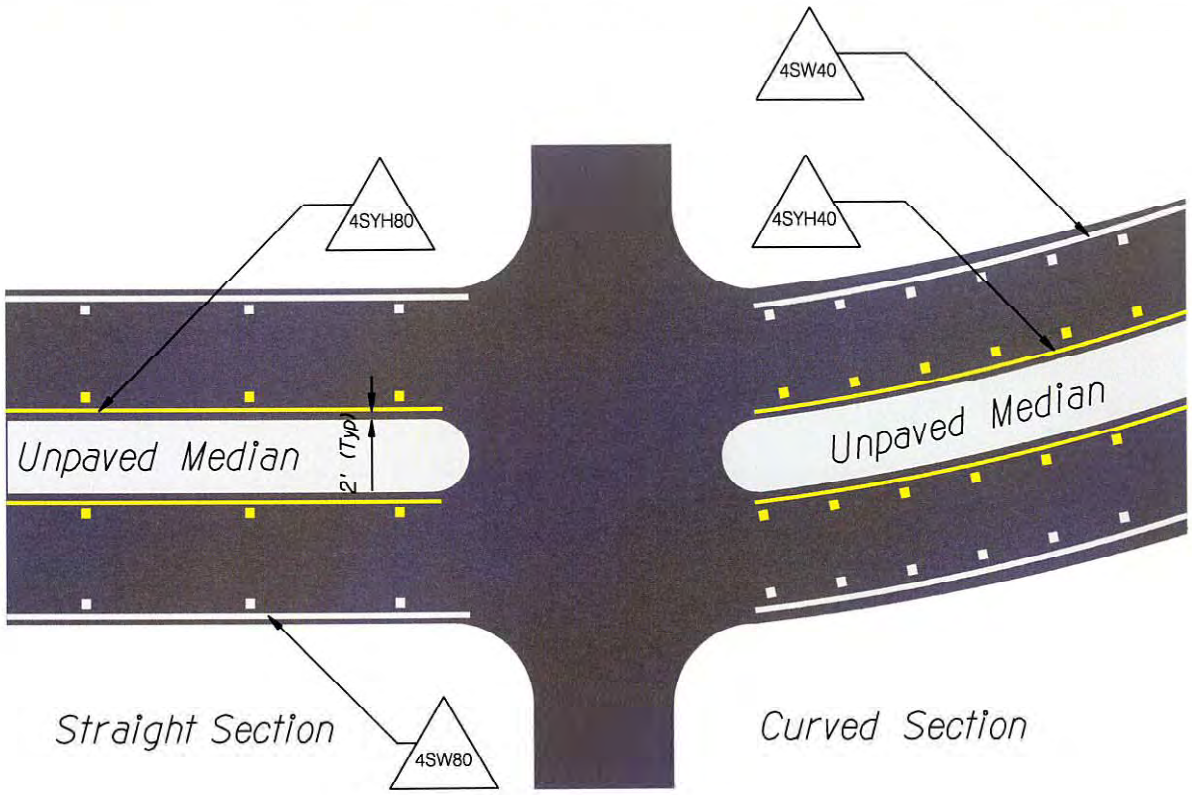
4" Solid white line with type 'G' RPMs @ 80' spacing



4" Broken yellow line with a 10' line segment and a 30' gap with type 'D' RPMs @ 40' spacing



4" Double yellow line, one solid, one broken with a 10' line segment and a 30' gap with type 'H' RPMs @ 20' spacing (solid) type 'D' RPMs @ 40' spacing (broken)



PAVEMENT MARKINGS FOR UNCURBED MEDIANS

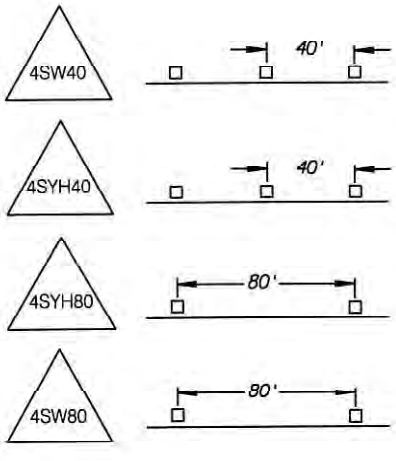
(not to scale)

GENERAL NOTES:

1. Offset dimension may vary with pavement width.

2. For curbed medians, RPMs are not required.

LEGEND:

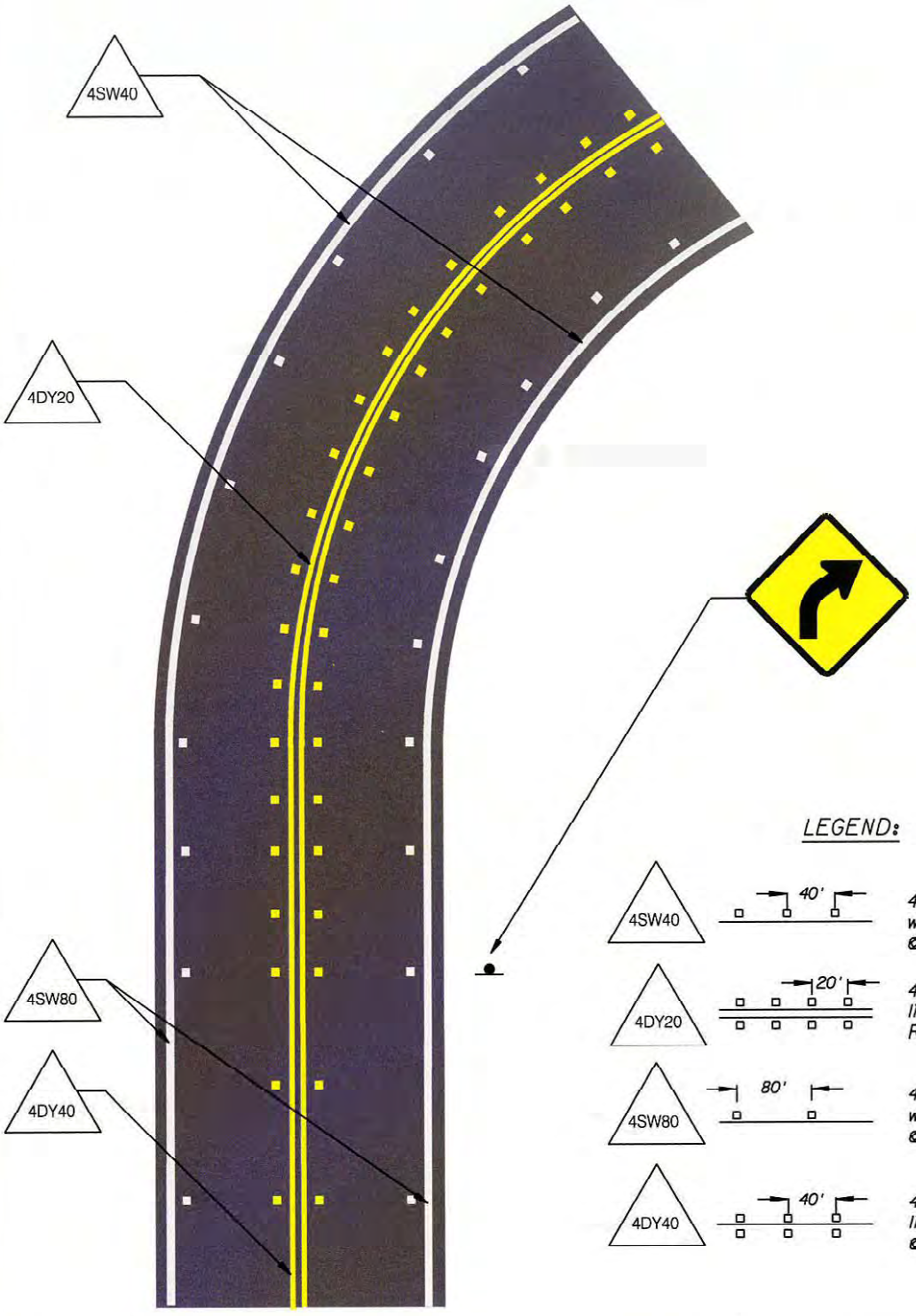


4" Solid white line with type 'G' RPMs @ 40' spacing (for curved and tapered sections of roadway)

4" Solid yellow line with type 'H' RPMs @ 40' spacing (for curved and tapered sections of roadway with dirt median)

4" Solid yellow line with type 'H' RPMs @ 80' spacing (for straight sections of roadway with dirt median)

4" Solid white line with type 'G' RPMs @ 80' spacing (For straight sections of roadway)



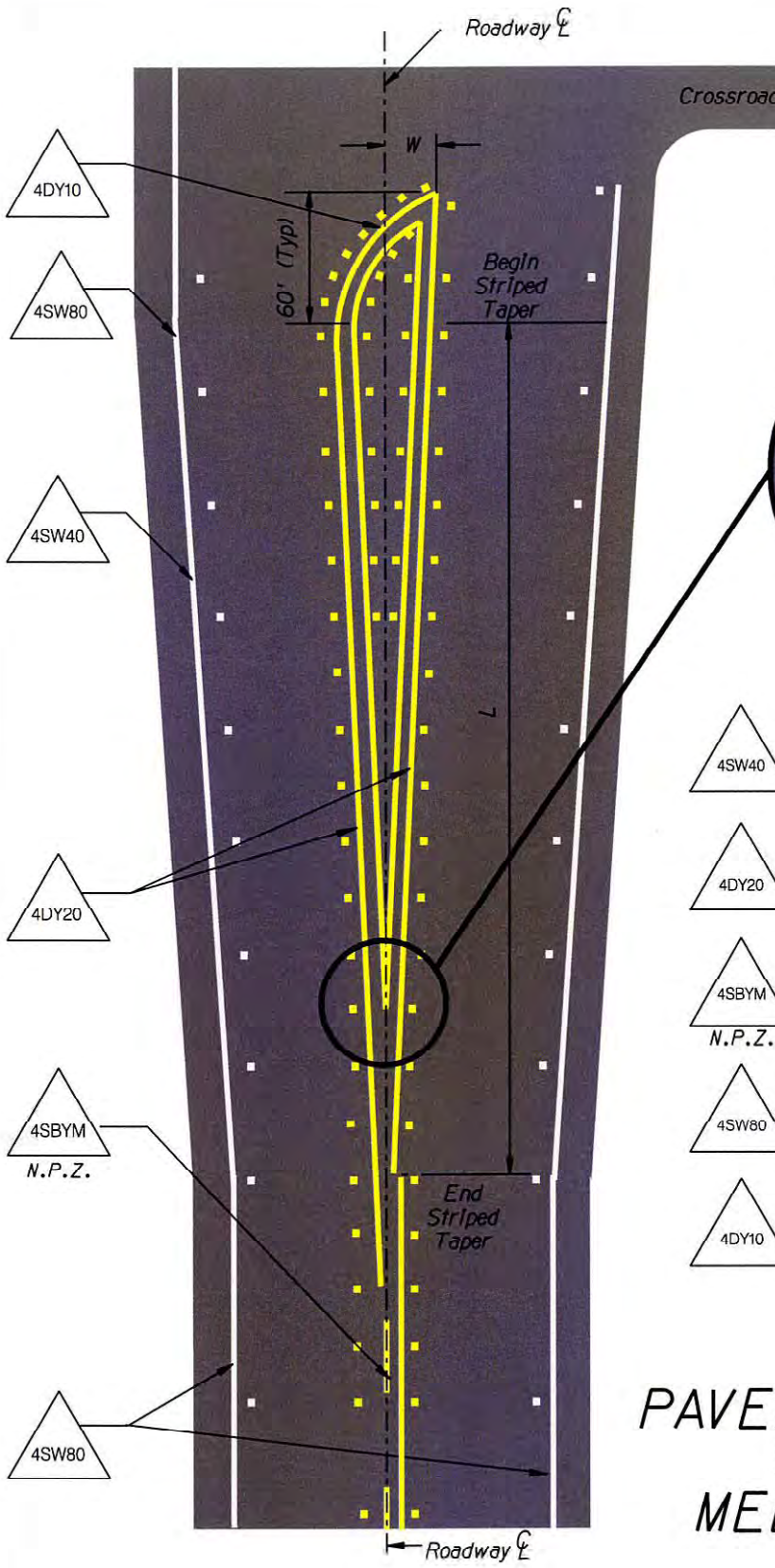
LEGEND:

4SW40	40'	4" Solid white line with type 'G' RPMs @ 40' spacing
4DY20	20'	4" Solid double yellow line with type 'D' RPMs @ 20' spacing
4SW80	80'	4" Solid white line with type 'G' RPMs @ 80' spacing
4DY40	40'	4" Solid double yellow line with type 'D' RPMs @ 40' spacing

RAISED PAVEMENT MARKERS

Supplementing Center Lines and Edge Lines

(not to scale)



GENERAL NOTES:

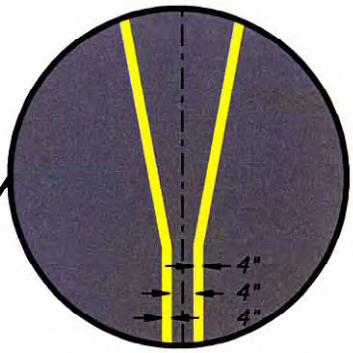
L = Length in feet

S = 85th percentile speed (On new construction the design speed may be used)

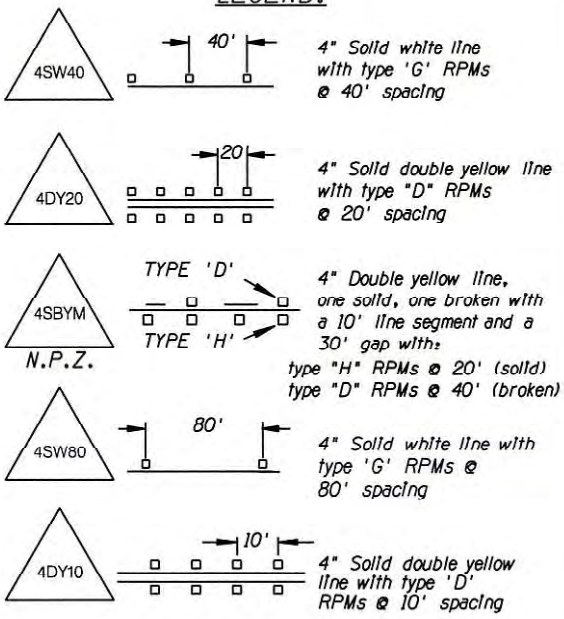
W = Offset in feet

$L = \frac{WS^2}{60}$ - For speeds less than 45 mph

L = S x W - For speeds 45 mph or greater



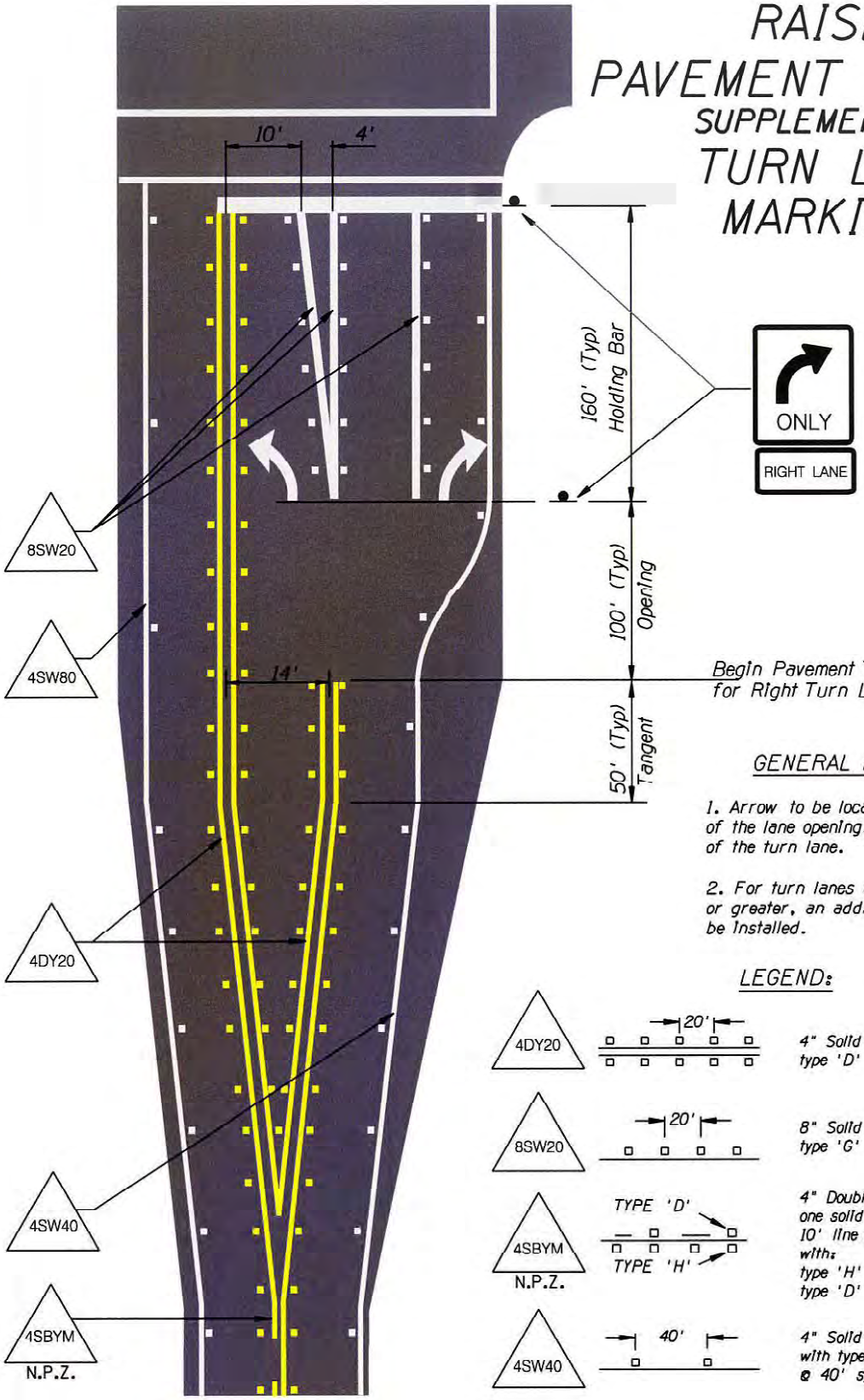
LEGEND:



RAISED PAVEMENT MARKERS SUPPLEMENTING MEDIAN ISLANDS

(not to scale)

RAISED PAVEMENT MARKERS SUPPLEMENTING TURN LANE MARKINGS

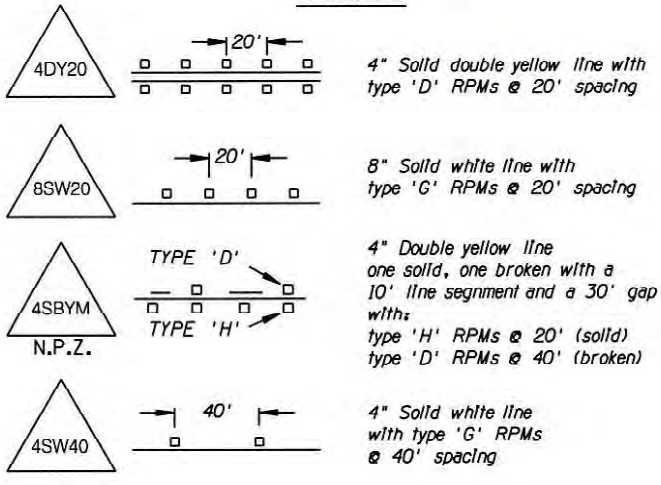


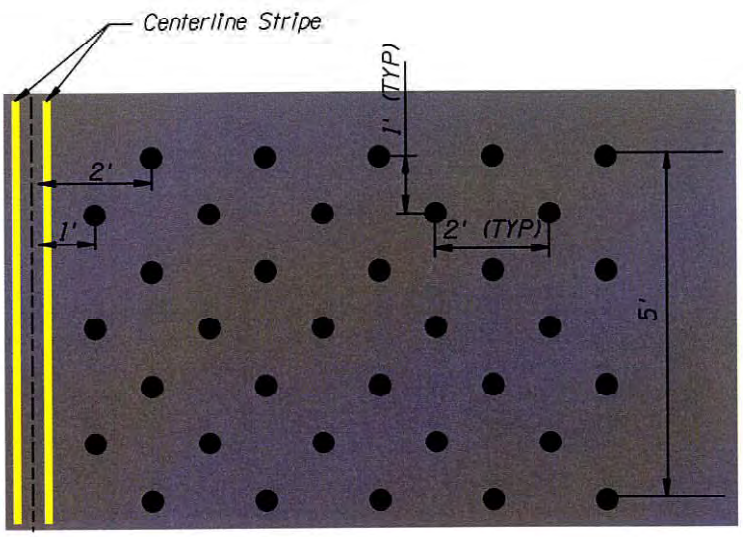
GENERAL NOTES:

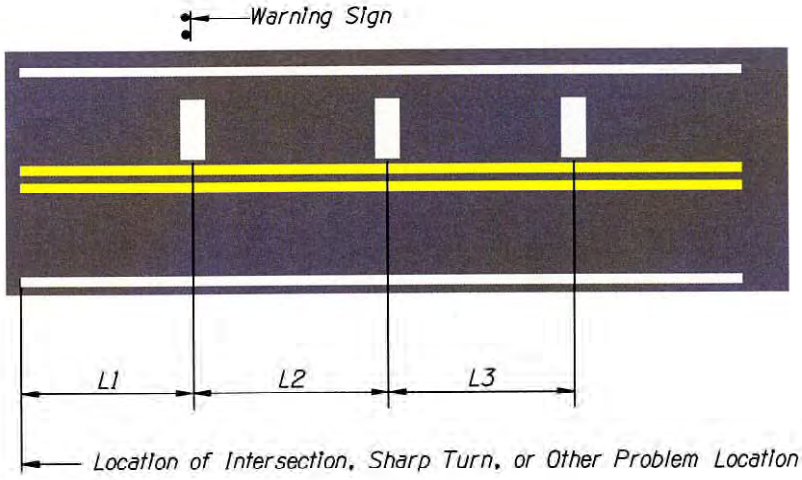
1. Arrow to be located in the center of the lane opening, at the beginning of the turn lane.

2. For turn lanes over 200' in length, or greater, an additional arrow shall be installed.

LEGEND:







RUMBLE STRIPS

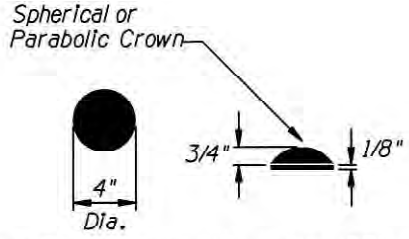
(not to scale)

GENERAL NOTES:

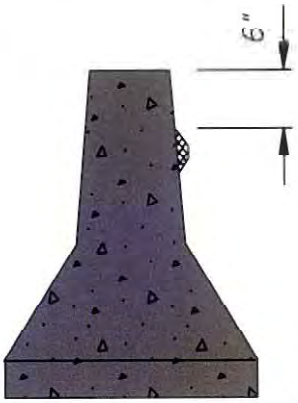
Condition 'C'

APPROACH SPEED	L1	L2	L3
≥ 55 MPH	Use Table 2C-4 in Section 2C.05 in Manual on Uniform Traffic Control Devices.	200 ft.	200 ft.
50 MPH		175 ft.	175 ft.
45 MPH		150 ft.	150 ft.
40 MPH		140 ft.	140 ft.
≤ 35 MPH		125 ft.	125 ft.

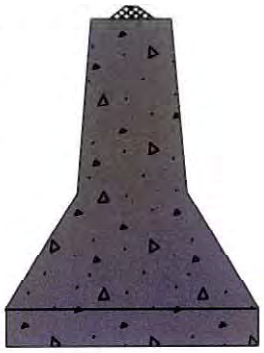
LEGEND:



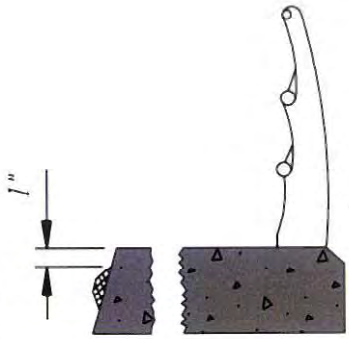
Type 'AB' black non-reflectorized RPM.



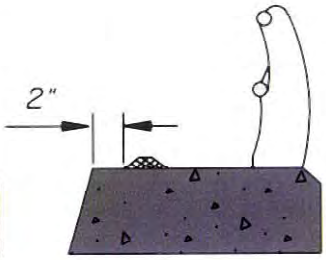
Typical Concrete Barrier Installation



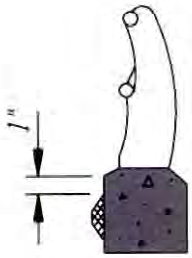
Concrete Barrier Installation on Curved Roadways



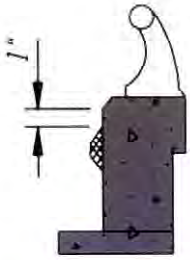
Sidewalk



Curb



Parapet with Double Rail



Parapet with Single Rail

SPACING TABLE FOR BARRIER & BRIDGE MARKERS	
TANGENT TO 5°	100 ft. (Apart)
5° TO 10° CURVE	75 ft. (Apart)
10° TO 20° CURVE	50 ft. (Apart)
OVER 20° CURVE	25 ft. (Apart)

BRIDGE & BARRIER MARKER PLACEMENT

(not to scale)

GENERAL NOTES:

1. For horizontal spacing of markers see spacing chart. A minumum of three (3) markers shall be installed on each bridge and/or concrete barrier. A minumum of three (3) markers shall be continuously visible at all times.

2. The single faced WHITE marker shall be placed on the right side of all bridge and concrete barriers for one-way and two-way roadways.

3. The single faced YELLOW marker shall be placed on the left side of all bridge and concrete barriers for divided and one-way roadways.

4. The front edge of the marker shall be placed perpendicular to the edge of the roadway.

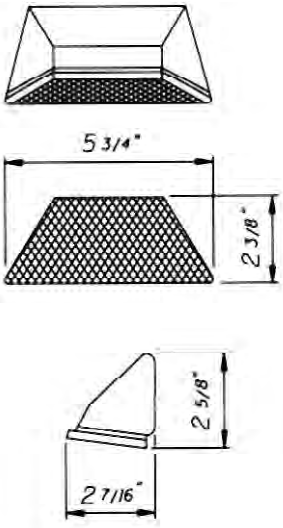
5. Concrete surfaces shall be wired brushed or sandblasted and treated as per the manufacturer's recommendations.

6. Installation of markers shall be done as per manufacturer's specifications.

7. Markers shall be mounted on the top of the concrete barriers only when the curvature of the roadway is so sharp that three (3) side mounted markers would not be continuously visible from the traffic lane(s). (e.g., left-hand curve on median side of roadway: right-hand curve on right side of roadway.) Where glare screen is installed, the typical side-mounted installation shall be utilized.

8. Prismatic reflectors shall be colorless or amber in color as required.

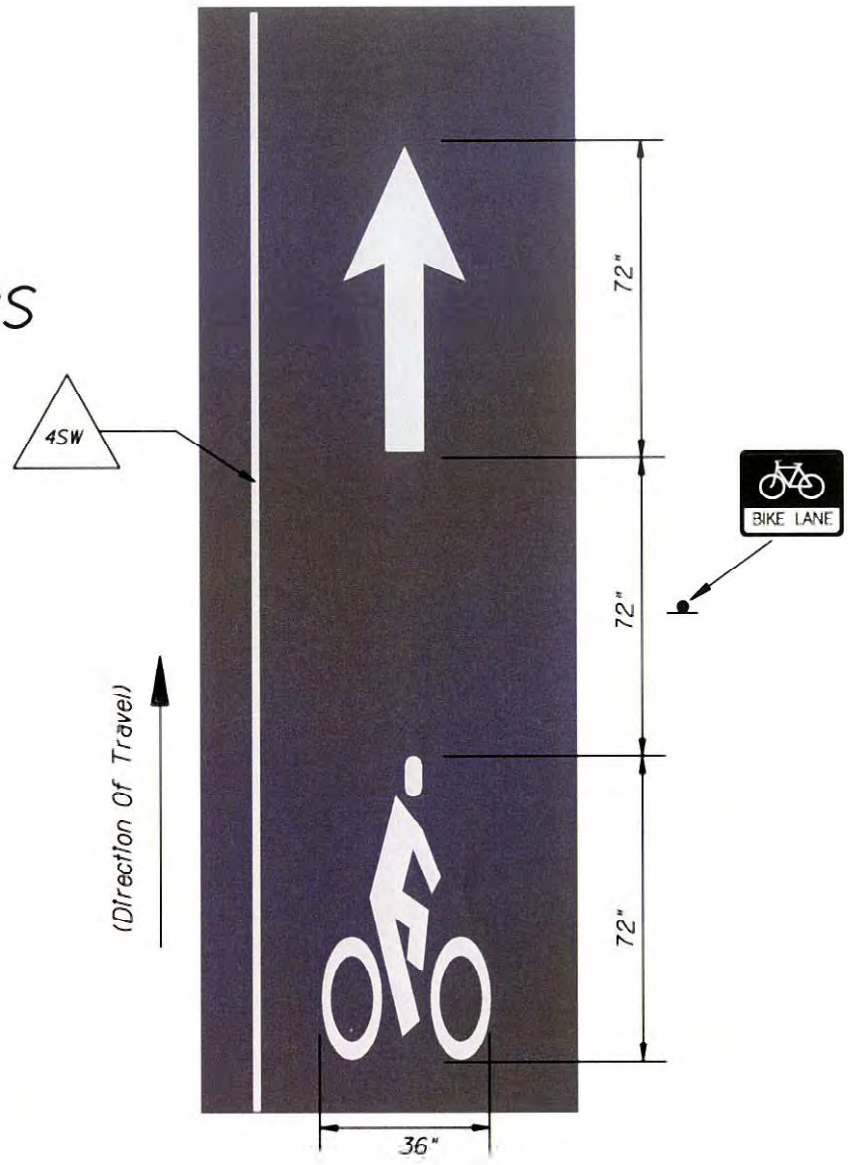
LEGEND:



PRISMATIC REFLECTOR

BIKE LANE MARKINGS

(not to scale)



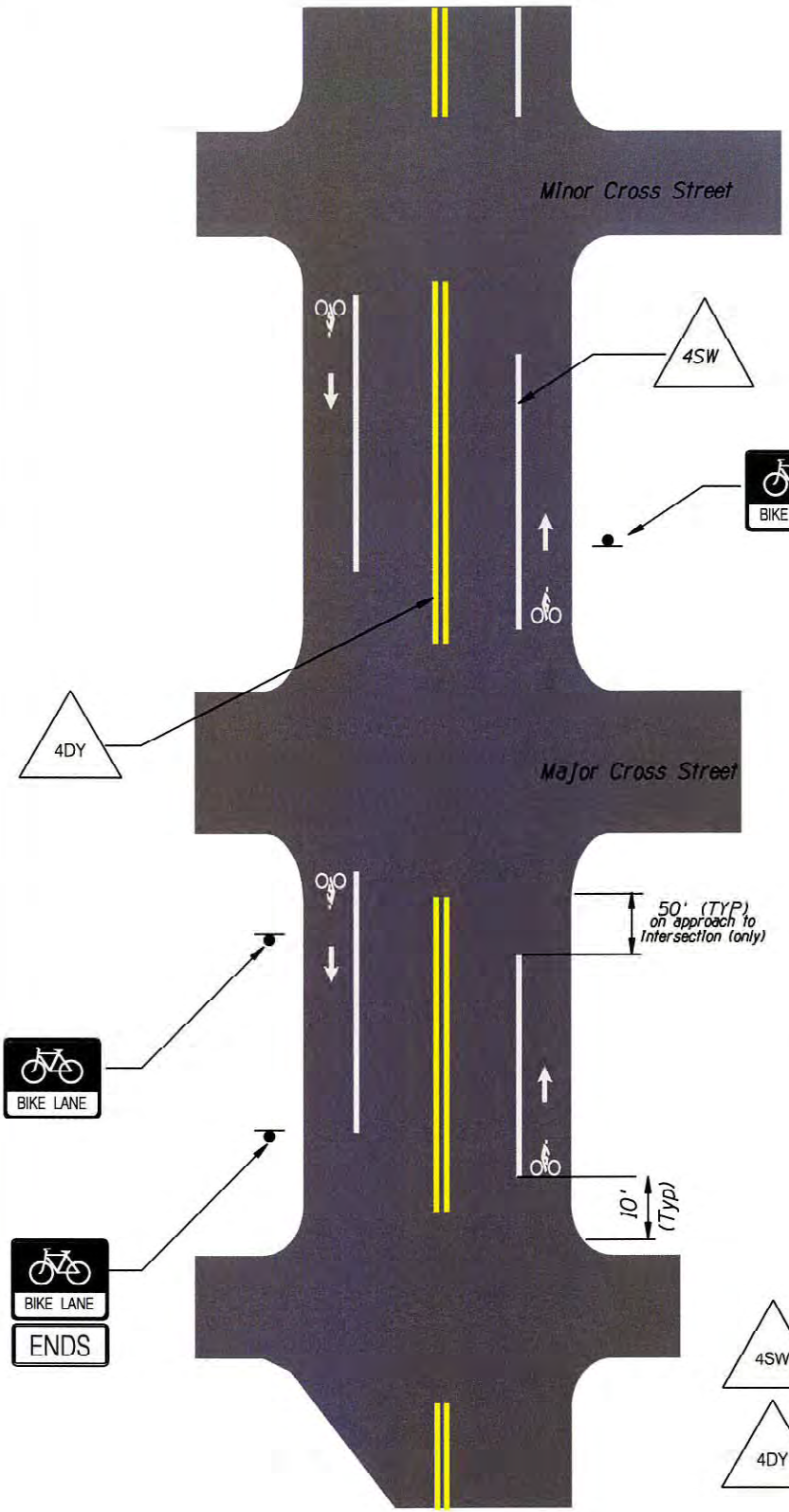
GENERAL NOTES:

1. Pavement markings shall be spaced in urban areas as determined by the Traffic Engineer or his designated representative.
2. Pavement markings will be installed on any route with continuous markings.
3. Rural pavement markings shall be installed at all major intersections, as a minimum, or as determined by the Traffic Engineer or his designated representative.
4. Bicycle markings shall be centered in the pavement alloted for the lane.
5. No RPMs on designated bike lanes.

(Source: MUTCD, Part 9, Bicycle Facilities)

LEGEND:

4SW — 4" Solid white line



BIKE LANES

(2-Way Low Right Turn Volumes)

(not to scale)

GENERAL NOTES:

1. Bicycle pavement markings shall be spaced in urban areas as determined by the Traffic Engineer or his designated representative.

2. For information on bicycle facility design reference the MCDOT Roadway Design Manual, Chapter 8, Bicycle Facility Guidelines.

3. No RPMs shall be installed on bike lane.

LEGEND:

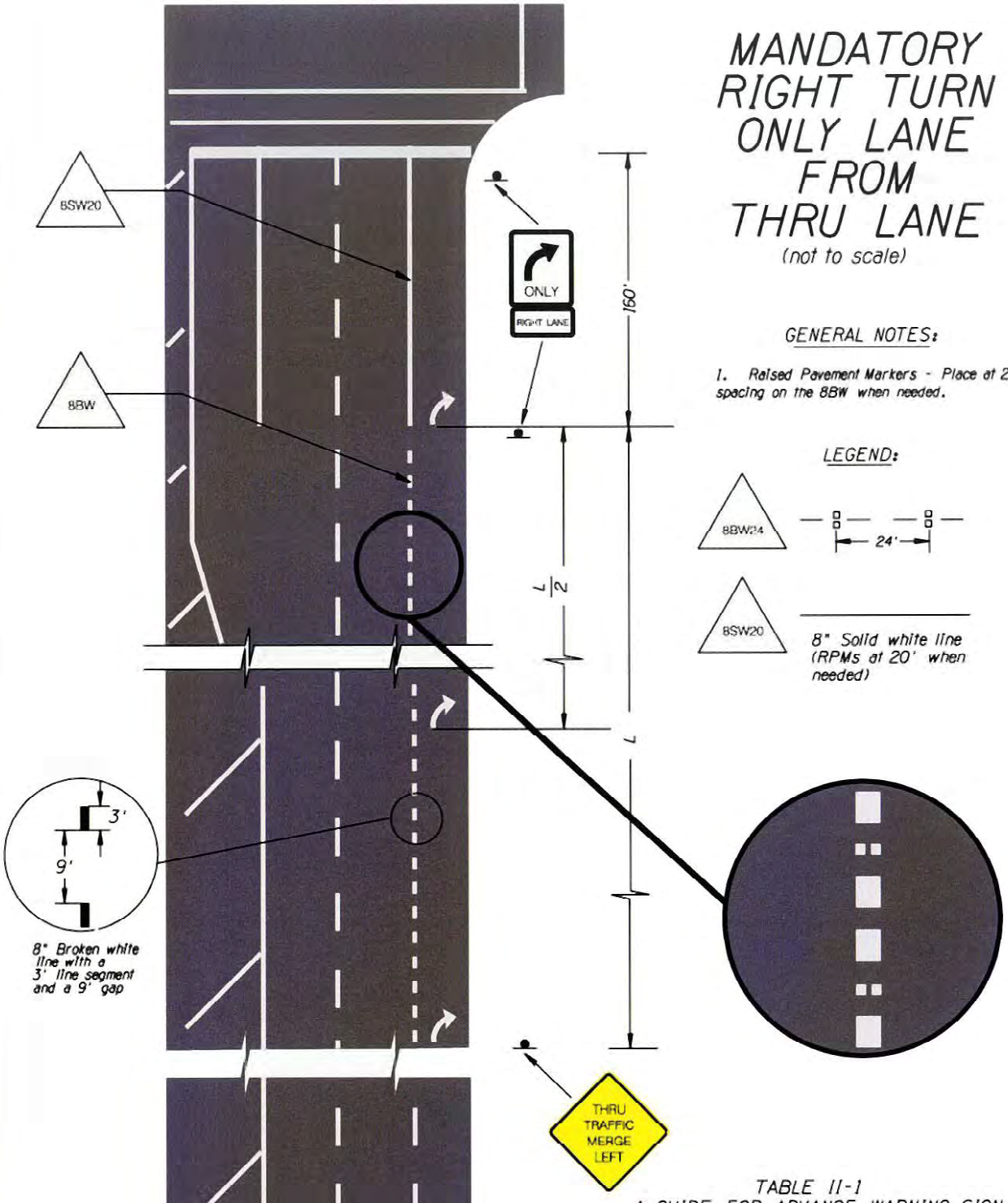
4SW — 4" Solid white line

4DY — 4" Solid double yellow line

(Source: AASHTO Guide for Development of New Bicycle Facilities)

MANDATORY RIGHT TURN ONLY LANE FROM THRU LANE

(not to scale)



GENERAL NOTES:

1. Raised Pavement Markers - Place at 24' spacing on the 8BW when needed.

LEGEND:

8BW24 — 24'

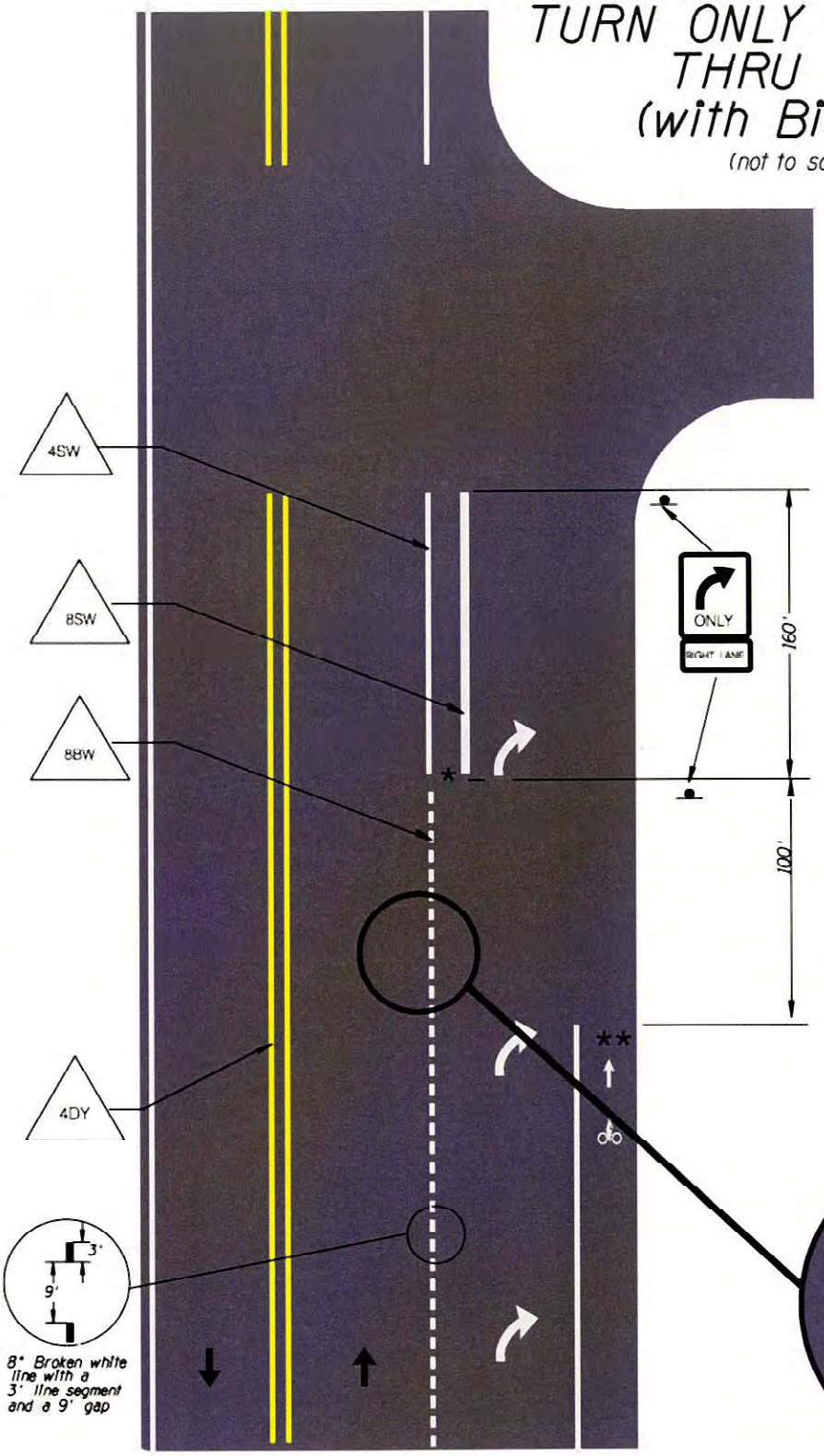
8SW20 — 8" Solid white line (RPMs at 20' when needed)

TABLE II-1
A GUIDE FOR ADVANCE WARNING SIGN PLACEMENT DISTANCE

(MPH)	20	25	30	35	40	45	50	55	60	65
'L' (FT)	275	350	425	500	575	650	725	800	875	950

MANDATORY RIGHT TURN ONLY LANE FROM THRU LANE (with Bike Lane)

(not to scale)



GENERAL NOTES:

1. Raised Pavement Markers - Place at 24' spacing on the 8BW when needed.

* If space is available.

** Otherwise all delineation should be dropped at this point.

LEGEND:

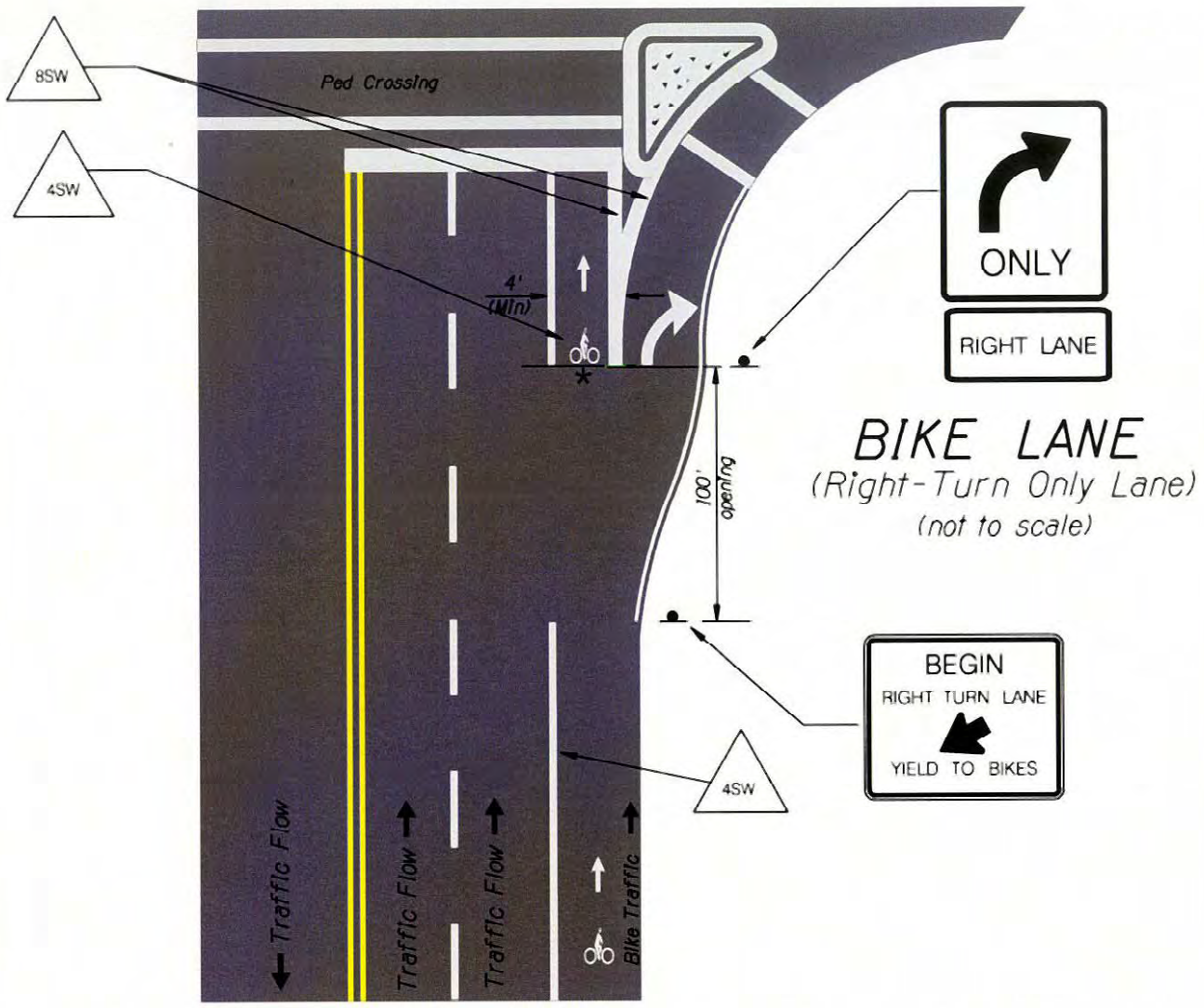
8BW24 — 24'

8" Broken white line with a 3' line segment and a 9' gap with two type 'A' RPMs @ 24' spacing

8SW — 8" Solid white line

4SW — 4" Solid white line

4DY — 4" Solid double yellow line



GENERAL NOTES:

1. All bicycle facility signs and pavement markings shall be reviewed and approved by the County Traffic Engineer or his designated representative prior to installation.

2. For information on bicycle facility design reference the MCDOT Roadway Design Manual, Chapter 8, Bicycle Facility Guidelines.

3. Preferential lane symbols shall be installed immediately after each roadway intersection. The word message 'BIKE ONLY' shall be added only at major roadway intersections. Additional preferential lane symbols should be installed to provide a spacing of approximately 1000 feet between lane markings.

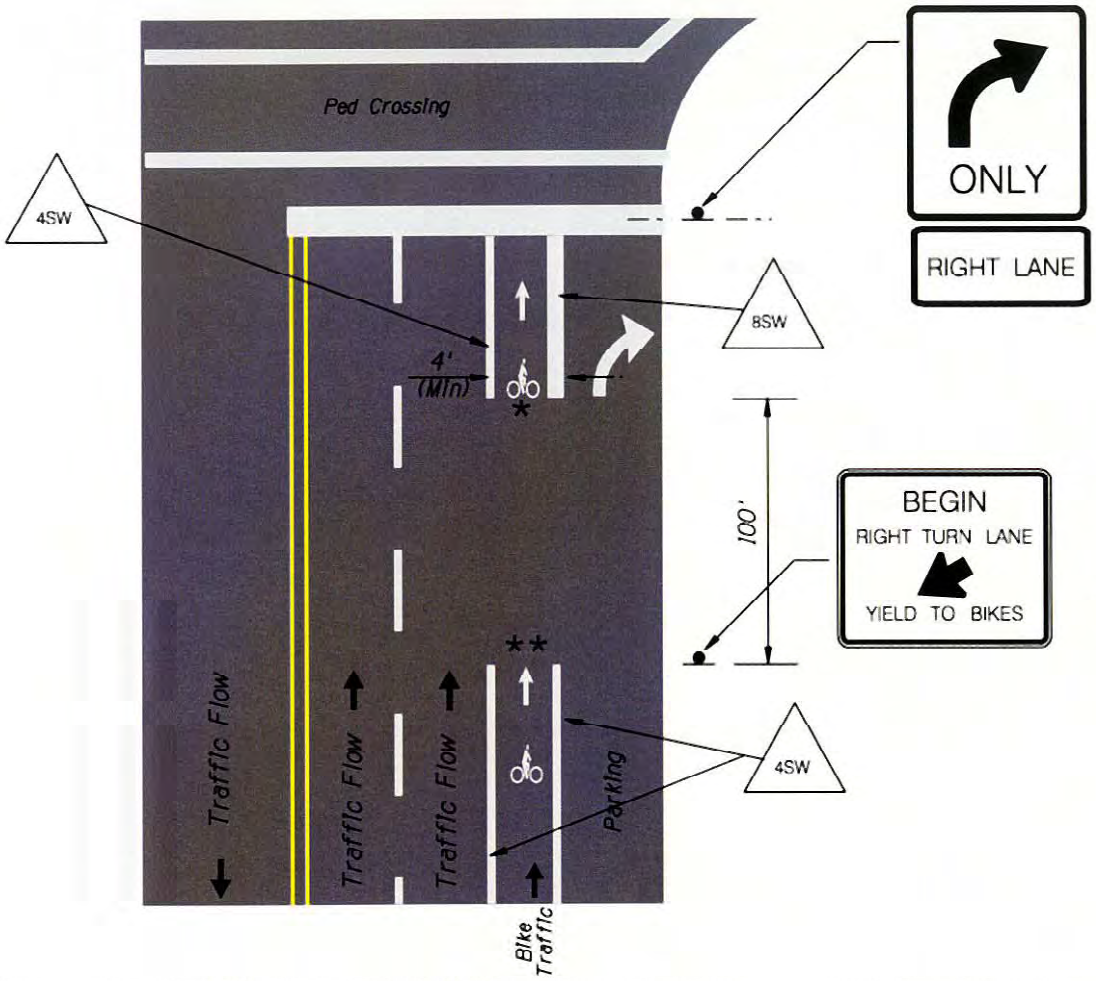
★ If space is available.

LEGEND:

8SW — 8" Solid white line

4SW — 4" Solid white line

(Source: AASHTO Guide for Development of New Bicycle Facilities)



BIKE LANE

(Parking Lane Becomes Right-Turn Only Lane with Bike Lane Striping)

(not to scale)

GENERAL NOTES:

1. All bicycle facility signs and pavement markings shall be reviewed and approved by the County Traffic Engineer or his designated representative prior to installation.

2. For information on bicycle facility design reference the MCDOT Roadway Design Manual, Chapter 8, Bicycle Facility Guidelines.

* If space is available.

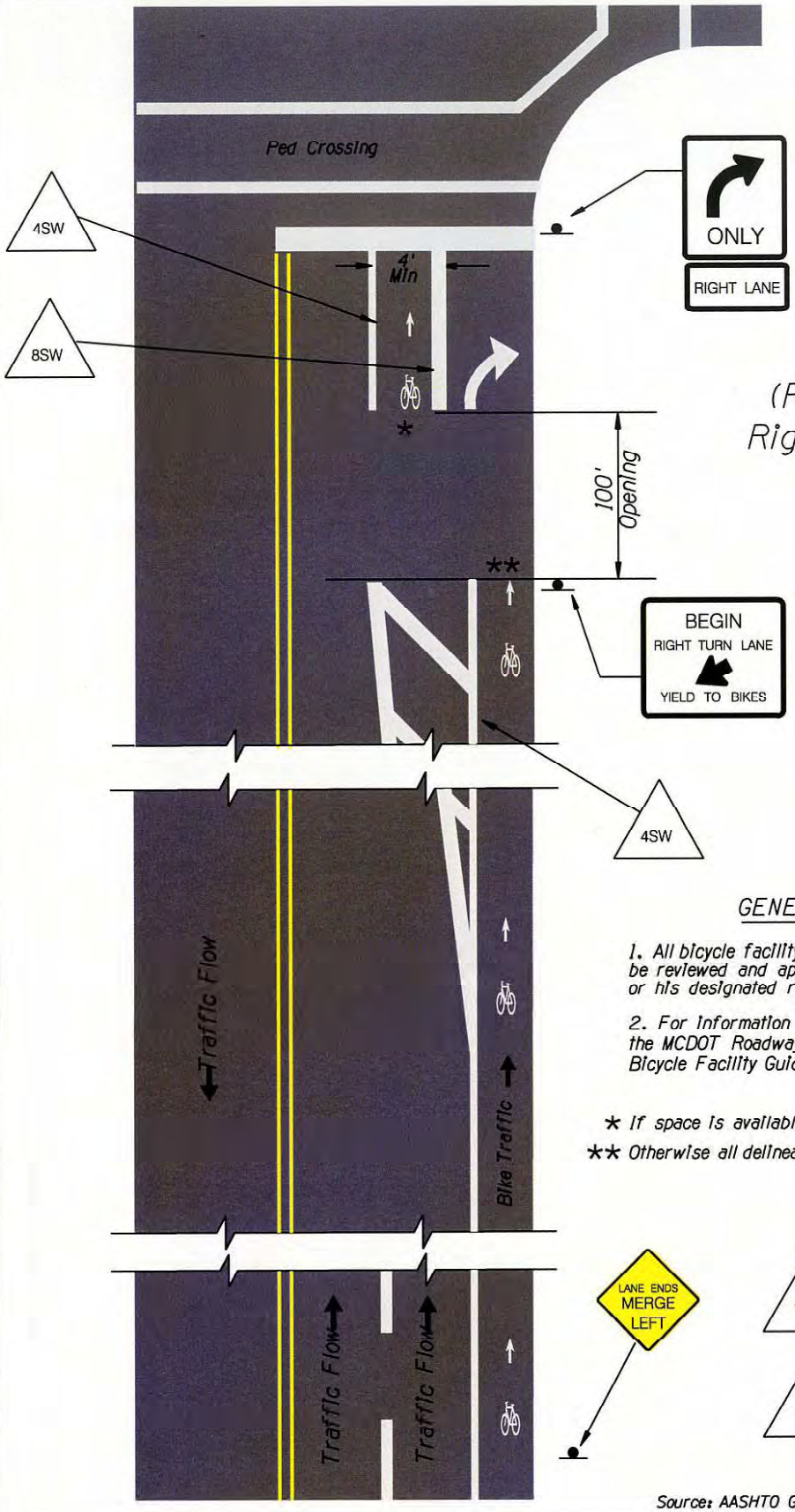
** Otherwise all delineation should be dropped at this point.

LEGEND:

8SW — 8" Solid white line

4SW — 4" Solid white line

(Source: AASHTO Guide for Development of New Bicycle Facilities)



BIKE LANE

(Right Lane Becomes Right-Turn Only Lane)

(not to scale)

GENERAL NOTES:

1. All bicycle facility signs and pavement markings shall be reviewed and approved by the County Traffic Engineer or his designated representative prior to installation.

2. For information on bicycle facility design reference the MCDOT Roadway Design Manual, Chapter 6N, #1 Bicycle Facility Guidelines.

* If space is available.

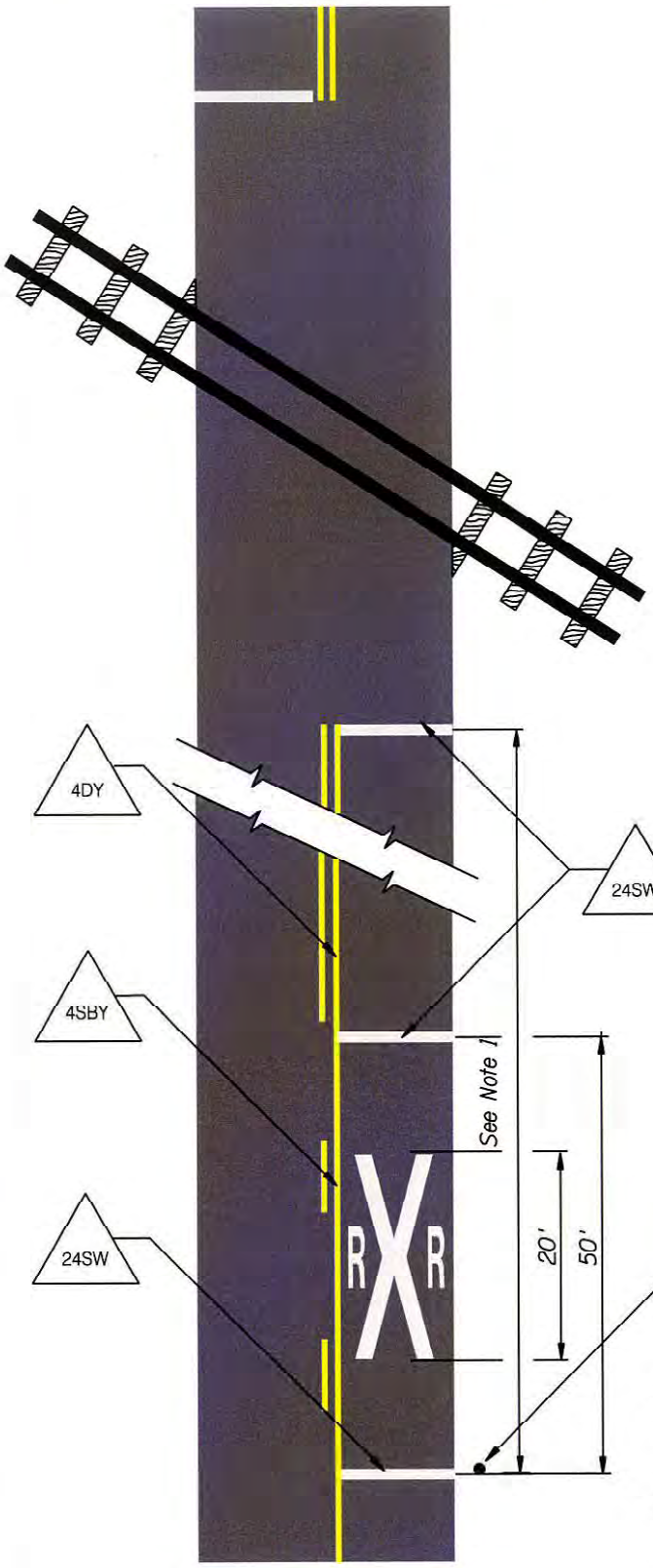
** Otherwise all delineation should be dropped at this point.

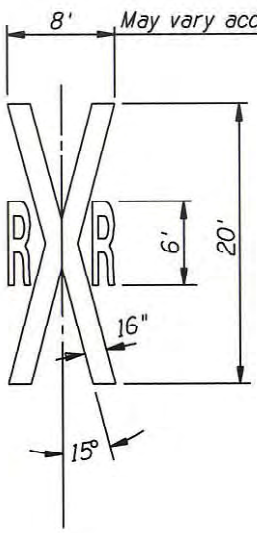
LEGEND:

8SW — 8" Solid white line

4SW — 4" Solid white line

Source: AASHTO Guide for Development of Bicycle Facilities





RAILROAD CROSSING

(Without Gates and Flashing Lights)

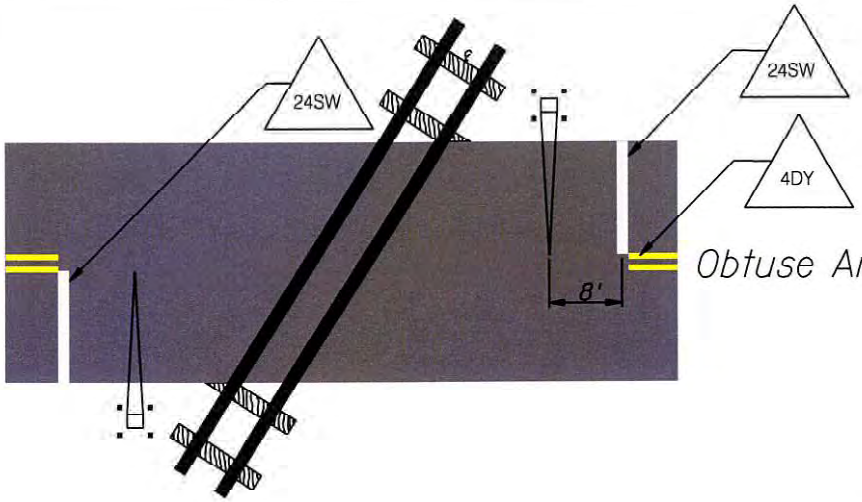
(not to scale)

GENERAL NOTES:

1. Sign placement of W10-1 will be installed per Table 2C-4 in Chapter 2C of the MUTCD.

LEGEND:

24SW	24" Solid white line
4SBY N.P.Z.	4" Double yellow line one solid, one broken with a 10' line segment and a 30' gap
4DY	4" Solid double yellow line

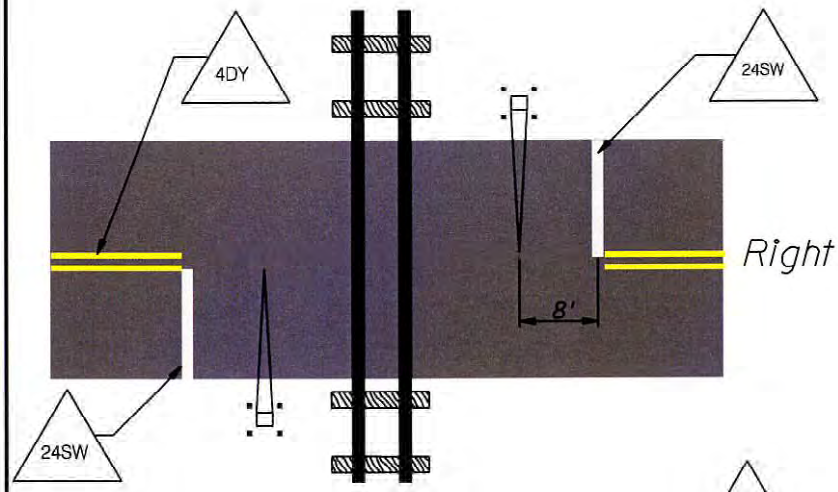


Obtuse Angle

RAILROAD CROSSINGS

(With Gates and Flashing Lights)

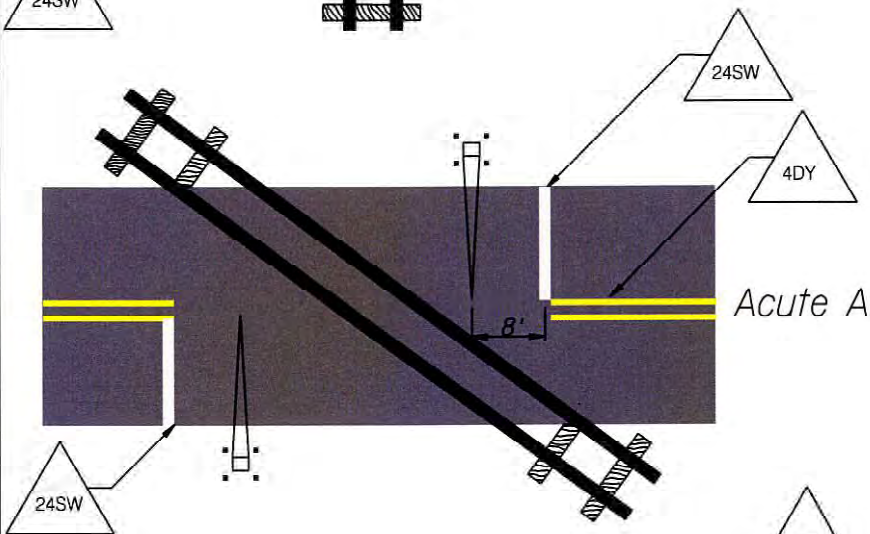
(not to scale)



Right Angle

GENERAL NOTES:

1. All striping will be from center of stripe to center of stripe

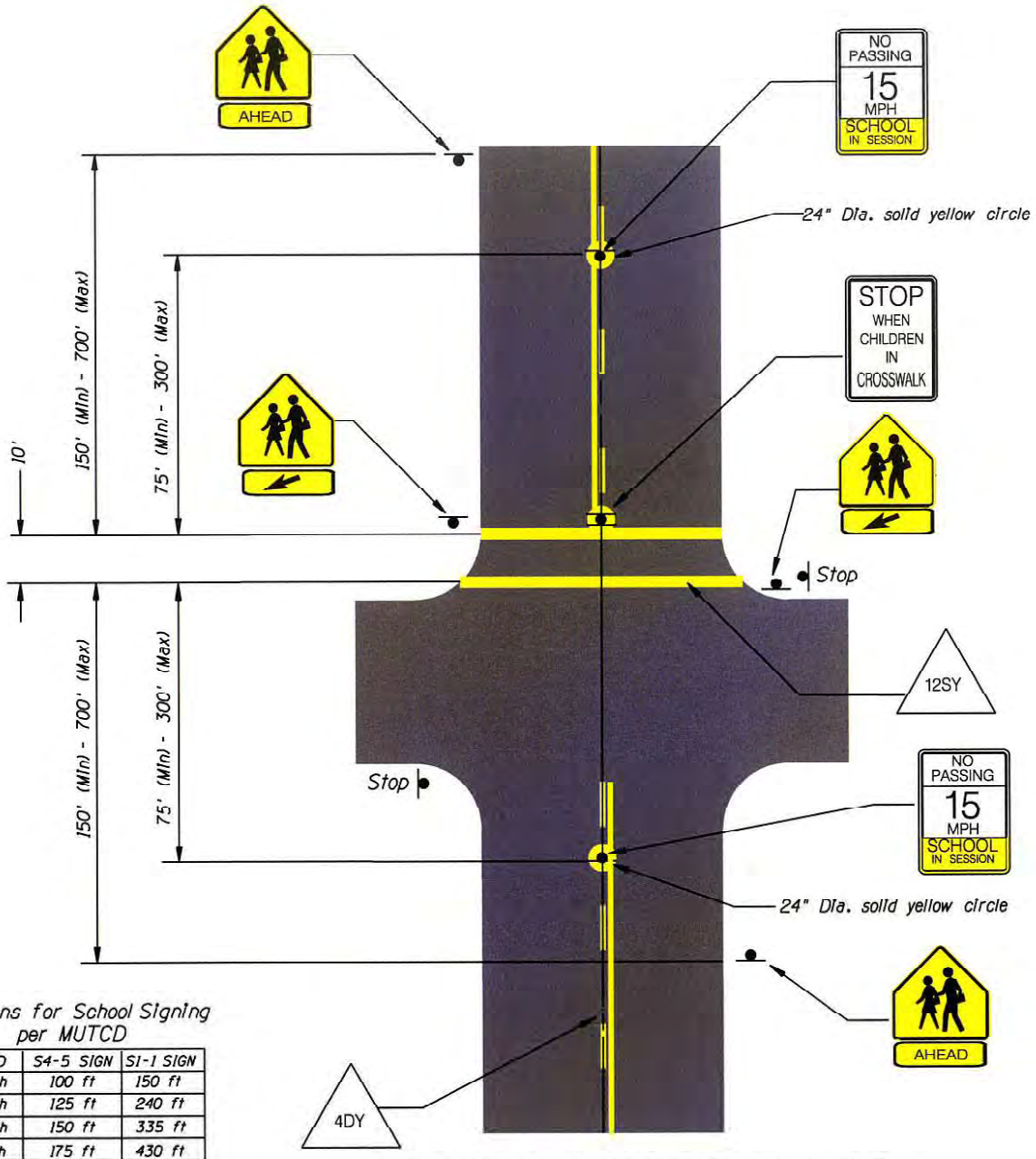


Acute Angle

LEGEND:

24SW — 24" Solid white line

4DY — 4" Solid double yellow line



Locations for School Signing per MUTCD

SPEED	S4-5 SIGN	S1-1 SIGN
25 mph	100 ft	150 ft
30 mph	125 ft	240 ft
35 mph	150 ft	335 ft
40 mph	175 ft	430 ft
45 mph	200 ft	520 ft
50 mph	250 ft	610 ft
55 mph	300 ft	700 ft

SCHOOL CROSSWALKS

(2 Lane - 2 Way)

(not to scale)

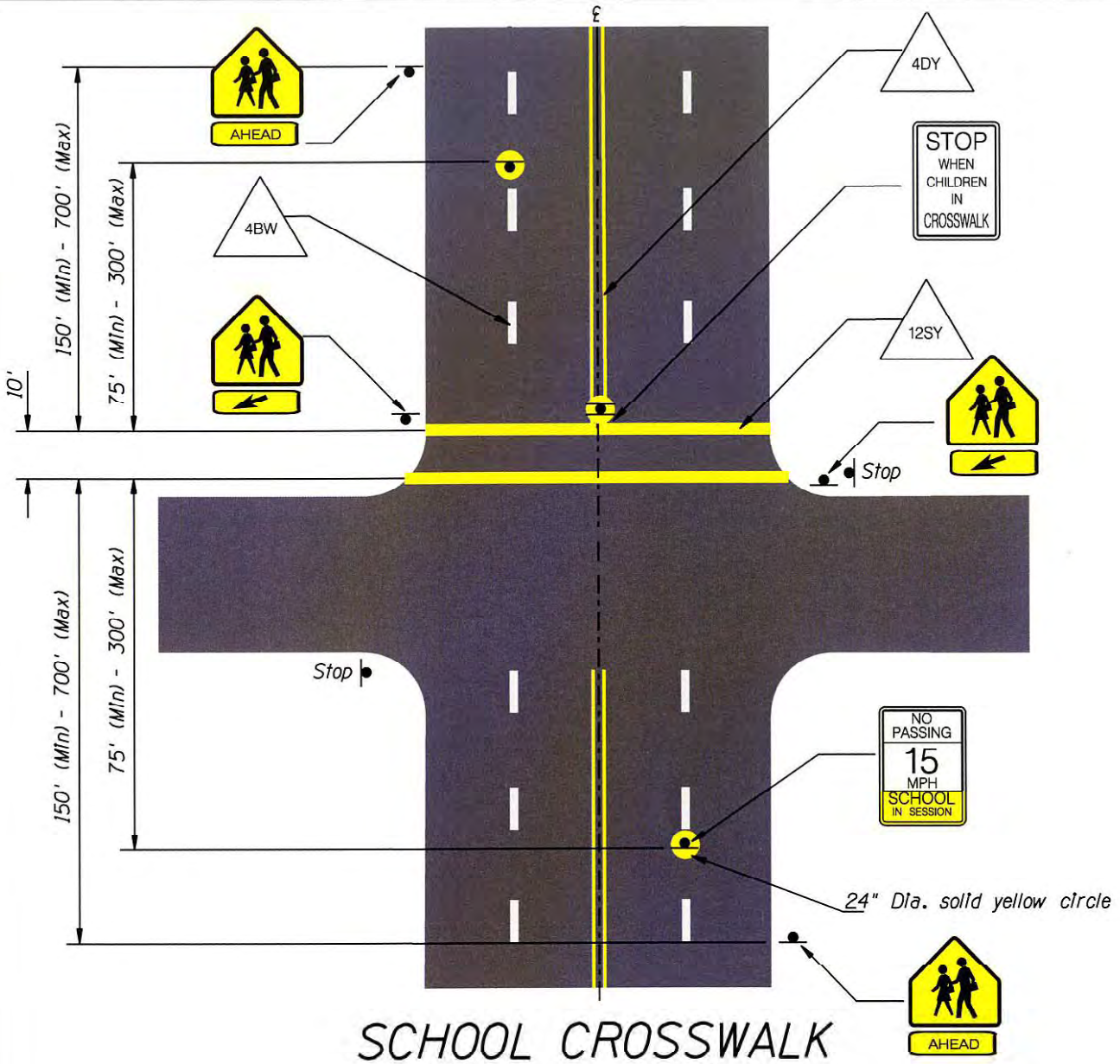
GENERAL NOTES:

1. All striping will be from center of stripe to center of stripe.
2. NPZs shall be installed per MUTCD guidelines. Final layout of NPZ shall be checked by the County Traffic Engineer or his representative.
3. Crosswalks shall be installed only after a study is performed in accordance with MCDOT Traffic Policy/Procedure Guidelines, and final approval is given by the County Board of Supervisors.
4. School crosswalks shall be striped with yellow paint.
5. For speeds greater than 25 mph, use high-intensity crosswalk.

LEGEND:

12SY — 12" Solid yellow line

4DY — 4" Double yellow line



SCHOOL CROSSWALK

(Multi Lane - 2 Way)

(not to scale)

GENERAL NOTES:

1. All striping will be from center of stripe to center of stripe.
2. NPZs shall be installed per MUTCD guidelines. Final layout of NPZ shall be checked by the County Traffic Engineer or his representative.
3. Crosswalks shall be installed only after a study is performed in accordance with MCDOT Traffic Policy/Procedure Guidelines, and final approval is given by the County Board of Supervisors.
4. School crosswalks shall be striped with yellow paint.
5. For speeds greater than 25 mph, use high-intensity crosswalk.
6. See table on page 4-33 for Locations for School Signing per MUTCD.

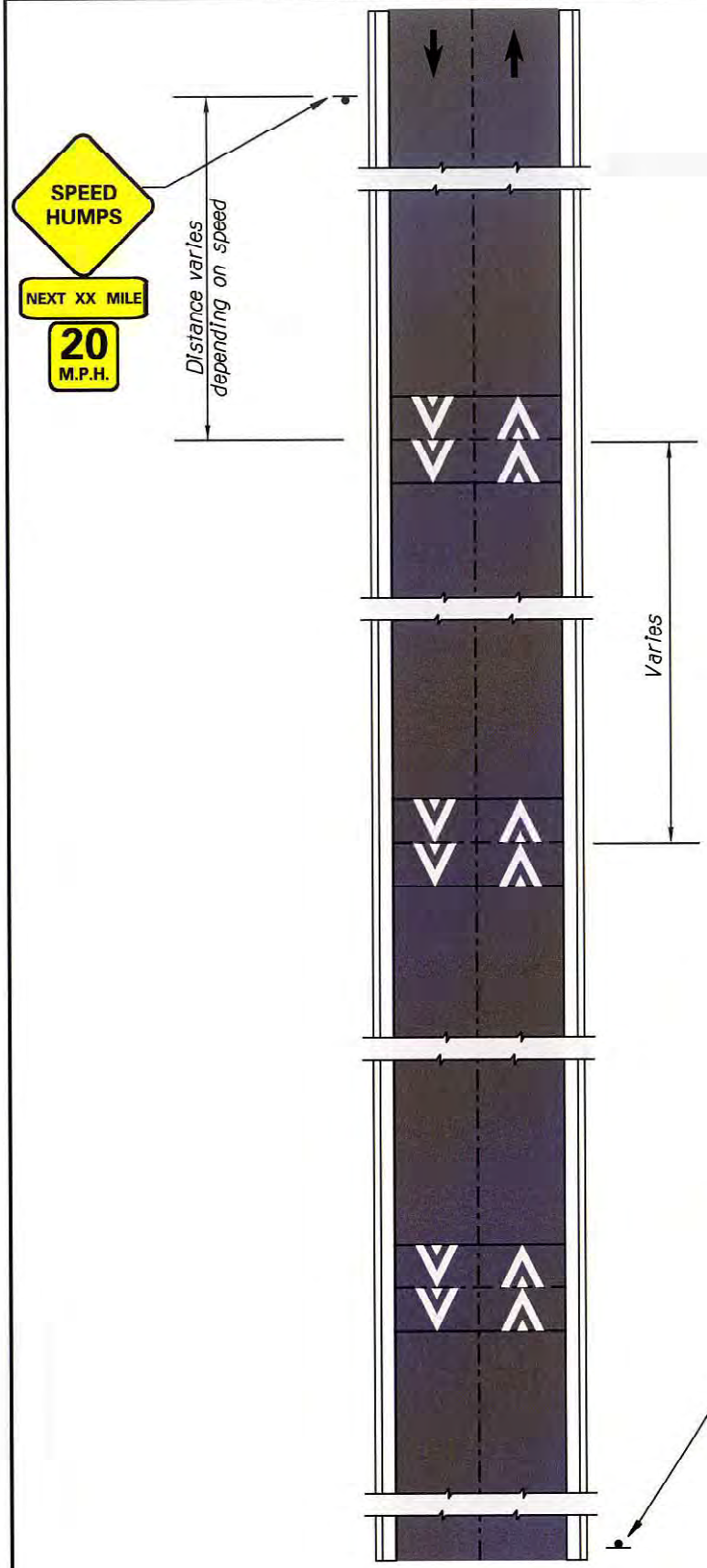
LEGEND:

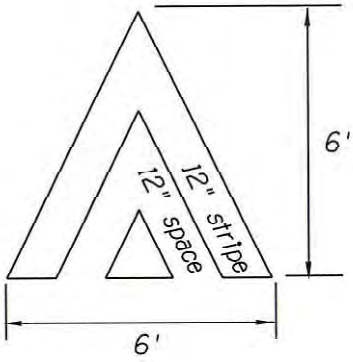
4BW	4" Broken white line with a 10' line segment and a 30' gap
12SY	12" Solid yellow line
4DY	4" Double yellow line

SPEED HUMPS

(With Curb and Gutter)

(not to scale)

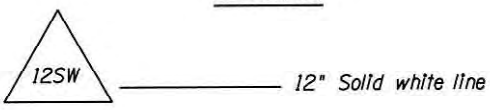




GENERAL NOTES:

1. MCDOT striping standard for speed humps will be Option B per MUTCD.
2. Speed humps are installed in groups of two or three, or as directed by the Traffic Engineer.
3. Sign distance depends on project design.

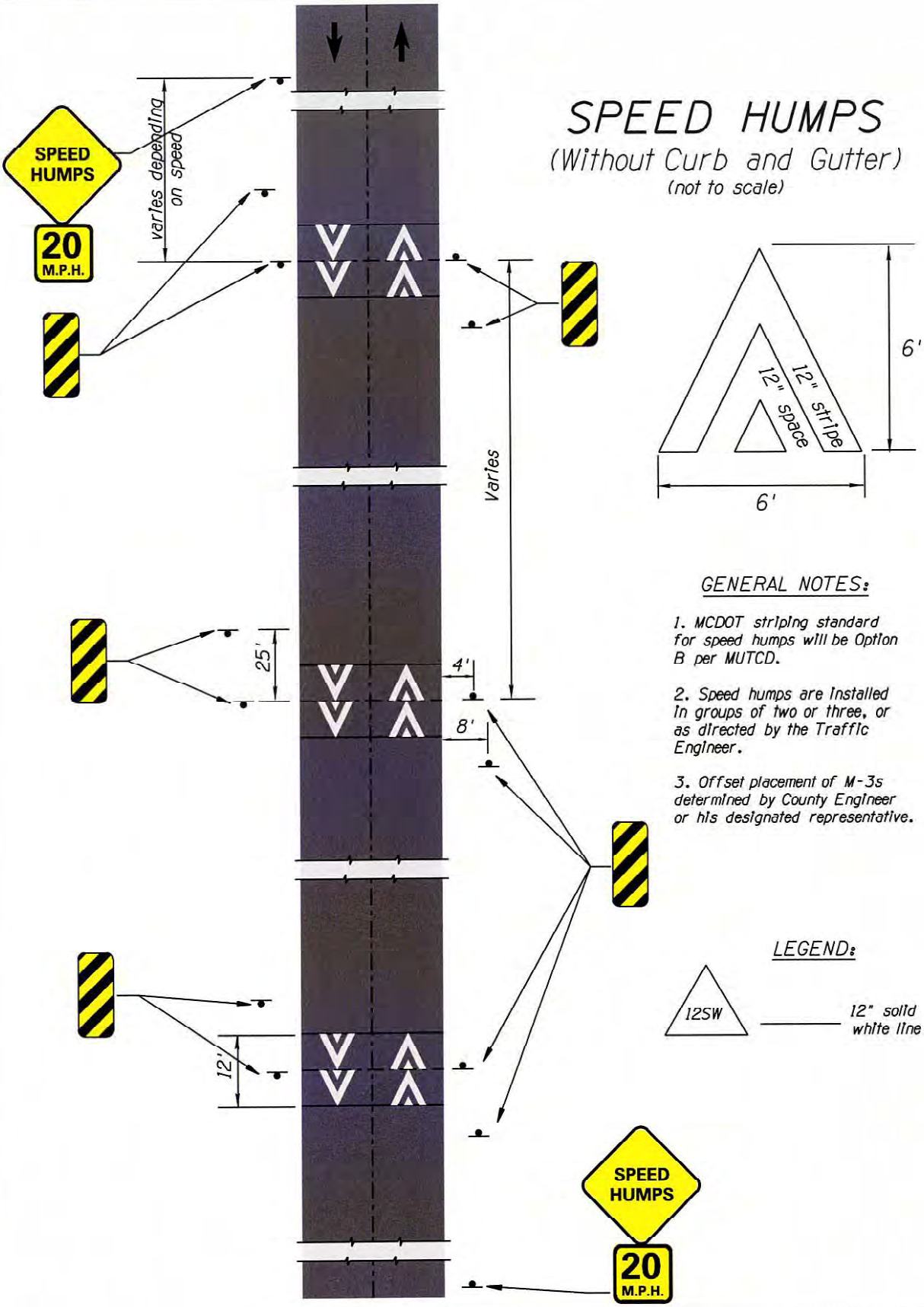
LEGEND:



SPEED HUMPS

(Without Curb and Gutter)

(not to scale)

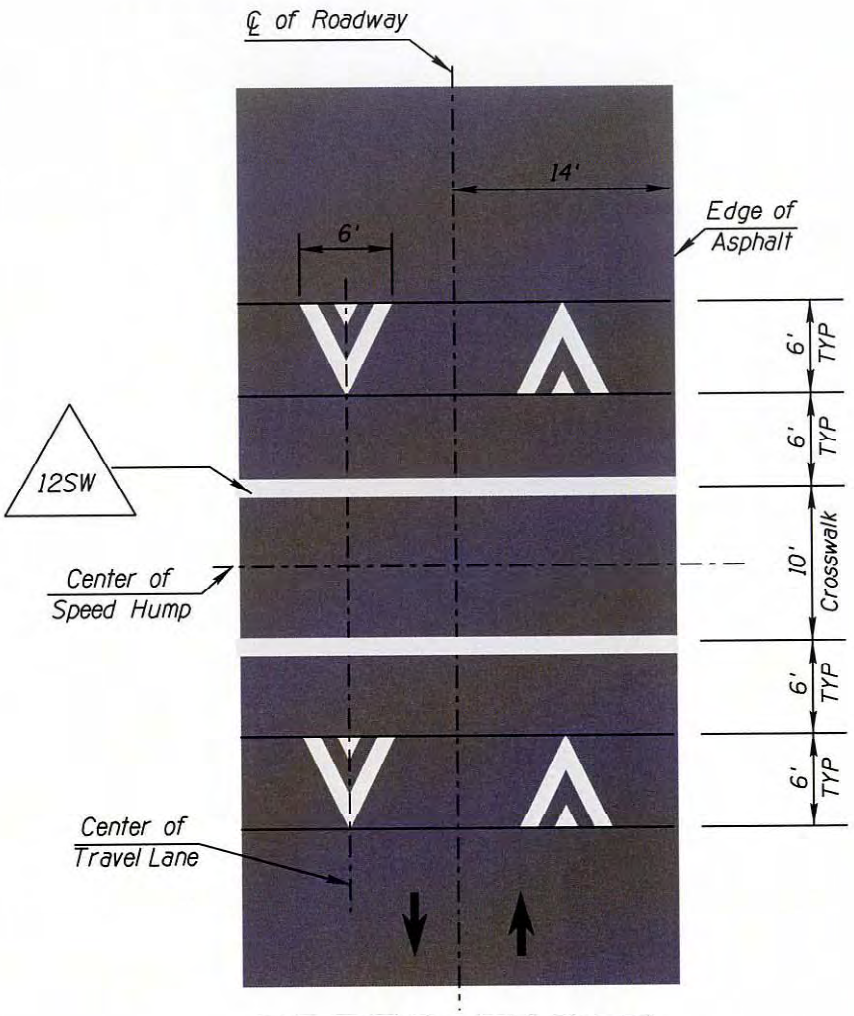


GENERAL NOTES:

1. MCDOT striping standard for speed humps will be Option B per MUTCD.
2. Speed humps are installed in groups of two or three, or as directed by the Traffic Engineer.
3. Offset placement of M-3s determined by County Engineer or his designated representative.

LEGEND:

12SW — 12" solid white line



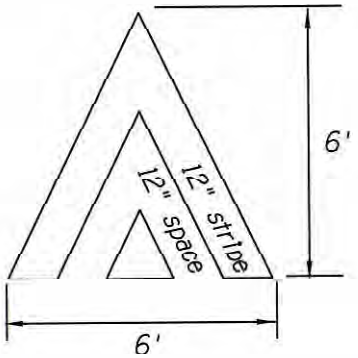
SPEED TABLE

(Without Curb and Gutter)

(not to scale)

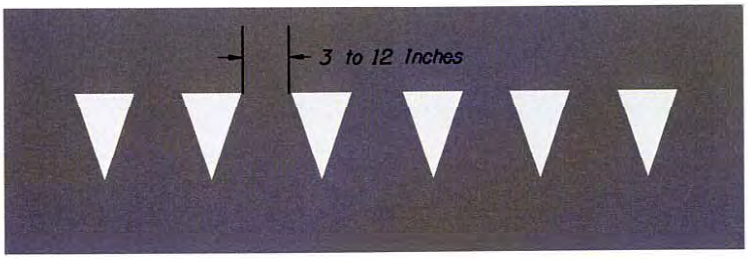
GENERAL NOTES:

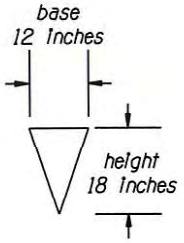
1. MCDOT striping standard for speed humps will be per MUTCD.
2. Table humps must be the full 3" for maximum effect but shall not exceed 3.25".
3. Cross-section elevations shall have a maximum tolerance of + 0.25".
4. Speed table humps shall not be placed over manholes, water valves, survey monuments, junction chambers, etc. or in conflict with driveways.
5. Speed table humps must be placed at locations approved by MCDOT.



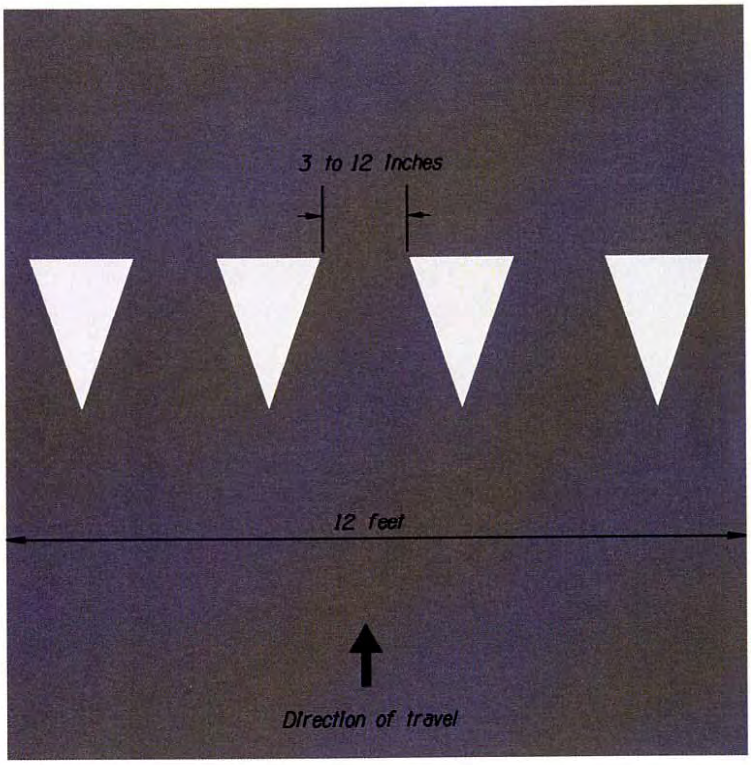
LEGEND:

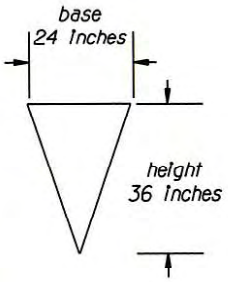
12SW — 12" Solid white line





a. Minimum Dimensions





b. Maximum Dimensions

GENERAL NOTES:

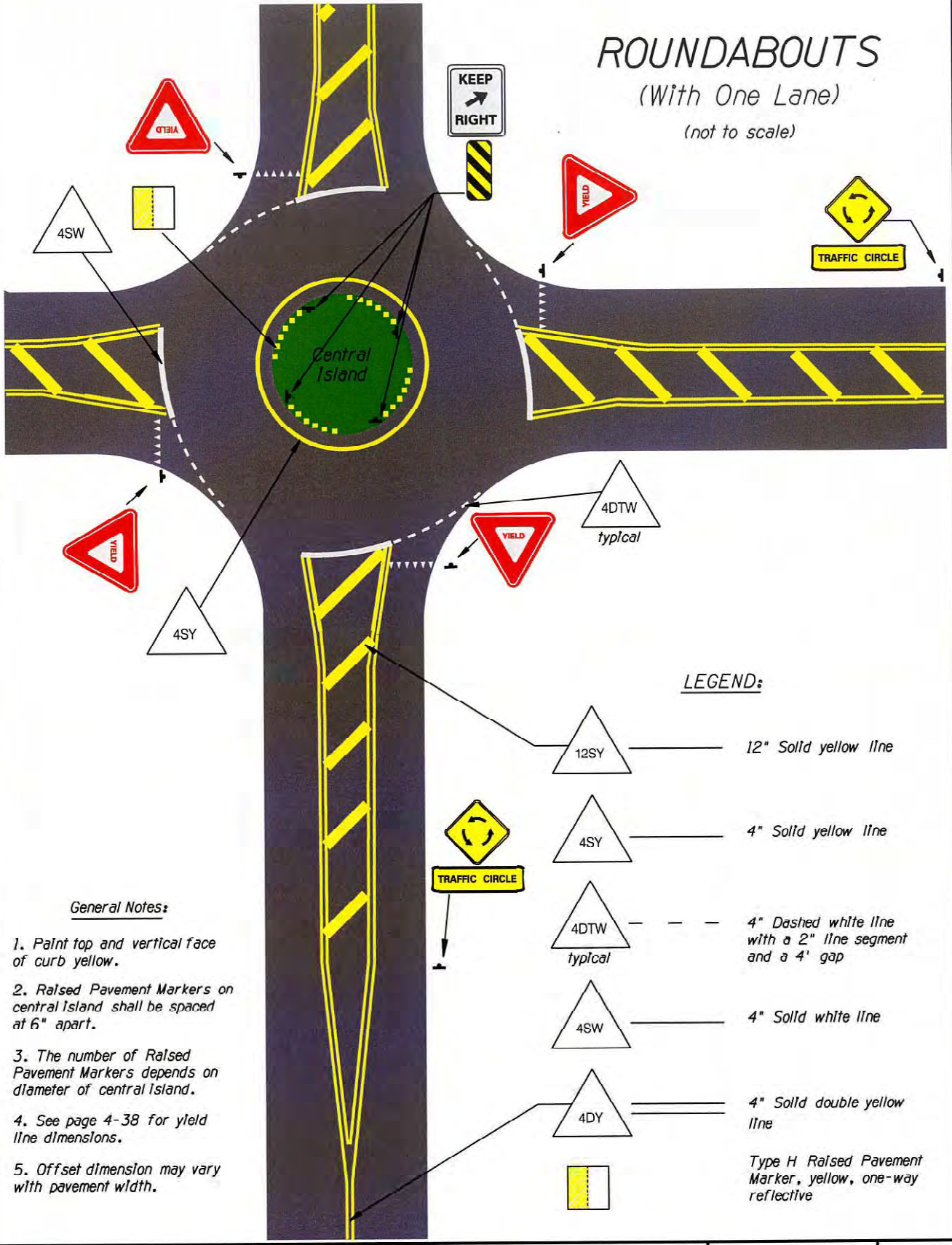
1. Triangle height is equal to 1.5 times the base dimension.
2. Yield lines may be smaller than suggested when installed on much narrower, slow-speed facilities such as shared-use paths.
3. The yield line should be placed at the desired yielding point, but should be placed no more than 30 feet nor less than 4 feet from the nearest edge of the intersecting traveled way.

YIELD LINE LAYOUTS

ROUNDABOUTS

(With One Lane)

(not to scale)



LEGEND:

- 12SY — 12" Solid yellow line
- 4SY — 4" Solid yellow line
- 4DTW (typical) — 4" Dashed white line with a 2" line segment and a 4' gap
- 4SW — 4" Solid white line
- 4DY — 4" Solid double yellow line
- Type H Raised Pavement Marker, yellow, one-way reflective

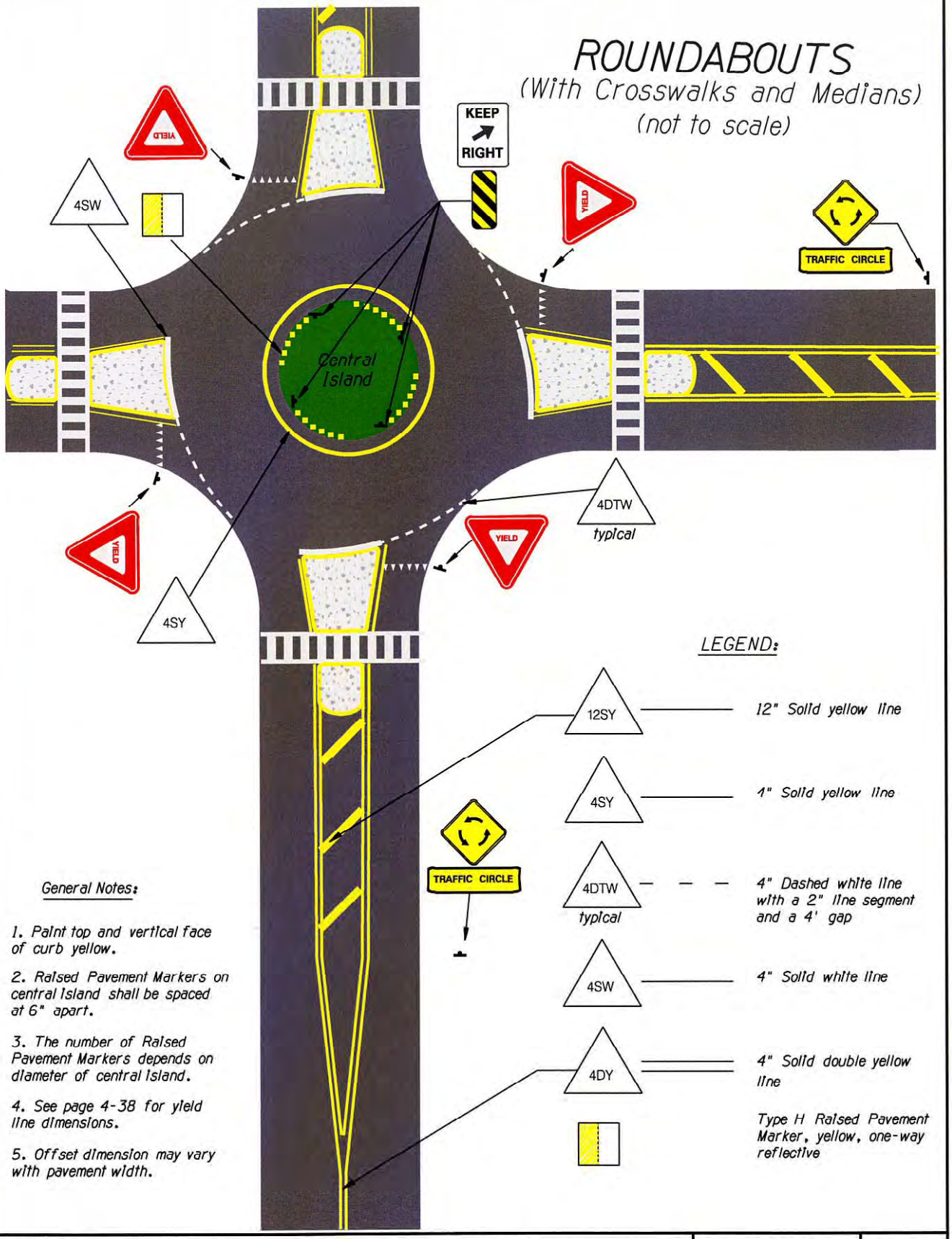
General Notes:

1. Paint top and vertical face of curb yellow.
2. Raised Pavement Markers on central island shall be spaced at 6" apart.
3. The number of Raised Pavement Markers depends on diameter of central island.
4. See page 4-38 for yield line dimensions.
5. Offset dimension may vary with pavement width.

ROUNDABOUTS

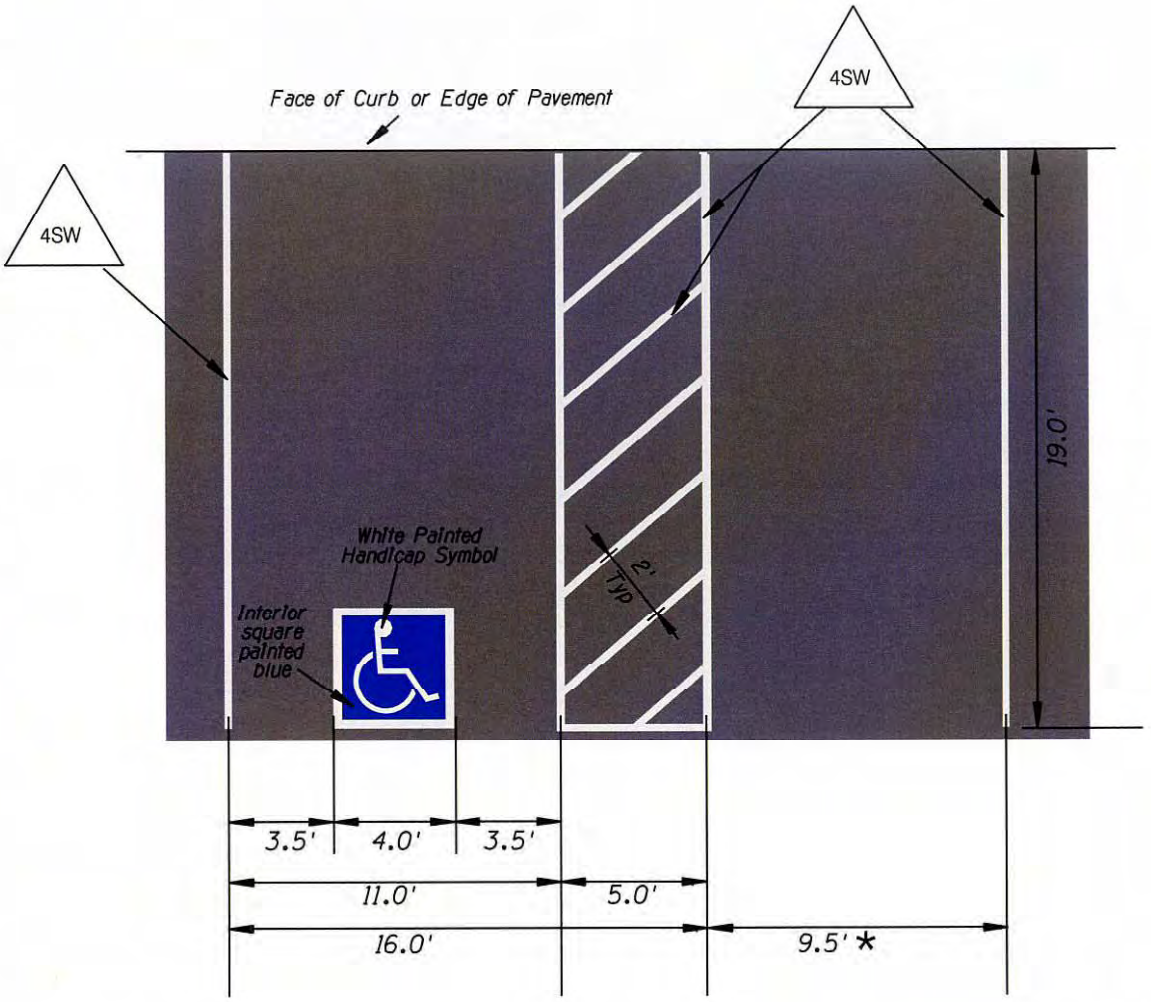
(With Crosswalks and Medians)

(not to scale)



General Notes:

1. Paint top and vertical face of curb yellow.
2. Raised Pavement Markers on central island shall be spaced at 6" apart.
3. The number of Raised Pavement Markers depends on diameter of central island.
4. See page 4-38 for yield line dimensions.
5. Offset dimension may vary with pavement width.



TYPICAL HANDICAP PARKING SPACE AND TYPICAL PARKING SPACE

(not to scale)

GENERAL NOTES:

1. All striping will be from center of stripe to center of stripe.

* Typical Parking Space Width may vary.

LEGEND:

4SW ——— 4" Solid white line