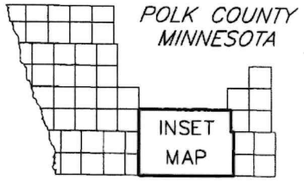
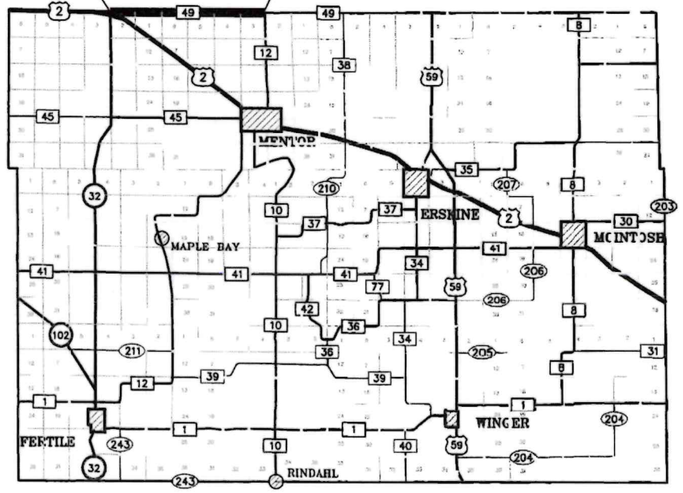


GRADED UNDER:
S.A.P. 60–649–02 in 1992

SURFACED UNDER:
S.A.P. 60–649–03 in 1993
S.A.P. 60–649–07 in 2007

BEGIN: S.A.P. 060–649–008
STA 0+28

END: S.A.P. 060–649–008
STA 314+60



DESIGN DESIGNATION

ADT (2025)	294
ADT (2045)	323
Shoulder Width	4.4/4.6
Soil Factor	100
Ton Design	10
Design Speed (MPH)	55
Clear Zone	15'
ΣN18	112,000
R–Value	12
Major Collector	
Design Standard	8820.9926

SCALE
INDEX MAP 1" = 5.0 MILES
5 MI 0 5.0 MI

STOPPING SIGHT DISTANCE BASED ON:
3.5' HEIGHT OF EYE
2.0' HEIGHT OF OBJECT

All Traffic Control Devices shall conform to the latest MMUTCD, including the latest "Field Manual for Temporary Traffic Control Zone Layouts".

The subsurface utility information in this plan is utility quality level D. This quality level was determined according to the guidelines of CI/ASCE 38–22, entitled "Standard Guidelines for Investigating and Documenting Existing Utilitie".

GOVERNING SPECIFICATIONS

The 2020 Edition of the Minnesota Department of Transportation "Standard Specifications for Construction," shall govern.

MINNESOTA DEPARTMENT OF TRANSPORTATION

POLK COUNTY

COUNTY STATE AID HIGHWAY NO. 49

CONSTRUCTION PLAN FOR: BITUMINOUS OVERLAY & AGGREGATE SHOULDERING

From T.H. 32 AT MARCOUX CORNER
To C.S.A.H. 12, 4 MILES NORTH OF MENTOR, MN.

From A point 28.0' East of the N.W. cor. sec. 2, T. 149 N., R. 44 W.
To A point 27.0' West of the N.E. Cor. sec. 3, T. 149 N., R. 43 W.

GROSS LENGTH	31,432 FEET	5.953	MILES
BRIDGE LENGTH	0 FEET	0	MILES
EXCEPTIONS LENGTH	0 FEET	0	MILES
NET LENGTH	31,432 FEET	5.953	MILES

SHEET INDEX

THIS PLAN CONTAINS 8 SHEETS

I HEREBY CERTIFY THAT THIS PLAN WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY REGISTERED ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.

Richard C. Sanders, PE
Digitally signed by Richard C. Sanders, PE
Date: 2025.04.10 16:43:28 -05'00'

Approved by: Polk County Engineer

Richard C. Sanders, P. E.
Name

4/10/2025
Date

23169
Reg. No.

STATE AID APPROVALS:

Brian Ketring
Digitally signed by Brian Ketring
DN: CN=Brian Ketring
Date: 2025.04.14 06:50:28-05'00'
District State Aid Engineer: Reviewed for Compliance with State–Aid Rule

Date:

Brian Ketring
Digitally signed by Brian Ketring
DN: CN=Brian Ketring
Date: 2025.04.14 06:50:57-05'00'
Approved For State Aid Funding: State Aid Engineer

Date:

STATE AID PROJECT 060–649–008
COUNTY PROJECT 125–49–1403

SHEET 1 OF 8 SHEETS

ESTIMATED QUANTITIES

	ITEM NO.	ITEM	UNIT	TOTAL EST. QUANTITIES
	2221.509	SHOULDER BASE AGGREGATE CLASS 1	TON	6,800
①	2232.504	MILL BITUMINOUS SURFACE (1.5")	SQ YD	120
	2232.603	MILLED RUMBLE STRIPS	LIN FT	58,000
	2360.509	TYPE SP 9.5 BITUMINOUS MIXTURE FOR PAVER LAVELING (2,B)	TON	3,100
	2360.509	TYPE SP 9.5 WEARING COURSE MIXTURE (2,B)	TON	10,000
	2563.601	TRAFFIC CONTROL	LUMP SUM	1
	2580.503	INTERIM PAVEMENT MARKING	LIN FT	5,000
③	2582.503	4" SOLID LINE PAINT	LIN FT	1,500
②	2582.503	6" SOLID LINE PAINT	LIN FT	61,000
③	2582.503	4" BROKEN LINE PAINT	LIN FT	6,300

① INCLUDES MILLING OF ROAD INTERSECTIONS, AND AS DIRECTED BY THE ENGINEER.

② WHITE PAINT

③ YELLOW PAINT

BASIS FOR ESTIMATED QUANTITIES

BITUMINOUS WEARING COURSES

BITUMINOUS MIXTURE – 110 POUNDS/SQ YD/INCH OF DEPTH

BITUMINOUS TACK COAT

SEE SPECIAL PROVISIONS.

AGGREGATE SHOULDERING

AGGREGATE MATERIAL COMPUTED AT 135 POUNDS/CU FT

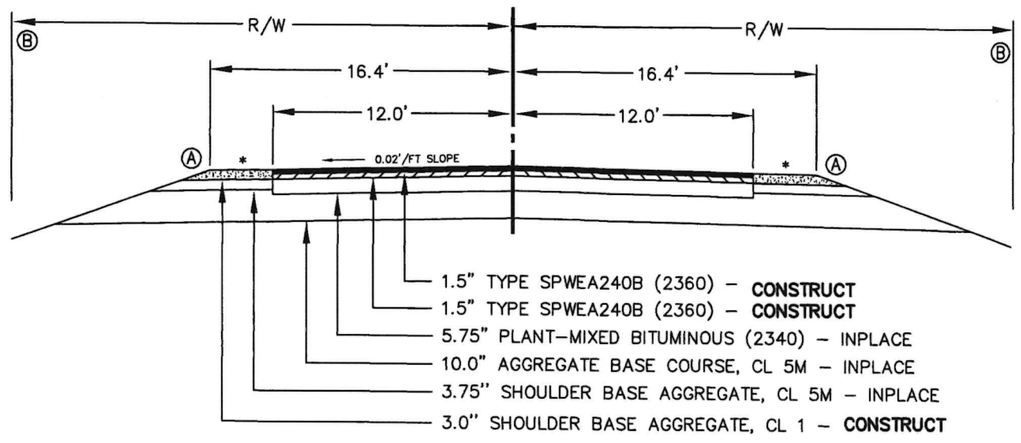
NOTES

ADDITIONAL MATERIAL FOR 10 ROAD APPROACHES, 31 ENTRANCES AND 5 MAILBOXES HAS BEEN PROVIDED FOR IN ITEMS 2221.509 (700 TONS), 2360.509 (600 TONS).

THE FOLLOWING STANDARD PLATES, APPROVED BY THE FEDERAL HIGHWAY ADMINISTRATION, SHALL APPLY.

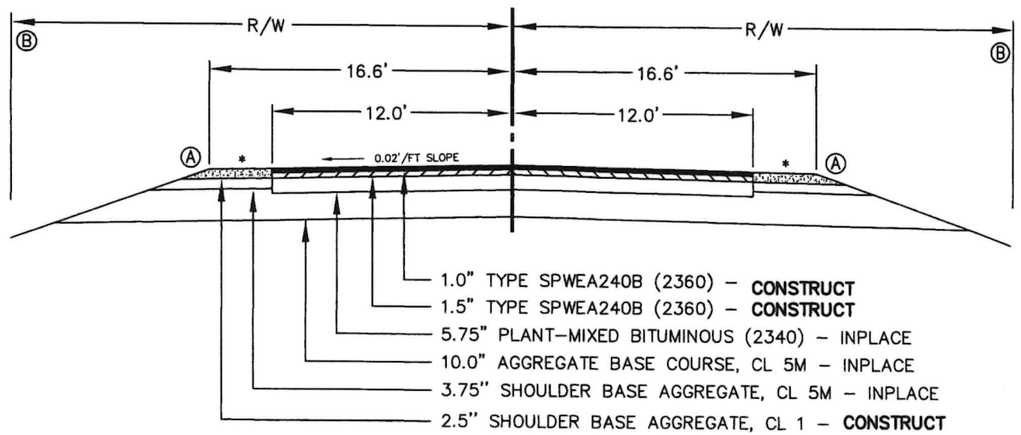
STANDARD PLATES	
PLATE NO.	DESCRIPTION
8000 K	TEMPORARY CHANNELIZERS – TYPE A

TYPICAL SURFACING SECTION



THE ABOVE SECTION APPLIES TO STA. 0+28 TO 106+00

TYPICAL SURFACING SECTION



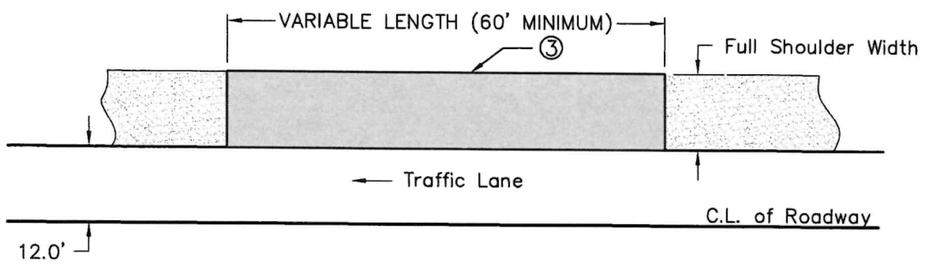
THE ABOVE SECTION APPLIES TO 106+00 TO 314+60

Ⓐ SLOPE THE NEW SHOULDER FROM THE SHOULDER P.I. TO BLEND INTO THE EXISTING SLOPE. ALL AGGREGATE MATERIAL SHALL BE COMPACTED COMPLETELY.

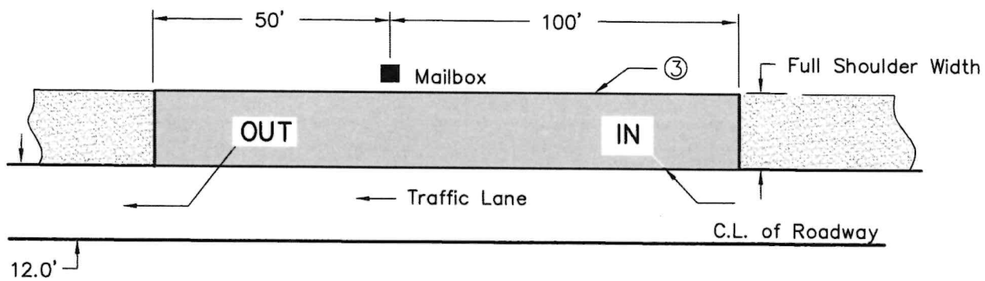
Ⓑ RIGHT OF WAY DISTANCE VARIABLE THROUGHOUT PROJECT.

* SHOULDER CROSS–SLOPE = 0.02 FT/FT

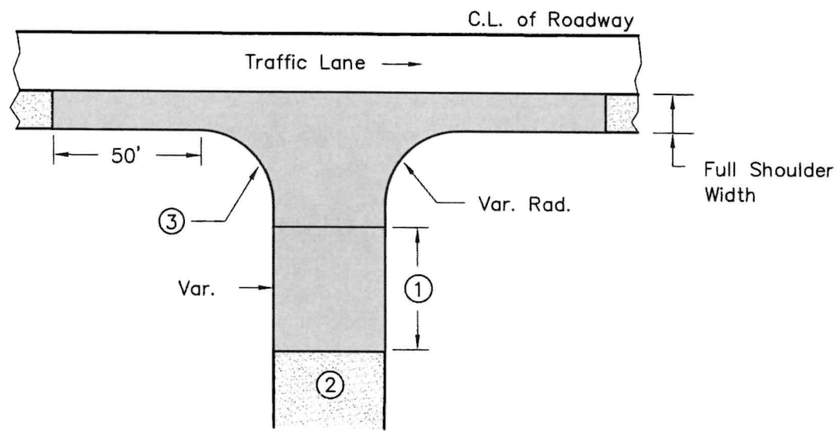
TYPICAL ENTRANCE DETAIL
(PLAN VIEW)



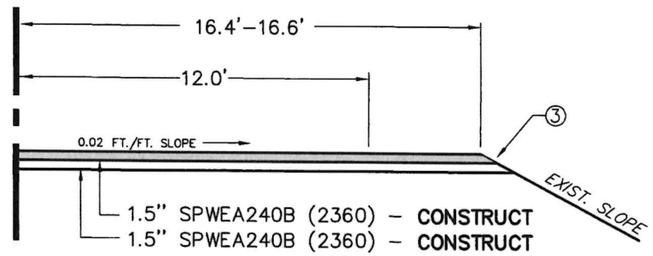
TYPICAL MAILBOX DETAIL
(PLAN VIEW)



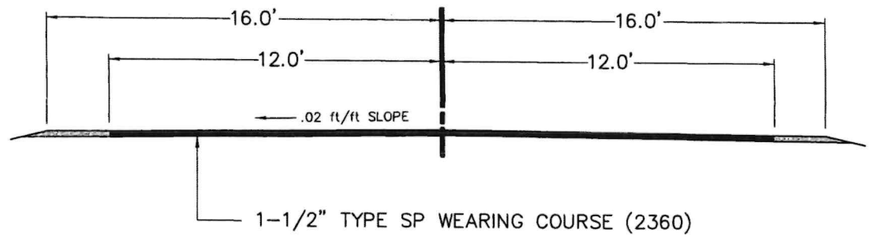
COUNTY AND TOWNSHIP ROAD APPROACH DETAIL
(PLAN VIEW)



TYPICAL ENTRANCE AND MAILBOX SECTIONS



TYPICAL FUTURE SECTION



THIS SECTION APPLIES TO THE ENTIRE PROJECT

NOTES:

① DETERMINED BY THE ENGINEER
② PLACE GRAVEL BEYOND BITUMINOUS SURFACING
③ SLOPE PAVEMENT EDGE TO 4:1 SLOPE

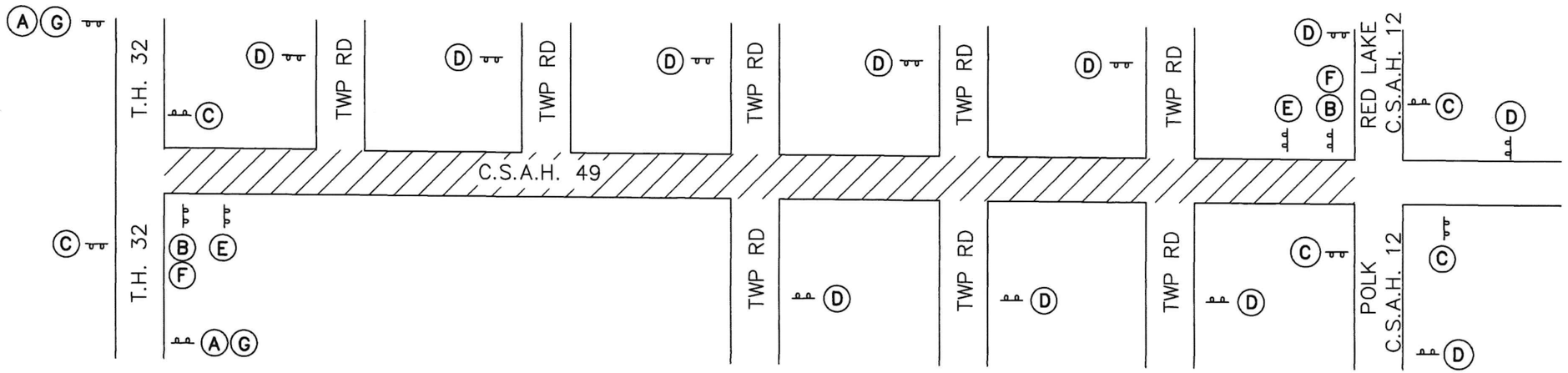
DESIGNATES BITUMINOUS SURFACING
DESIGNATES GRAVEL SURFACING
ALL DIMENSIONS AND SLOPES SHOWN ON THE TYPICAL SECTIONS ARE APPROXIMATE

CERTIFIED BY Richard Sanders #23169 4/10/2025
RICHARD C. SANDERS, P.E. DATE

C.S.A.H 49
POLK COUNTY, MN

S.A.P. 060–649–008 C.P. 125–49–1403 SHEET 3 OF 8 SHEETS

TRAFFIC CONTROL PLAN



1. CONSTRUCTION ZONE SIGNING SHALL ALSO BE THE RESPONSIBILITY OF THE CONTRACTOR WHICH WILL INCLUDE BUT NOT BE LIMITED TO FLAGMAN AHEAD, BUMP, SHOULDER WORK, AND LOW SHOULDER. THE NUMBER AND LOCATION WILL BE DETERMINED BY THE CONTRACTOR'S OPERATION.

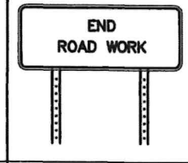
2. ALL TRAFFIC CONTROL DEVICES SHALL CONFORM TO THE MOST CURRENT MN MUTCD MANUAL AND MOST CURRENT FIELD MANUAL.

3. ALL STRUCTURES, SIGNS AND TRAFFIC CONTROL DEVICES SHALL BE CERTIFIED AS NCHRP 350 CRASH TESTED.

4. SIGN FACE MATERIAL FOR ALL SIGN PANELS SHALL BE HIGH PERFORMANCE SIGN SHEEETING FOR RIGID PERMANENT SIGNS, DELINEATORS, AND MARKERS, FROM MNDOT OFFICE OF TRAFFIC SAFTEY, SECURITY, AND OPERATIONS QUALIFIED PRODUCTS LIST. MUST MEET MINIMUM LEVELS FOR RETROREFLECTIVITY STATED IN TABLE 2A-3 OF MUTCD MANUAL.

5. IF CONSTRUCTION IS NOT STARTED WITHIN 10 WORKING DAYS AFTER THE INSTALLATION OF THE TRAFFIC CONTROL DEVICES, ALL SIGNS SHALL BE COVERED UNTIL WORK BEGINS. THE DEVICES SHALL BE REMOVED AS SOON AS THE WORK IS COMPLETED AND ARE NO LONGER NEEDED.

6. TRAFFIC CONTROL DEVICES 48" X 48" AND LARGER ON T.H. 32 REQUIRE FLASHERS.

INSTALLATION CODE	Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ	Ⓕ	Ⓖ
QUANTITY	2	2	4	8	2	2	2
MMUTCD REF.	W20-1	G20-1	G20-2A	W20-1	W20-X5	W13-1	M1-X4
SIZE	48" X 48"	60" X 36"	48" X 24"	36" X 36"	36" X 36"	24" X 24"	24" X 24"
SIGN							
NOTES	PLACE AT 1000' INTERVALS FROM INTERSECTION	PLACE ON TYPE III BARRICADE AT PROJECT TERMINI	PLACE 200' FROM INTERSECTION	PLACE 500' FROM INTERSECTION	PLACE 200' FROM INSTALLATION CODE Ⓑ	PLACE ONTO OR NEXT TO SIGN INSTALLATION CODE Ⓑ	PLACE ONTO OR NEXT TO SIGN INSTALLATION CODE Ⓐ

CERTIFIED BY Richard Sanders #23169 4/10/2025
RICHARD C. SANDERS, P.E. DATE

C.S.A.H. 49
POLK COUNTY, MN

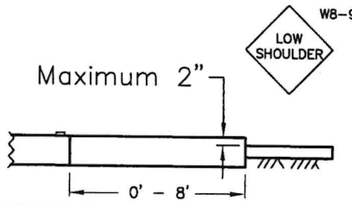
S.A.P. 060-649-008

C.P. 125-49-1403

SHOULDER EDGE DROP–OFF

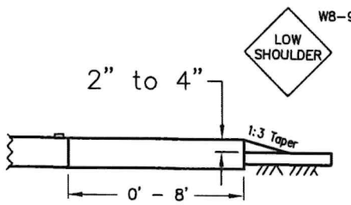
(SHOULDER – OPEN)

SHOULDER TO REMAIN OPEN
WITH APPROPRIATE WARNING SIGNS.



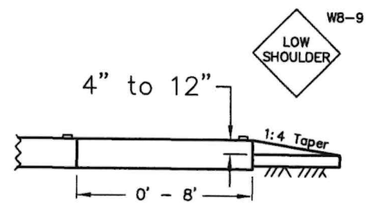
(SHOULDER – OPEN)

SHOULDER TO REMAIN OPEN
WITH APPROPRIATE WARNING SIGNS.



EDGE DROP–OFF WITH TAPER
(SHOULDER – OPEN)

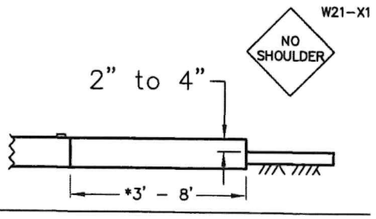
THIS CONDITION WILL NOT BE PERMITTED UNLESS THE SLOPE IS COMPACTED SO THAT A VEHICLE MAY SAFELY DRIVE ONTO IT WITHOUT LOSING CONTROL AND IN THE OPINION OF THE ENGINEER THERE ARE NO OTHER HAZARDOUS CONDITIONS.



(SHOULDER – CLOSE)

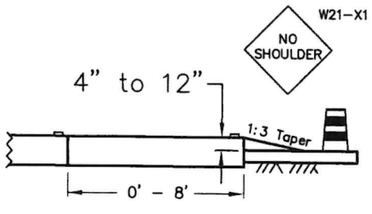
SHOULDER TO REMAIN CLOSED
WITH APPROPRIATE WARNING SIGNS.

* FOR DISTANCES LESS THAN 3 FEET, TUBULAR MARKERS ARE REQUIRED AS PER FIELD MANUAL.



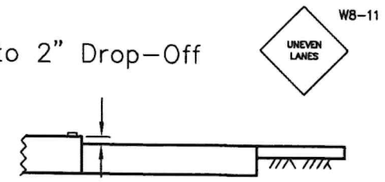
(SHOULDER – CLOSED)

SHOULDER SHALL BE CLOSED
WITH APPROPRIATE WARNING
SIGNS AND CHANNELIZING DEVICES
AS PER FIELD MANUAL.



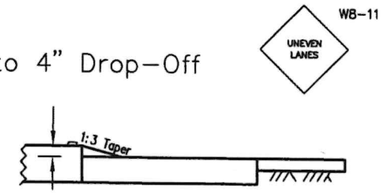
UNEVEN LANES

0.5" to 2" Drop–Off

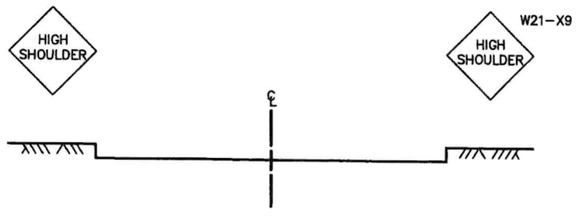


UNEVEN LANES – WITH TAPER

2" to 4" Drop–Off



MILLED EDGE



Note: Milled Edges greater than 2" require tapers and/or delineation as detailed for Edge Drop–Offs in addition to the High Shoulder signs.

GUIDELINES

These guidelines are intended to increase traffic safety using traffic control devices, safety related appurtenances, and construction techniques for uneven lanes, milled edges, and edge drop–offs that occur in highway work zones. The best way to increase traffic safety is to make every attempt to minimize exposure to uneven lanes, milled edges, and drop–offs. Only when uneven lanes, milled edges, or drop–offs are deemed necessary, shall the appropriate portion(s) of these guidelines be applied to enhance traffic safety.

Tapered slopes shall be adequately compacted to provide a firm driving surface.

Appropriate uneven lane warning signs or shoulder warning signs shall be repeated after each intersection.

Maximum warning sign spacing shall be:
a – 1 mile when the speed limit is greater than 30 mph and
b – 1/4 mile when the speed limit is 30 mph or less.

1. Drop–offs of 4"– 12" adjacent to traffic carrying lanes are permitted without tapers or portable concrete barriers for:
   a – projects within urban areas when the speed limit is 30 mph or less: or
   b – short term (3 calendar days or less) concrete or utility repair, less than 50 feet in length when the speed limit is greater than 30 mph.

2. Weather permitting, all milling and paving operations shall be required to complete the full width of the section under construction at the end of each work period. At no time shall there be more than one uneven lane condition between the traffic carrying lanes which include auxilliary lanes, turn lanes, and ramp access or egress areas.

3. For any excavations or drop–offs in excess of 12" see the Minnesota Manual on Uniform Traffic Control Devices.

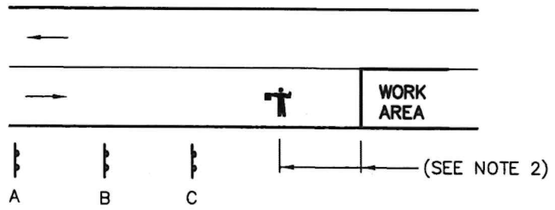
Traffic Control Treatment of
Longitudinal
Drop–offs in Work Zones

CERTIFIED BY: Richard Sanders #23169 4/10/2025
RICHARD C. SANDERS, P.E. DATE

C.S.A.H. 49
POLK COUNTY, MN

S.A.P. 060–649–008 C.P. 125–49–1403 SHEET 5 OF 8 SHEETS

TYPICAL LAYOUT FOR PAVING AND SHOULDERING OPERATIONS



LAYOUT IS TYPICAL FOR THE OPPOSITE SIDE OF THE WORK AREA

INSTALL. CODE	MMUTCD REFERENCE	SIZE	SIGN	NOTES
A	W20–1	36"X36"	ROAD WORK AHEAD	PLACE AT 750' INTERVALS
B	W20–4	36"X36"	ONE LANE ROAD AHEAD	PLACE AT 750' INTERVALS
C	W20–7A	36"X36"		PLACE AT 750' INTERVALS

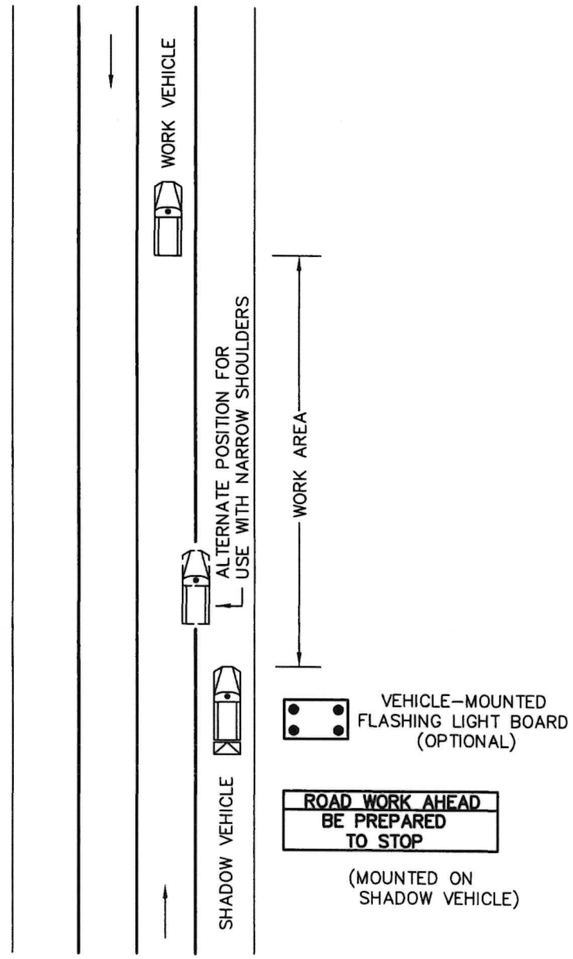
NOTES:

1. ALL SIGNS FURNISHED BY THE CONTRACTOR SHALL CONFORM TO SPECIFICATION 3352.2A.3.
2. THE SIGNING LAYOUT AND THE FLAGMAN SHALL BE STATIONED AS CLOSE AS POSSIBLE BUT NO MORE THAN ONE MILE FROM THE WORK AREA.
3. SIGNS PLACED ON PORTABLE SUPPORTS ON THE SHOULDER SHALL BE A MINIMUM OF ONE FOOT ABOVE THE PAVEMENT.

LAYOUT A

TYPICAL LAYOUT FOR SHOULDERING OPERATIONS

DAYLIGHT USE ONLY WITH GOOD VISIBILITY

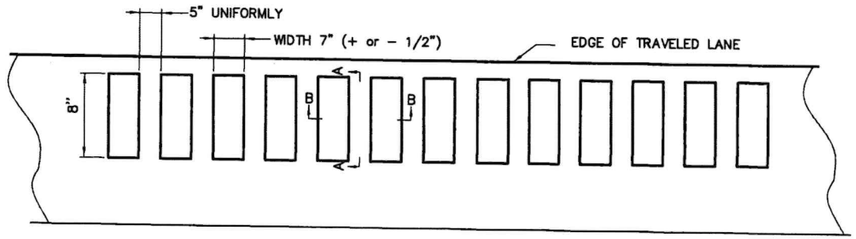


NOTES:

1. ALL VEHICLES SHALL DISPLAY A 360 DEGREE FLASHING BEACON.
2. SIGNS SHALL HAVE BLACK LETTERS ON ORANGE BACKROUND AND SHALL CONFORM TO SPECIFICATION 3352.2A.3.
3. IF THE APPROACH SITE DISTANCE IS RESTRICTED, A FLAGGER SHOULD BE USED TO PROTECT THE WORK AREA AND TO WARN THE DRIVER.
4. ADVANCED WARNING SIGNS SHOULD BE MOVED OR RESET AFTER EACH MAJOR ROAD INTERSECTION OR AFTER EACH MILE WICHEVER COMES FIRST.
5. A COMPACT WORK AREA SHALL BE MAINTAINED. WHEN THE WORK AREA EXTENDS BEYOND 500 FT IN LENGTH, OTHER TRAFFIC CONTROL LAYOUTS SHOULD BE CONSIDERED.

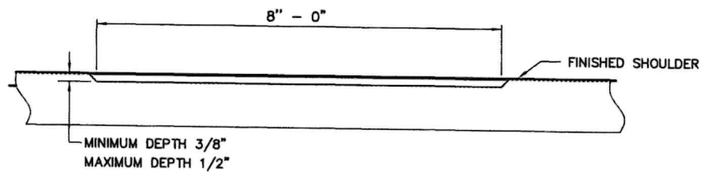
LAYOUT B

SHOULDER RUMBLE STRIP PLAN VIEW

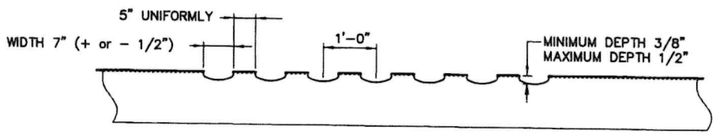


CONTINUOUS

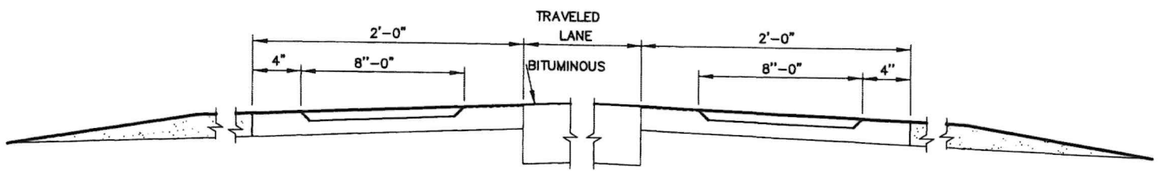
SECTION A–A



SECTION B–B

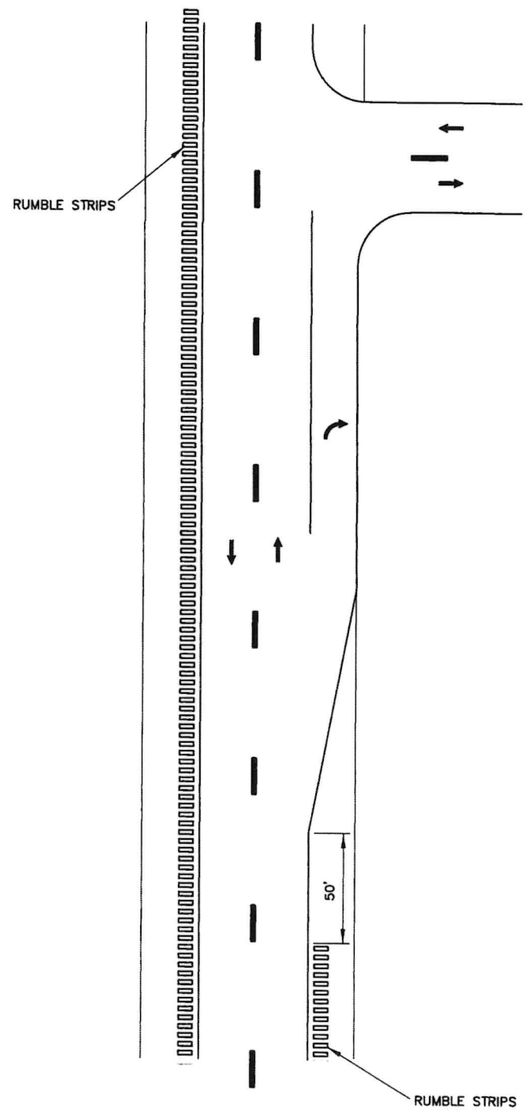


SECTION VIEW OF TWO–LANE ROADWAY
(WITH 2'–0" PAVED SHOULDERS)

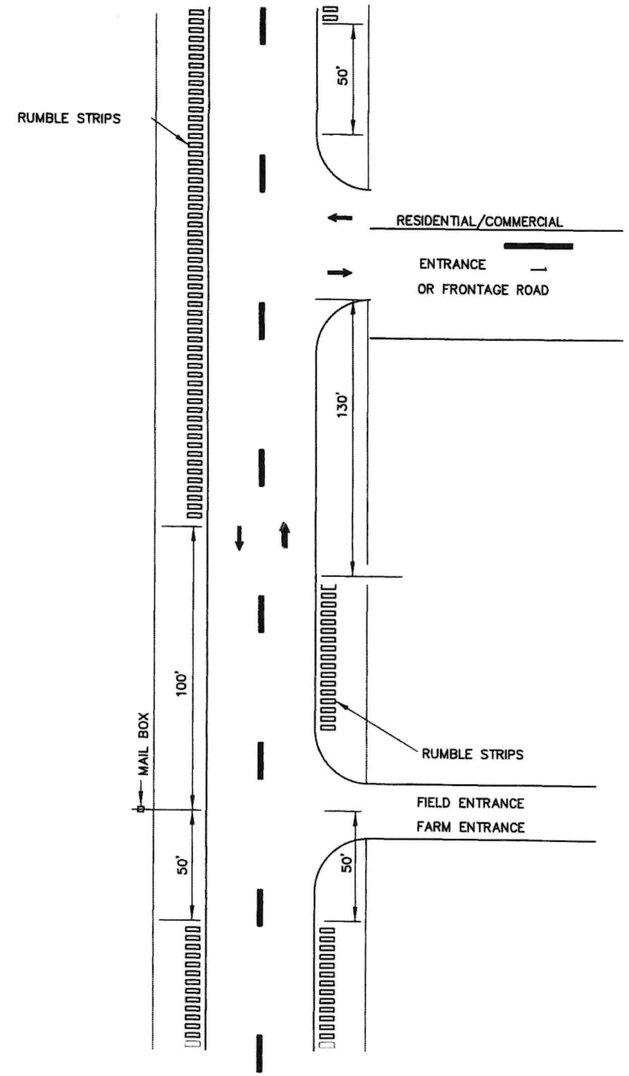


SHOULDER RUMBLE STRIP – APPROPRIATE BREAKS

RIGHT TURN LANE



ENTRANCE ROADS



CERTIFIED BY: *Richard Sanders* #23169 4/10/2025
RICHARD C. SANDERS, P.E. DATE

C.S.A.H. 49
POLK COUNTY, MN

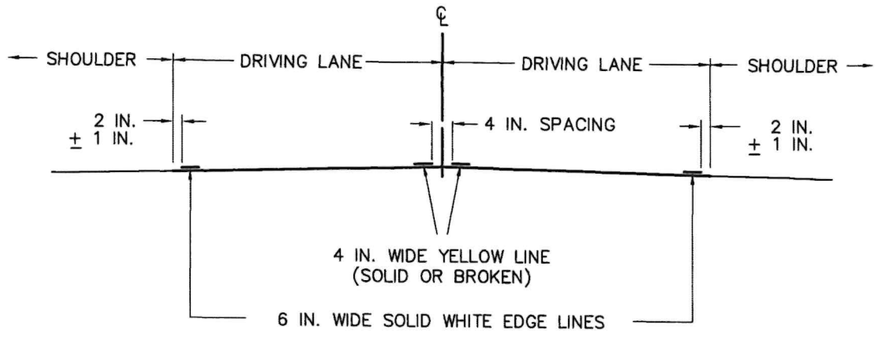
S.A.P. 060–649–008 C.P. 125–49–1408 SHEET 7 OF 8 SHEETS

PAVEMENT MARKING

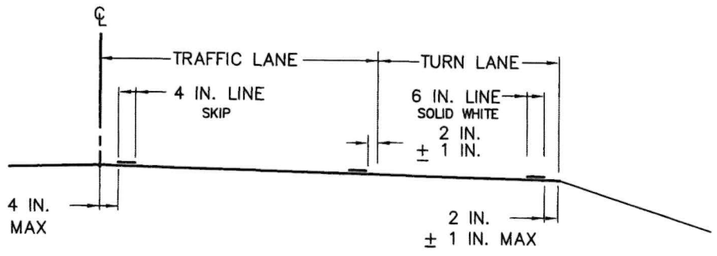
GENERAL REQUIREMENTS

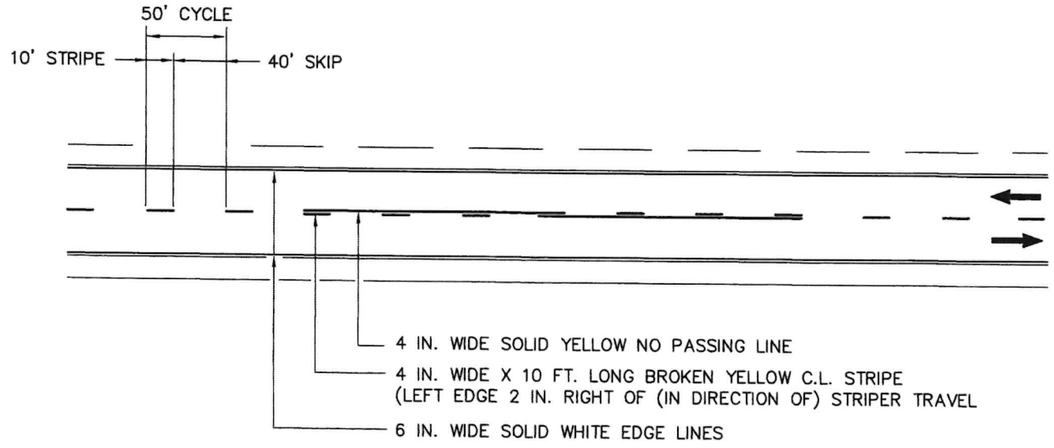
THE ENGINEER'S INVOLVEMENT IN THE APPLICATION OF THE MATERIAL SHALL BE LIMITED TO FIELD SPOTTING, LOCATION, AND INSPECTION. THE ENGINEER WILL PLACE NECESSARY "SPOTTING" AT APPROPRIATE POINTS TO PROVIDE HORIZONTAL CONTROL FOR STRIPING AND TO DETERMINE NECESSARY STARTING AND CUTOFF POINTS. BROKEN LINE INTERVALS WILL NOT BE MARKED. LONGITUDINAL JOINTS, PAVEMENT EDGES, AND EXISTING MARKINGS SHALL SERVE AS HORIZONTAL CONTROL WHEN SO DIRECTED. EDGE LINES AND LANE LINES ARE TO BE BROKEN ONLY AT INTERSECTIONS WITH PUBLIC ROADS AND AT PRIVATE ENTRANCES IF THEY ARE CONTROLLED BY A YIELD SIGN, STOP SIGN, OR TRAFFIC SIGNAL. THE BREAK POINT IS TO BE AT THE START OF THE RADIUS FOR THE INTERSECTION OR AT MARKED STOP LINES OR CROSSWALKS.

TWO–LANE TWO–WAY TRAFFIC MARKINGS



TYPICAL RIGHT TURN LANE





CERTIFIED BY: *Richard Sanders* #23169 4/10/2025
RICHARD C. SANDERS, P.E. DATE

C.S.A.H. 49
POLK COUNTY, MN

S.A.P. 060–649–008 C.P. 125–49–1403 SHEET 8 OF 8 SHEETS