

MassHighway Standard Details and Drawings for the Development of Temporary Traffic Control Plans

Introduction

MassHighway (MHD) has developed the following drawings and details for the purpose of standardizing the Temporary Traffic Control Plans (TTCP) used to control traffic during road and bridge construction on all MassHighway projects.

These drawings should meet the majority of typical work zone setups, but shall also be used as templates for more customized applications. Each of the standard drawings and details provided in this document conform to the 2003 Edition of the *Manual on Uniform Traffic Control Devices* (MUTCD). MassHighway will require that all projects under the purview of Department review follow these guidelines.

These standard details include the following categories:

- General Notes
- Intersections
- Two-lane Roads
- Divided Highways
- Bridges
- Ramps
- Multi-Lane Roads
- Pedestrian
- Railroad/Detours

MassHighway Standard Details and Drawings for the Development of Temporary Traffic Control Plans

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General Notes

NOTES:

1. ALL TEMPORARY TRAFFIC CONTROL WORK SHALL CONFORM TO THE LATEST EDITION OF THE "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES" (MUTCD) AND ALL REVISIONS.
2. ALL SIGN LEGENDS, BORDERS AND MOUNTING SHALL BE IN ACCORDANCE WITH THE MUTCD.
3. TEMPORARY CONSTRUCTION SIGNING AND ALL OTHER TRAFFIC CONTROL DEVICES SHALL BE IN PLACE PRIOR TO THE START OF ANY WORK.
4. TEMPORARY CONSTRUCTION SIGNING, BARRICADES AND ALL OTHER NECESSARY WORK ZONE TRAFFIC CONTROL DEVICES SHALL BE REMOVED FROM THE HIGHWAY OR COVERED WHEN THEY ARE NOT REQUIRED FOR CONTROL OF TRAFFIC.
5. SIGNS AND SIGN SUPPORTS LOCATED ON OR NEAR THE TRAVELED WAY, AND REFLECTORIZED PLASTIC DRUMS WITH LIGHTING DEVICES MOUNTED ON THEM, MUST PASS THE CRITERIA SET FORTH IN NCHRP REPORT 350, "RECOMMENDED PROCEDURES FOR THE SAFETY PERFORMANCE EVALUATION OF HIGHWAY FEATURES."
6. CONTRACTORS SHALL NOTIFY EACH ABUTTER AT LEAST 24 HOURS IN ADVANCE OF THE START OF ANY WORK THAT WILL REQUIRE THE TEMPORARY CLOSURE OF ACCESS, SUCH AS CONDUIT INSTALLATION, EXISTING PAVEMENT EXCAVATION, TEMPORARY DRIVEWAY PAVEMENT PLACEMENT AND SIMILAR OPERATIONS.
7. THE FIRST THREE PLASTIC DRUMS OF A TAPER MAY BE MOUNTED WITH TYPE A LIGHTS.
8. THE ADVISORY SPEED LIMIT, IF REQUIRED, SHALL BE DETERMINED BY THE ENGINEER.
9. DISTANCES ARE A GUIDE AND MAY BE ADJUSTED IN THE FIELD BY THE ENGINEER.
10. MAXIMUM SPACING OF TRAFFIC DEVICES IN A TAPER (DRUMS OR CONES) IS EQUAL IN FEET TO THE SPEED LIMIT IN MPH.
11. MINIMUM LANE WIDTH IS TO BE 11 FEET (3.3m) UNLESS OTHERWISE SHOWN. MINIMUM LANE WIDTH TO BE MEASURED FROM THE EDGE OF DRUMS OR MEDIAN BARRIER.
12. ALL SIGNS SHALL BE MOUNTED ON THEIR OWN STANDARD SIGN SUPPORTS.

LEGEND:

- REFLECTORIZED PLASTIC DRUM  WORK ZONE  WORK VEHICLE
- P/F POLICE/FLAGGER DETAIL  DIRECTION OF TRAFFIC  MOVEABLE IMPACT ATTENUATOR
-  TYPE III BARRICADE  IMPACT ATTENUATOR  TRAFFIC OR PEDESTRIAN SIGNAL
-  CHANGEABLE MESSAGE SIGN  MEDIAN BARRIER  SIGN
-  FLASHING ARROW PANEL  MEDIAN BARRIER WITH WARNING LIGHTS

THE IDEAL CAPACITY OF A MAJOR HIGHWAY IS GENERALLY CONSIDERED TO BE 1900 PASSENGER CARS PER HOUR PER LANE (PCPHPL). IN WORK ZONES ON A MULTI-LANE DIVIDED HIGHWAY, THE FOLLOWING VOLUME GUIDELINES HAVE BEEN SUGGESTED:

MEASURED AVERAGE WORK ZONE CAPACITIES

Number of Lanes		Number of Studies	Average Capacity	
NORMAL (existing)	OPEN (to traffic)		VPH	VPHPL
3	1	7	1,170	1,170
2	1	8	1,340	1,340
5	2	8	2,740	1,370
4	2	4	2,960	1,480
3	2	9	2,980	1,490
4	3	4	4,560	1,520

Source: Dudek, C., Notes on Work Zone Capacity and Level of Service. Texas Transportation Institute, Texas A&M University, College Station, Texas (1984)

BY OBTAINING HOURLY TRAFFIC COUNTS FOR A PARTICULAR ROADWAY (WITH A MINIMUM OF A 48-HOUR AUTOMATIC TRAFFIC RECORDER (ATR) COUNT), THIS WILL HELP TO DETERMINE AT WHAT TIMES OF THE DAY OR NIGHT A CERTAIN NUMBER OF LANES MAY BE CLOSED.



**Standard Details
and Drawings
for the Development of
Traffic Management Plans**

**FIGURE Gen-1
GENERAL GUIDELINES**

SUGGESTED WORK ZONE WARNING SIGN SPACING

Road Type	Distance Between Signs**		
	A	B	C
LOCAL OR LOW VOLUME ROADWAYS*	350 (100)	350 (100)	350 (100)
MOST OTHER ROADWAYS*	500 (150)	500 (150)	500 (150)
FREEWAYS AND EXPRESSWAYS*	1,000 (300)	1,500 (450)	2,640 (800)

* SPEED CATEGORY TO BE DETERMINED BY HIGHWAY AGENCY

** DISTANCES ARE SHOWN IN FEET (METERS). THE COLUMN HEADINGS A, B, AND C ARE THE DIMENSIONS SHOWN IN THE DETAIL/ TYPICAL SETUP FIGURES. THE A DIMENSION IS THE DISTANCE FROM THE TRANSITION OR POINT OF RESTRICTION TO THE FIRST SIGN. THE B DIMENSION IS THE DISTANCE BETWEEN THE FIRST AND SECOND SIGNS. THE C DIMENSION IS THE DISTANCE BETWEEN THE SECOND AND THIRD SIGNS. (THE "THIRD" SIGN IS THE FIRST ONE TYPICALLY ENCOUNTERED BY A DRIVER APPROACHING A TEMPORARY TRAFFIC CONTROL (TTC) ZONE.)

THE "THIRD" SIGN ABOVE IS TYPICALLY REFERRED TO AS AN "ADVANCE WARNING" SIGN ON THE TMP SETUPS. IT IS THE ONE WHICH MAY OFTEN HAVE THE "STANDARD RED OR RED-ORANGE FLAGS (16 in. X 16 in.)" MOUNTED ON IT. THESE ADVANCE WARNING SIGNS ARE LOCATED AT THE PROJECT LIMITS ON ALL APPROACHES (i.e. THE W20-1 SERIES (ROAD WORK XX FT) SIGNS), AND USUALLY REMAIN FOR THE DURATION OF THE PROJECT. ADDITIONAL SIGNS (i.e. "RIGHT LANE CLOSED 1 MILE" AND "LEFT LANE CLOSED 1 MILE") HAVE BEEN SHOWN IN SOME FIGURES AS EXAMPLES OF REINFORCEMENT SIGN PLACEMENT BUT ARE USED IN RARE OCCASIONS.

THE FIRST AND SECOND WARNING SIGNS ABOVE ARE REFERRED TO AS THE OPERATIONAL (DAY-TO-DAY) WORK ZONE SIGNS AND MAY BE MOVED DEPENDING ON WHERE THE SPECIFIC ROADWAY WORK FOR THAT DAY IS LOCATED.

R2-10a SIGNS SHALL BE PLACED BETWEEN THE SECOND AND THIRD SIGNS AS DESCRIBED ABOVE.

R2-10a AND W20-1 SERIES SIGNS ARE TO BE INCLUDED ON ALL DETAILS/TYPICAL SETUPS.

Based on: Table 6C-1 2003 MUTCD

STOPPING SIGHT DISTANCE AS A FUNCTION OF SPEED

SPEED*	DISTANCE
(km/h)	(m)
30	35
40	50
50	65
60	85
70	105
80	130
90	160
100	185
110	220
120	250

SPEED*	DISTANCE
(mph)	(ft)
20	115
25	155
30	200
35	250
40	305
45	360
50	425
55	495
60	570
65	645
70	730
75	820

*POSTED SPEED, OFF-PEAK 85TH-PERCENTILE SPEED PRIOR TO WORK STARTING, OR THE ANTICIPATED OPERATING SPEED

THESE VALUES MAY BE USED TO DETERMINE THE LENGTH OF LONGITUDINAL BUFFER SPACES.

THE DISTANCES IN THE ABOVE CHART REPRESENT THE MINIMAL VALUES FOR BUFFER SPACING.

Source: Table 6C-2 2003 MUTCD



**Notes
for
Traffic Management**

**FIGURE Gen-2
NOTES ON WORK ZONE DISTANCES**

CONVENTIONAL ROADWAY– A STREET OR HIGHWAY OTHER THAN A LOW-VOLUME ROAD, EXPRESSWAY, OR FREEWAY.

EXPRESSWAY– A DIVIDED HIGHWAY WITH PARTIAL CONTROL OF ACCESS.

FREEWAY– A DIVIDED HIGHWAY WITH FULL CONTROL OF ACCESS.

LOW-VOLUME ROAD– A FACILITY LYING OUTSIDE OF BUILT-UP AREAS OF CITIES, TOWNS, AND COMMUNITIES, AND IT SHALL HAVE A TRAFFIC VOLUME OF LESS THAN 400 AADT. IT SHALL NOT BE A FREEWAY, EXPRESSWAY, INTERCHANGE RAMP, FREEWAY SERVICE ROAD, OR A ROAD ON A DESIGNATED STATE HIGHWAY SYSTEM.

Source: 2003 MUTCD

TAPER LENGTH CRITERIA FOR TEMPORARY TRAFFIC CONTROL ZONES

Type of Taper	Taper Length (L)*
MERGING TAPER	AT LEAST L
SHIFTING TAPER	AT LEAST 0.5L
SHOULDER TAPER	AT LEAST 0.33L
ONE-LANE, TWO-WAY TRAFFIC TAPER	100 FT (30 m) MAXIMUM
DOWNSTREAM TAPER	100 FT (30 m) PER LANE

Source: Table 6C-3 2003 MUTCD

FORMULAS FOR DETERMINING TAPER LENGTHS

Speed Limit (S)	Taper Length (L) Feet	Speed Limit (S)	Taper Length (L) Meters
40 MPH OR LESS	$L = \frac{WS^2}{60}$	60 KM/H OR LESS	$L = \frac{WS^2}{155}$
45 MPH OR MORE	$L = WS$	70 KM/H OR MORE	$L = \frac{WS}{1.6}$

WHERE: L = TAPER LENGTH IN FEET (METERS)

W = WIDTH OF OFFSET IN FEET (METERS)

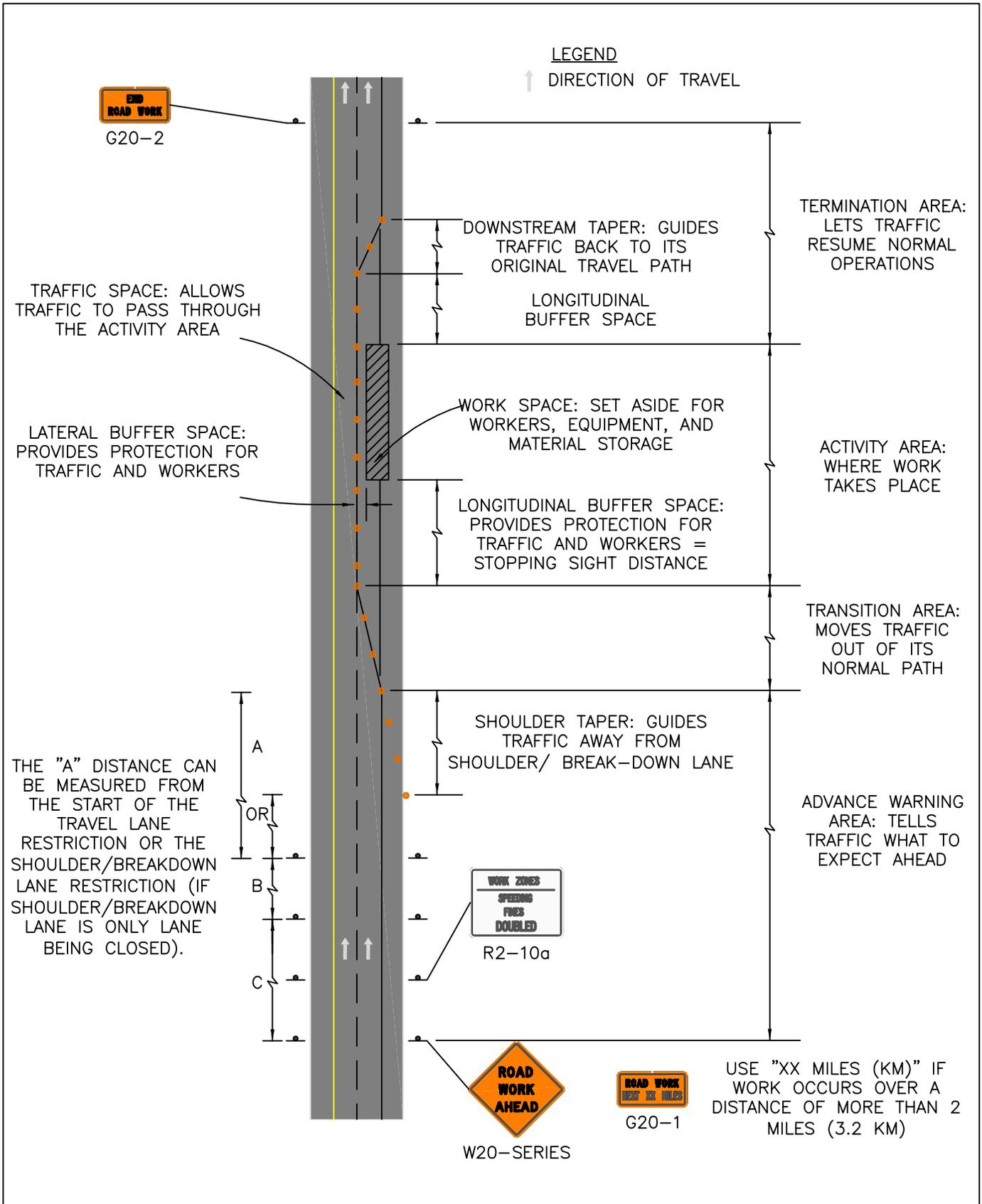
S = POSTED SPEED LIMIT, OR OFF-PEAK 85TH-PERCENTILE SPEED PRIOR TO WORK STARTING, OR THE ANTICIPATED OPERATING SPEED IN MPH (KM/H)

Source: Table 6C-4 2003 MUTCD



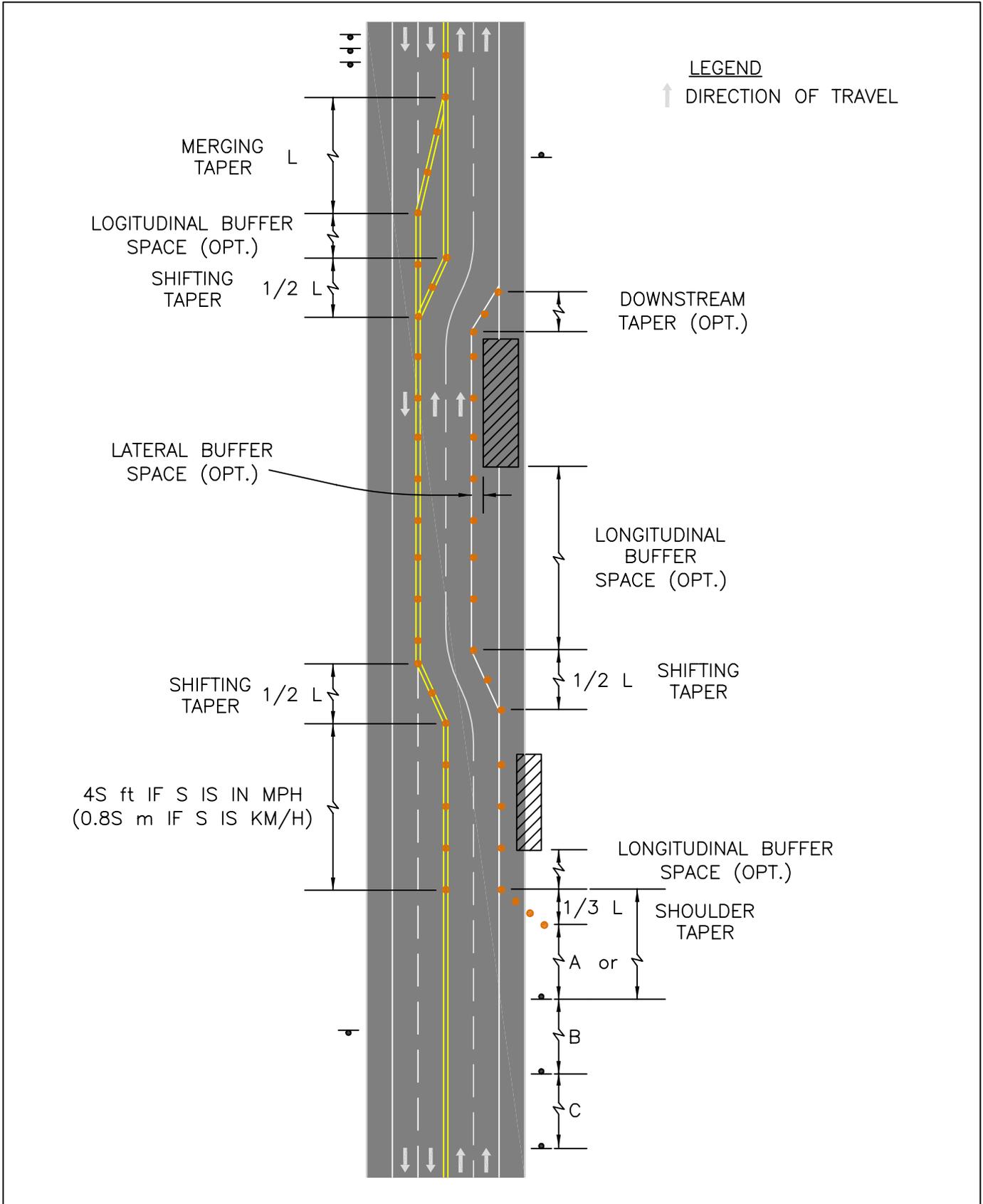
Notes
for
Traffic Management

FIGURE Gen-3
NOTES ON WORK ZONE DISTANCES



Standard Details
and Drawings
for the Development of
Traffic Management Plans

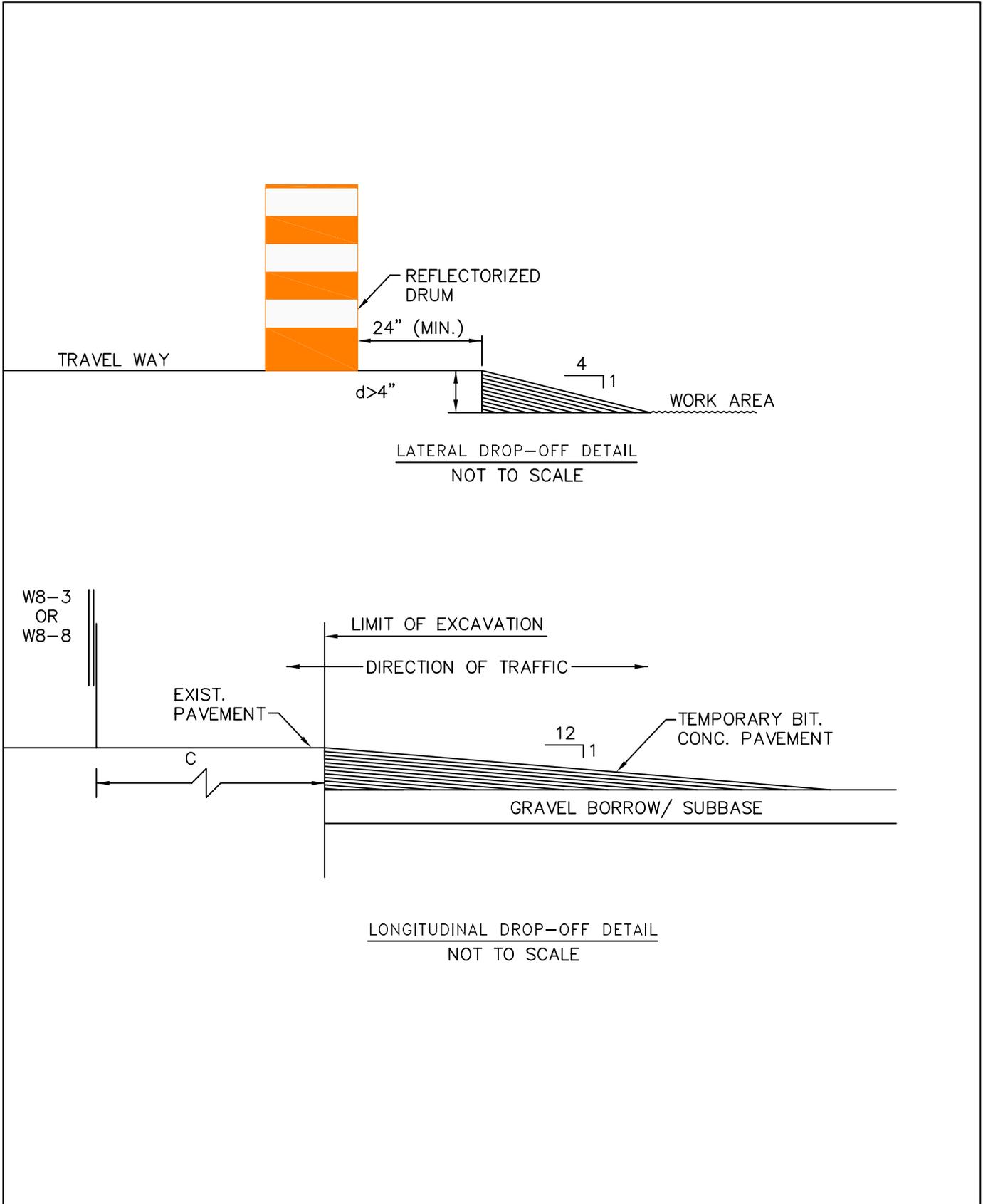
FIGURE Gen-4
COMPONENT PARTS OF A
TEMPORARY TRAFFIC CONTROL
(TTC) ZONE
NOT TO SCALE



Standard Details
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FIGURE Gen-5
 TYPES OF TAPERS AND BUFFER
 SPACES

NOT TO SCALE

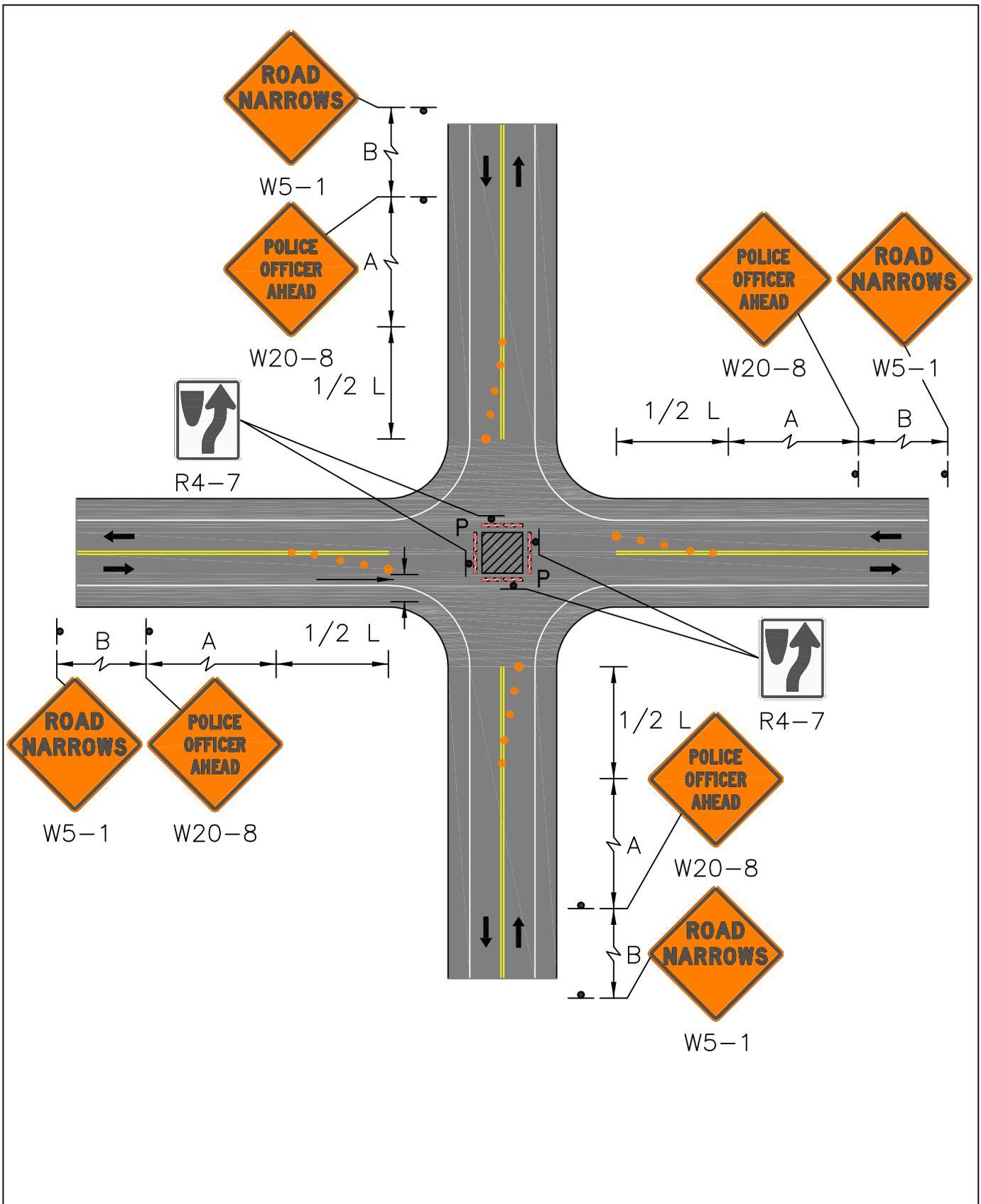


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for the Development of
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FIGURE Gen-6
LATERAL AND LONGITUDINAL
DROP-OFF DETAILS

NOT TO SCALE

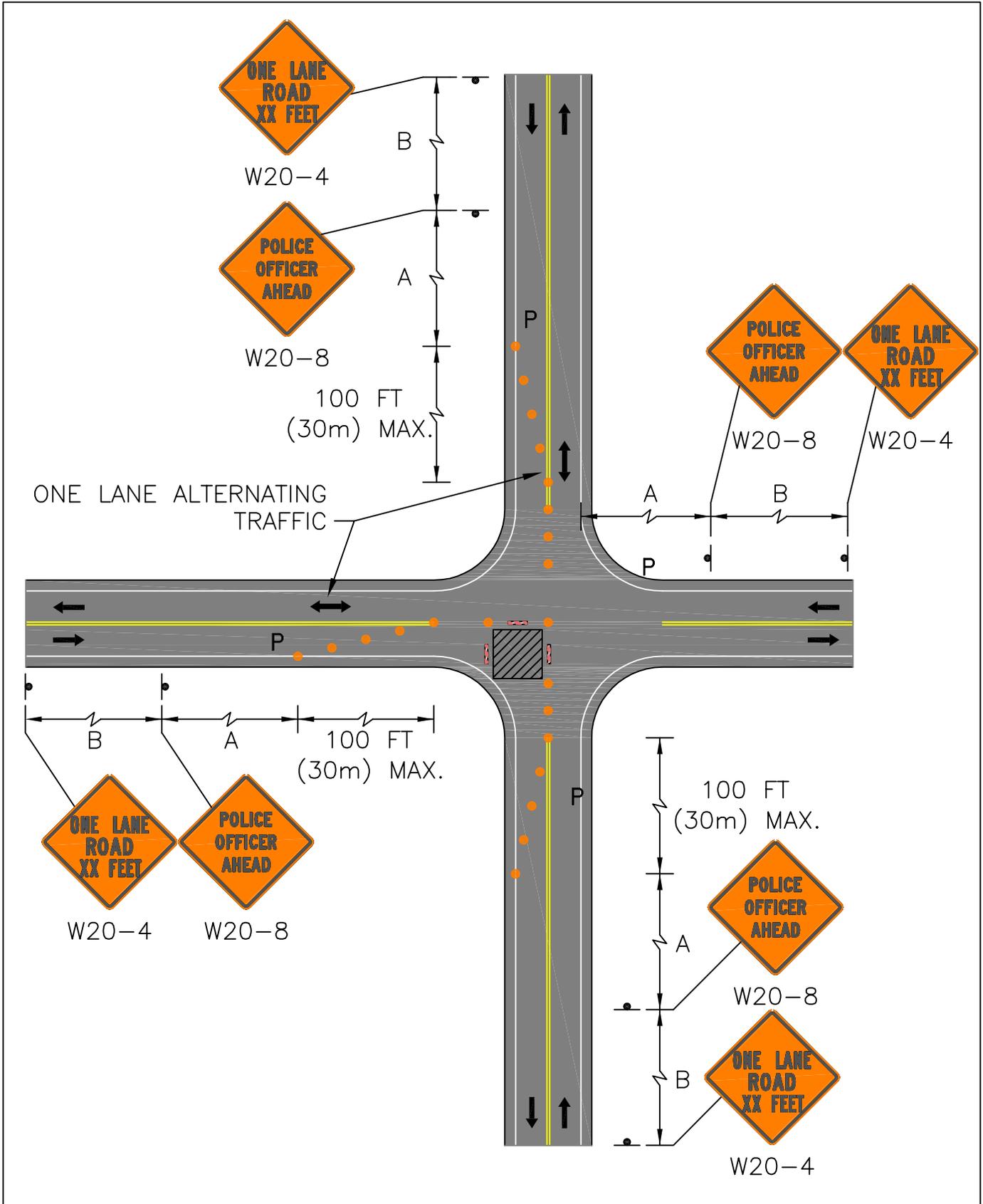
Intersections



Standard Details
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for the Development of
Traffic Management Plans

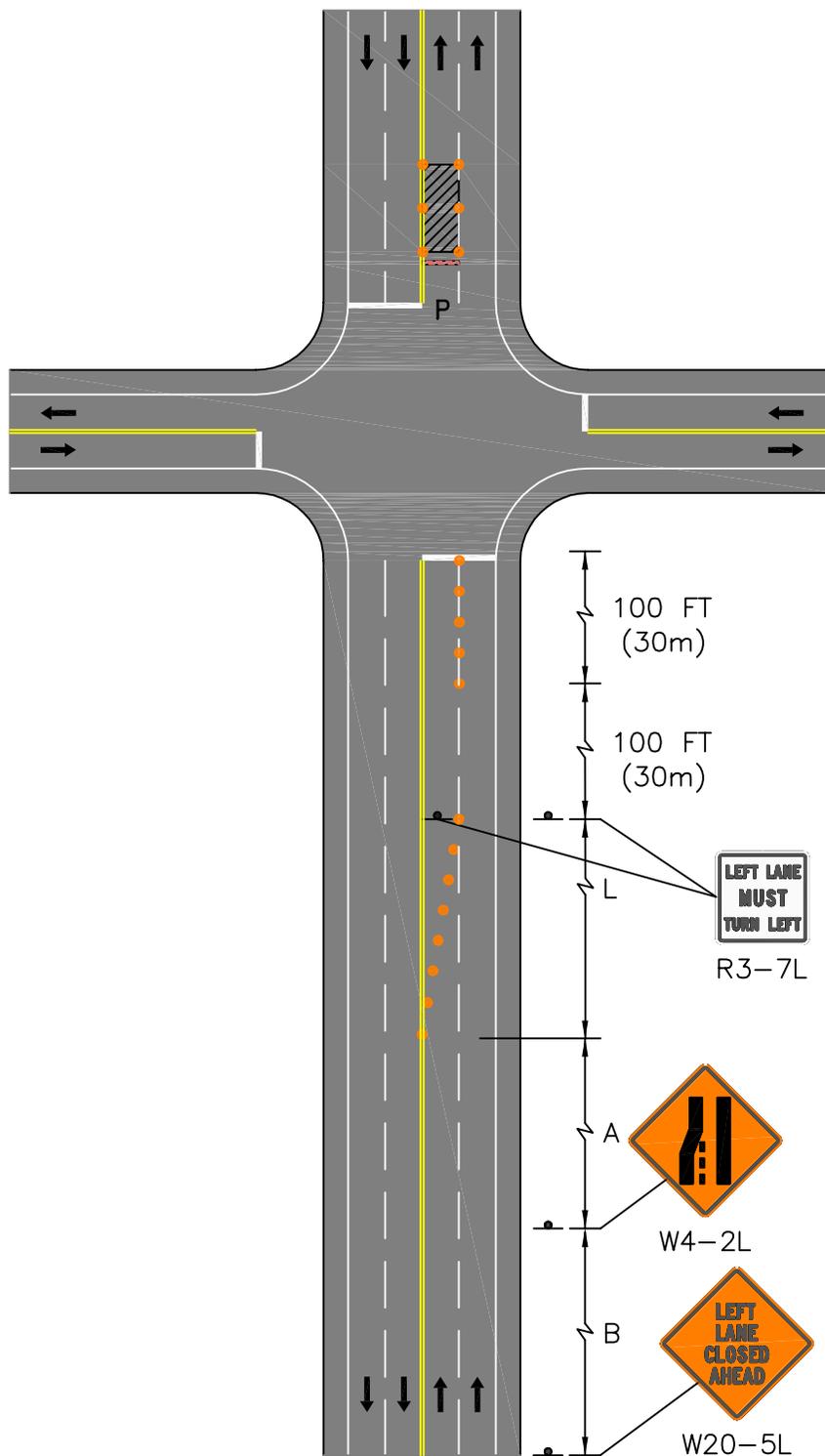
FIGURE Int-1
SINGLE LANE APPROACH
CENTER CLOSURE

NOT TO SCALE



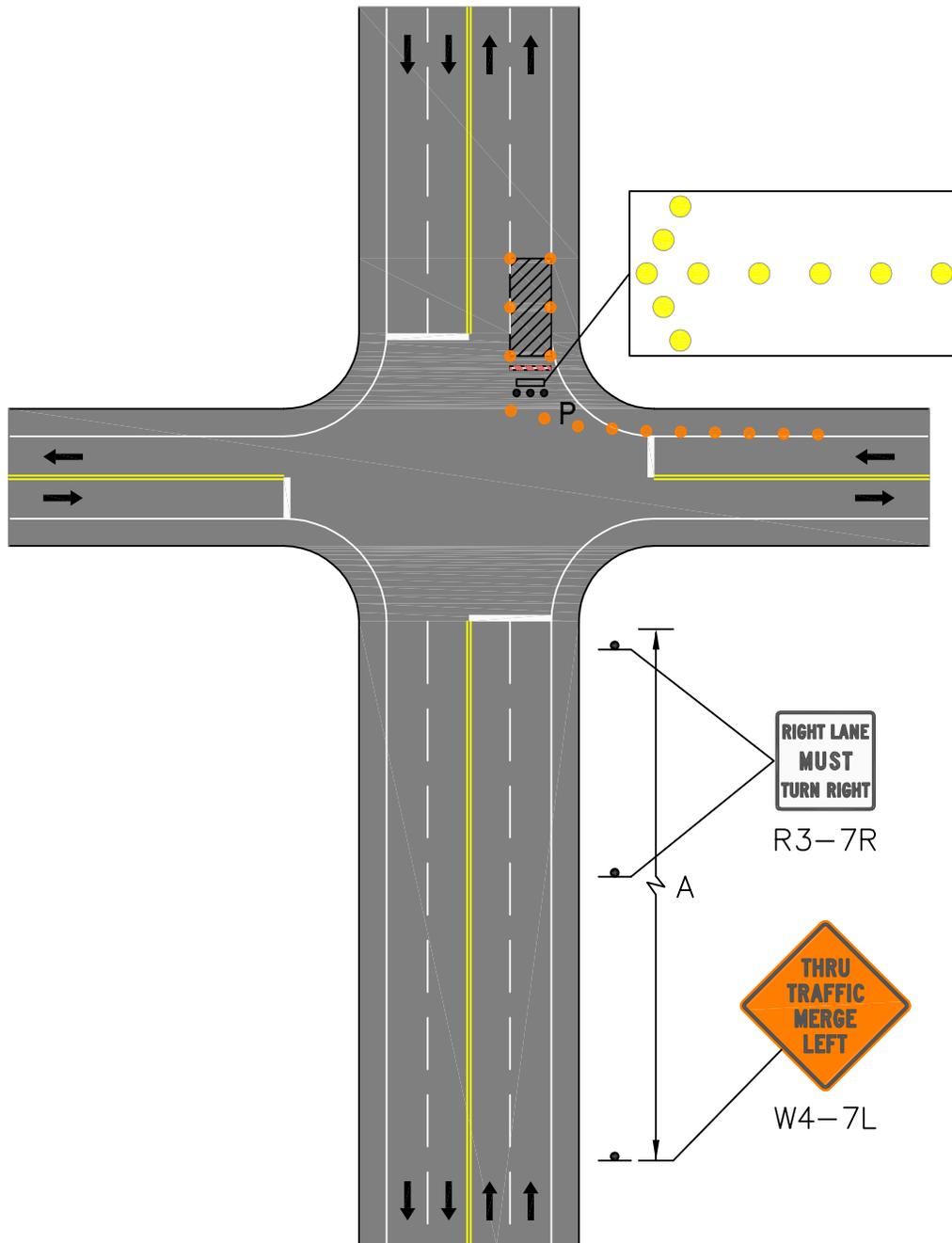
Standard Details
and Drawings
for the Development of
Traffic Management Plans

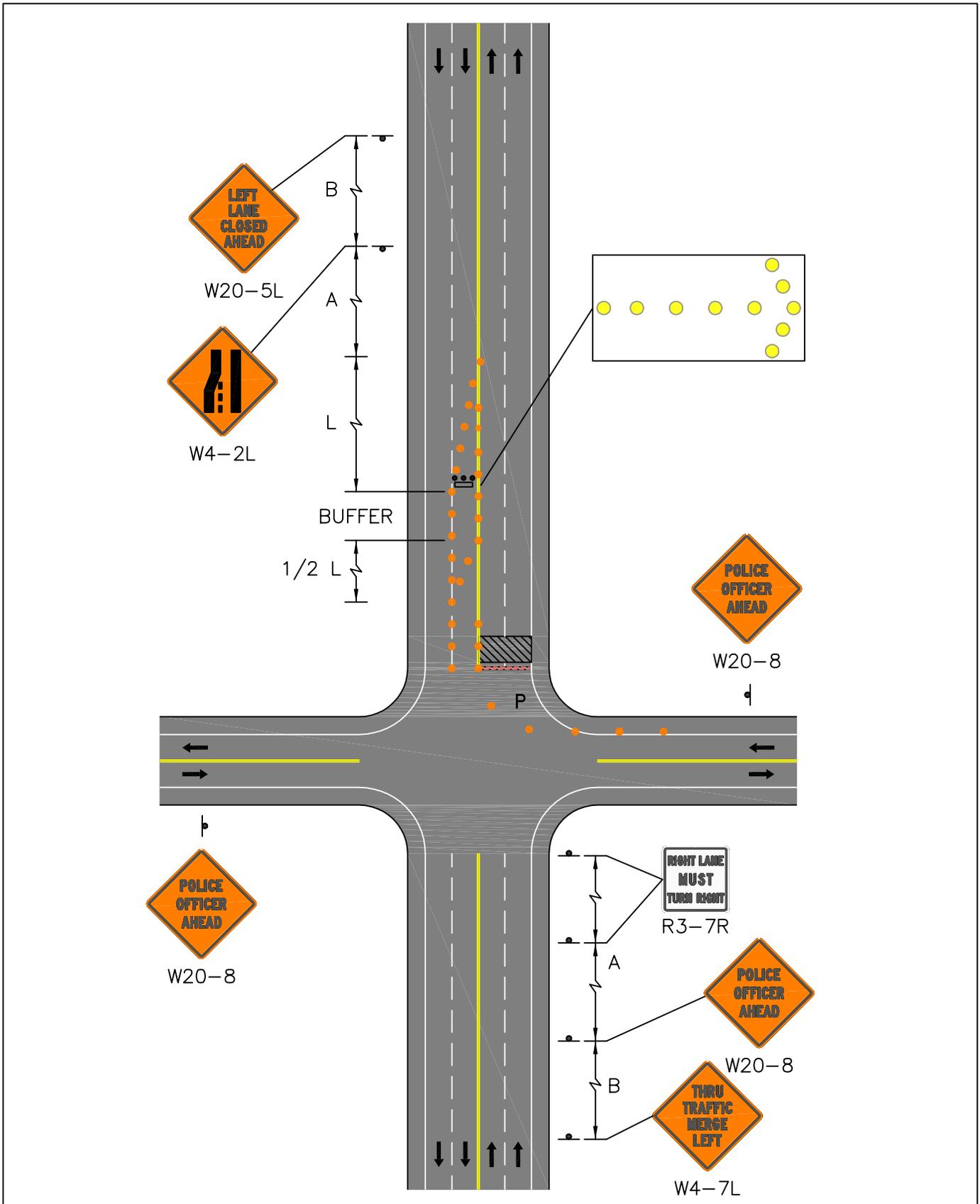
FIGURE Int-2
SINGLE LANE APPROACH
ONE QUADRANT CLOSURE
NOT TO SCALE



Standard Details
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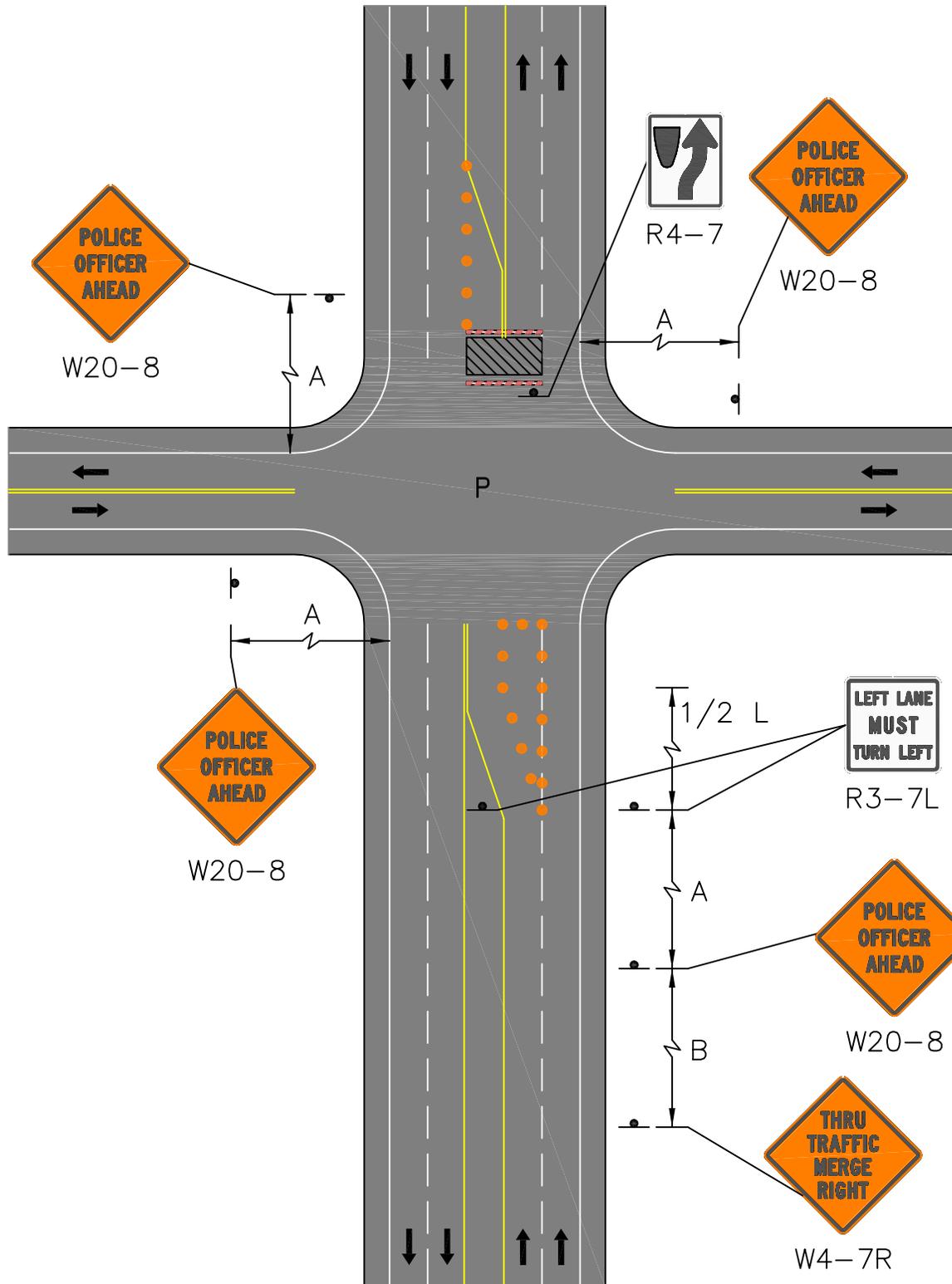
FIGURE Int-3
DOUBLE LANE APPROACH
FAR SIDE CLOSURE
INSIDE LANE
NOT TO SCALE





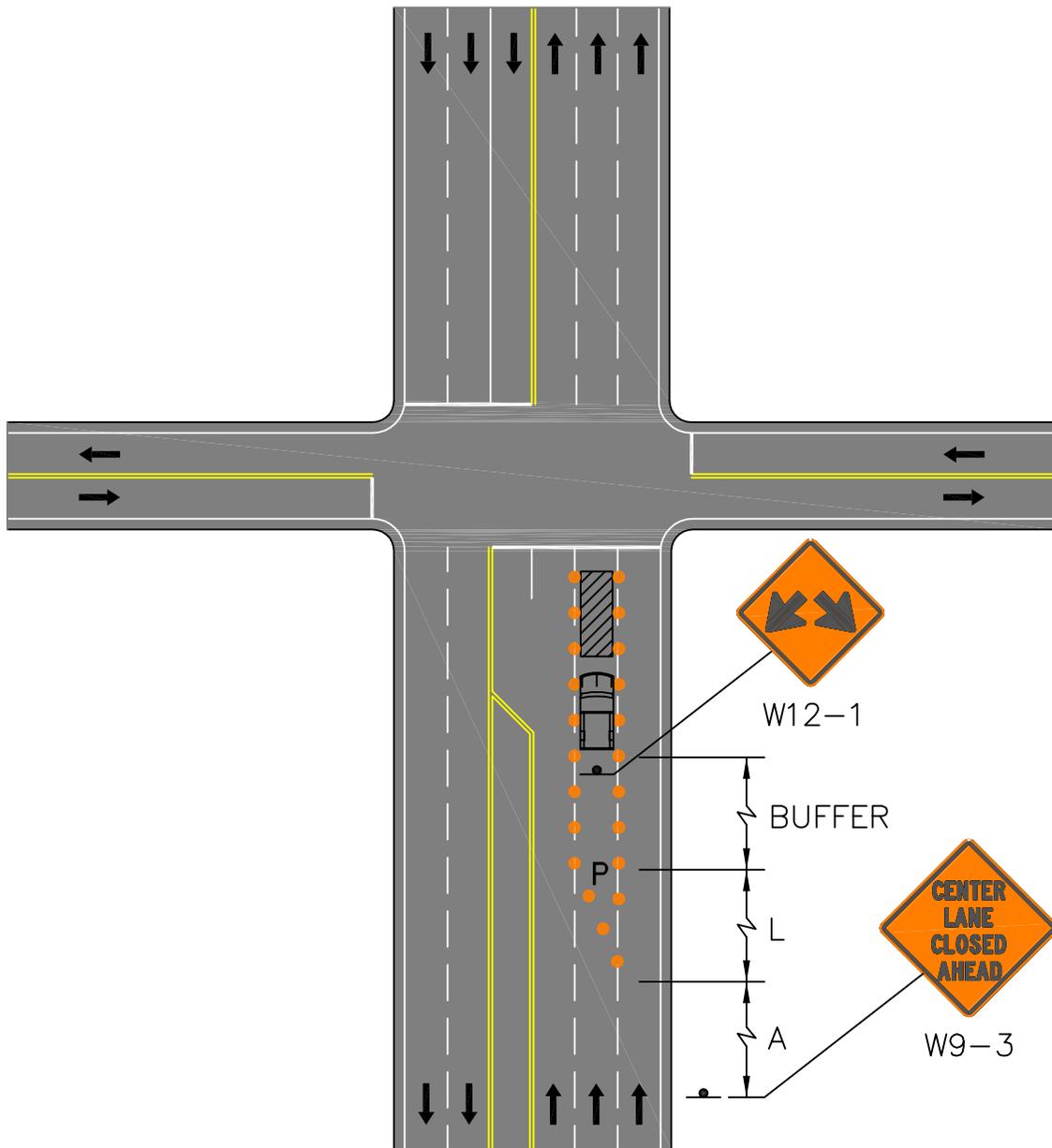
Standard Details
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FIGURE Int-5
DOUBLE LANE APPROACH
HALF ROAD CLOSURE
NOT TO SCALE

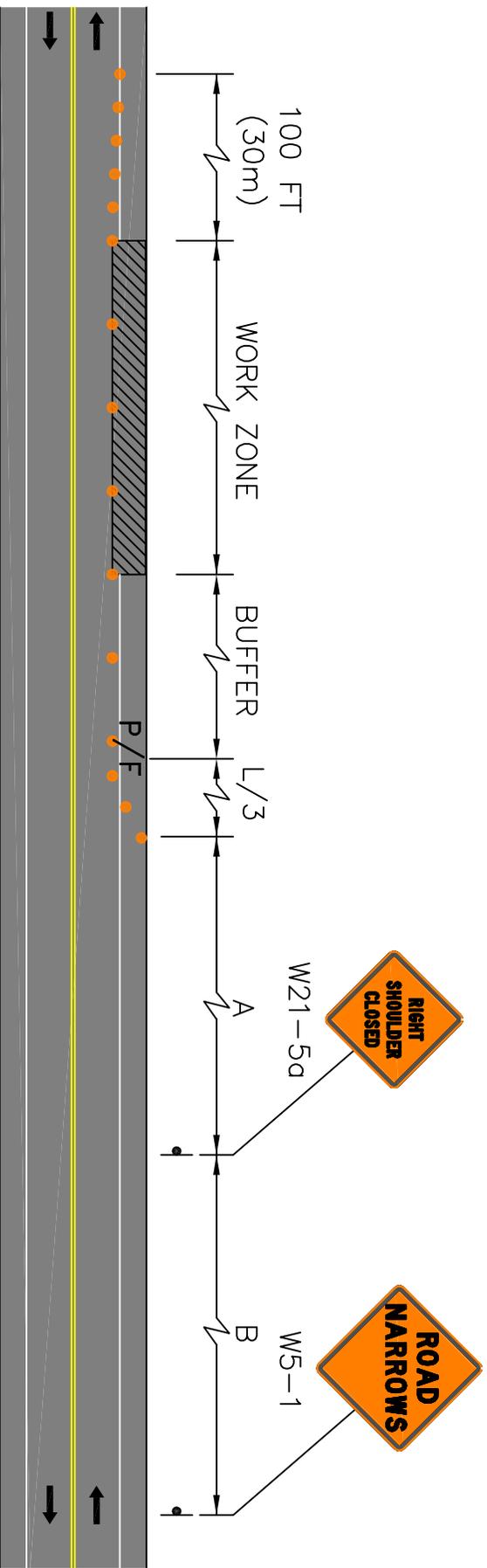


Standard Details
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Traffic Management Plans

FIGURE Int-6
MULTI-LANE APPROACH
MULTIPLE LANE CLOSURE
NOT TO SCALE



Two-Lane Roads

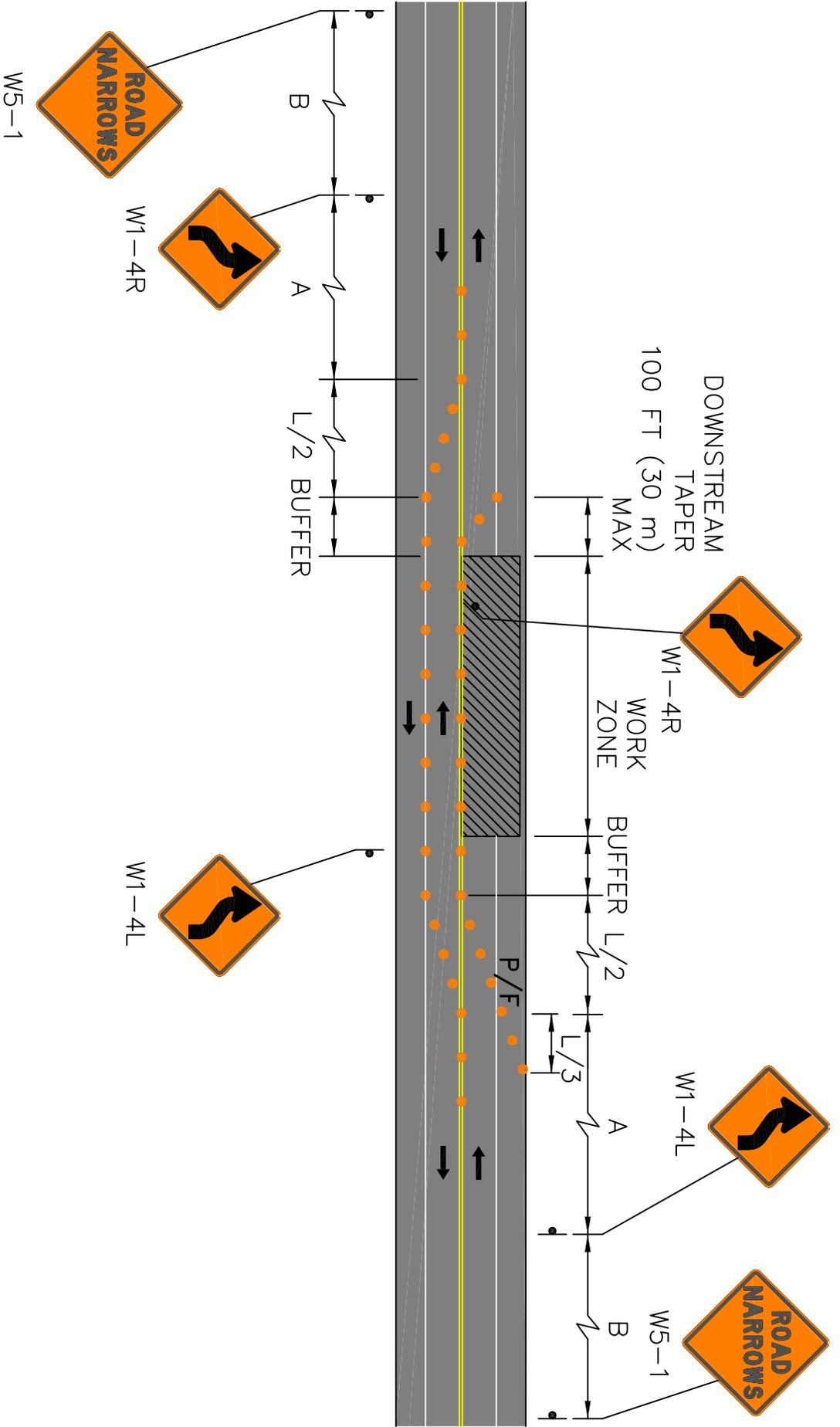


DRUM SPACING DEPENDENT ON SPEED



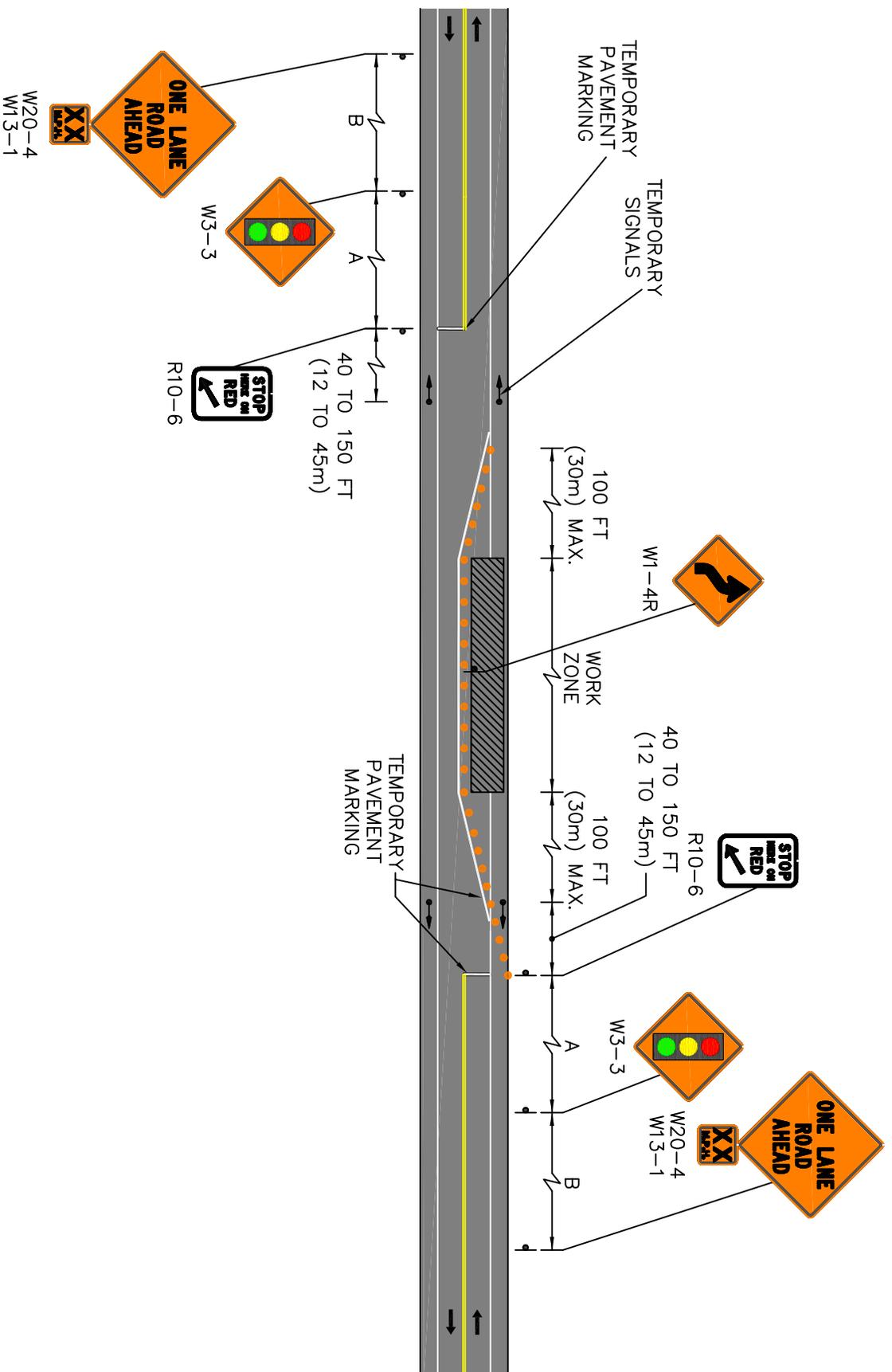
Standard Details and Drawings
for the
Development of Traffic Management Plans

FIGURE TLR-1
TWO LANE ROAD
SHOULDER CLOSED
NOT TO SCALE



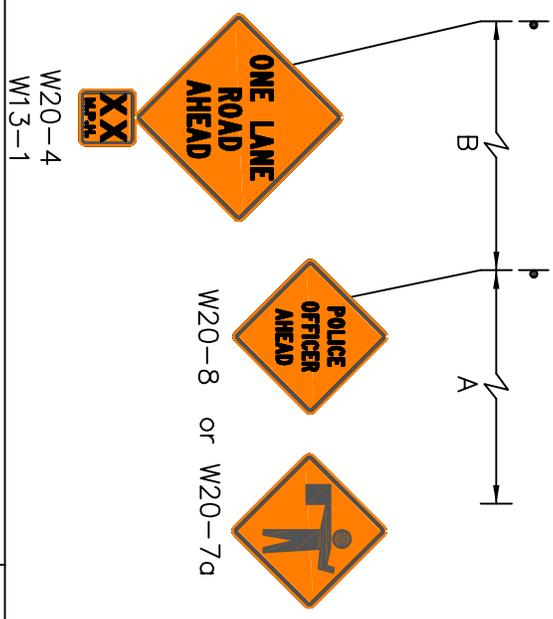
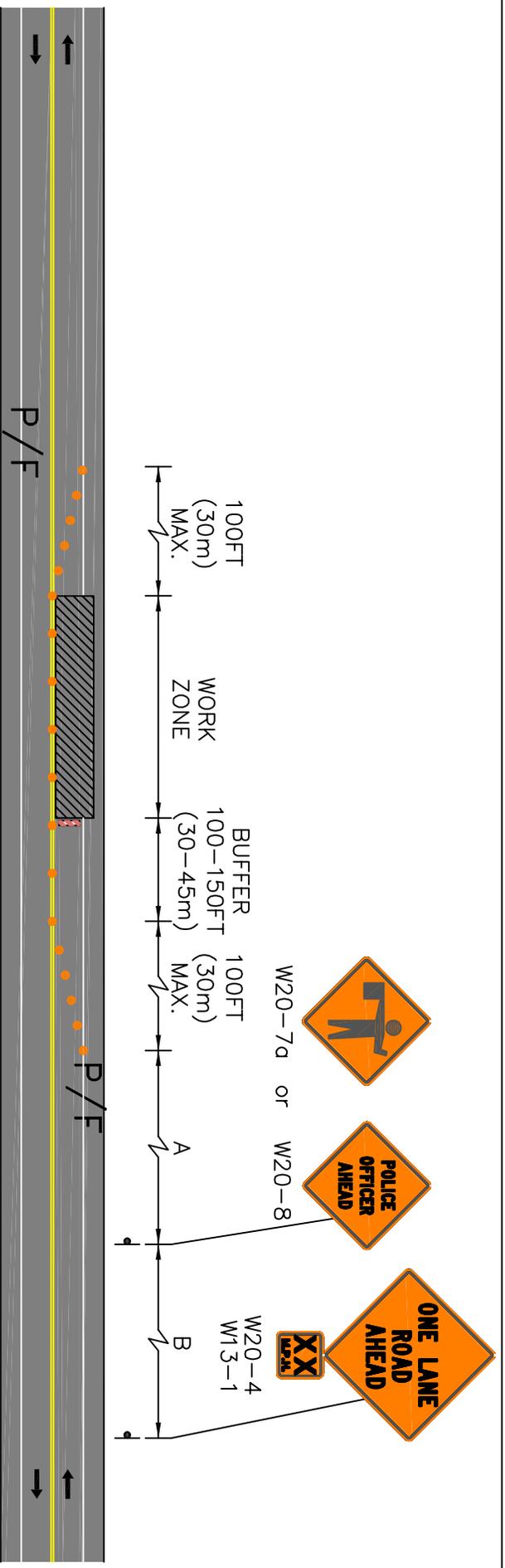
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FIGURE TLR-2
TWO LANE ROAD
SHOULDER AND TRAVEL LANE CLOSED
NOT TO SCALE



Standard Details and Drawings
for the
Development of Traffic Management Plans

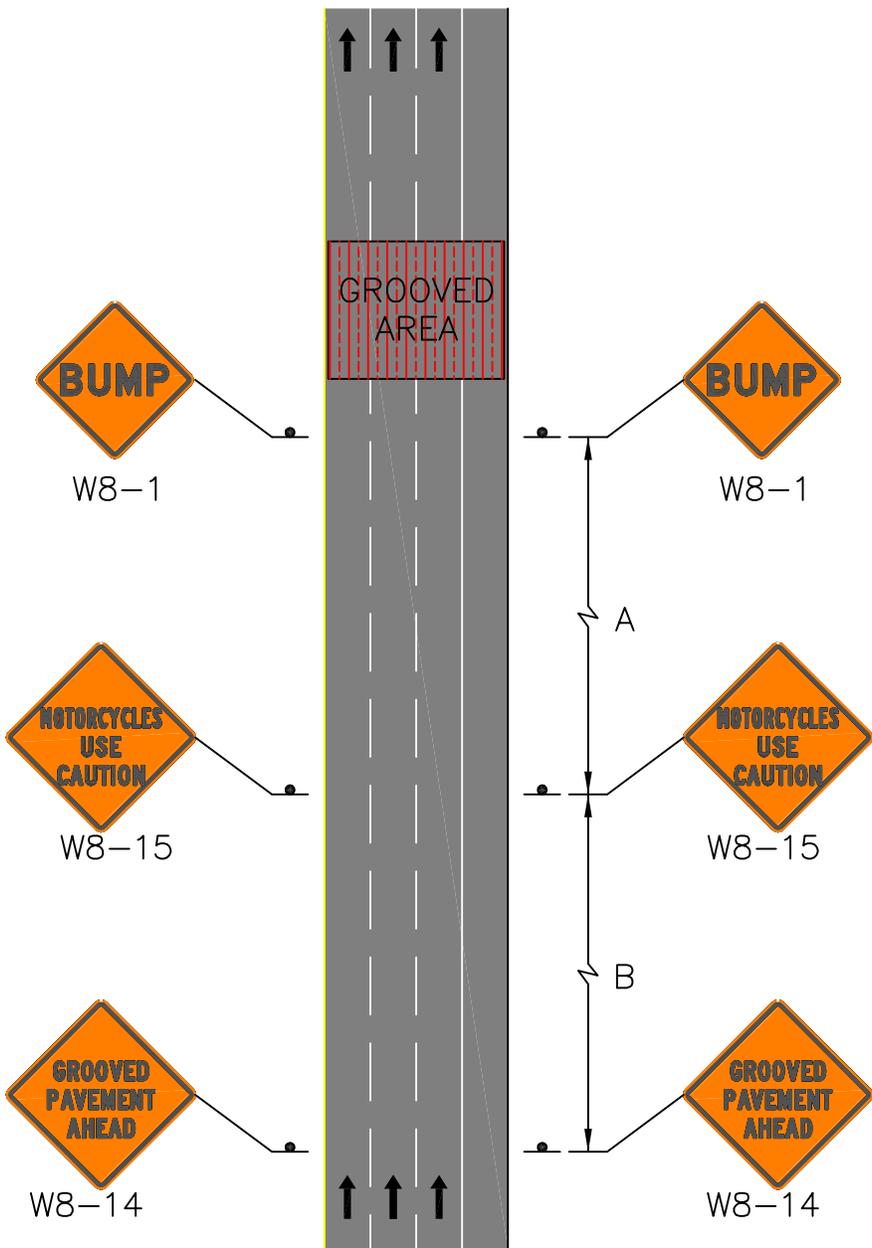
FIGURE TLR-4
TWO LANE ROAD
ONE LANE ALTERNATING TRAFFIC WITH
TEMPORARY SIGNAL
NOT TO SCALE



Standard Details and Drawings
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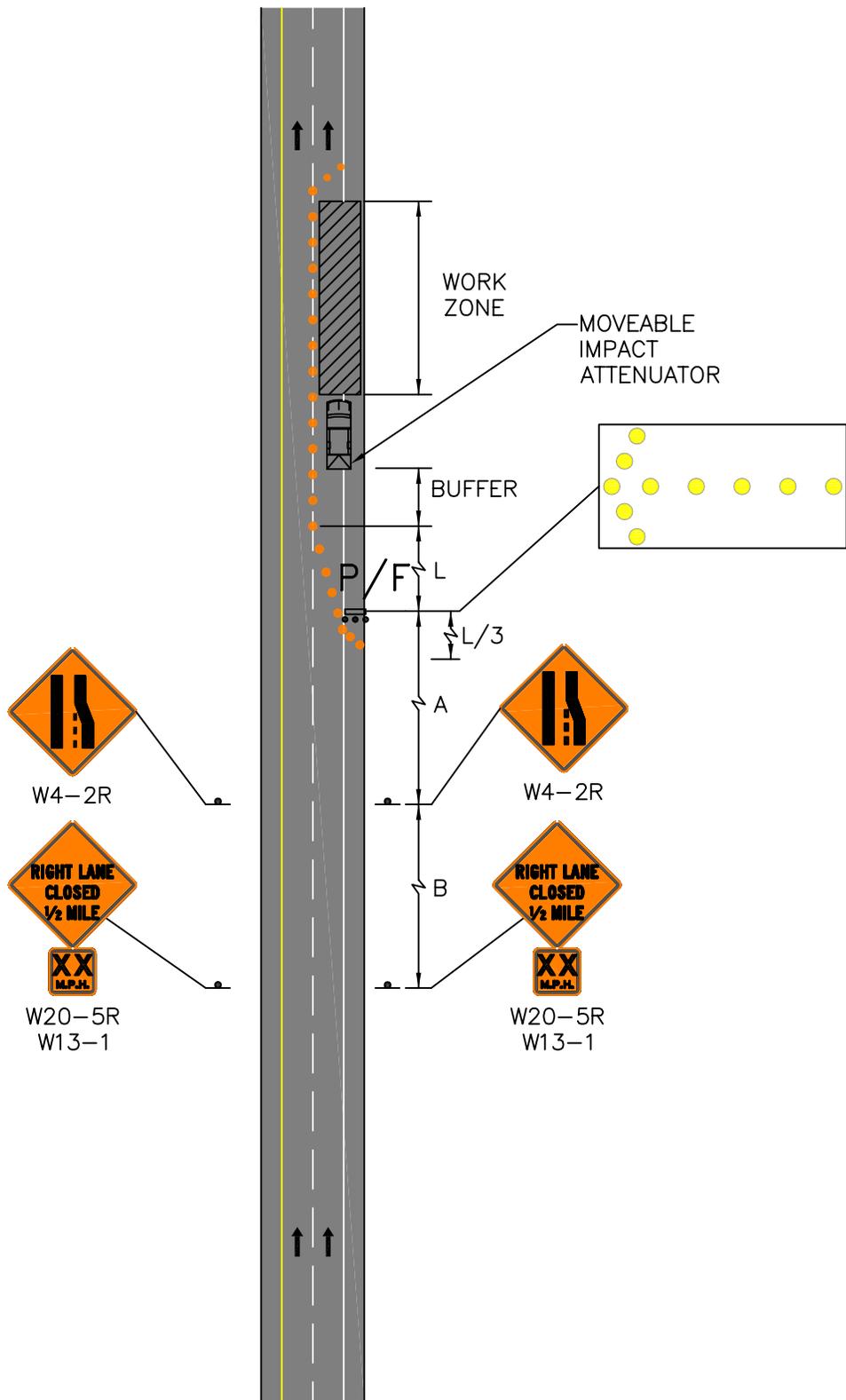
FIGURE TLR-5
TWO LANE ROAD
ONE LANE ALTERNATING TRAFFIC
WITH POLICE DETAIL
NOT TO SCALE

Divided Highways



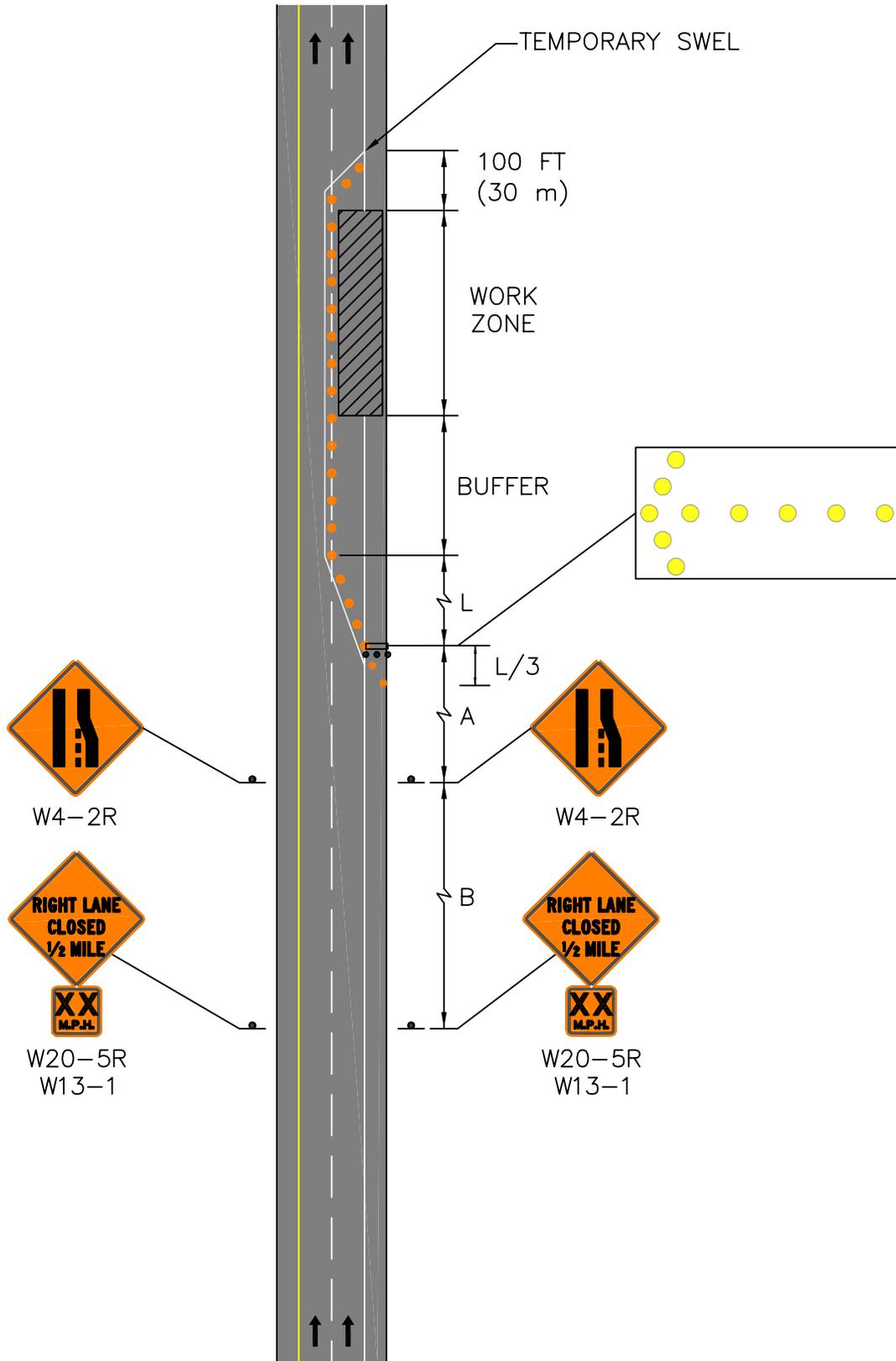
Standard Details
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FIGURE Div-1
DIVIDED HIGHWAY
SCARIFIED PAVEMENT
NOT TO SCALE



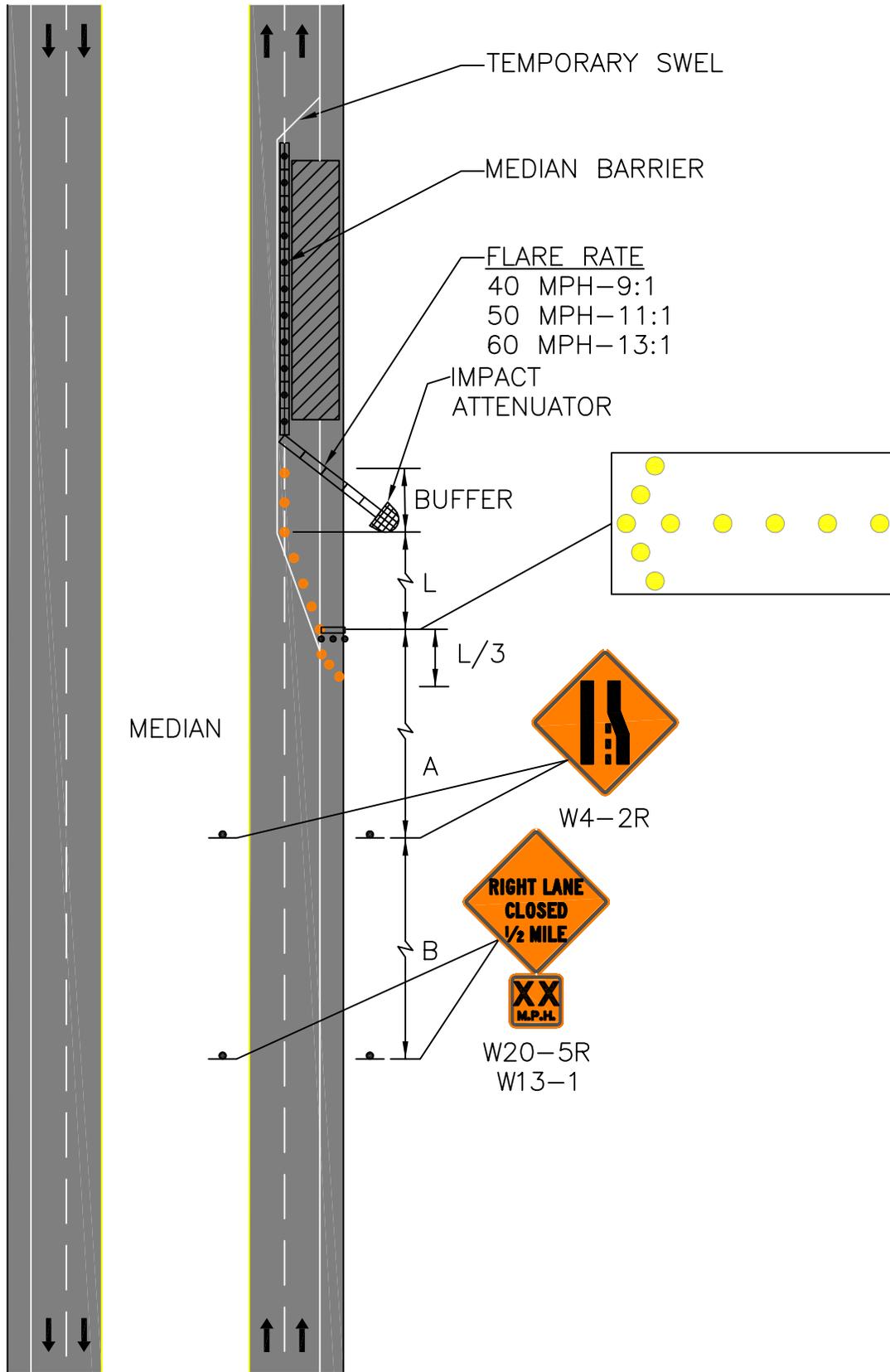
Standard Details
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FIGURE Div-2
DIVIDED HIGHWAY/ LANE CLOSURE
(SHORT TERM)
NOT TO SCALE



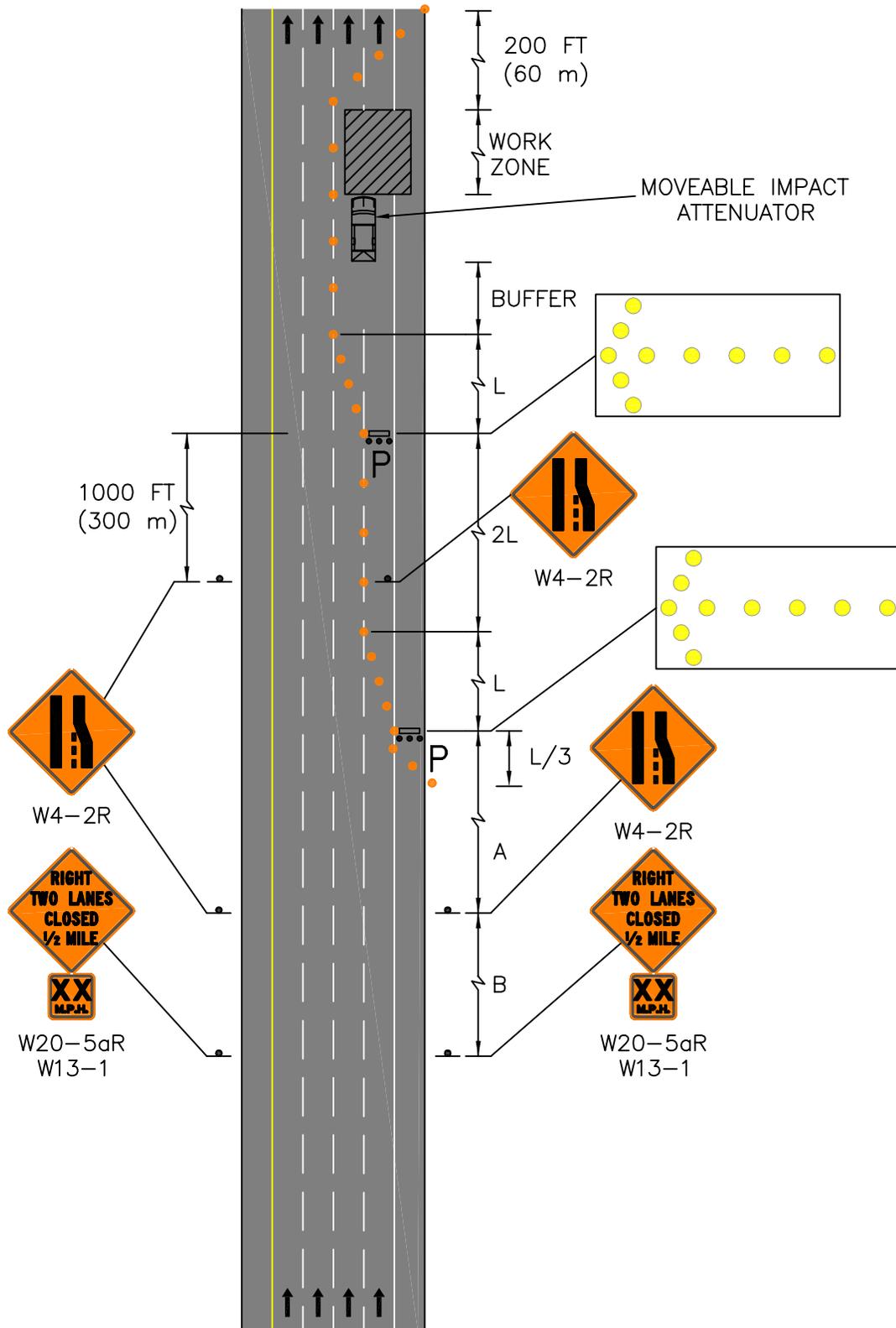
Standard Details
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FIGURE Div-3
DIVIDED HIGHWAY
STATIONARY LANE CLOSURE
(LONG TERM AND INTERMEDIATE)
NOT TO SCALE



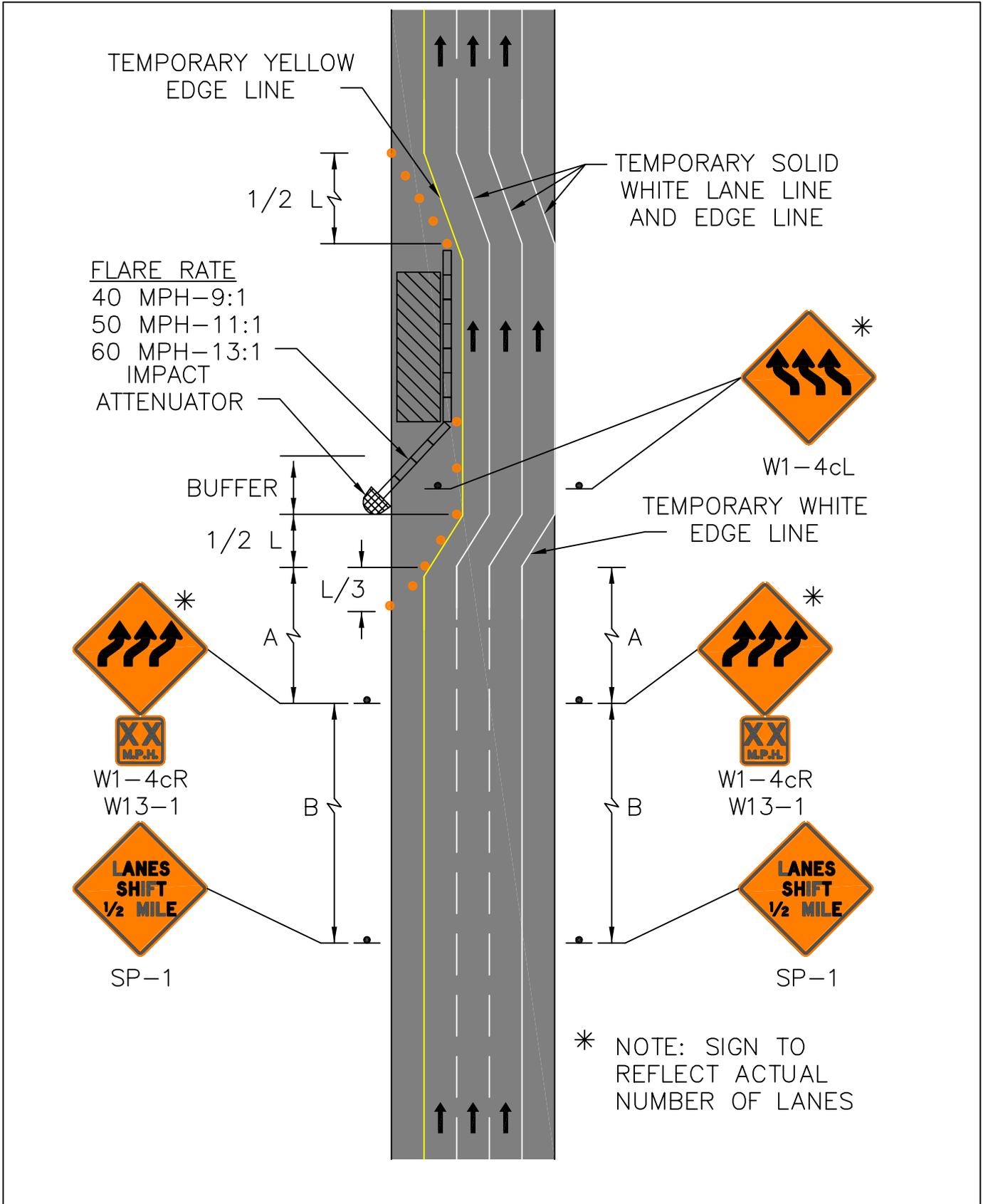
Standard Details
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FIGURE Div-4
 DIVIDED HIGHWAY
 ONE LANE CLOSED WITH BARRIER
 NOT TO SCALE



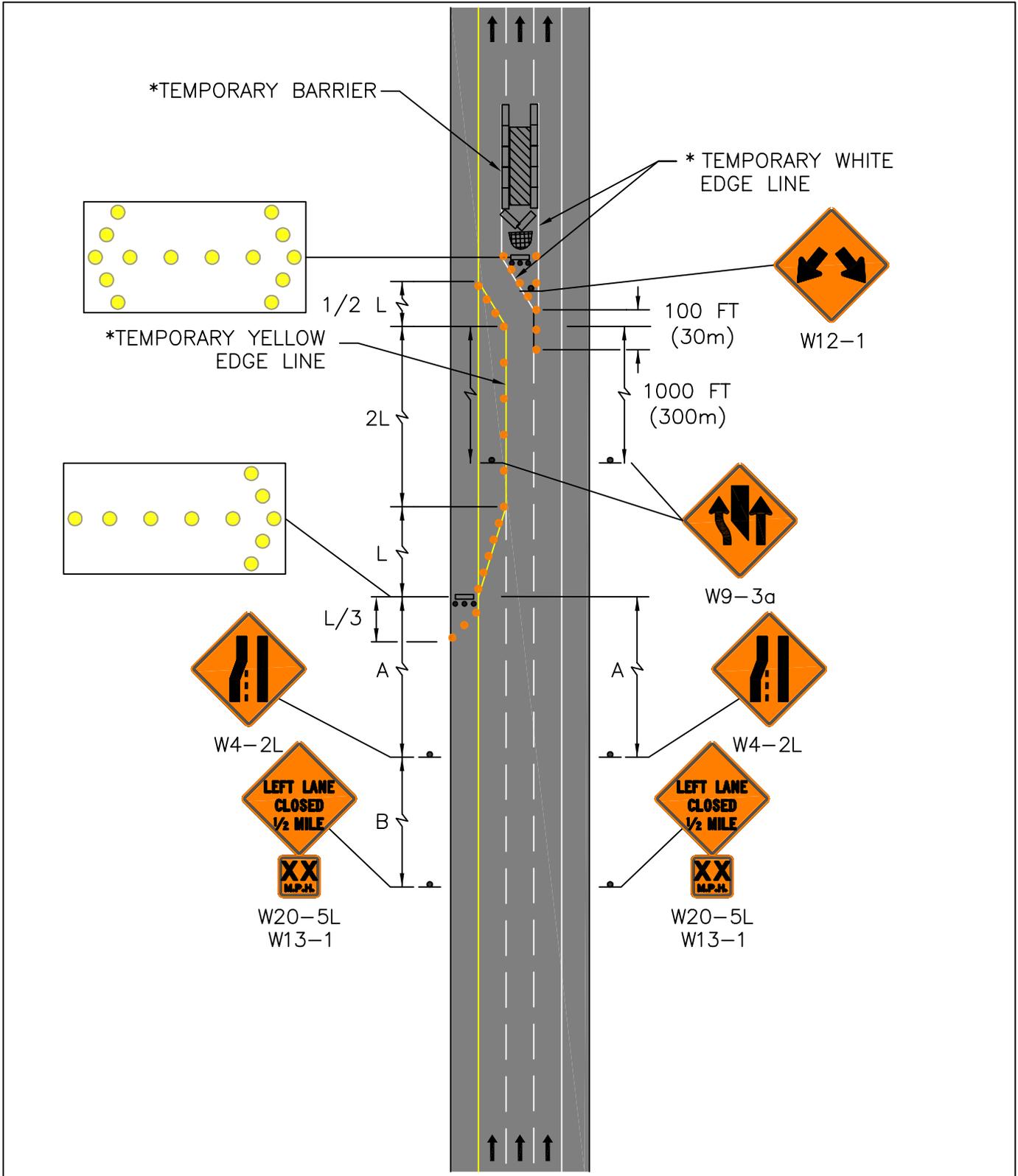
Standard Details
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Traffic Management Plans

FIGURE Div-5
DIVIDED HIGHWAY
MULTIPLE LANE CLOSURE
NOT TO SCALE



Standard Details and Drawings for the Development of Traffic Management Plans

FIGURE Div-6
 DIVIDED HIGHWAY
 MULTIPLE LANE SHIFT WITH BARRIER
 NOT TO SCALE

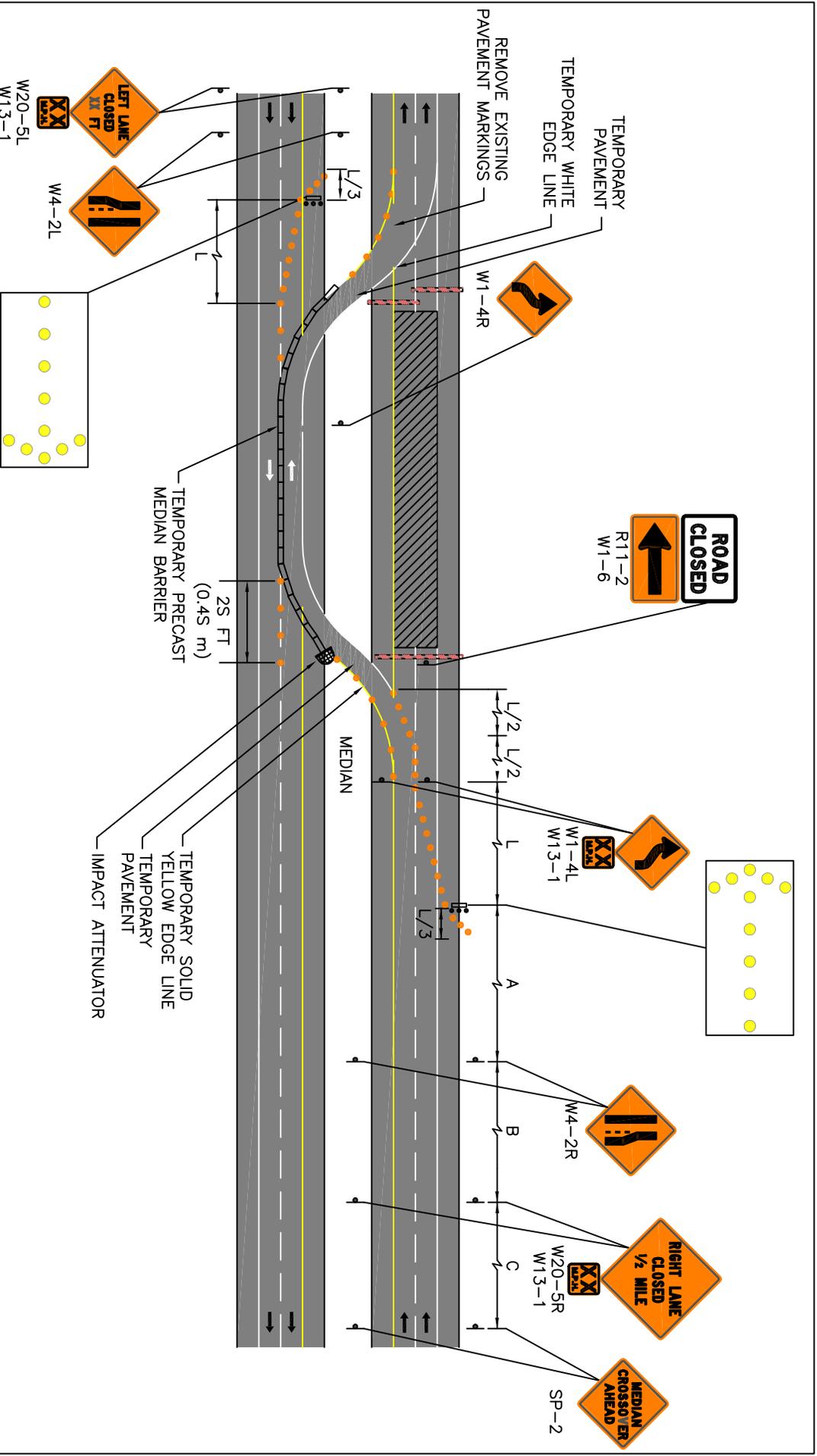


* FOR LONG TERM CLOSURES ONLY



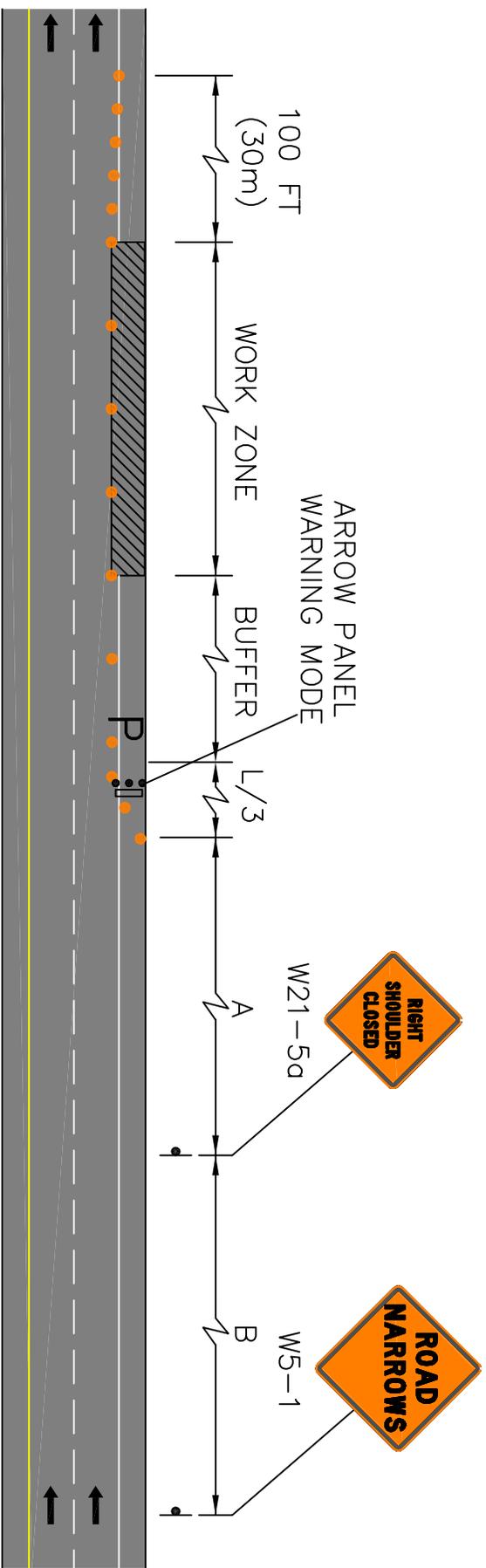
Standard Details and Drawings for the Development of Traffic Management Plans

FIGURE Div-7
DIVIDED HIGHWAY CENTER LANE CLOSURE
NOT TO SCALE



Standard Details and Drawings
for the
Development of Traffic Management Plans

FIGURE DIV-8
DIVIDED HIGHWAY
MEDIAN CROSS-OVER
NOT TO SCALE



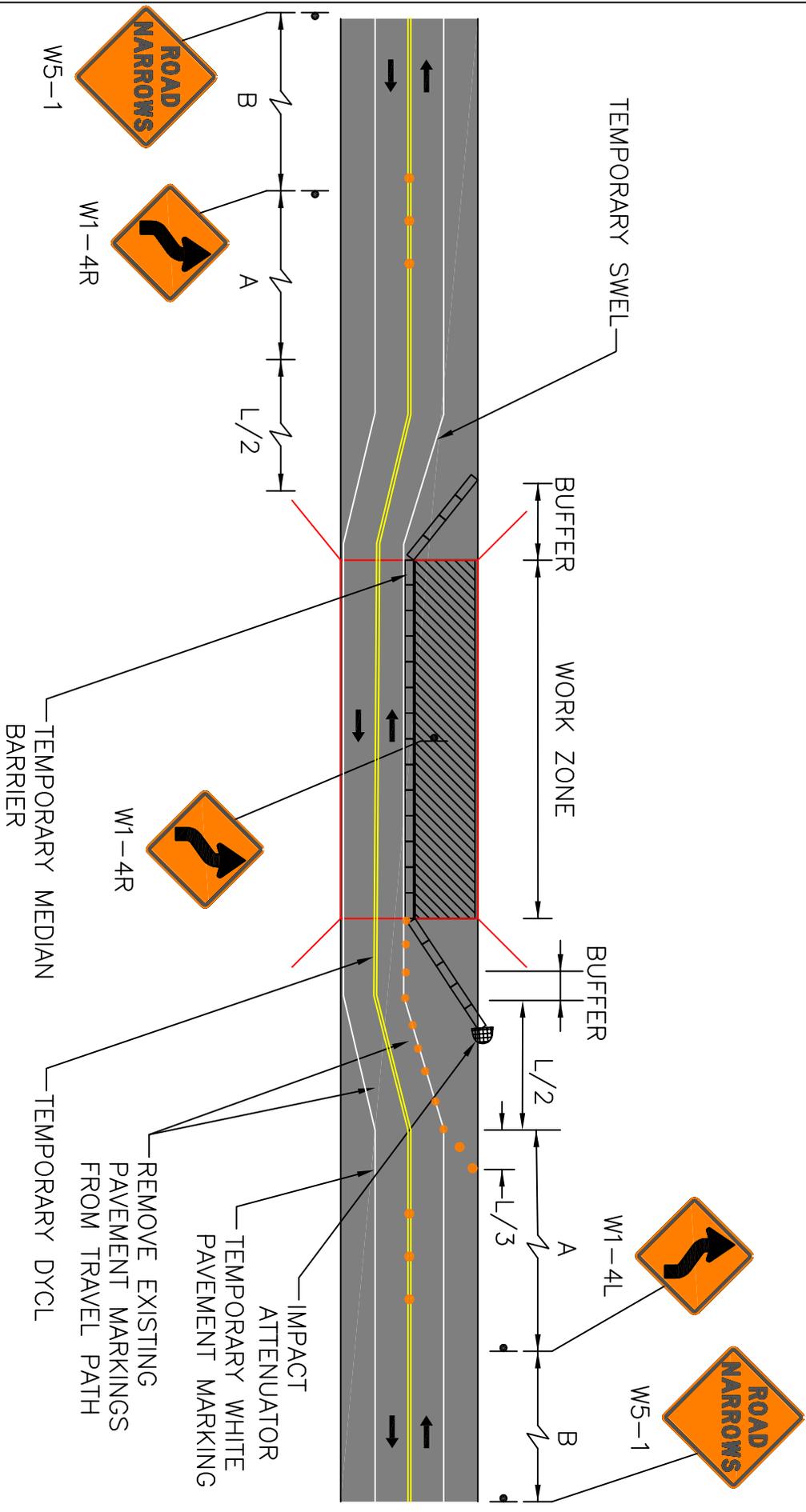
DRUM SPACING DEPENDENT ON SPEED



Standard Details and Drawings
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Development of Traffic Management Plans

FIGURE Div-9
DIVIDED HIGHWAY
SHOULDER CLOSED
NOT TO SCALE

Bridges

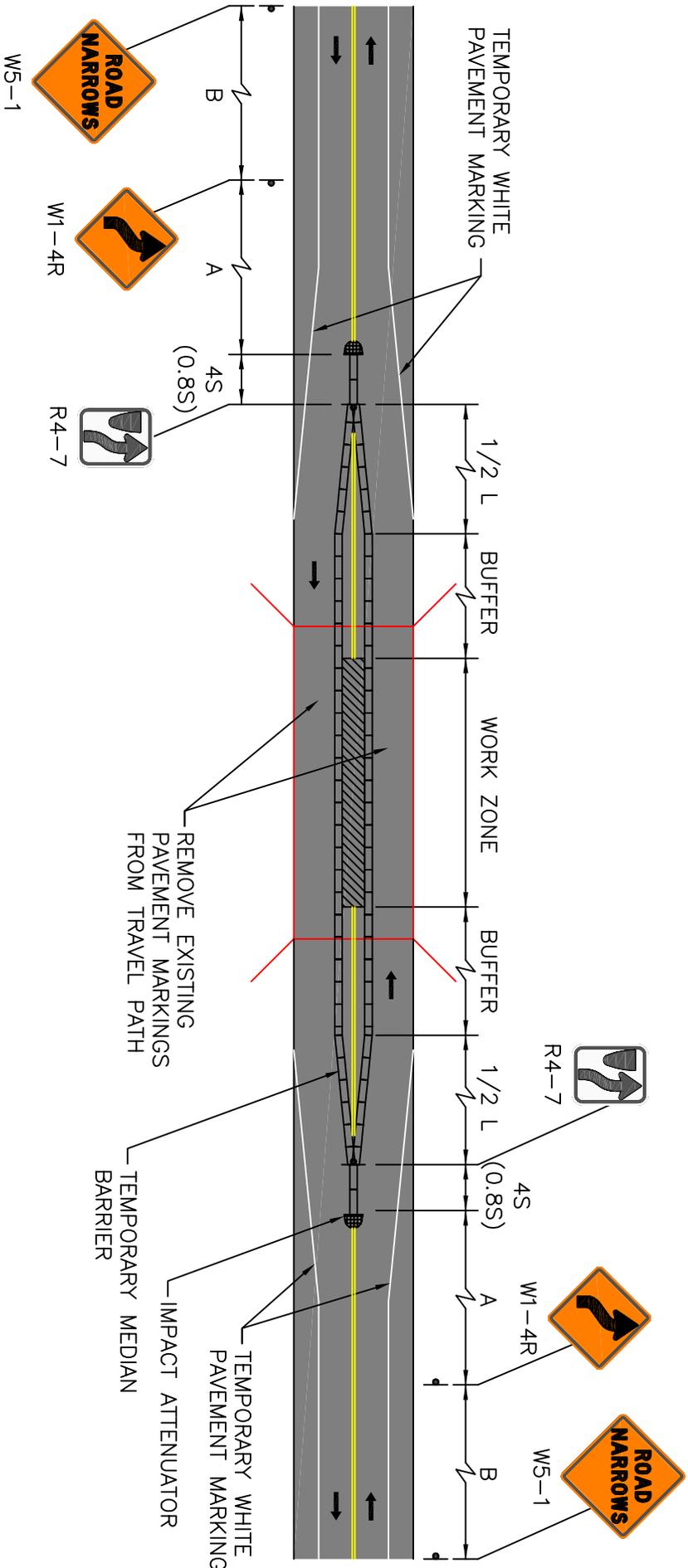


Standard Details and Drawings
for the
Development of Traffic Management Plans

FIGURE Brg-3

PARTIAL BRIDGE CLOSURE STAGE ONE
STAGE TWO (SWITCH TO OTHER SIDE)

NOT TO SCALE



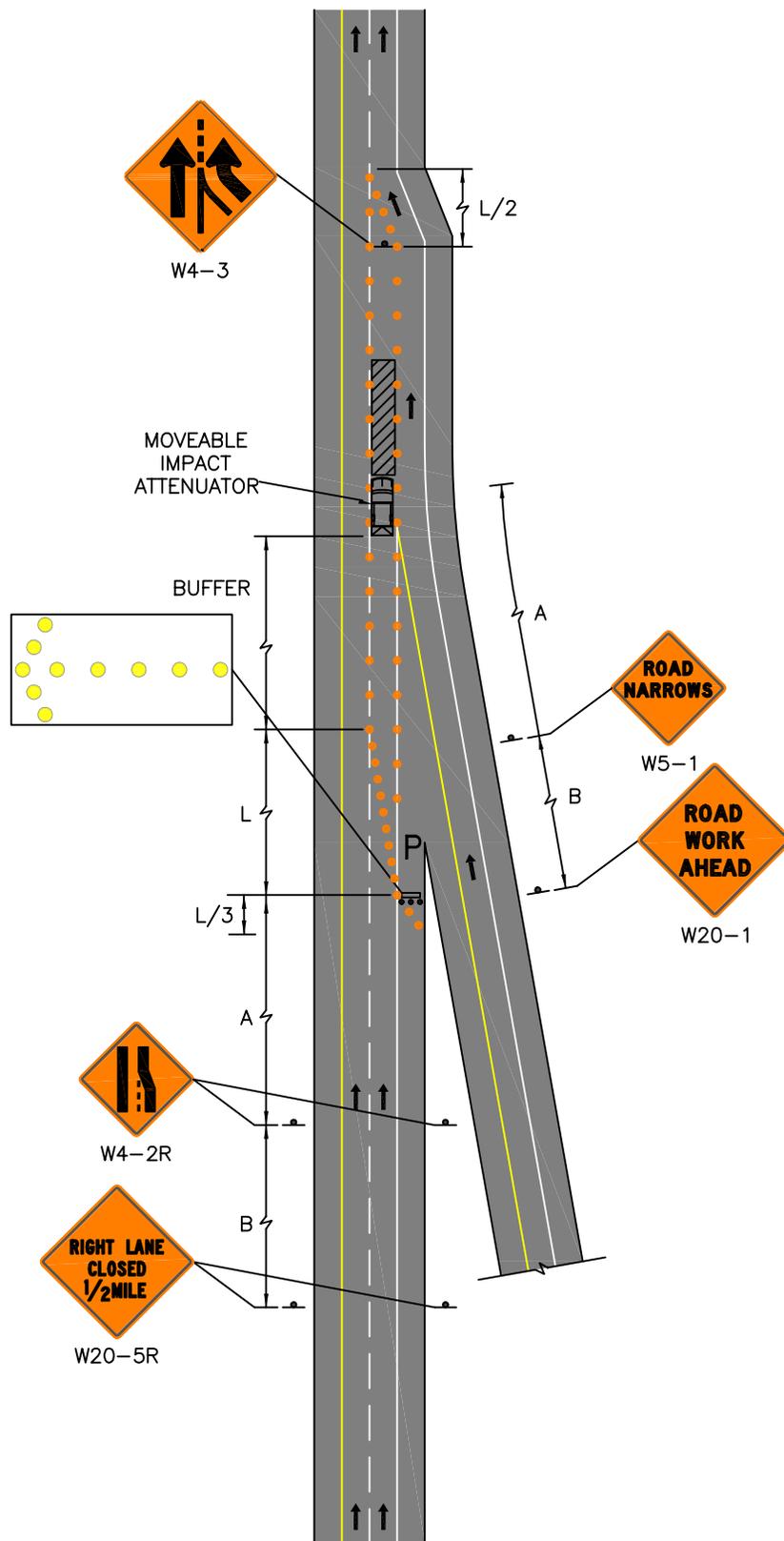
Standard Details and Drawings
for the
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FIGURE Brg-4

PARTIAL CENTER CLOSURE
STAGE THREE

NOT TO SCALE

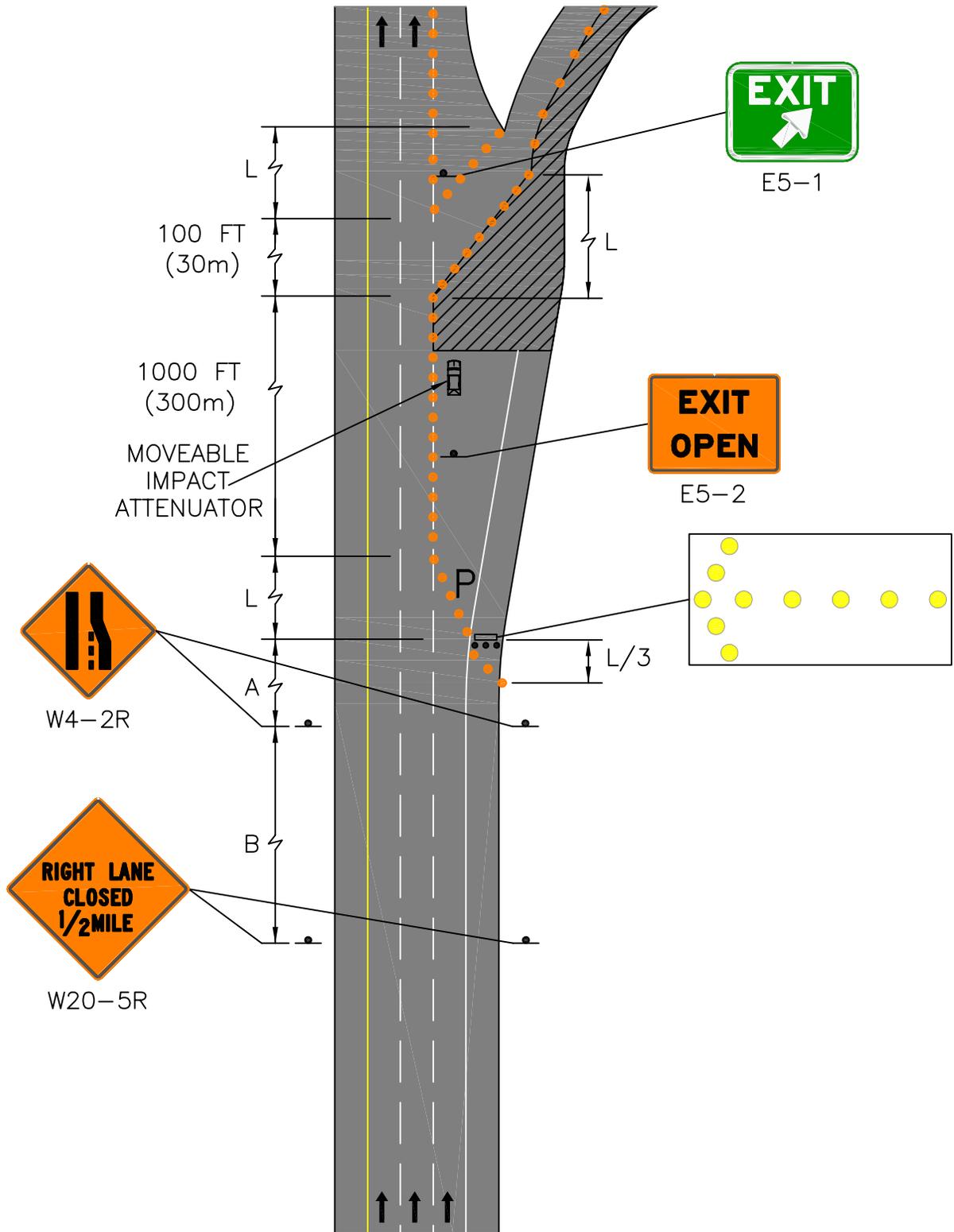
Ramps



Standard Details
and Drawings
for the Development of
Traffic Management Plans

FIGURE R-1
WORK AT ENTRANCE RAMP

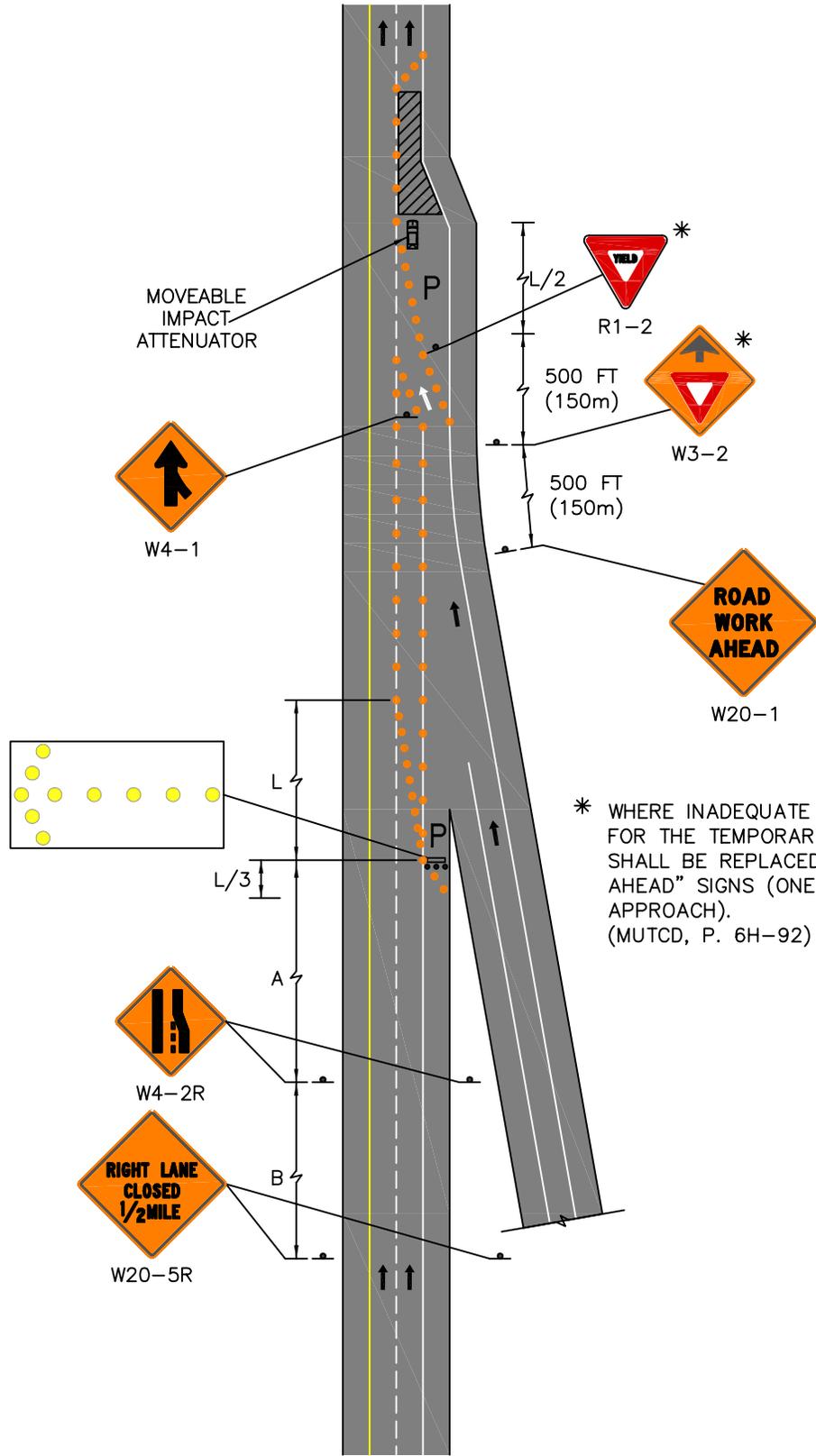
NOT TO SCALE



Standard Details
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Traffic Management Plans

FIGURE R-3
WORK IN VICINITY OF EXIT RAMP

NOT TO SCALE



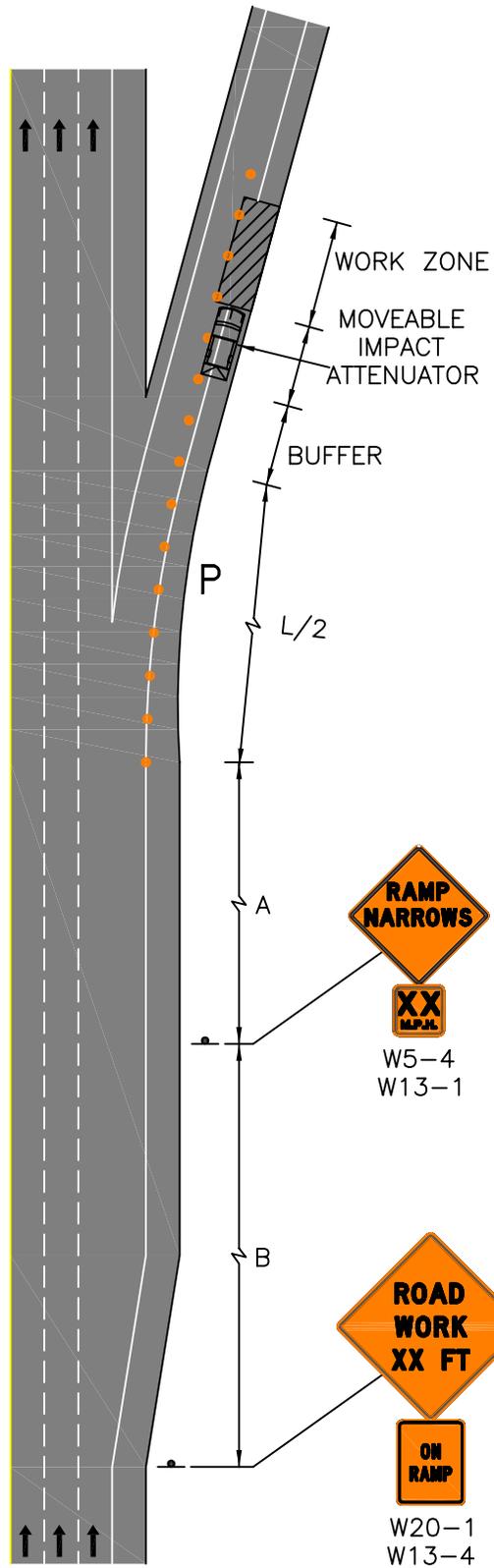
* WHERE INADEQUATE ACCELERATION DISTANCE EXISTS FOR THE TEMPORARY ENTRANCE, THE "YIELD" SIGNS SHALL BE REPLACED WITH "STOP" AND "STOP AHEAD" SIGNS (ONE ON EACH SIDE OF THE APPROACH). (MUTCD, P. 6H-92)



Standard Details
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Traffic Management Plans

FIGURE R-4
WORK BEYOND ENTRANCE RAMP

NOT TO SCALE



**RAMP
NARROWS**

**XX
M.P.M.**

W5-4
W13-1

**ROAD
WORK
XX FT**

**ON
RAMP**

W20-1
W13-4

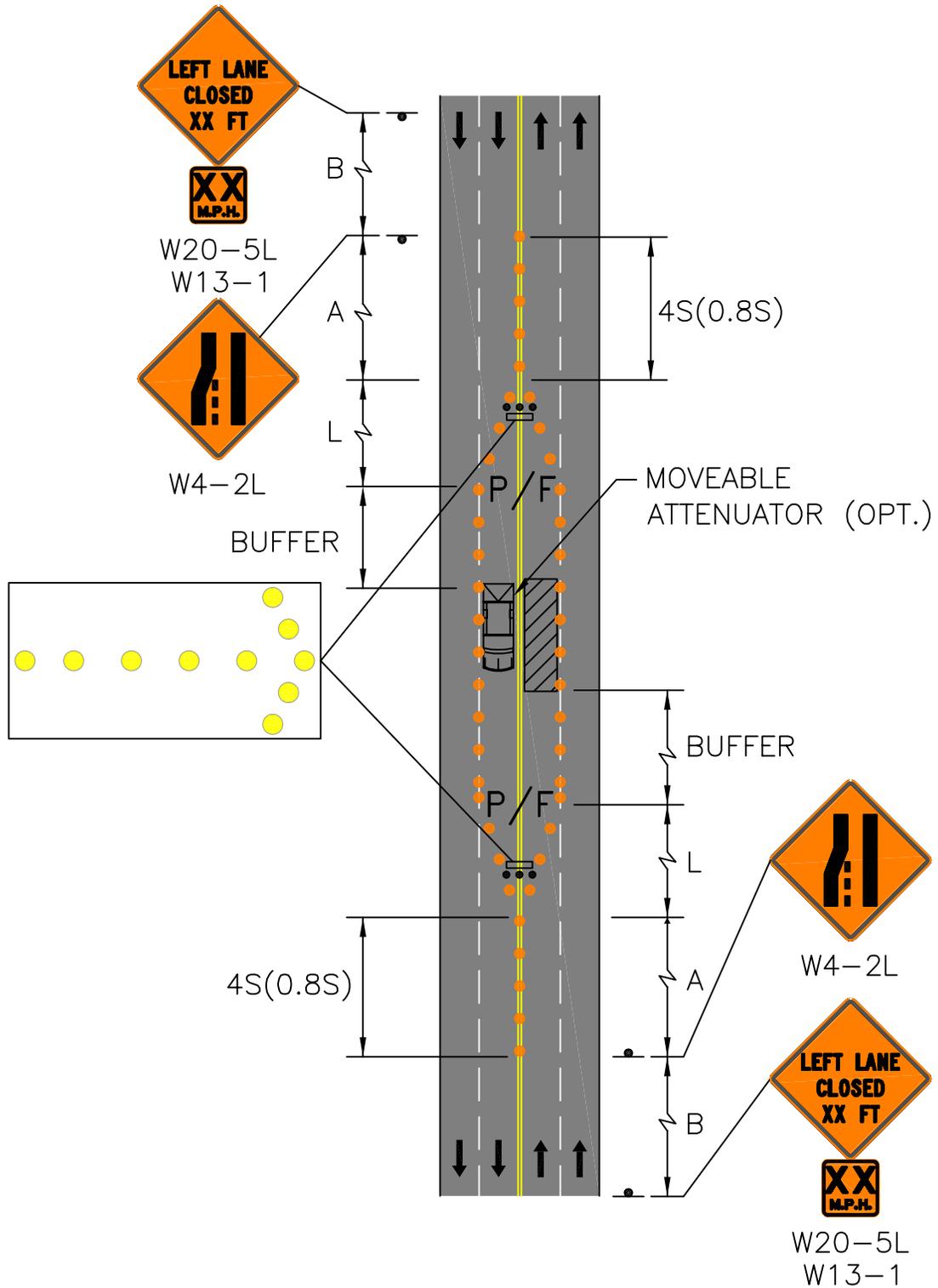


Standard Details
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FIGURE R-5
PARTIAL EXIT RAMP CLOSURE

NOT TO SCALE

Multi-Lane Roads



Standard Details
and Drawings
for the Development of
Traffic Management Plans

FIGURE MLR-1
MULTIPLE LANE ROAD
INTERIOR LANE CLOSURE

NOT TO SCALE



W20-5L

B



W4-2L

A

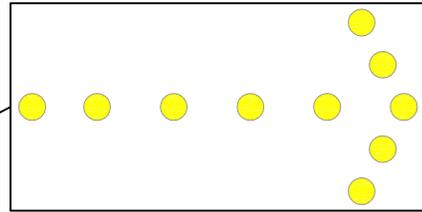
L

BUFFER

1/2 L

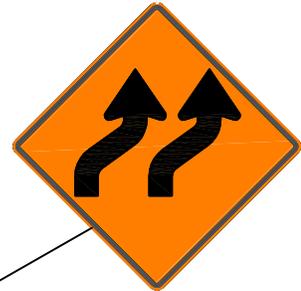
TEMPORARY SOLID WHITE LANE LINE

4S(0.8S)



REMOVE EXISTING PAVEMENT MARKINGS

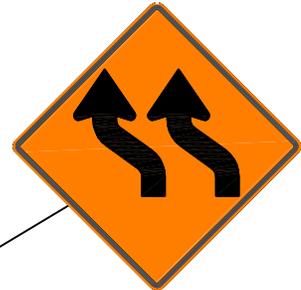
100 FT (30m)



W1-4bR

BUFFER

1/2 L



W1-4bL

A

B

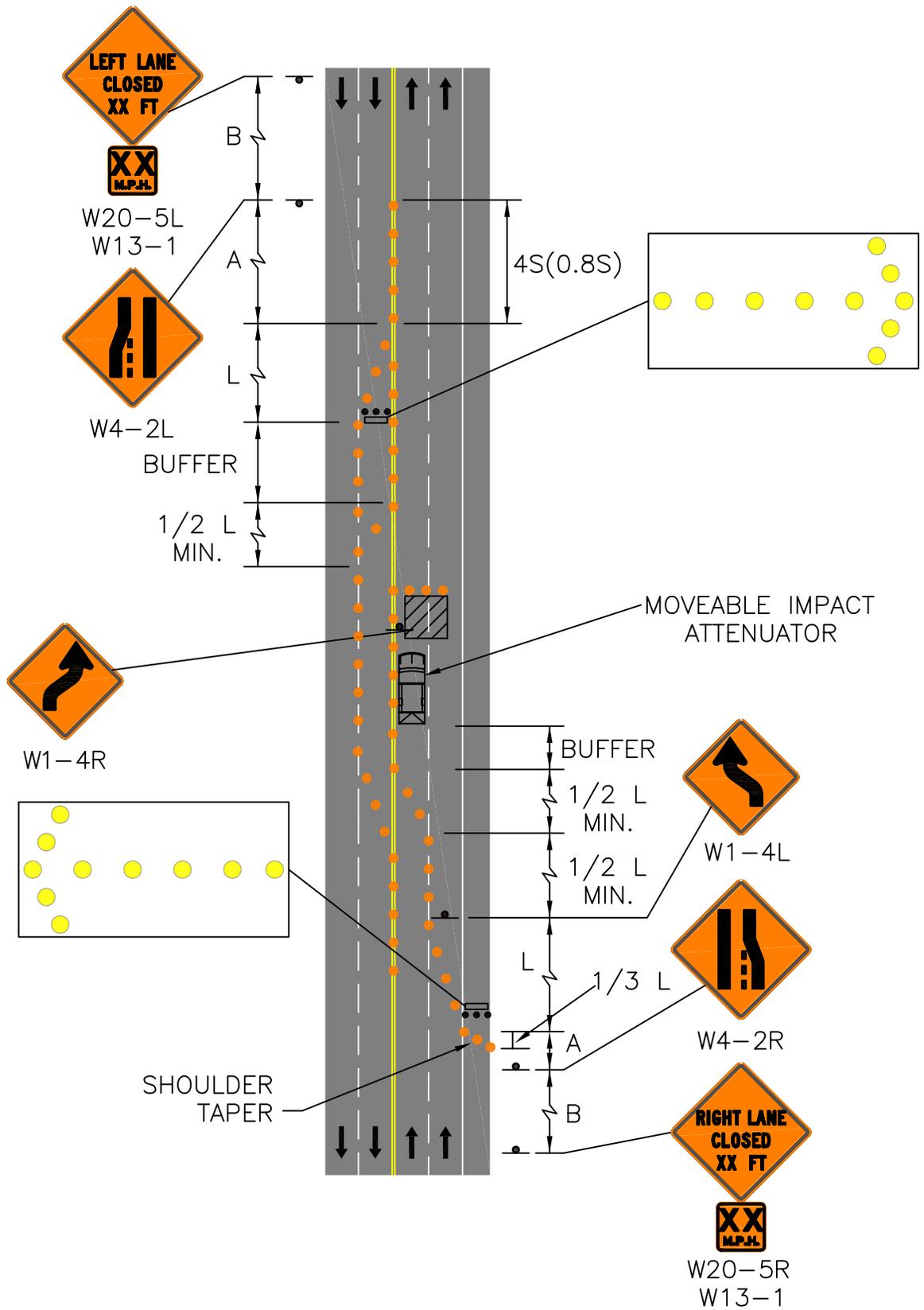


W5-1

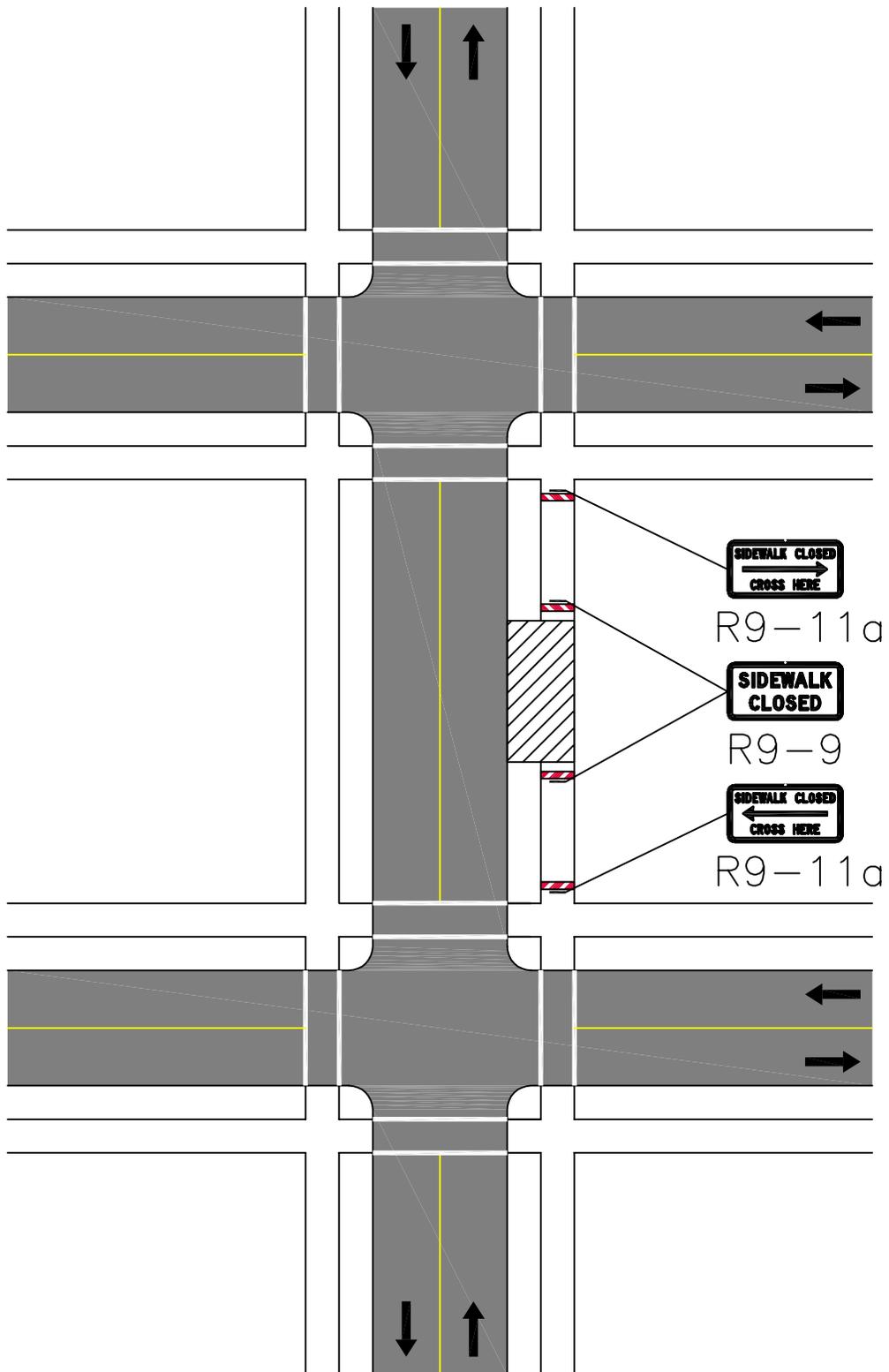


Standard Details and Drawings for the Development of Traffic Management Plans

FIGURE MLR-2
MULTIPLE LANE ROAD
INTERIOR LANE CLOSURE W/ UNEVEN
VOLUMES
NOT TO SCALE



Pedestrian



SIDEWALK CLOSED
 →
CROSS HERE

R9-11a

SIDEWALK CLOSED

R9-9

SIDEWALK CLOSED
 ←
CROSS HERE

R9-11a

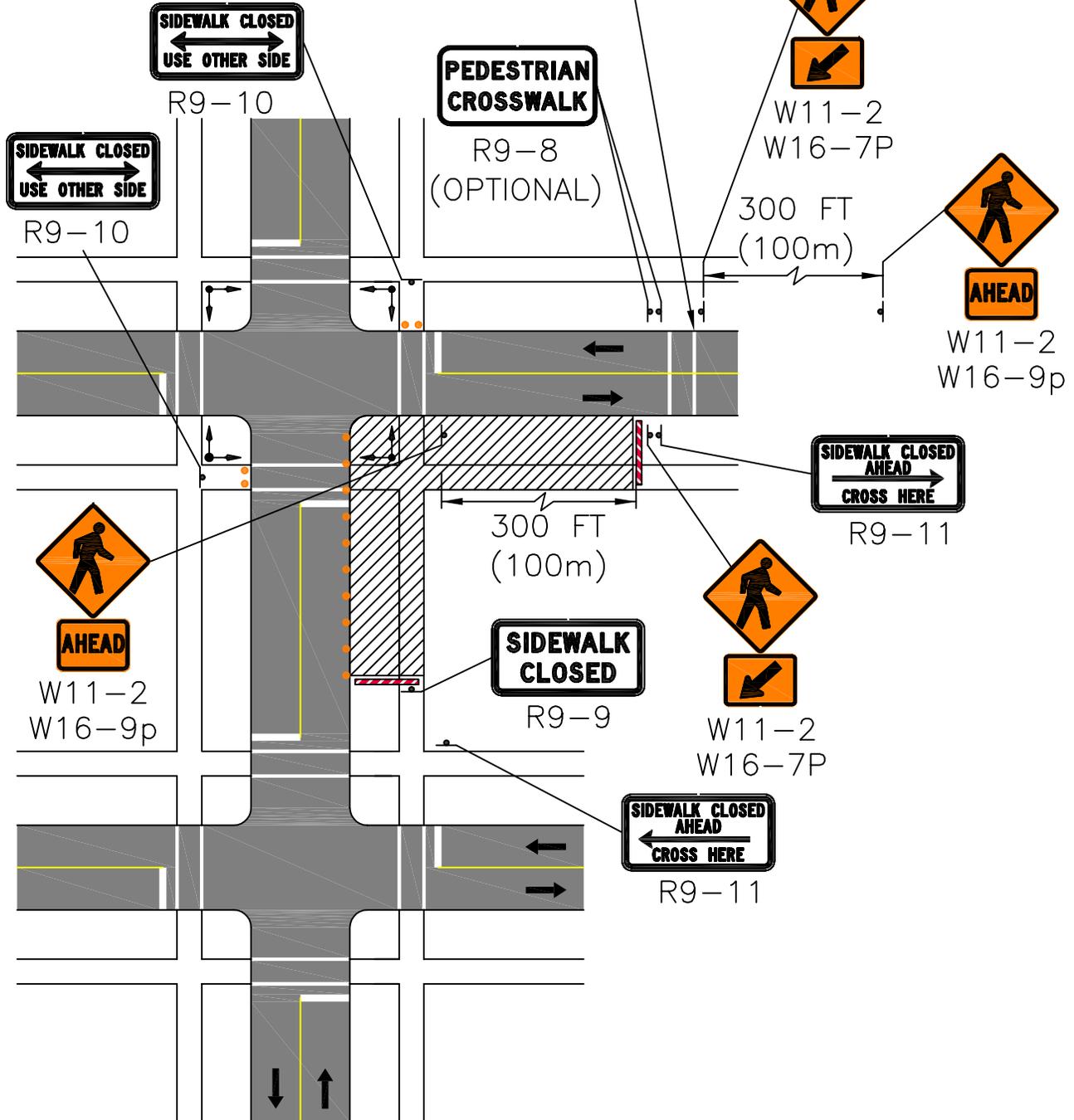


Standard Details
 and Drawings
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 Traffic Management Plans

FIGURE Ped-1
 SIDEWALK CLOSED WITH DETOUR

NOT TO SCALE

TEMPORARY MARKING FOR CROSSWALK LINES (CROSS-HATCHING OPTIONAL)



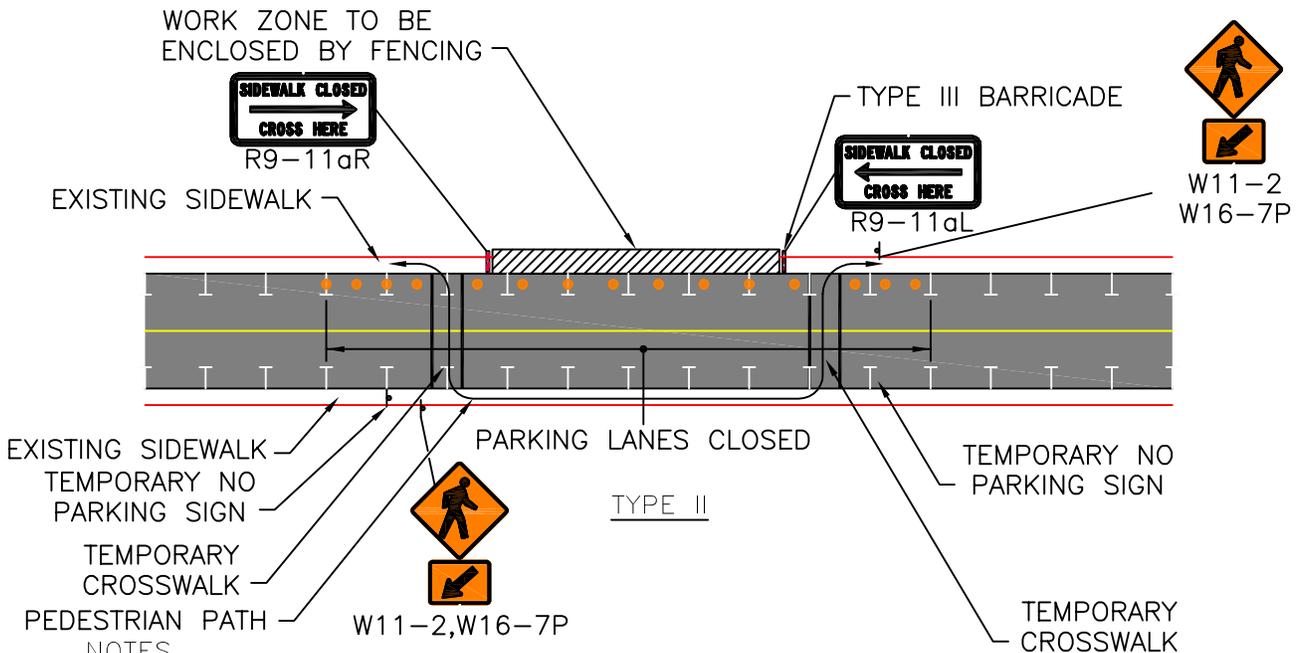
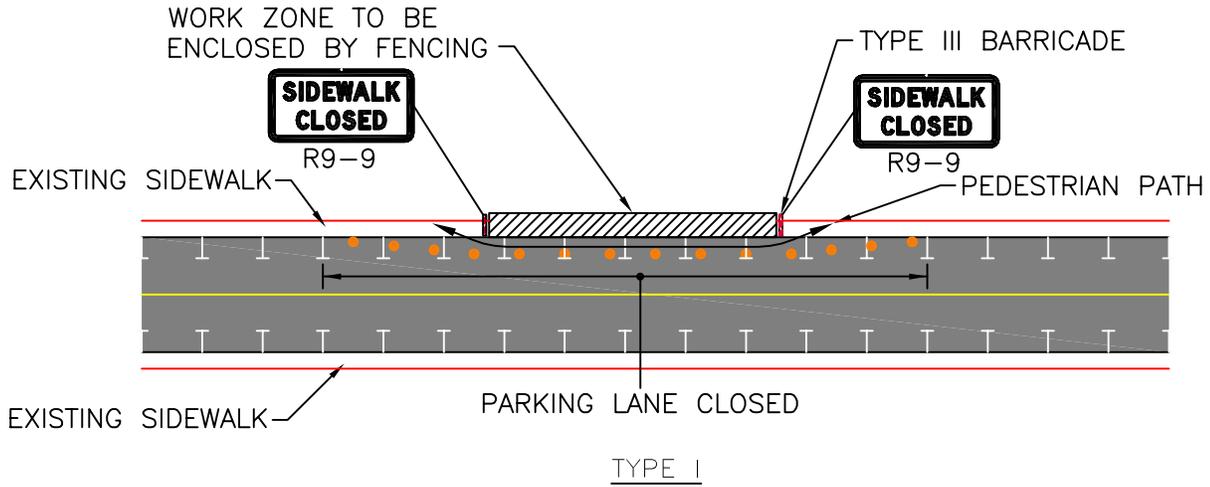
NOTE: FOR LONG-TERM STATIONARY WORK, THE DOUBLE YELLOW CENTERLINE AND/OR LANE LINES SHOULD BE REMOVED BETWEEN THE CROSSWALK LINES.



Standard Details
and Drawings
for the Development of
Traffic Management Plans

FIGURE Ped-2
PEDESTRIAN DETOUR

NOT TO SCALE



NOTES

1. ADDITIONAL ADVANCE WARNING MAY BE NECESSARY.
2. CONTROLS ONLY FOR PEDESTRIAN TRAFFIC ARE SHOWN. VEHICULAR TRAFFIC SHOULD BE HANDLED AS SHOWN ELSEWHERE.
3. STREET LIGHTING SHOULD BE CONSIDERED WHEN LOCATING CONTROL DEVICES.
4. IF THE WORK ZONE DOES NOT PERMIT PEDESTRIANS TO TRAVEL ADJACENT TO IT AS SHOWN IN PEDESTRIAN BYPASS TYPE I, TEMPORARY CROSSWALKS WITH APPROPRIATE SIGNS SHOULD BE INSTALLED TO CROSS PEDESTRIANS TO THE OPPOSITE SIDE OF THE STREET AS SHOWN IN PEDESTRIAN BYPASS TYPE II, AND AS DIRECTED BY THE ENGINEER.
5. BYPASS IS TO BE USED IN CONJUNCTION WITH THE PROPOSED LANE CLOSURE DETAILS AND DURING CONSTRUCTION STAGING, AS DIRECTED BY THE ENGINEER.

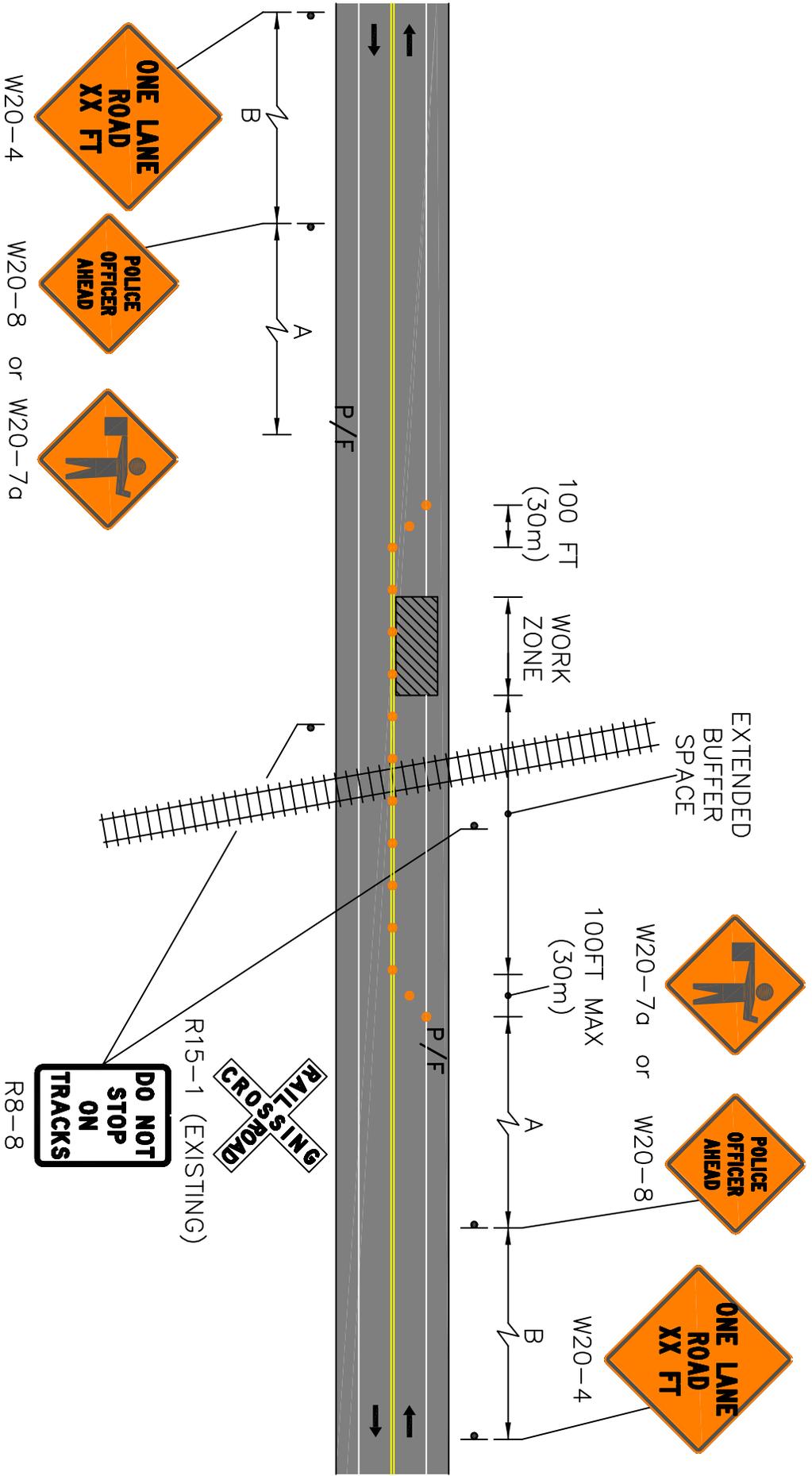


Standard Details
and Drawings
for the Development of
Traffic Management Plans

FIGURE Ped-3
PEDESTRIAN BYPASS

NOT TO SCALE

Railroad/Detours



NOTE: INSTALL IF NOT PRESENT

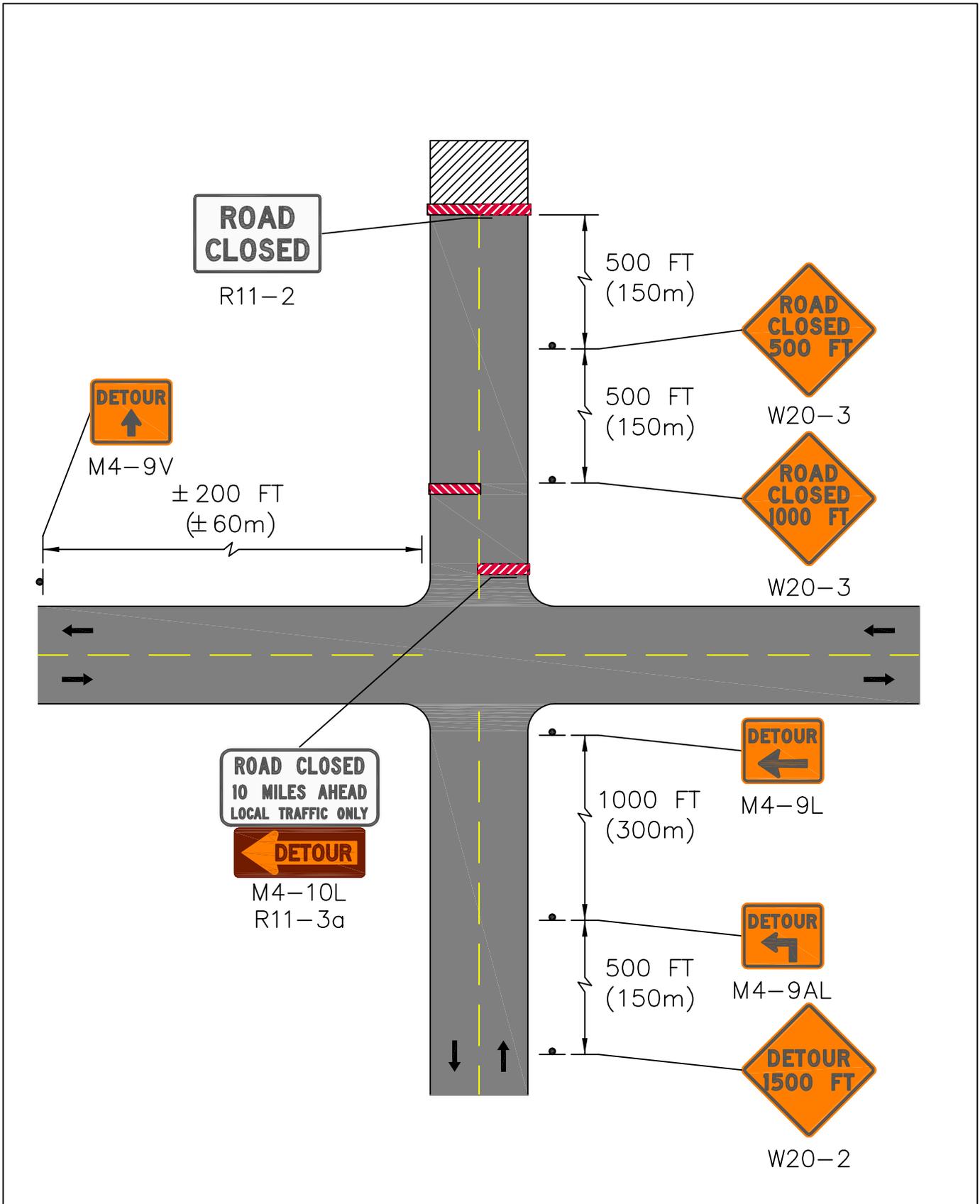


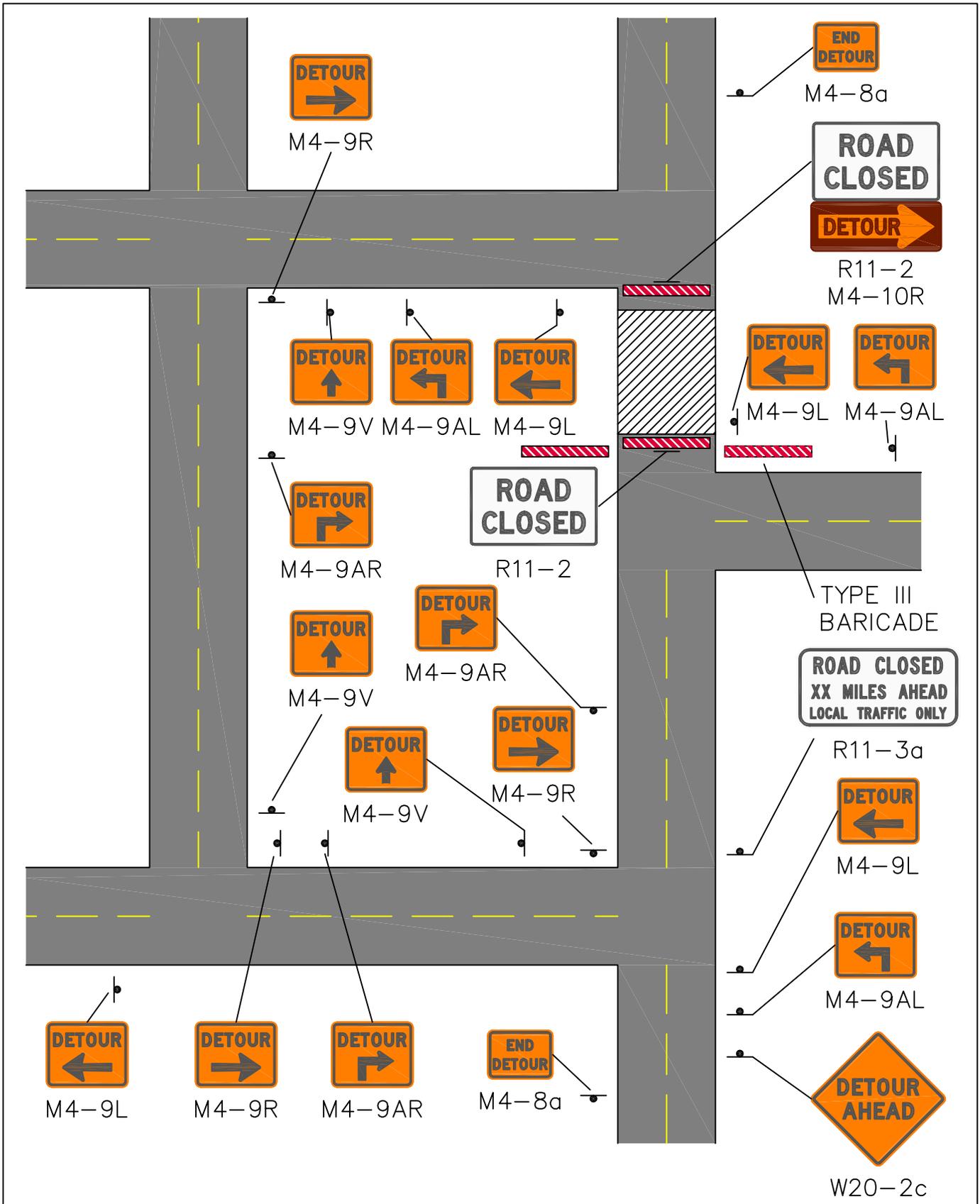
Standard Details and Drawings
for the
Development of Traffic Management Plans

FIGURE RR-1

WORK NEAR RAILROAD CROSSING

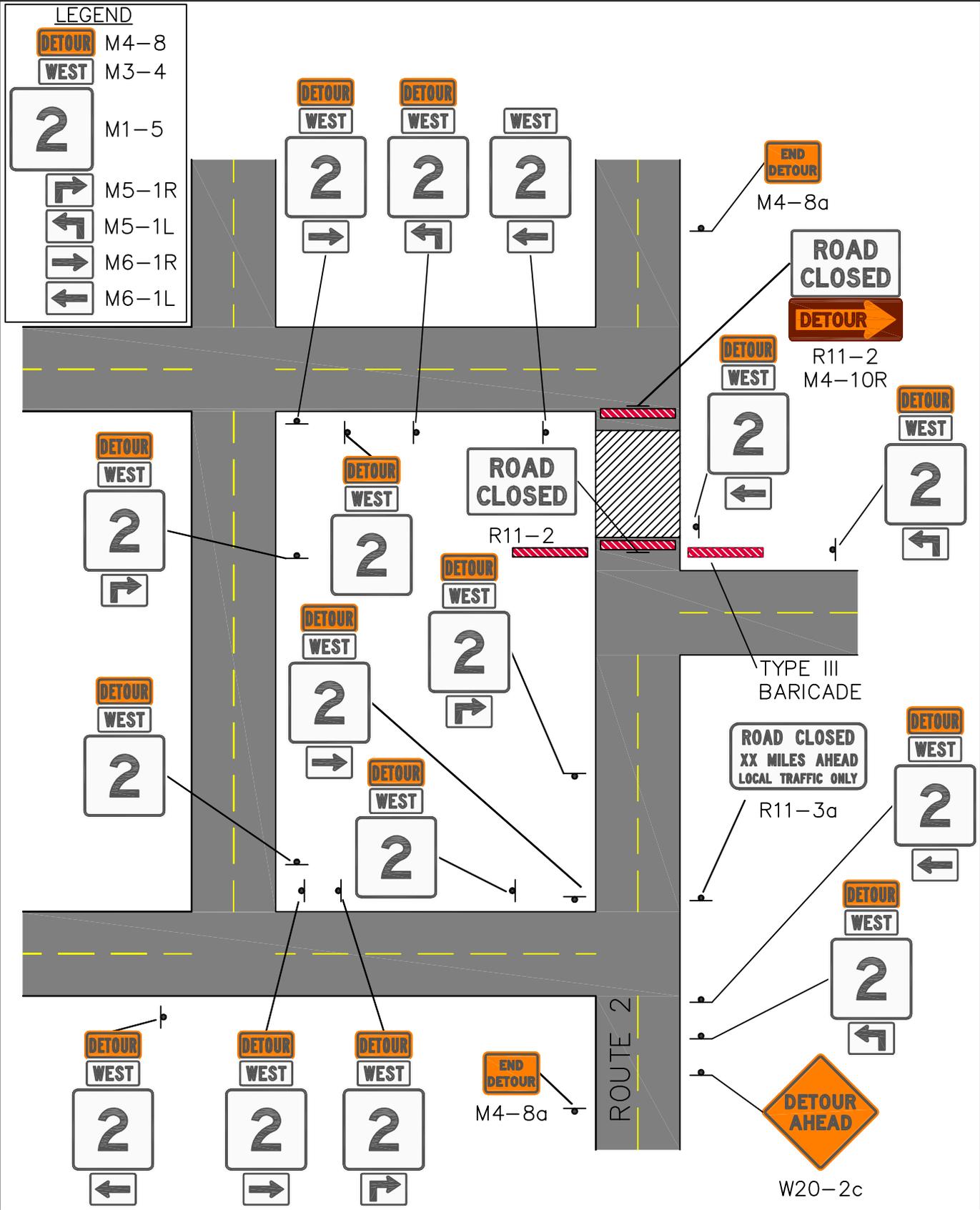
NOT TO SCALE





Standard Details
and Drawings
for the Development of
Traffic Management Plans

FIGURE D-2
DETOUR
NOT TO SCALE



Standard Details
and Drawings
for the Development of
Traffic Management Plans

FIGURE D-3
ROUTE WITH DETOUR

NOT TO SCALE