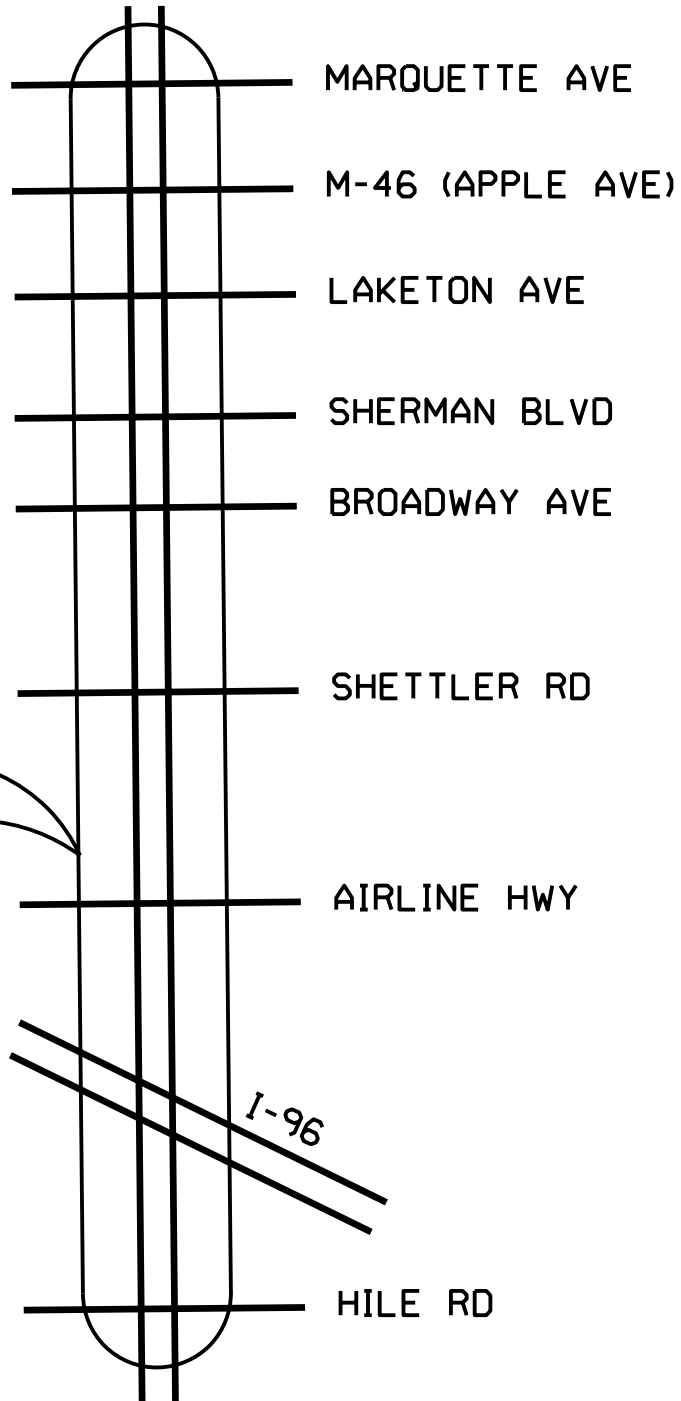


# MICHIGAN DEPARTMENT OF TRANSPORTATION

US-31

CITIES OF MUSKEGON, MUSKEGON HEIGHT, AND NORTON SHORES  
AND FRUITPORT TOWNSHIP  
MUSKEGON COUNTY

US-31



**PROJECT  
LOCATION**

US-31



BRADLEY WEIFERICH P.E. - DIRECTOR

DATE: 4/30/26

DESIGN UNIT: BLOCK

TSC: MUSKEGON

US-31

CONCRETE JOINT REPAIRS

MUSKEGON COUNTY

DRAWING SHEET

SECTION 2

## **LOCATION**

This maintenance project consists of work US-31 NB and SB more specifically described as:

Commencing at the Hile Rd overpass and US-31, thence continuing approximately 5.31 Miles northerly to the Marquette Ave overpass, located in the cities of Muskegon and Norton Shores, Muskegon and Fruitport Townships, Muskegon County.

## **DESCRIPTION OF WORK**

Project involves full depth Concrete Joint Repairs. Perform all work in accordance with the MDOT 2020 Standard Specifications for Construction.

## **MAINTENANCE OF TRAFFIC**

Maintain traffic according to the most current edition of the standard specifications including any Supplemental Specifications, and as specified herein.

Traffic will be maintained using single lane closures according to MOT typical 203-FW-1LC-(R) and 204-FW-1LC-(L), and ramps will be maintained using 231-ExR-O-LC and 223-FW-EnR-LO. No more than 2 ramp interchanges may be affected at one time for each bound, and closure length cannot exceed 2 miles. Continuous lane closures are allowed from Friday, 7 PM, to Monday, 5 AM. Lane closures must be taken down for Memorial Day weekend, May 22<sup>nd</sup> to May 25<sup>th</sup>.

## **PROGRESS CLAUSE**

Start work within (3) days of receiving notice of award or as approved by MDOT project staff. Under no circumstances shall work commence prior to the receipt of a formal notice of award.

All work shall be completed by June 12th, 2026

## **APPLICABLE MDOT STANDARD PLANS**

<b><u>Standard Plan Title</u></b>	<b><u>Plan Series</u></b>
Transverse Pavement Joints (Plain Concrete Pavement)	R-39
Load Transfer Assemblies for Transverse Joints	R-40
Longitudinal Pavement Joints	R-41
Typical Joint Layouts for Concrete Pavement	R-42
Location of Transverse in Plain Concrete Pavement	R-43
Concrete Pavement Repairs	R-44

## **PERMITS AND ORDINANCES**

The Contractor shall observe all local ordinances and local laws that may pertain to work completed on this project. Obtaining permits shall be the responsibility of the Contractor.

## **PROJECT COORDINATION**

The Contractor shall coordinate with MDOT and local projects occurring in the area of this project.

## **OLD PLANS**

The Contractor can obtain old plans to reference for this project by contacting the Muskegon TSC.

## **UTILITIES**

MDOT'S roadway lighting system Intelligent Transportation Systems (ITS) and other electrical systems are not a part of MISS DIG. Contractors shall contact the following at least (5) business days in advance for staking requests. Note that these are not emergency contacts for damage to utilities.

Grand Region

All Grand Region staking requests shall be submitted using MDOT form 5300:

<https://mdotjbos.state.mi.us/webforms/GetDocument.htm?fileName=5300.pdf>

Telephone inquiries can be made by calling the Grand Region Office at 616-451-3091.

## **PROJECT MATERIALS**

All materials being incorporated into this project shall conform with current MDOT material requirements outlined in the 2020 MDOT Standard Specifications for Construction. The Contractor and any subcontractors shall submit MDOT form 0501 Materials Source List for all materials being incorporated into the project for review by the MDOT project staff. For all concrete related work, the contractor shall submit a Concrete Quality Control Plan for review and approval. Only MDOT approved concrete mix designs shall be used for this project.

## **PROJECT STAKING**

The Contractor and MDOT staff shall visit the project site and mark the locations for Concrete Joint Repairs and Concrete Pavement replacement prior to the start of construction.

## **SAFETY PROGRAM AND CONTACT LIST**

The Contractor shall provide at the preconstruction meeting, or prior to beginning work, a copy of the Contractors Construction Safety Program and a list of contacts for any subcontractors. The Contractor shall also provide an emergency contact for the project.

## **SUBMITTAL LIST**

Form 501 Materials Source List

Concrete Quality Control Plan

Contractor Safety Program

Form 1130 Progress Schedule

Contractors Damage Claim Plan

Subcontractor List

## **FINAL INSPECTION**

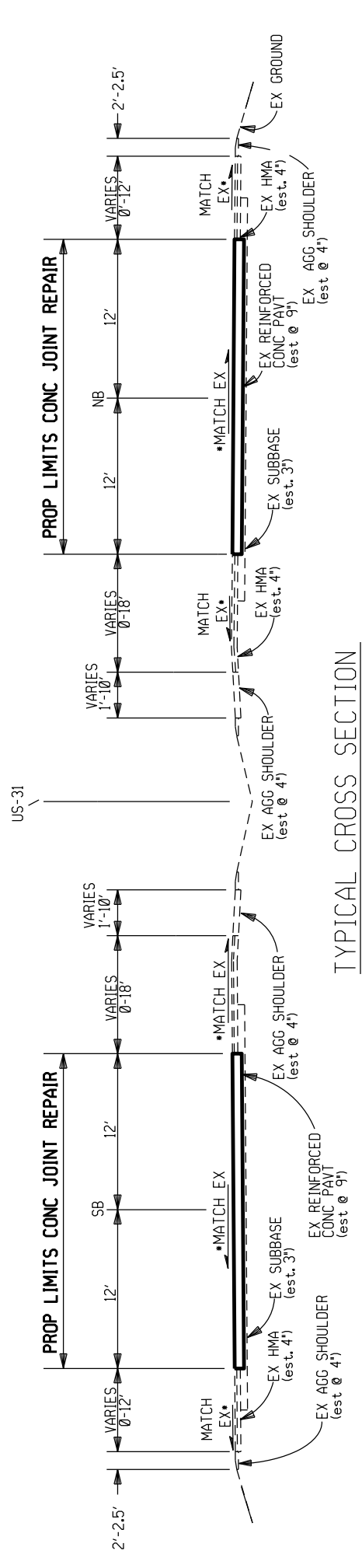
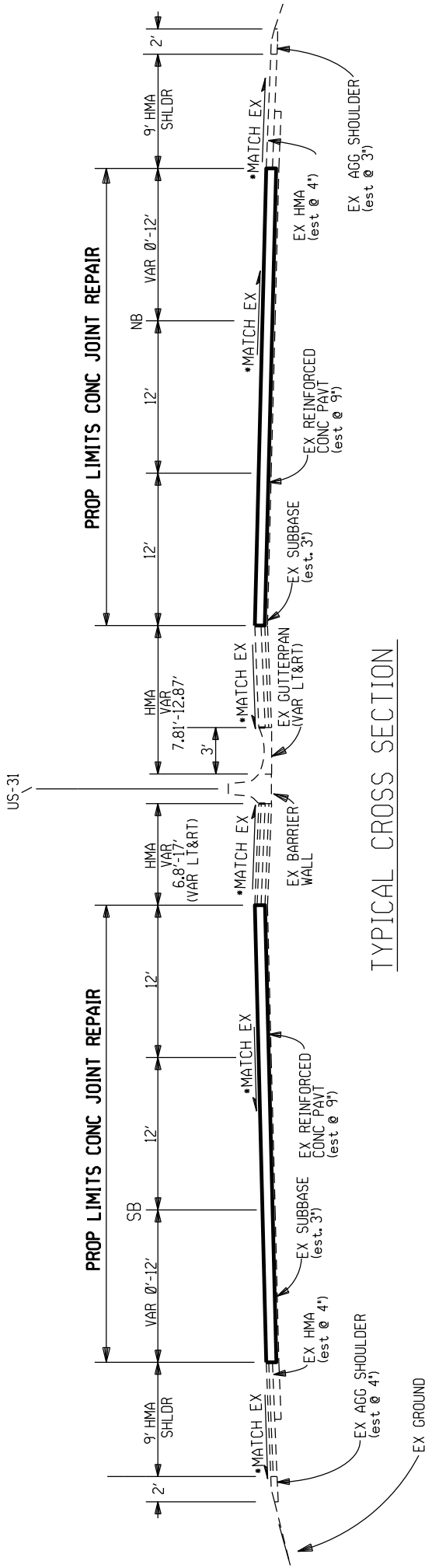
MDOT will make a final inspection of all work performed before releasing final payment.

## **CONSTRUCTION ITEMS**

Mobilization	1	LSUM
Concrete Joint and Pavement Repairs	263	CYD
Maintenance of Traffic	1	LSUM
Minor Traffic Devices	1	LSUM

## **CONTACTS**

Muskegon County Road Commission 7700 Apple Ave Muskegon MI 49442 Phone: (231) 788-2381	General
City of Muskegon DPW 1350 E Keating Ave Muskegon MI 49442 Phone: (231) 724-6903	General
City of Norton Shores Public Works 1174 Mt Garfield Rd Norton Shores MI 49441 Phone: (231) 799-6804	General
Fruitport Township 5865 Airline Hwy Fruitport MI 49415 Phone: (231) 865-3151	General
Muskegon Township 1990 Apple Ave Muskegon MI 49442 Phone: (231) 777-2555	General



US-31 NB and SB  
 MATCH EXISTING FIELD CONDITIONS

DATE 4/27/26  
 SCALE 1" = 10'  
 CONT. SEC. 84913

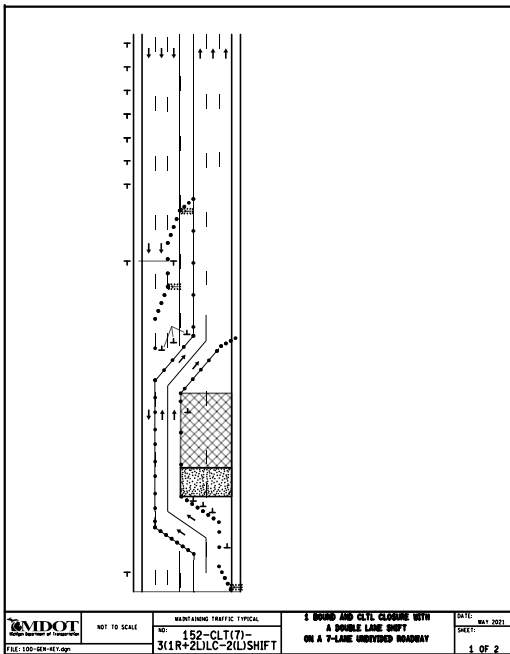
US-31 NB and SB  
 JOB NO. SHEET NO.

\*\* ALL GRADES TO MATCH EXISTING FIELD CONDITIONS

# TYPICAL NUMBER KEY

## CODES

AB = ARROW BOARD AW = ADVANCE WARNING C = CLOSURE CLT = CENTER LEFT TURN LANE CROSS = CROSSOVER CruSha = CRUSH AND SHAPE EM = EARLY MERGE EnR = ENTRANCE RAMP ExR = EXIT RAMP FW = FREEWAY GEN = GENERAL INFORMATION GORE = FREEWAY GORE AREA IN = INSIDE INT = INTERSECTION L = LANE (L) = LEFT LC = LANE CLOSURE LD = LONG DURATION	LO = LANE OPEN O = OUTSIDE (LANE CLOSURE) OUT = OUTSIDE OF SHOULDER MID = MIDDLE OF INTERSECTION OR ROAD NFW = NON-FREEWAY PARK = PARKING LANE PCMS = PORTABLE CHANGEABLE MESSAGE SIGN (R) = RIGHT ROLL = ROLLING ROADBLOCK RUM = RUMBLE STRIP SD = SHORT DURATION SHL = SHOULDER CLOSURE SIGN = SIGN SP = SPECIAL SPEED = SPEED STA = STOPPED TRAFFIC ADVISORY TR = TRAFFIC REGULATOR TS = TEMPORARY SIGNAL ZIP = ZIPPER MERGE
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- 100 - GENERAL NOTES
- 110 - TRAFFIC REGULATORS
- 120 - NON-FREEWAY
- 130 - CENTER LEFT TURN (CLT) LANES
- 140 - PARKING LANES
- 150 - CLT 7 LANE SECTIONS
- 160 - SIGNAL WORK
- 200 - FREEWAY CLOSURES
- 210 - FREEWAY LANE SHIFTS
- 220 - FREEWAY ENTRANCE RAMPS
- 230 - FREEWAY EXIT RAMPS
- 300 - ADVANCE WARNINGS
- 310 - CROSSOVER CLOSURE
- 320 - CRUSH AND SHAPE
- 340 - MERGE SYSTEMS
- 350 - GORE LOCATIONS
- 360 - ROLLING ROADBLOCK
- 4000 - MAINTENANCE
- 5000 - SURVEY

EXAMPLE TYPICAL

CODE: 152-CTL(7)-3(1R+2L)LC-2(L)SHIFT

152 - TYPICAL NUMBER

CTL(7) = CENTER LEFT TURN LANE, 7 LANES TOTAL.

3(1R+2L)LC = 3 LANES CLOSED, (1 RIGHT LANE AND 2 LEFT LANES).

2(L)SHIFT = 2 LANES SHIFTED TO THE LEFT.

NOT TO SCALE

 Michigan Department of Transportation	NOT TO SCALE	MAINTAINING TRAFFIC TYPICAL	<b>TYPICAL NUMBERING KEY</b>	DATE: DECEMBER 2021
		NO: <b>100-GEN-KEY</b>		SHEET:  1 OF 1

**DISTANCE BETWEEN TRAFFIC SIGNS, "D"**

"D" DISTANCES	POSTED SPEED LIMIT, MPH (PRIOR TO WORK AREA)										
	25	30	35	40	45	50	55	60	65	70	75
D (FEET)	250	300	350	400	450	500	550	600	650	700	750

**GUIDELINES FOR LENGTH OF LONGITUDINAL BUFFER SPACE, "B"**

"B" LENGTHS	SPEED*, MPH (PRIOR TO WORK AREA)											
	20	25	30	35	40	45	50	55	60	65	70	75
B (FEET)	33	50	83	132	181	230	279	329	411	476	542	625

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

**MINIMUM MERGING TAPER LENGTH, "L" (FEET)**

OFFSET (FEET)	POSTED SPEED LIMIT, MPH (PRIOR TO WORK AREA)										
	25	30	35	40	45	50	55	60	65	70	75
1	11	15	21	27	45	50	55	60	65	70	75
2	21	30	41	54	90	100	110	120	130	140	150
3	32	45	62	80	135	150	165	180	195	210	225
4	42	60	82	107	180	200	220	240	260	280	300
5	53	75	103	134	225	250	275	300	325	350	375
6	63	90	123	160	270	300	330	360	390	420	450
7	73	105	143	187	315	350	385	420	455	490	525
8	84	120	164	214	360	400	440	480	520	560	600
9	94	135	184	240	405	450	495	540	585	630	675
10	105	150	205	267	450	500	550	600	650	700	750
11	115	165	225	294	495	550	605	660	715	770	825
12	125	180	245	320	540	600	660	720	780	840	900
13	136	195	266	347	585	650	715	780	845	910	975
14	146	210	286	374	630	700	770	840	910	980	1050
15	157	225	307	400	675	750	825	900	975	1050	1125

NOT TO SCALE

	NOT TO SCALE	MAINTAINING TRAFFIC TYPICAL	<b>"B", "D" AND "L" TABLES</b> <b>CHANNELIZING DEVICE SPACING,</b> <b>SIGN BORDER KEY, AND ROLL-AHEAD SPACING</b>	DATE: MAY 2021
		NO: 101-GEN-SPACING-CHARTS		SHEET: 1 OF 3

THE FORMULAS FOR THE MINIMUM LENGTH OF A MERGING TAPER IN DERIVING THE "L" VALUES SHOWN IN THE ABOVE TABLES ARE AS FOLLOWS:

"L" =  $\frac{W \times S^2}{60}$  WHERE POSTED SPEED PRIOR TO THE WORK AREA IS 40 MPH OR LESS

"L" = W X S WHERE POSTED SPEED PRIOR TO THE WORK AREA IS 45 MPH OR GREATER

L = MINIMUM LENGTH OF MERGING TAPER  
 S = POSTED SPEED LIMIT IN MPH PRIOR TO WORK AREA  
 W = WIDTH OF OFFSET

TYPES OF TAPERS

**UPSTREAM TAPERS**

- MERGING TAPER
- SHIFTING TAPER
- SHOULDER TAPER
- 2 TO 1 LANE ROAD TAPER

TAPER LENGTH

- L - MINIMUM
- 1/2 L - MINIMUM
- 1/3 L - MINIMUM
- 100' - MAXIMUM

**DOWNSTREAM TAPERS**  
 (USE IS RECOMMENDED)

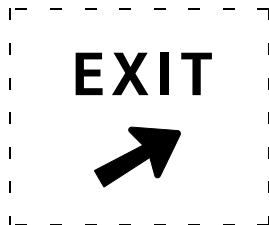
100' (PER LANE)

**MAXIMUM SPACING FOR CHANNELIZING DEVICES**

WORK ZONE SPEED LIMIT	DRUM AND 42" DEVICE SPACING (FT)		NIGHTTIME 42" DEVICE SPACING (FT)	
	TAPER	TANGENT	TAPER	TANGENT
< 45 MPH	1 x SPEED LIMIT	2 x SPEED LIMIT	25 FEET	50 FEET
≥ 45 MPH	50 FEET	100 FEET	25 FEET	50 FEET

**SIGN OUTLINE KEY**

DASHED OUTLINES INDICATE A SIGN THAT EXISTS ON SITE, AND NEEDS TO BE COVERED.



SOLID OUTLINES INDICATE A SIGN THAT IS TO BE PLACED ON THE PROJECT



NOT TO SCALE

	NOT TO SCALE	MAINTAINING TRAFFIC TYPICAL	<b>"B", "D" AND "L" TABLES</b> <b>CHANNELIZING DEVICE SPACING</b> <b>SIGN BORDER KEY AND ROLL-AHEAD SPACING</b>	DATE: MAY 2021
		NO: 101-GEN-SPACING-CHARTS		SHEET: 2 OF 3

GUIDELINES FOR ROLL-AHEAD DISTANCES FOR TMA VEHICLES – TEST LEVEL 2

WEIGHT OF TMA VEHICLE	PREVAILING SPEED (POSTED SPEED PRIOR TO WORK ZONE)	ROLL-AHEAD DISTANCE* (DISTANCE FROM FRONT OF TMA VEHICLE TO WORK AREA)
5.5 TONS (STATIONARY)	40 MPH OR LESS	25 FT

\* ROLL-AHEAD DISTANCES ARE CALCULATED USING A 4,410 POUND IMPACT VEHICLE WEIGHT.

GUIDELINES FOR ROLL-AHEAD DISTANCES FOR TMA VEHICLES – TEST LEVEL 3

WEIGHT OF TMA VEHICLE	PREVAILING SPEED (POSTED SPEED PRIOR TO WORK ZONE)	ROLL-AHEAD DISTANCE* (DISTANCE FROM FRONT OF TMA VEHICLE TO WORK AREA)
5 TONS (MOBILE)	45 MPH	100 FT
	50-55 MPH	150 FT
	60-75 MPH	175 FT
12 TONS (STATIONARY)	45 MPH	25 FT
	50-55 MPH	25 FT
	60-75 MPH	50 FT

\* ROLL-AHEAD DISTANCES ARE CALCULATED USING A 10,000 POUND IMPACT VEHICLE WEIGHT.



NOT TO SCALE

MAINTAINING TRAFFIC TYPICAL

NO: 101-GEN-SPACING-CHARTS

"B", "D" AND "L" TABLES  
CHANNELIZING DEVICE SPACING  
SIGN BORDER KEY AND ROLL AHEAD SPACING

DATE: MAY 2021  
SHEET:

3 OF 3

**THE FOLLOWING NOTES APPLY IF CALLED FOR ON THE TRAFFIC TYPICAL**

**GENERAL NOTES**

- G1: SEE GEN-SPACING-CHARTS FOR COMMON VALUES INCLUDING:  
 D = DISTANCE BETWEEN TRAFFIC CONTROL DEVICES  
 L = MINIMUM LENGTH OF TAPER  
 B = LENGTH OF LONGITUDINAL BUFFER  
 ROLL AHEAD DISTANCE
- G2: DISTANCE BETWEEN SIGNS, "D", THE VALUES FOR WHICH ARE SHOWN IN TYPICAL GEN-KEY ARE APPROXIMATE AND MAY NEED ADJUSTING AS DIRECTED BY THE ENGINEER.
- G3: ALL TEMPORARY SIGNS, TYPE III BARRICADES, THEIR SUPPORT SYSTEMS AND LIGHTING MUST MEET NATIONAL COOPERATIVE HIGHWAY RESEARCH PROGRAM REPORT 350 (NCHRP 350) TEST LEVEL 3, OR MANUAL FOR ASSESSING SAFETY HARDWARE (MASH) TL-3 AS WELL AS THE CURRENT EDITION OF THE MICHIGAN MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES, THE CURRENT EDITION OF THE STANDARD SPECIFICATIONS FOR CONSTRUCTION, THE STANDARD PLANS AND APPLICABLE SPECIAL PROVISIONS. ONLY DESIGNS AND MATERIALS APPROVED BY MDOT WILL BE ALLOWED.
- G4: DO NOT STORE EQUIPMENT, MATERIALS OR PERFORM WORK IN ESTABLISHED BUFFER AREAS.
- G5: ALL EXISTING PAVEMENT MARKINGS WHICH ARE IN CONFLICT WITH EITHER PROPOSED CHANGES IN TRAFFIC PATTERNS OR PROPOSED TEMPORARY TRAFFIC MARKINGS SHALL BE REMOVED BEFORE ANY CHANGE IS MADE IN THE TRAFFIC PATTERN. EXCEPTION WILL BE MADE FOR TRAFFIC PATTERNS FOR WORK LESS THAN THREE DAYS THAT ARE ADEQUATELY DELINEATED BY OTHER TRAFFIC CONTROL DEVICES.

**SIGN NOTES**

- S1: ALL NON-APPLICABLE SIGNING WITHIN THE CIA MUST BE MODIFIED TO FIT CONDITIONS, COVERED, OR REMOVED. FOR GUIDANCE SEE THE WORK ZONE SAFETY AND MOBILITY MANUAL, SECTIONS 6.01.09 AND 6.01.10.
- S2: R5-18b SIGNS ARE ONLY REQUIRED ON FREEWAY PROJECTS WITH A DURATION OF 15 DAYS OR LONGER OR NON-FREEWAY PROJECTS WITH A DURATION OF 90 DAYS OR LONGER. TO APPLY THIS TYPICAL WITHOUT R5-18b SIGNS, REMOVE THE SIGNS AND CONSOLIDATE THE SEQUENCE AS APPROPRIATE.
- S3: R5-18c IS ONLY REQUIRED IN THE INITIAL SIGNING SEQUENCE IN THE WORK ZONE. OMIT THIS SIGN IN SUBSEQUENT SEQUENCES IN THE SAME WORK ZONE.
- S4: ADDITIONAL SIGNING AND/OR ELONGATED SIGNING SEQUENCES SHOULD BE USED WHEN TRAFFIC VOLUMES ARE SIGNIFICANT ENOUGH TO CREATE BACKUPS BEYOND THE W20-5 SIGNS.
- S5: PLACE ADDITIONAL SPEED LIMIT SIGNS REFLECTING THE WORK ZONE SPEED AFTER EACH MAJOR CROSSROAD THAT INTERSECTS THE WORK ZONE, OR AFTER EACH ENTRANCE RAMP THAT COMES ONTO THE FREEWAY WHERE THE REDUCED SPEED IS IN EFFECT. PLACE ADDITIONAL SPEED LIMIT SIGNS AT INTERVALS ALONG THE ROADWAY SUCH THAT NO SPEED LIMIT SIGNS ARE MORE THAN 2 MILES APART. WHEN REDUCED SPEED LIMITS ARE UTILIZED IN THE WORK AREA, PLACE ADDITIONAL SPEED LIMIT SIGNS RETURNING TRAFFIC TO ITS NORMAL SPEED BEYOND THE LIMITS OF THE WORK AREA AS INDICATED. IF PERMANENT SIGNS DISPLAYING THE CORRECT SPEED LIMIT ARE POSTED, OMIT ALL W3-5b AND R2-1 SIGNS AND REDUCE SPACING ACCORDINGLY.
- S6: FABRICATE SPECIAL SIGNS IN ACCORDANCE WITH CURRENT SIGNING DESIGN STANDARDS.
- S7: PLACE ADDITIONAL R8-3 SIGNS AT A MAXIMUM 500' SPACING THROUGHOUT THE WORK ZONE.
- S8: WHEN SPEED LIMIT SIGNS CANNOT BE PLACED SIDE BY SIDE AS SHOWN, PLACE THEM "D" DISTANCE APART.
- S9: STOP SIGNS NOT REQUIRED IF SIGNALS ARE ON 4-WAY FLASHING RED. STOP AHEAD SIGNS ARE NOT REQUIRED IF THERE IS ADEQUATE VISIBILITY OF THE STOP SIGN OR IF SIGNALS ARE BEING USED TO CONTROL TRAFFIC.
- S10: PLACE REDUCED SPEED ZONE AHEAD SIGN (W3-5b) HERE WHEN USING A SPEED REDUCTION IN THIS DIRECTION.
- S11: THE NUMBER OF W1-6 SHIFT SIGNS TO PLACE FOR A SHIFT IS AS FOLLOWS:  
 SHIFTS 4FT OR LESS, PLACE ONE W1-6(R)(L)  
 SHIFTS 5FT TO 12FT, PLACE TWO W1-6(R)(L)  
 SHIFTS MORE THAN 12FT, PLACE THREE OR MORE W1-6(R)(L) SIGNS DEPENDING UPON LENGTH OF SHIFT AND AS PER THE ENGINEER.
- S12: PLACE R2-1 SIGNS AS DETAILED IN NOTE S5 WHEN THERE IS A SPEED REDUCTION IN THIS DIRECTION

**TRAFFIC REGULATOR NOTES**

- TR1: TRAFFIC REGULATORS MUST FOLLOW ALL THE REQUIREMENTS IN THE STANDARD SPECIFICATIONS, THE STANDARD PLANS AND APPLICABLE SPECIAL PROVISIONS, THE CURRENT VERSIONS OF THE TRAFFIC REGULATOR'S INSTRUCTION MANUAL AND THE VIDEO "HOW TO SAFELY REGULATE TRAFFIC IN MICHIGAN". THE MAXIMUM DISTANCE BETWEEN THE TRAFFIC REGULATORS IS DETERMINED BY THE ROADWAY ADT, GEOMETRICS, AND AS DIRECTED BY THE ENGINEER.
- TR2: PROVIDE APPROPRIATE BALLOON LIGHTING TO SUFFICIENTLY ILLUMINATE TRAFFIC REGULATOR'S STATIONS WHEN TRAFFIC REGULATING IS ALLOWED DURING THE HOURS OF DARKNESS.
- TR3: PROVIDE EITHER A STOP/SLOW AFAD OR A RED/YELLOW LENS AFAD, MEETING THE REQUIREMENTS OF THE MMUTCD

**TEMPORARY TRAFFIC CONTROL DEVICE NOTES**

- TCD1: THE MAXIMUM DISTANCE IN FEET BETWEEN CHANNELIZING DEVICES IN A TAPER SHOULD NOT EXCEED 1.0 TIMES THE WORK ZONE SPEED LIMIT IN MPH FOR ROADWAYS WITH A POSTED WORK ZONE SPEED LIMIT LESS THAN 45 MPH AND SHOULD NOT EXCEED 50 FEET ON ROADWAYS WITH A POSTED WORK ZONE SPEED LIMIT OF 45 MPH OR GREATER. THE SPACING FOR 42 INCH CHANNELIZING DEVICE TAPERS ARE NOT TO EXCEED 25 FEET AT NIGHT.
- TCD2: THE MAXIMUM DISTANCE IN FEET BETWEEN CHANNELIZING DEVICES IN A TANGENT SHOULD NOT EXCEED TWICE THE WORK ZONE SPEED LIMIT IN MPH FOR ROADWAYS WITH A POSTED WORK ZONE SPEED LIMIT LESS THAN 45 MPH AND SHOULD NOT EXCEED 100 FEET ON ROADWAYS WITH A POSTED WORK ZONE SPEED LIMIT OF 45 MPH OR GREATER. THE SPACING FOR 42 INCH CHANNELIZING DEVICE TANGENTS ARE NOT TO EXCEED 50 FEET AT NIGHT.
- TCD3: TYPE III BARRICADES MUST BE LIGHTED FOR OVERNIGHT CLOSURES.
- TCD4: WHEN THE HAUL ROAD IS NOT IN USE, PLACE LIGHTED TYPE III BARRICADES WITH "ROAD CLOSED" EXTENDING COMPLETELY ACROSS THE HAUL ROAD.
- TCD5: USE OBJECT MARKER SIGNS IN LIEU OF THE TYPE B HIGH INTENSITY LIGHT SHOWN IN THE STANDARD PLAN FOR TEMPORARY CONCRETE BARRIER (R-53, AND R-126) WHEN USED WITH A TEMPORARY SIGNAL SYSTEM. THE OBJECT MARKERS MUST BE A MINIMUM OF 12 INCHES IN WIDTH AND 36 INCHES IN HEIGHT AND HAVE ORANGE AND WHITE RETROREFLECTIVE SHEETING. THE RETROREFLECTIVE SHEETING MUST HAVE ALTERNATING DIAGONAL ORANGE AND WHITE STRIPES SLOPING DOWNWARD AT AN ANGLE OF 45 DEGREES IN THE DIRECTION VEHICULAR TRAFFIC IS TO PASS.
- TCD6: PLACE LIGHTED ARROW PANELS AS CLOSE TO THE BEGINNING OF TAPERS AS PRACTICAL, BUT NOT IN A MANNER THAT WILL OBSCURE OR CONFUSE APPROACHING MOTORISTS WHEN PHYSICAL LIMITATIONS RESTRICT PLACEMENT. IN CURBED SECTIONS, IF ARROW BOARD CANNOT BE PLACED BEHIND CURB, PLACE ARROW BOARD IN THE CLOSED LANE AS CLOSE TO THE BEGINNING OF TAPER AS POSSIBLE.
- TCD7: ADDITIONAL TYPE III BARRICADES MAY BE REQUIRED TO COMPLETELY CLOSE OFF ROAD FROM EDGE OF PAVEMENT TO EDGE OF PAVEMENT.
- TCD8: WHERE THE SHIFTED SECTION IS SHORTER THAN 600 FEET, A DOUBLE REVERSE CURVE SIGN (W24-1) CAN BE USED INSTEAD OF THE FIRST REVERSE CURVE SIGN, AND THE SECOND REVERSE CURVE SIGN CAN BE OMITTED.
- TCD9: RUMBLE STRIPS ARE TO BE PLACED AS SPECIFIED IN THE CONTRACT. IF NOT SPECIFIED IN THE CONTRACT, PLACE RUMBLE STRIPS AS SHOWN, AND IN ACCORDANCE WITH THE RUMBLE STRIP MANUFACTURER'S RECOMMENDATIONS. AN ARRAY OF RUMBLE STRIPS CONTAINS THREE RUMBLE STRIPS. PLACE THE RUMBLE STRIPS IN THE ARRAY AT A CONSISTENT DISTANCE, BETWEEN 10' AND 20' APART.
- TCD10: SEE THE WORK ZONE SAFETY AND MOBILITY MANUAL, PORTABLE CHANGEABLE MESSAGE SIGN GUIDELINES FOR RECOMMENDED AND CORRECT PCMS MESSAGING. STAGGER PCMS THAT ARE ON OPPOSING SIDES OF THE ROAD 1000 FEET FROM EACH OTHER.

**RAMP NOTES**

- RMP1: WHEN CONDITIONS ALLOW, E5-1 SIGNS MUST BE REMOVED OR COVERED AND CHANNELIZING DEVICES MUST BE POSITIONED TO ENABLE RAMP TRAFFIC TO DIVERGE IN A FREE MANNER
- RMP2: STOP AND YIELD CONDITIONS SHOULD BE AVOIDED WHENEVER PRACTICAL. WHEN CONDITIONS WARRANT, R1-1 SIGNS MAY BE USED IN PLACE OF R1-2 SIGNS. WHEN R-1 SIGNS ARE USED, W3-1 SIGNS MUST BE USED IN PLACE OF W3-2 SIGNS. CONSIDERATION SHOULD BE GIVEN TO CLOSING THE RAMP TO COMPLETE WORK TO ALLOW AN ADEQUATE MERGE DISTANCE. WORK SHOULD BE EXPEDITED TO AVOID THE STOP AND/OR YIELD CONDITIONS.

	NOT TO SCALE	MAINTAINING TRAFFIC TYPICAL	<b>TRAFFIC TYPICALS NOTE SHEET</b>	DATE: MAY 2022
		NO: <b>102-GEN-NOTES</b>		SHEET:  1 OF 2
FILE: 102-GEN-NOTES.dgn				

THE FOLLOWING NOTES APPLY IF CALLED FOR ON THE TRAFFIC TYPICAL

SIGNAL NOTES

- SIG1: EXISTING SIGNAL MUST BE EITHER 4-WAY FLASHING RED, BAGGED, OR TURNED OFF.
- SIG2: SIGNAL IS IN OPERATION.
- SIG3: DELINEATE THE WORK ZONE AREA WITH 28 INCH CONES FOR DAYTIME WORK, OR 42 INCH CHANNELIZING DEVICES FOR NIGHTTIME WORK.
- SIG4: THE CONTRACTOR MUST HAVE A DESIGNATED SPOTTER IF THE AERIAL BUCKET TRUCK IS LOCATED OVER ACTIVE TRAVEL LANES.
- SIG5: THE LOWEST POINT OF THE BUCKET MAY NOT TRAVEL BELOW 14 FOOT VERTICAL CLEARANCE. THE CONTRACTOR MUST UTILIZE AN ALTERNATE SET UP, OR PLACE THE INTERSECTION IN A 4 WAY STOP IF THE 14 FOOT VERTICAL CLEARANCE IS COMPROMIZED. USE TRAFFIC REGULATORS TO CONTROL TRAFFIC THROUGH THE INTERSECTION WHEN TRAFFIC IS PLACED IN A 4 WAY STOP.
- SIG6: DELINEATE THE TRUCK WITH CHANNELIZING DEVICES. THE POSITION OF THE TRUCK MAY BE MOVED TO FACILITATE WORK.

MAINTENANCE AND SURVEYING NOTES

- MS1: WHENEVER STOPPING SIGHT DISTANCE EXISTS TO THE REAR, THE SHADOW VEHICLES SHOULD MAINTAIN THE RECOMENDED DISTANCE FROM THE WORK AREA AND PROCEED AT THE SAME SPEED. THE SHADOW VEHICLE SHOULD SLOW DOWN AND TRAVEL AT A FARTHER DISTANCE TO PROVIDE ADEQUATE SIGHT DISTANCE IN ADVANCE OF VERTICAL OR HORIZONTAL CURVES.
- MS2: WORKERS OUTSIDE OF VEHICLES SHOULD WORK WITHIN 150' OF WORK VEHICLES WITH AN ACTIVATED BEACON, BETWEEN THE "BEGIN WORK CONVOY" SIGN AND THE "END WORK CONVOY" SIGN, OR BETWEEN THE "WORK ZONE BEGINS" AND "END ROAD WORK" SIGN.
- MS3: WORK OR SHADOW VEHICLES WITH OR WITHOUT A TMA MAY BE USED TO SEPARATE THE WORK SPACE FROM TRAFFIC. IF USED, THE VEHICLES SHOULD BE PARKED ACCORDING TO THE ROLL AHEAD DISTANCE TABLES.
- MS4: WORK AND SHADOW VEHICLES SHALL BE APPROPRIATELY EQUIPPED WITH AN ACTIVATED AMBER BEACON.
- MS5: WHEN WORKERS ARE OUTSIDE THEIR VEHICLES IN AN EXISTING LANE WHILE A MOBILE OPERATION IS OCCURRING DURING THE NIGHTTIME HOURS, CHANNELIZING DEVICES TO DELINEATE OPEN OR CLOSED LANES AT 50 FT SPACING MUST BE USED. AN EXAMPLE OF AN OPERATION (BUT NOT LIMITED TO) IS THE LAYOUT OF CONCRETE PATCHES.
- MS6: W21-6 AND W20-1 SIGNS MAY BE SUBSTITUTED AS DETERMINED BY THE TYPE OF WORK TAKING PLACE AS PER THE ENGINEER.



NOT TO SCALE

MAINTAINING TRAFFIC TYPICAL

NO: 102-GEN-NOTES

TRAFFIC TYPICALS  
NOTE SHEET

DATE: MAY 2022  
SHEET:

2 OF 2

SIGN NUMBER KEY

 E5-1f 48" x 48" 60" x 48"	 E5-2 48" x 36"	 E5-2a 48" x 36"	 E5-3 48" x 36"	 E13-1P VAR x 24"	 E13-1aP 36" x 24"	 G20-1 60" x 24"	 G20-2 48" x 24"
 G20-4 36" x 18"	 I-6a 18" x 18" 24" x 24" 30" x 30"	 M1-1 18" x 18" 24" x 24" 36" x 36" 48" x 48"	 M1-1 22.5" x 18" 30" x 24" 45" x 36" 60" x 48"	 M1-2 18" x 18" 24" x 24" 36" x 36" 48" x 48"	 M1-2 22.5" x 18" 30" x 24" 45" x 36" 60" x 48"	 M1-3 18" x 18" 24" x 24" 36" x 36" 48" x 48"	 M1-3 22.5" x 18" 30" x 24" 45" x 36" 60" x 48"
 M1-4 18" x 18" 24" x 24" 36" x 36" 48" x 48"	 M1-4 22.5" x 18" 30" x 24" 45" x 36" 60" x 48"	 M1-5 18" x 18" 24" x 24" 30" x 30" 36" x 36"	 M1-5a 18" x 18" 24" x 24"	 M1-6 18" x 18" 24" x 24" 36" x 36"	 M1-6 22.5" x 18" 30" x 24" 45" x 36"	 M3-1 12" x 6" 18" x 9" 24" x 12" 30" x 15" 36" x 18"	 M3-2 12" x 6" 18" x 9" 24" x 12" 30" x 15" 36" x 18"
 M3-3 12" x 6" 18" x 9" 24" x 12" 30" x 15" 36" x 18"	 M3-4 12" x 6" 18" x 9" 24" x 12" 30" x 15" 36" x 18"	 M4-1 12" x 6" 18" x 9" 24" x 12" 30" x 15" 36" x 18"	 M4-1a 12" x 6" 18" x 9" 24" x 12" 30" x 15" 36" x 18"	 M4-2 12" x 6" 18" x 9" 24" x 12" 30" x 15" 36" x 18"	 M4-3 12" x 6" 18" x 9" 24" x 12" 30" x 15" 36" x 18"	 M4-4 18" x 9" 24" x 12" 30" x 15" 36" x 18"	 M4-5 12" x 6" 18" x 9" 24" x 12" 30" x 15" 36" x 18"
 M4-6 12" x 6" 18" x 9" 24" x 12" 30" x 15" 36" x 18"	 M4-7 12" x 6" 18" x 9" 24" x 12" 30" x 15" 36" x 18"	 M4-7a 12" x 6" 18" x 9" 24" x 12" 30" x 15" 36" x 18"	 M4-8 12" x 6" 18" x 9" 24" x 12" 30" x 15"	 M4-8a 24" x 18"	 M4-8b 24" x 12"	 M4-9L 30" x 24" 48" x 36" 60" x 48"	 M4-9R 30" x 24" 48" x 36" 60" x 48"
 M4-9j 30" x 24" 48" x 36" 60" x 48"	 M4-9kL 30" x 30" 48" x 42" 60" x 54"	 M4-9kR 30" x 30" 48" x 42" 60" x 54"	 M4-9mL 30" x 30" 48" x 42" 60" x 54"	 M4-9mR 30" x 30" 48" x 42" 60" x 54"	 M4-9dL 12" x 18"	 M4-9dR 12" x 18"	 M4-9e 12" x 18"
 M4-9f 12" x 18"	 M4-9gL 12" x 18"	 M4-9gR 12" x 18"	 M4-9h 12" x 24"	 M4-9i 12" x 18"	 M4-10L 48" x 18"	 M4-10R 48" x 18"	 M4-11a 12" x 6" 18" x 9" 24" x 12" 30" x 15" 36" x 18"
 M5-1L 12" x 9" 21" x 15" 30" x 21"	 M5-1R 12" x 9" 21" x 15" 30" x 21"	 M5-2L 12" x 9" 21" x 15" 30" x 21"	 M5-2R 12" x 9" 21" x 15" 30" x 21"	 M5-3 12" x 9" 21" x 15" 30" x 21"	 M6-1L 12" x 9" 18" x 12" 21" x 15" 30" x 21"	 M6-1R 12" x 9" 18" x 12" 21" x 15" 30" x 21"	 M6-2L 12" x 9" 18" x 12" 21" x 15" 30" x 21"
 M6-2R 12" x 9" 18" x 12" 21" x 15" 30" x 21"	 M6-3 12" x 9" 18" x 12" 21" x 15" 30" x 21"	 M6-4 12" x 9" 18" x 12" 21" x 15" 30" x 21"	 M6-5 12" x 9" 18" x 12" 21" x 15" 30" x 21"	 M6-6L 12" x 9" 18" x 12" 21" x 15" 30" x 21"	 M6-6R 12" x 9" 18" x 12" 21" x 15" 30" x 21"	 M6-7L 12" x 9" 18" x 12" 21" x 15" 30" x 21"	 M6-7R 12" x 9" 18" x 12" 21" x 15" 30" x 21"

SEE MDOT SHS 13-WORK ZONE FOR SIGN DETAILS



NOT TO SCALE

MAINTAINING TRAFFIC TYPICAL

NO:

103-GEN-SIGN

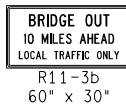
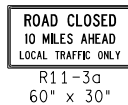
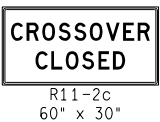
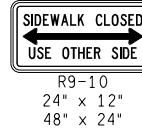
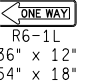
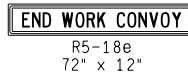
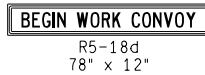
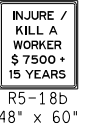
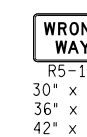
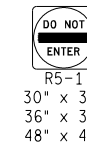
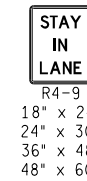
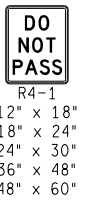
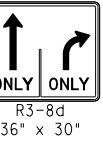
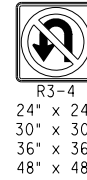
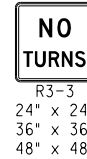
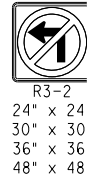
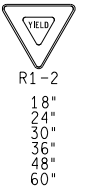
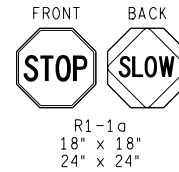
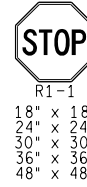
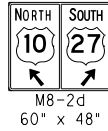
TRAFFIC TYPICALS  
SIGN SHEET

DATE:  
JUNE 2021

SHEET:

1 OF 5

SIGN NUMBER KEY



SEE MDOT SHS 13-WORK ZONE FOR SIGN DETAILS



NOT TO SCALE

MAINTAINING TRAFFIC TYPICAL

NO: 103-GEN-SIGN

TRAFFIC TYPICALS SIGN SHEET

DATE: JUNE 2021  
SHEET:

FILE: 103-GEN-SIGN.dgn

2 OF 5

SIGN NUMBER KEY



W1-1L  
18" x 18"  
24" x 24"  
30" x 30"  
36" x 36"  
48" x 48"



W1-1R  
18" x 18"  
24" x 24"  
30" x 30"  
36" x 36"  
48" x 48"



W1-2L  
18" x 18"  
24" x 24"  
30" x 30"  
36" x 36"  
48" x 48"



W1-2R  
18" x 18"  
24" x 24"  
30" x 30"  
36" x 36"  
48" x 48"



W1-2bL  
36" x 36"  
48" x 48"



W1-2bR  
36" x 36"  
48" x 48"



W1-3L  
18" x 18"  
24" x 24"  
30" x 30"  
36" x 36"  
48" x 48"



W1-3R  
18" x 18"  
24" x 24"  
30" x 30"  
36" x 36"  
48" x 48"



W1-4L  
18" x 18"  
24" x 24"  
30" x 30"  
36" x 36"  
48" x 48"



W1-4R  
18" x 18"  
24" x 24"  
30" x 30"  
36" x 36"  
48" x 48"



W1-4bL  
24" x 24"  
30" x 30"  
36" x 36"  
48" x 48"



W1-4bR  
24" x 24"  
30" x 30"  
36" x 36"  
48" x 48"



W1-4cL  
24" x 24"  
30" x 30"  
36" x 36"  
48" x 48"



W1-4cR  
24" x 24"  
30" x 30"  
36" x 36"  
48" x 48"



W24-1L  
30" x 30"  
36" x 36"  
48" x 48"

ALL LANES

W24-1cP  
24" x 18"  
30" x 24"



W24-1R  
30" x 30"  
36" x 36"  
48" x 48"



W24-1aL  
30" x 30"  
36" x 36"  
48" x 48"



W24-1aR  
30" x 30"  
36" x 36"  
48" x 48"



W24-1bL  
30" x 30"  
36" x 36"  
48" x 48"



W24-1bR  
30" x 30"  
36" x 36"  
48" x 48"



W1-6L  
24" x 12"  
36" x 18"  
48" x 24"  
60" x 30"  
96" x 48"



W1-6R  
24" x 12"  
36" x 18"  
48" x 24"  
60" x 30"  
96" x 48"



W1-8L  
12" x 18"  
18" x 24"  
24" x 30"  
30" x 36"  
36" x 48"



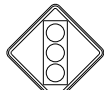
W1-8R  
12" x 18"  
18" x 24"  
24" x 30"  
30" x 36"  
36" x 48"



W3-1  
18" x 18"  
24" x 24"  
30" x 30"  
36" x 36"  
48" x 48"



W3-2  
18" x 18"  
24" x 24"  
30" x 30"  
36" x 36"  
48" x 48"



W3-3  
18" x 18"  
30" x 30"  
36" x 36"  
48" x 48"



W3-4  
30" x 30"  
36" x 36"  
48" x 48"  
60" x 60"



W3-4b  
30" x 30"  
36" x 36"  
48" x 48"



W3-5  
36" x 36"  
48" x 48"



W3-5a  
30" x 30"  
36" x 36"  
48" x 48"  
60" x 60"



W3-5b  
30" x 30"  
36" x 36"  
48" x 48"



W4-1L  
24" x 24"  
30" x 30"  
36" x 36"  
48" x 48"



W4-1R  
24" x 24"  
30" x 30"  
36" x 36"  
48" x 48"



W4-2L  
30" x 30"  
36" x 36"  
48" x 48"



W4-2R  
30" x 30"  
36" x 36"  
48" x 48"



W4-3L  
30" x 30"  
36" x 36"  
48" x 48"



W4-3R  
30" x 30"  
36" x 36"  
48" x 48"



W4-5L  
24" x 24"  
30" x 30"  
36" x 36"  
48" x 48"



W4-5R  
24" x 24"  
30" x 30"  
36" x 36"  
48" x 48"



W4-5P  
18" x 24"  
24" x 30"



W4-6L  
24" x 24"  
30" x 30"  
36" x 36"  
48" x 48"



W4-6R  
24" x 24"  
30" x 30"  
36" x 36"  
48" x 48"



W4-7L  
30" x 30"  
36" x 36"  
48" x 48"  
60" x 60"



W4-7R  
30" x 30"  
36" x 36"  
48" x 48"  
60" x 60"



W5-1  
30" x 30"  
36" x 36"  
48" x 48"



W5-2  
18" x 18"  
30" x 30"  
36" x 36"  
48" x 48"



W5-3  
24" x 24"  
30" x 30"  
36" x 36"  
48" x 48"



W5-4  
30" x 30"  
36" x 36"  
48" x 48"



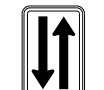
W6-1  
30" x 30"  
36" x 36"  
48" x 48"



W6-2  
30" x 30"  
36" x 36"  
48" x 48"



W6-3  
30" x 30"  
36" x 36"  
48" x 48"



W6-4  
12" x 18"



W7-1  
24" x 24"  
30" x 30"  
36" x 36"  
48" x 48"



W7-1a  
24" x 24"  
30" x 30"  
36" x 36"  
48" x 48"



W8-1  
18" x 18"  
24" x 24"  
30" x 30"  
36" x 36"  
48" x 48"

SEE MDOT SHS 13-WORK ZONE FOR SIGN DETAILS



NOT TO SCALE

MAINTAINING TRAFFIC TYPICAL

NO:

103-GEN-SIGN

TRAFFIC TYPICAL  
SIGN SHEET

DATE:  
JUNE 2021

SHEET:

3 OF 5

SIGN NUMBER KEY



W8-2  
18" x 18"  
24" x 24"  
30" x 30"  
36" x 36"  
48" x 48"



W8-3  
18" x 18"  
30" x 30"  
36" x 36"  
48" x 48"



W8-4  
18" x 18"  
24" x 24"  
30" x 30"  
36" x 36"  
48" x 48"



W8-5  
24" x 24"  
30" x 30"  
36" x 36"  
48" x 48"



W8-5P  
24" x 18"  
30" x 24"  
36" x 30"



W8-7  
24" x 24"  
30" x 30"  
36" x 36"  
48" x 48"



W8-8  
24" x 24"  
30" x 30"  
36" x 36"  
48" x 48"



W8-9  
24" x 24"  
30" x 30"  
36" x 36"  
48" x 48"



W8-11  
24" x 24"  
30" x 30"  
36" x 36"  
48" x 48"



W8-12  
30" x 30"  
36" x 36"  
48" x 48"



W8-14  
24" x 24"  
30" x 30"  
36" x 36"  
48" x 48"



W8-15  
24" x 24"  
30" x 30"  
36" x 36"  
48" x 48"



W8-15P  
24" x 18"  
30" x 24"  
36" x 30"



W8-17L  
24" x 24"  
30" x 30"  
36" x 36"  
48" x 48"



W8-17R  
24" x 24"  
30" x 30"  
36" x 36"  
48" x 48"



W8-17P  
24" x 18"  
30" x 24"  
36" x 30"



W8-18  
24" x 24"  
36" x 36"  
48" x 48"



W8-23  
24" x 24"  
36" x 36"  
48" x 48"



W8-24  
30" x 30"  
36" x 36"  
48" x 48"



W8-25  
24" x 24"  
30" x 30"  
36" x 36"  
48" x 48"



W8-26  
36" x 36"  
48" x 48"



W9-1L  
24" x 24"  
30" x 30"  
36" x 36"  
48" x 48"



W9-1R  
24" x 24"  
30" x 30"  
36" x 36"  
48" x 48"



W9-2L  
30" x 30"  
36" x 36"  
48" x 48"



W9-2R  
30" x 30"  
36" x 36"  
48" x 48"



W9-3C  
30" x 30"  
36" x 36"  
48" x 48"  
60" x 60"



W9-3L  
30" x 30"  
36" x 36"  
48" x 48"  
60" x 60"



W9-3R  
30" x 30"  
36" x 36"  
48" x 48"  
60" x 60"



W9-3a  
30" x 30"  
36" x 36"  
48" x 48"  
60" x 60"



W9-3b  
30" x 30"  
36" x 36"  
48" x 48"  
60" x 60"



W11-10  
24" x 24"  
30" x 30"  
36" x 36"  
48" x 48"



W11-10a  
30" x 30"  
36" x 36"  
48" x 48"



W11-24  
36" x 36"  
48" x 48"



W12-1  
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30" x 30"  
36" x 36"  
48" x 48"



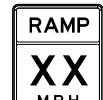
W12-2  
18" x 18"  
24" x 24"  
30" x 30"  
36" x 36"  
48" x 48"



W13-1P  
18" x 18"  
24" x 24"  
30" x 30"



W13-2  
24" x 30"  
36" x 48"  
48" x 60"



W13-3  
24" x 30"  
36" x 48"  
48" x 60"



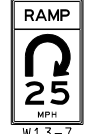
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36" x 36"



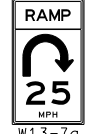
W13-6  
24" x 42"  
36" x 60"  
48" x 84"



W13-6a  
24" x 42"  
36" x 60"  
48" x 84"



W13-7  
24" x 42"  
36" x 60"  
48" x 84"



W13-7a  
24" x 42"  
36" x 60"  
48" x 84"



W14-3  
36" x 24"  
40" x 30"  
48" x 36"  
64" x 48"



W16-2P  
18" x 12"  
24" x 18"  
30" x 24"



W16-4aP  
18" x 12"  
24" x 18"  
30" x 24"  
36" x 30"



W16-12P  
24" x 18"



W16-13P  
24" x 18"  
30" x 24"



W20-1  
24" x 24"  
30" x 30"  
36" x 36"  
48" x 48"  
60" x 60"



W20-1a  
24" x 24"  
30" x 30"  
36" x 36"  
48" x 48"  
60" x 60"



W20-1b  
24" x 24"  
30" x 30"  
36" x 36"  
48" x 48"  
60" x 60"



W20-1c  
24" x 24"  
30" x 30"  
36" x 36"  
48" x 48"  
60" x 60"



W20-1d  
24" x 24"  
30" x 30"  
36" x 36"  
48" x 48"  
60" x 60"



W20-2  
30" x 30"  
36" x 36"  
48" x 48"



W20-3  
30" x 30"  
36" x 36"  
48" x 48"



W20-3a  
30" x 30"  
36" x 36"  
48" x 48"

SEE MDOT SHS 13-WORK ZONE FOR SIGN DETAILS



NOT TO SCALE

MAINTAINING TRAFFIC TYPICAL

NO:

103-GEN-SIGN

TRAFFIC TYPICALS  
SIGN SHEET

DATE:  
JUNE 2021

SHEET:

4 OF 5

SIGN NUMBER KEY



W20-3b  
30" x 30"  
36" x 36"  
48" x 48"



W20-4  
30" x 30"  
36" x 36"  
48" x 48"



W20-4c  
36" x 36"  
48" x 48"



W20-5c  
30" x 30"  
36" x 36"  
48" x 48"



W20-5L  
30" x 30"  
36" x 36"  
48" x 48"



W20-5L1  
30" x 30"  
36" x 36"  
48" x 48"



W20-5L2  
30" x 30"  
36" x 36"  
48" x 48"



W20-5R  
30" x 30"  
36" x 36"  
48" x 48"



W20-5R1  
30" x 30"  
36" x 36"  
48" x 48"



W20-5R2  
30" x 30"  
36" x 36"  
48" x 48"



W20-5aL2  
30" x 30"  
36" x 36"  
48" x 48"



W20-5aL3  
30" x 30"  
36" x 36"  
48" x 48"



W20-5aR2  
30" x 30"  
36" x 36"  
48" x 48"



W20-5aR3  
30" x 30"  
36" x 36"  
48" x 48"



W20-7a  
30" x 30"  
36" x 36"  
48" x 48"



W20-8  
24" x 18"



W20-9  
54" x 48"



W20-10  
48" x 24"  
66" x 30"



W20-11  
12" x 18"



W20-12P  
VARIABLE x 12"



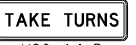
W20-13P  
VARIABLE x 12"



W20-14L  
36" x 36"  
48" x 48"



W20-14R  
36" x 36"  
48" x 48"



W20-14dP  
36" x 12"  
48" x 12"



W20-14bP  
36" x 12"  
48" x 12"



W20-15  
36" x 36"  
48" x 48"



W20-15a  
36" x 36"  
48" x 48"



W20-15c  
48" x 54"



W20-15d  
48" x 54"



W20-16  
36" x 36"  
48" x 48"



W20-17  
36" x 36"  
48" x 48"



W21-1  
24" x 24"  
30" x 30"  
36" x 36"  
48" x 48"



W21-2  
24" x 24"  
30" x 30"  
36" x 36"  
48" x 48"



W21-2  
24" x 24"  
30" x 30"  
36" x 36"  
48" x 48"



W21-3  
24" x 24"  
30" x 30"  
36" x 36"  
48" x 48"



W21-4  
36" x 18"



W21-5  
24" x 24"  
30" x 30"  
36" x 36"  
48" x 48"



W21-5aL  
30" x 30"  
36" x 36"  
48" x 48"  
60" x 60"



W21-5aR  
30" x 30"  
36" x 36"  
48" x 48"  
60" x 60"



W21-5bL  
30" x 30"  
36" x 36"  
48" x 48"  
60" x 60"



W21-5bR  
30" x 30"  
36" x 36"  
48" x 48"  
60" x 60"



W21-6  
24" x 24"  
30" x 30"  
36" x 36"  
48" x 48"



W21-7  
30" x 30"  
36" x 36"  
48" x 48"



W21-8  
30" x 30"  
36" x 36"  
48" x 48"



W22-1  
30" x 30"  
36" x 36"  
48" x 48"



W22-2  
42" x 36"



W22-3  
36" x 30"  
42" x 36"



W23-1  
48" x 24"



W23-2  
36" x 36"  
48" x 48"

SEE MDOT SHS 13-WORK ZONE FOR SIGN DETAILS



NOT TO SCALE

MAINTAINING TRAFFIC TYPICAL

NO:

103-GEN-SIGN

TRAFFIC TYPICAL  
SIGN SHEET

DATE:  
JUNE 2021

SHEET:

5 OF 5

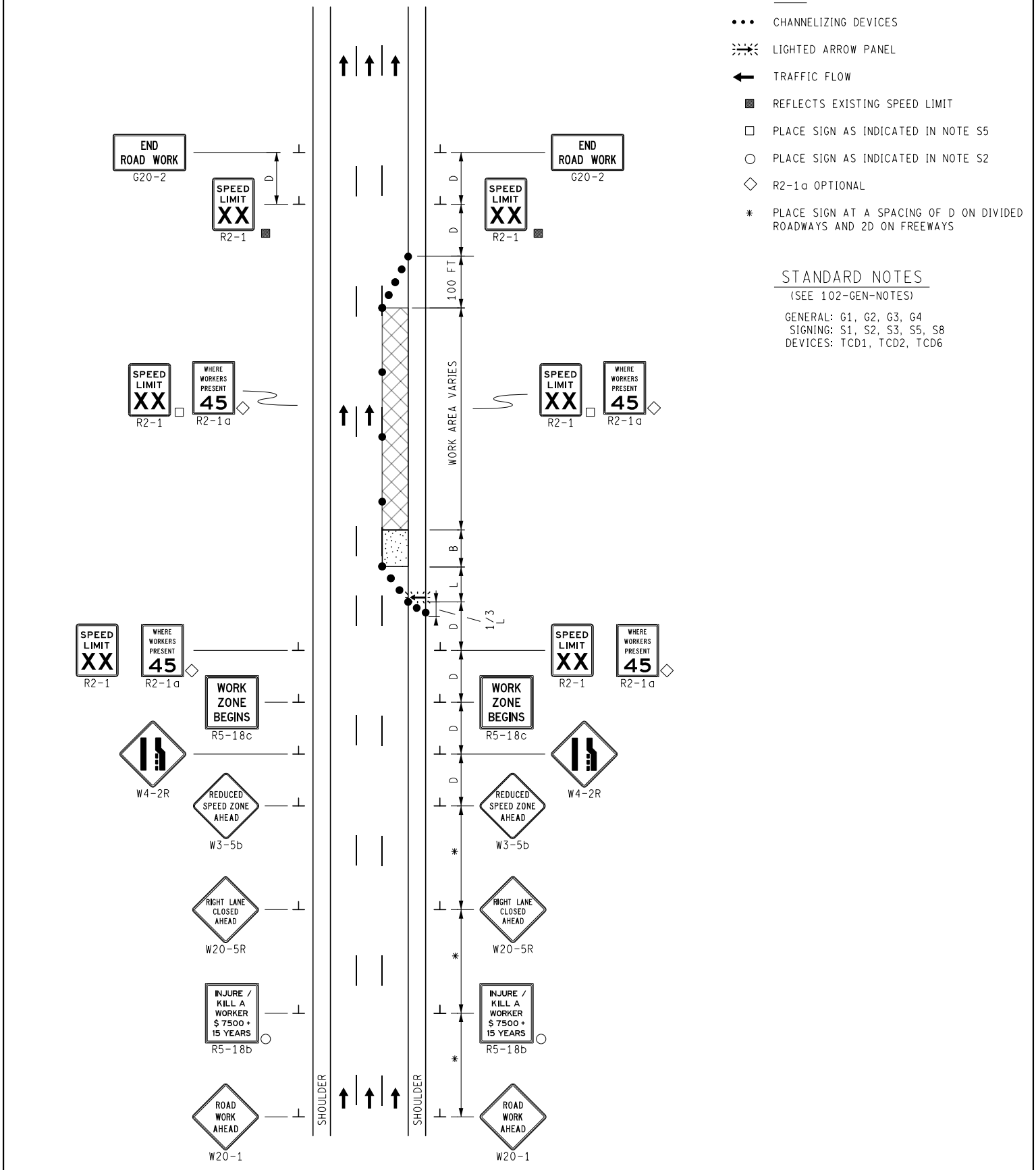
# KEY

- CHANNELIZING DEVICES
- ⚡ LIGHTED ARROW PANEL
- ← TRAFFIC FLOW
- REFLECTS EXISTING SPEED LIMIT
- PLACE SIGN AS INDICATED IN NOTE S5
- PLACE SIGN AS INDICATED IN NOTE S2
- ◇ R2-1a OPTIONAL
- \* PLACE SIGN AT A SPACING OF D ON DIVIDED ROADWAYS AND 2D ON FREEWAYS

# STANDARD NOTES

(SEE 102-GEN-NOTES)

GENERAL: G1, G2, G3, G4  
 SIGNING: S1, S2, S3, S5, S8  
 DEVICES: TCD1, TCD2, TCD6



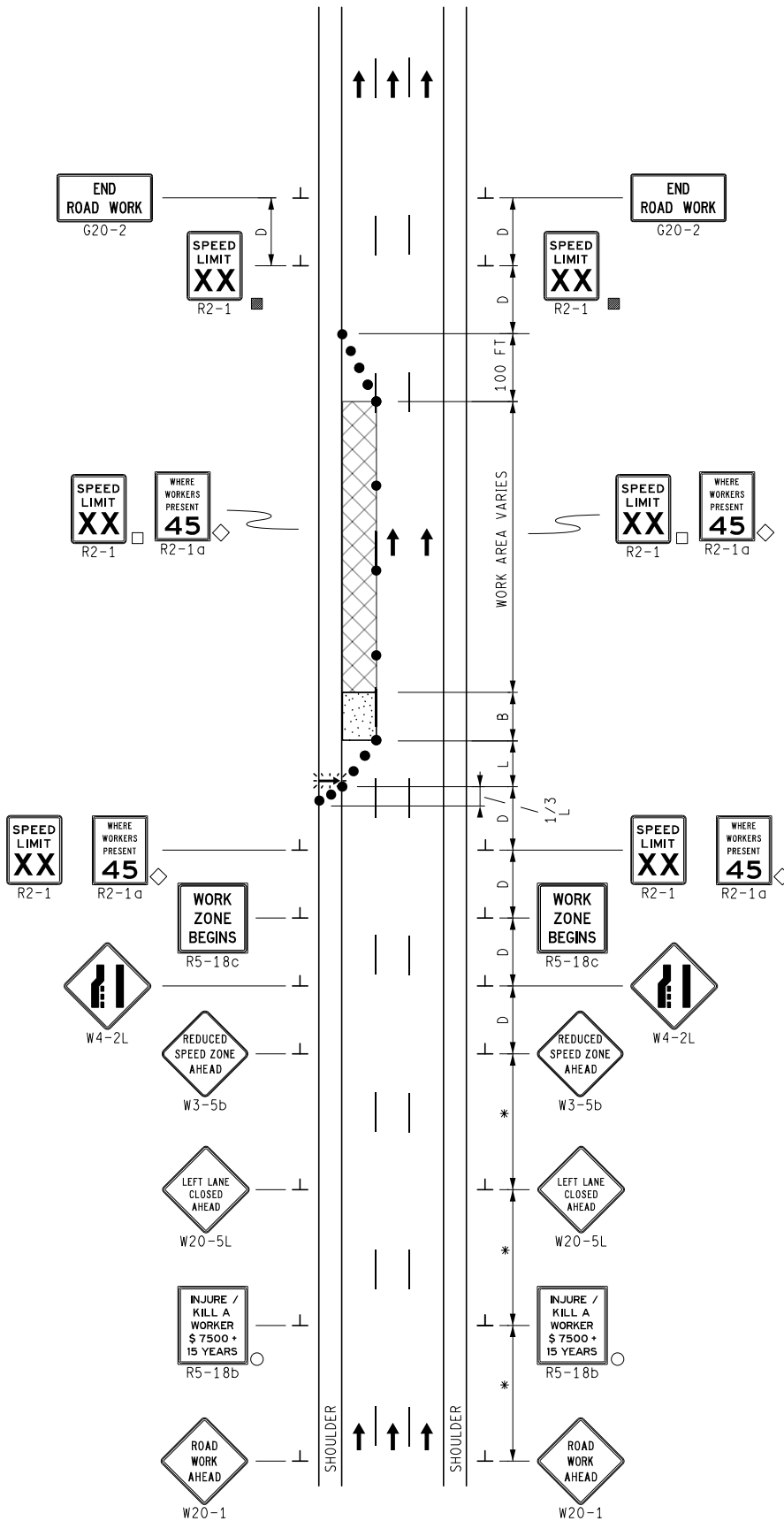
### KEY

- CHANNELIZING DEVICES
- ⚡ LIGHTED ARROW PANEL
- ← TRAFFIC FLOW
- REFLECTS EXISTING SPEED LIMIT
- PLACE SIGN AS INDICATED IN NOTE S2
- ◇ R2-1a OPTIONAL
- \* PLACE SIGN AT A SPACING OF D ON DIVIDED ROADWAYS AND 2D ON FREEWAYS

### STANDARD NOTES

(SEE 102-GEN-NOTES)

GENERAL: G1, G2, G3, G4  
 SIGNING: S1, S2, S3, S5, S8  
 DEVICES: TCD1, TCD2, TCD6



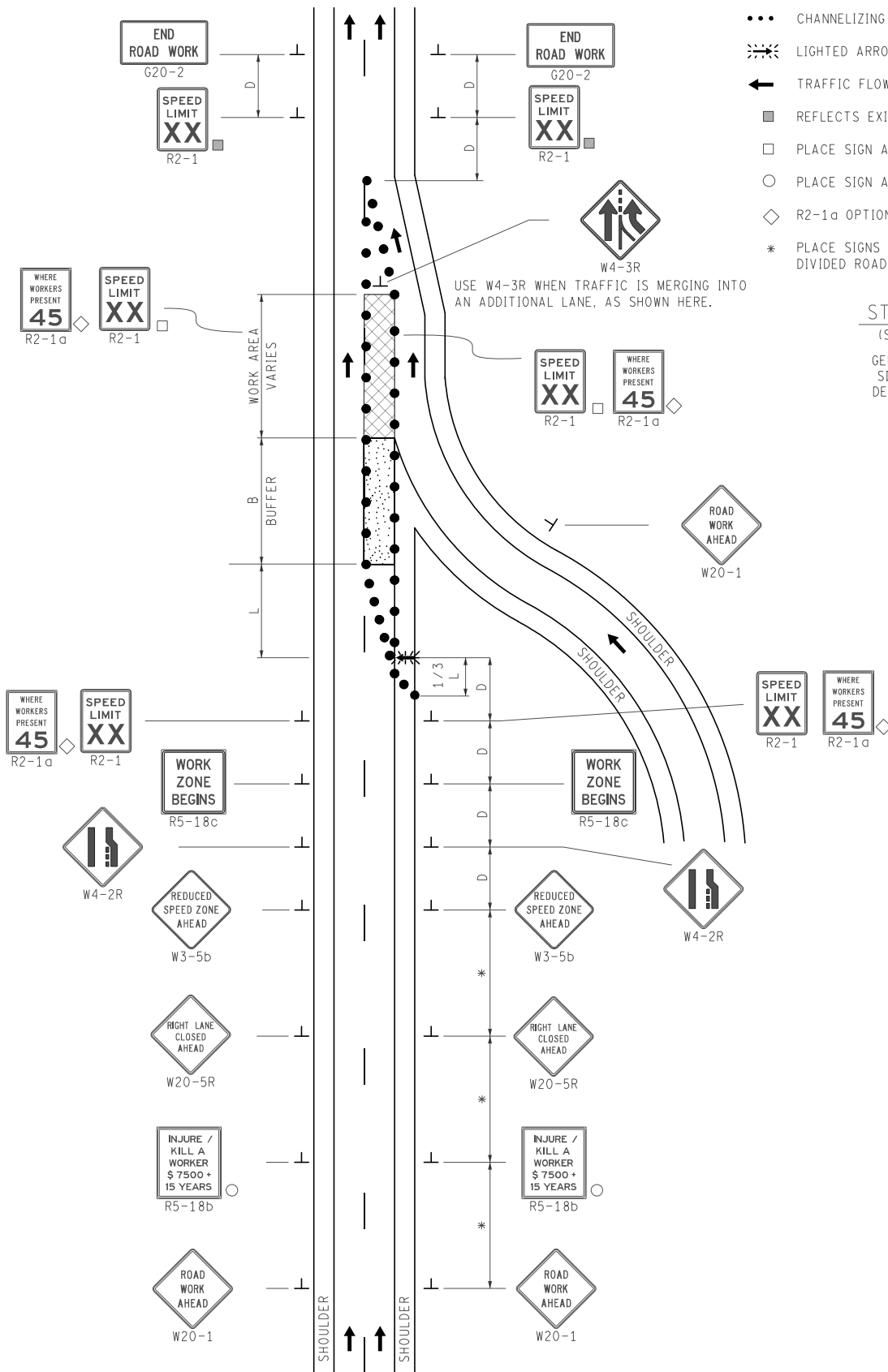
# KEY

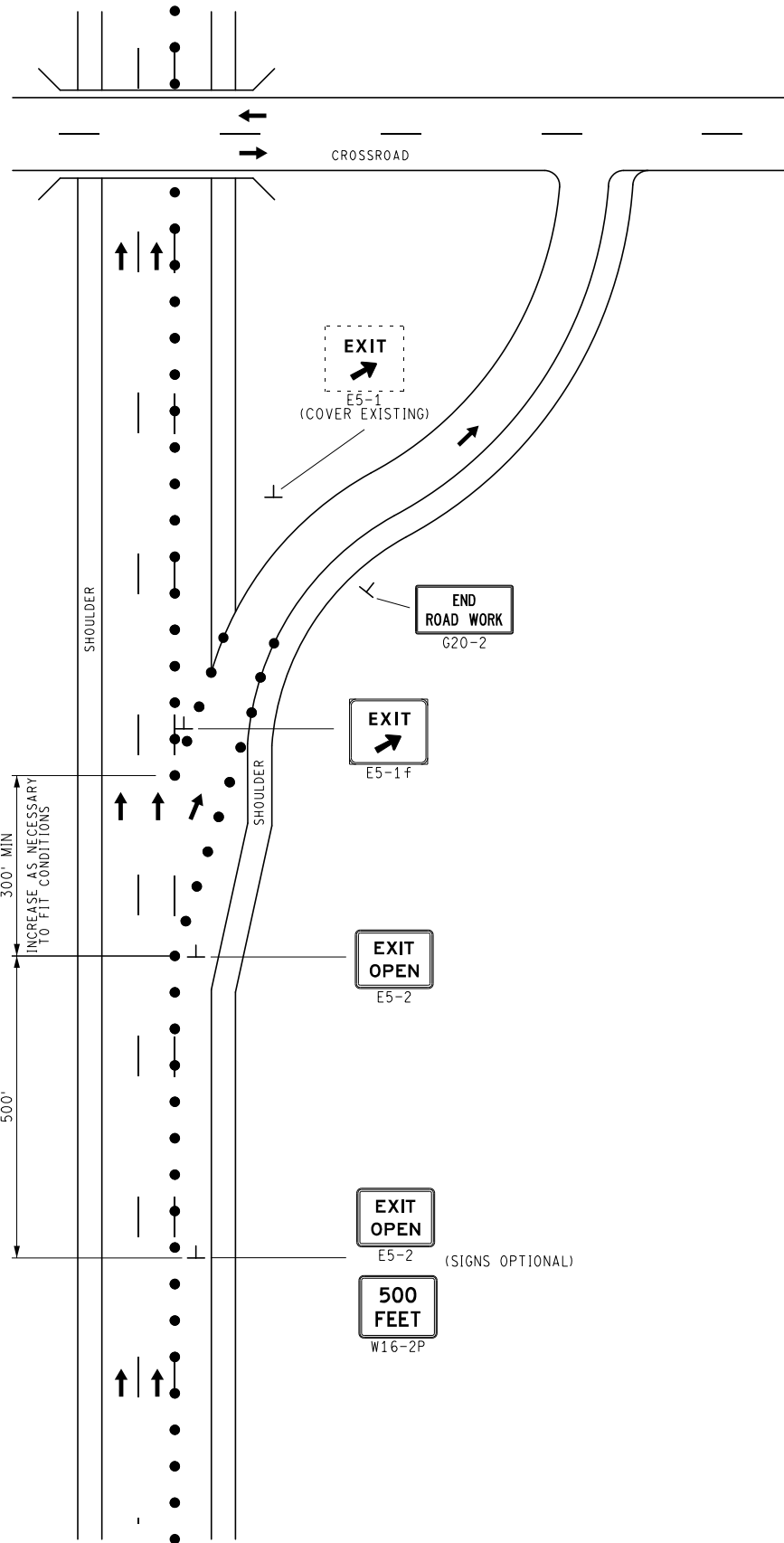
- CHANNELIZING DEVICES
- ⚡ LIGHTED ARROW PANEL
- ← TRAFFIC FLOW
- REFLECTS EXISTING SPEED LIMIT
- PLACE SIGN AS INDICATED IN NOTE S5
- PLACE SIGN AS INDICATED IN NOTE S2
- ◇ R2-1a OPTIONAL
- \* PLACE SIGNS AT A SPACING OF D ON DIVIDED ROADWAYS AND 2D ON FREEWAYS

# STANDARD NOTES

(SEE 102-GEN-NOTES)

GENERAL: G1, G2, G3, G4  
 SIGNING: S1, S2, S3, S5, S8  
 DEVICES: TCD1, TCD2, TCD6





KEY

- CHANNELIZING DEVICES
- ← TRAFFIC FLOW

STANDARD NOTES

(SEE 102-GEN-NOTES)

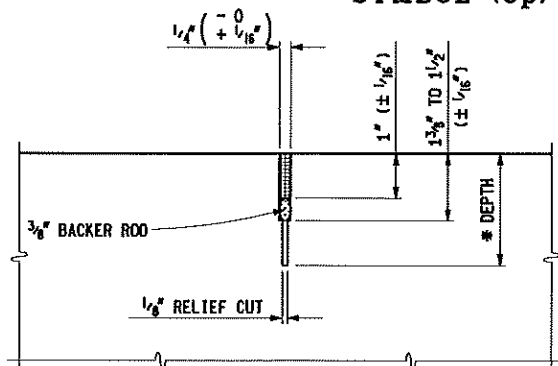
GENERAL: G1, G2, G3, G4

SIGNING: S1

DEVICES: TCD1, TCD2

RAMP: RMP1

**SYMBOL (Cp) AND (C3p)**

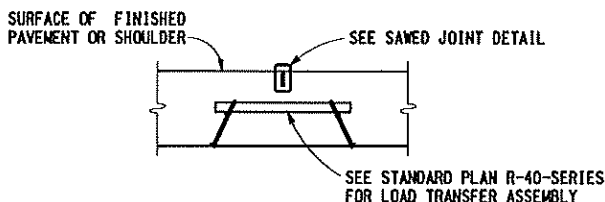


SYMBOL	LOAD TRANSFER	JOINT USE
(Cp)	YES	PAVEMENT
(C3p)	NO	SHOULDER

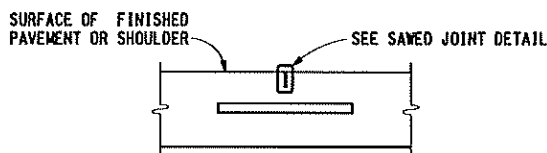
**SAWED JOINT DETAIL**

SAWED JOINT SEALED WITH LOW MODULUS HOT-POURED RUBBER-ASPHALT TYPE JOINT SEALING COMPOUND.

\* DEPTH OF RELIEF CUT FOR JOINT (Cp) AND (C3p) SHALL BE 1/4 THE SLAB THICKNESS FOR PAVEMENTS LESS THAN OR EQUAL TO 7" IN THICKNESS AND 1/3 THE SLAB THICKNESS FOR PAVEMENTS GREATER THAN 7" THICK.



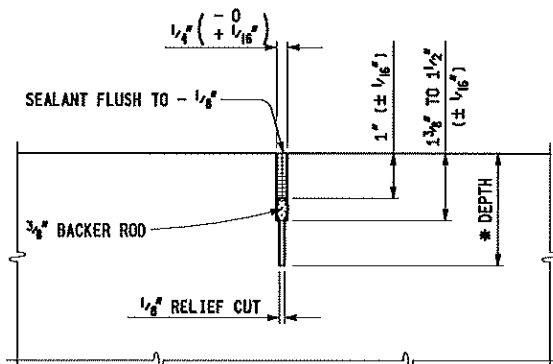
**LOAD TRANSFER ASSEMBLY METHOD**



**DOWEL BAR INSERTER METHOD**

**TRANSVERSE CONTRACTION JOINT**

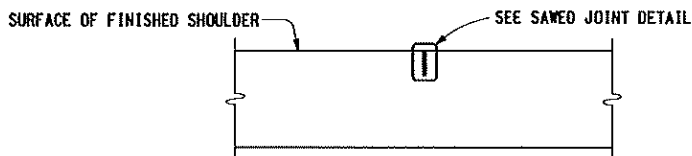
**SYMBOL (W)**



**SAWED JOINT DETAIL**

SAWED JOINT SEALED WITH LOW MODULUS HOT-POURED RUBBER-ASPHALT TYPE JOINT SEALING COMPOUND.

\* DEPTH OF RELIEF CUT FOR JOINT 1/4 THE SLAB THICKNESS.



**TRANSVERSE AND INTERSECTION PLANE OF WEAKNESS JOINTS**



PREPARED BY  
DESIGN DIVISION

DRAWN BY: B.L.T.

CHECKED BY: W.K.P.

DEPARTMENT DIRECTOR  
Kirk T. Stuede

APPROVED BY: Kimberly Avery  
DIRECTOR, BUREAU OF FIELD SERVICES

APPROVED BY: Bradley C. Wiefelich  
DIRECTOR, BUREAU OF DEVELOPMENT

MICHIGAN DEPARTMENT OF TRANSPORTATION  
BUREAU OF DEVELOPMENT STANDARD PLAN FOR

**TRANSVERSE PAVEMENT JOINTS  
(PLAIN CONCRETE PAVEMENT)**

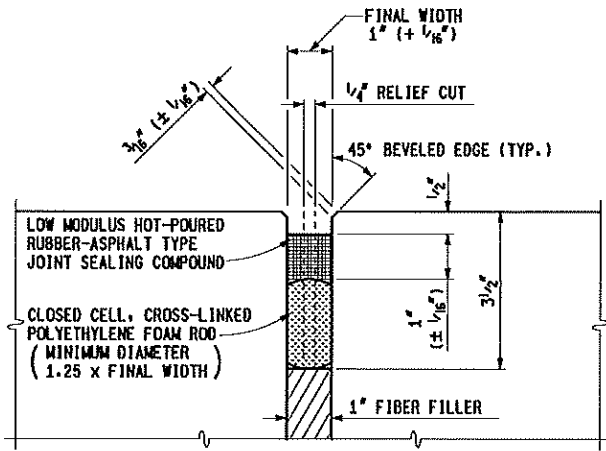
2-21-2018  
F.H.W.A. APPROVAL

9-25-2017  
PLAN DATE

**R-39-K**

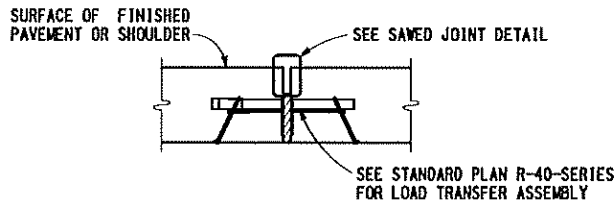
SHEET  
1 OF 5

**SYMBOL (E2) AND (E4)**



**SAWED JOINT DETAIL**

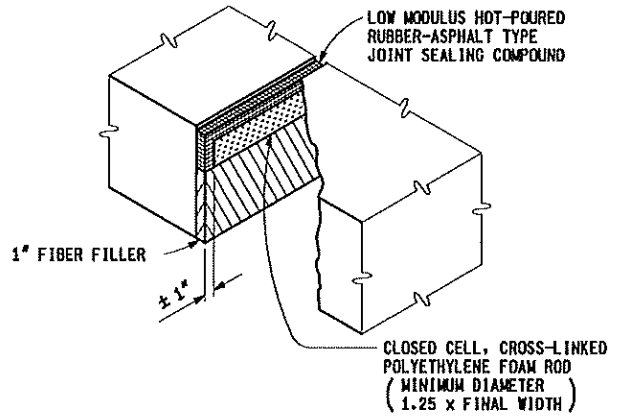
SAWED JOINT SEALED WITH LOW MODULUS HOT-POURED RUBBER-ASPHALT TYPE JOINT SEALING COMPOUND.



**NOTE:**

THE FINAL WIDTH OF THE GROOVE SHALL BE  $1" + \frac{1}{16}"$  PLUS ANY INCREASE OR MINUS ANY DECREASE IN THE WIDTH OF THE RELIEF CUT. THE FINAL SAW CUT SHALL BE TO THE TOP OF THE FIBER FILLER WITH A MINIMUM DEPTH AS SHOWN AND SHALL BE CENTERED OVER THE FIBER FILLER WITH A HORIZONTAL TOLERANCE OF  $\frac{1}{4}"$ . FIBER FILLER FOR EXPANSION JOINTS IN CONCRETE SHOULDERS SHALL BE FREE OF HOLES OR OTHER DEFECTS AND TRIMMED TO FIT SHOULDER CONFIGURATIONS.

SYMBOL	LOAD TRANSFER ASSEMBLY	JOINT USE
(E2)	YES	PAVEMENT
(E4)	NO	SHOULDER

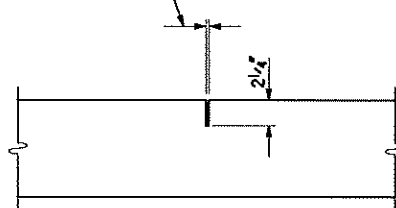


**OUTSIDE EDGE TREATMENT**

**TRANSVERSE EXPANSION JOINT**

**SYMBOL (U)**

$\frac{1}{2}"$  SAWED JOINT OR A FORMED JOINT MADE BY PLACING  $\frac{1}{4}"$  HARDBOARD OR OTHER APPROVED MATERIAL FLUSH WITH THE SURFACE OF THE CONCRETE BASE COURSE AND TRUE TO POSITION AND LINE BEFORE THE CONCRETE HAS SET



**TRANSVERSE PLANE OF WEAKNESS JOINTS IN CONCRETE BASE COURSE**

MICHIGAN DEPARTMENT OF TRANSPORTATION  
BUREAU OF DEVELOPMENT STANDARD PLAN FOR

**TRANSVERSE PAVEMENT JOINTS  
(PLAIN CONCRETE PAVEMENT)**

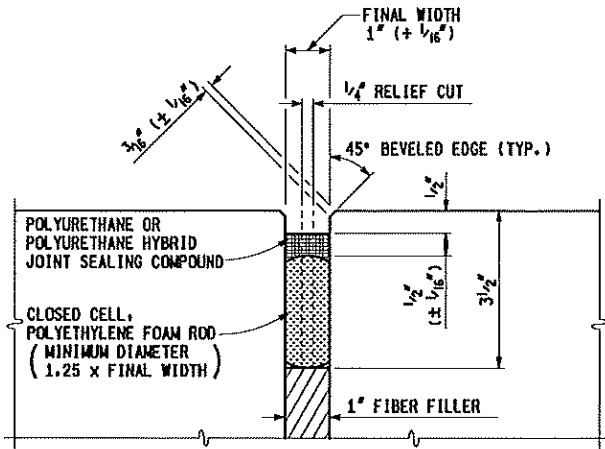
2-21-2018  
F.H.W.A. APPROVAL

9-25-2017  
PLAN DATE

**R-39-K**

SHEET  
2 OF 5

**SYMBOL (E3)**

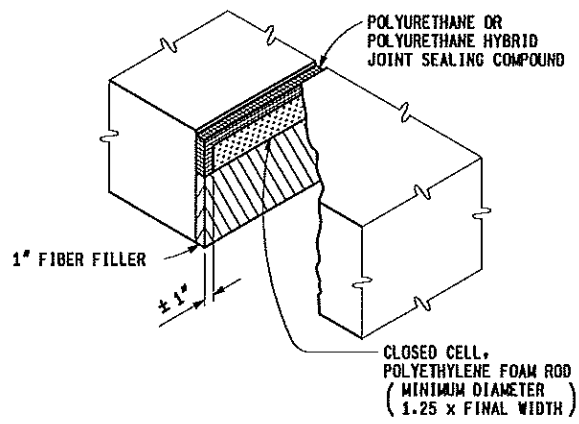


**SAWED JOINT DETAIL**  
SAWED JOINT SEALED WITH POLYURETHANE OR POLYURETHANE HYBRID JOINT SEALING COMPOUND.

**NOTE:**

THE FINAL WIDTH OF THE GROOVE SHALL BE  $1" + \frac{1}{16}"$  PLUS ANY INCREASE OR MINUS ANY DECREASE IN THE WIDTH OF THE RELIEF CUT. THE FINAL SAW CUT SHALL BE TO THE TOP OF THE FIBER FILLER WITH A MINIMUM DEPTH AS SHOWN AND SHALL BE CENTERED OVER THE FIBER FILLER WITH A HORIZONTAL TOLERANCE OF  $\frac{1}{4}"$ . FIBER FILLER FOR EXPANSION JOINTS IN CONCRETE SHOULDERS SHALL BE FREE OF HOLES OR OTHER DEFECTS AND TRIMMED TO FIT SHOULDER CONFIGURATIONS.

SYMBOL	LOAD TRANSFER ASSEMBLY	JOINT USE
(E3)	NO	PAVEMENT & SHOULDER



**OUTSIDE EDGE TREATMENT**

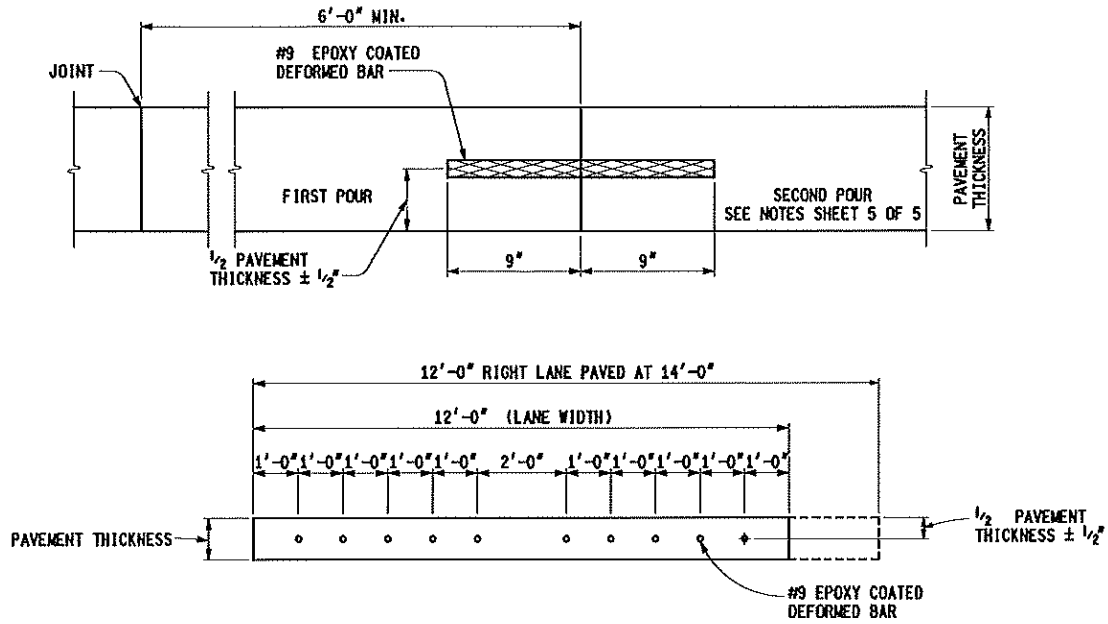
**TRANSVERSE EXPANSION JOINT**

MICHIGAN DEPARTMENT OF TRANSPORTATION  
BUREAU OF DEVELOPMENT STANDARD PLAN FOR

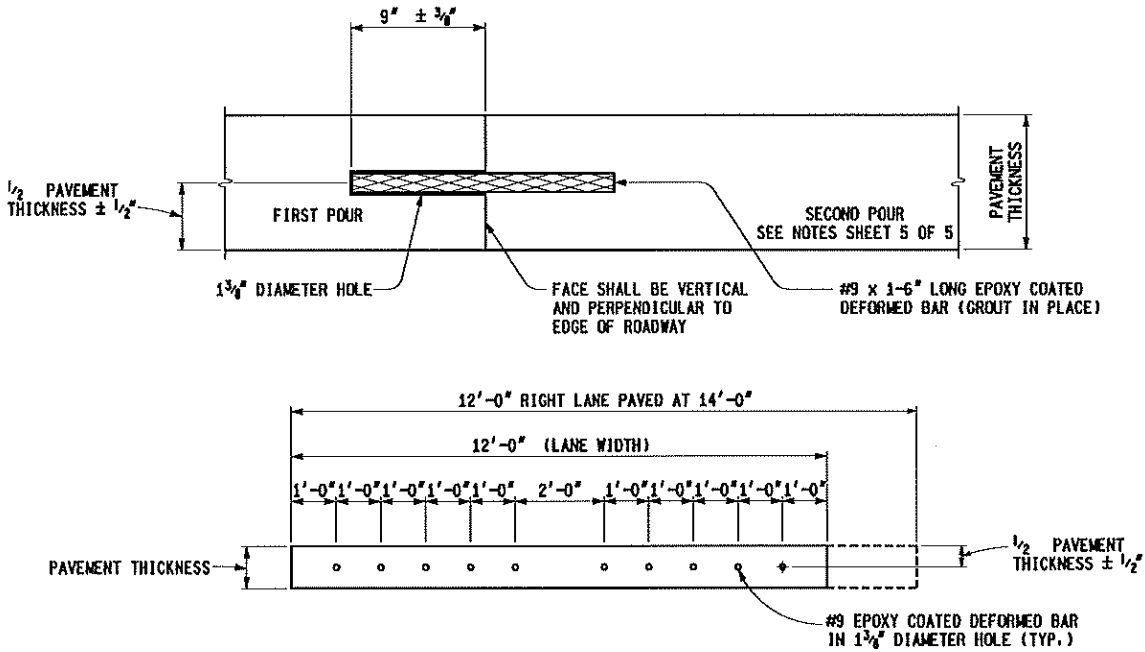
**TRANSVERSE PAVEMENT JOINTS**  
(PLAIN CONCRETE PAVEMENT)

2-21-2018 F.H.W.A. APPROVAL	9-25-2017 PLAN DATE	<b>R-39-K</b>	SHEET 3 OF 5
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**SYMBOL (H)**



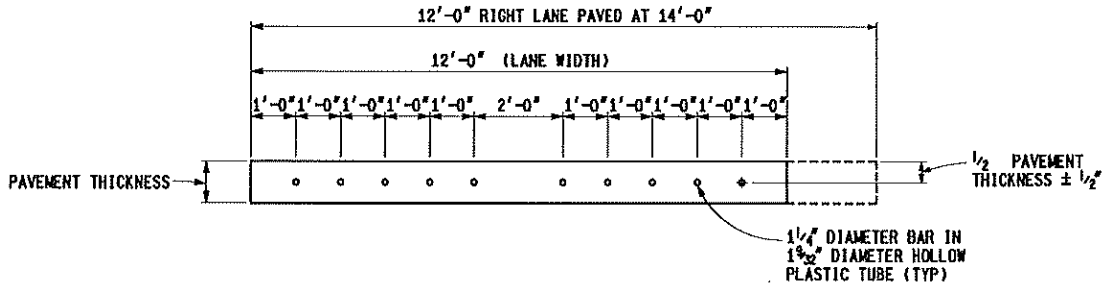
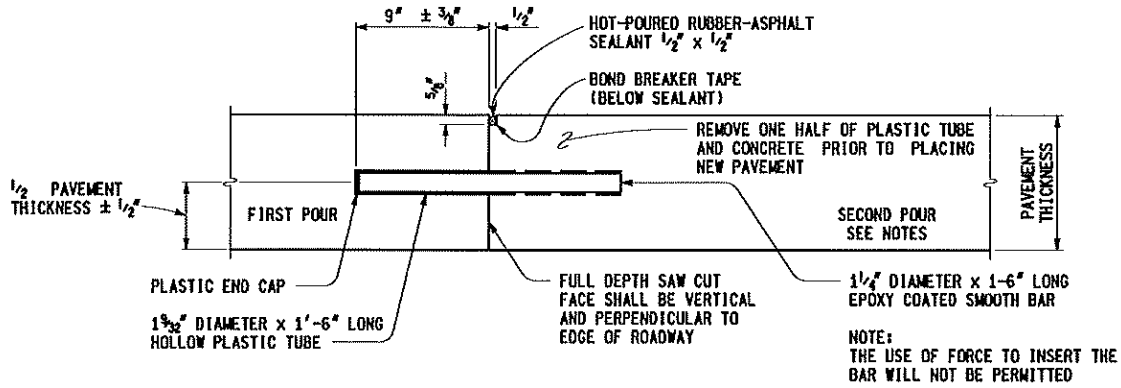
**DEFORMED BAR SPACING  
TRANSVERSE END OF POUR JOINT (SPLIT HEADER METHOD)**



**DEFORMED BAR SPACING  
NOTE: THE HOLE SPACING MAY BE ADJUSTED 1" HORIZONTALLY, RAISED 1/2", OR LOWERED 1" FROM THE ABOVE LOCATIONS TO AVOID DRILLING INTO THE REINFORCEMENT.  
TRANSVERSE END OF POUR JOINT (DRILLED IN METHOD)**

MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF DEVELOPMENT STANDARD PLAN FOR			
<b>TRANSVERSE PAVEMENT JOINTS (PLAIN CONCRETE PAVEMENT)</b>			
2-21-2018 F.H.W.A. APPROVAL	9-25-2017 PLAN DATE	<b>R-39-K</b>	SHEET 4 OF 5

**SYMBOL (H)**



**DEFORMED BAR SPACING  
TRANSVERSE END OF POUR JOINT (PLASTIC TUBE METHOD)**

**NOTES:**

LOAD TRANSFER ASSEMBLIES ARE DETAILED ON THE CURRENT STANDARD PLAN R-40-SERIES.

TRANSVERSE JOINTS SHALL BE SPACED ACCORDING TO THE CURRENT STANDARD PLAN R-43-SERIES.

A TRANSVERSE END OF POUR JOINT (DRILLED IN METHOD) SYMBOL (H), SHALL BE CONSTRUCTED WHEN IT IS ANTICIPATED THAT THE SECOND POUR WILL BE DELAYED 7 DAYS OR LONGER.

A TRANSVERSE END OF POUR JOINT (SPLIT HEADER METHOD) OR (PLASTIC TUBE METHOD) SHALL BE USED AT THE END OF THE DAY'S POUR OR WHEN THERE IS AN UNAVOIDABLE INTERRUPTION OF THE WORK FOR MORE THAN ONE-HALF HOUR AND LESS THAN 7 DAYS. THE JOINT SHALL BE CONSTRUCTED ACCORDING TO TRANSVERSE END OF POUR JOINT (SPLIT HEADER METHOD) OR (PLASTIC TUBE METHOD), SYMBOL (H).

THE EXPANSION JOINT MATERIAL IN THE SHOULDERS SHALL BE SUPPORTED BY ONE OF THE FOLLOWING METHODS:

1. A CONTINUOUS SUPPORT WIRE, AS SPECIFIED FOR EXPANSION LOAD TRANSFERS ASSEMBLIES, AS DETAILED ON STANDARD PLAN R-40-SERIES, SHALL BE USED ON EACH SIDE OF EXPANSION MATERIAL. THIS WIRE SHALL BE EQUIPPED WITH STAKES AND STAKE POCKETS TO RIGIDLY HOLD THE EXPANSION MATERIAL IN PLACE DURING CONCRETE PLACEMENT. STAKES SHALL BE AS SPECIFIED ON STANDARD PLAN R-40-SERIES, SPACED NOT MORE THAN 2'-0" APART.
2. "U" OR "J" SHAPE STAPLES OF W8 WIRE (0.319" NOMINAL DIAMETER) SHALL BE SPACED ON 2'-0" CENTERS EACH SIDE OF THE EXPANSION MATERIAL. EACH VERTICAL LEG OF THE STAPLE SHALL BE AT LEAST 1'-3" LONG.
3. OTHER EQUIVALENT METHODS MAY BE USED WHEN APPROVED BY THE ENGINEER.

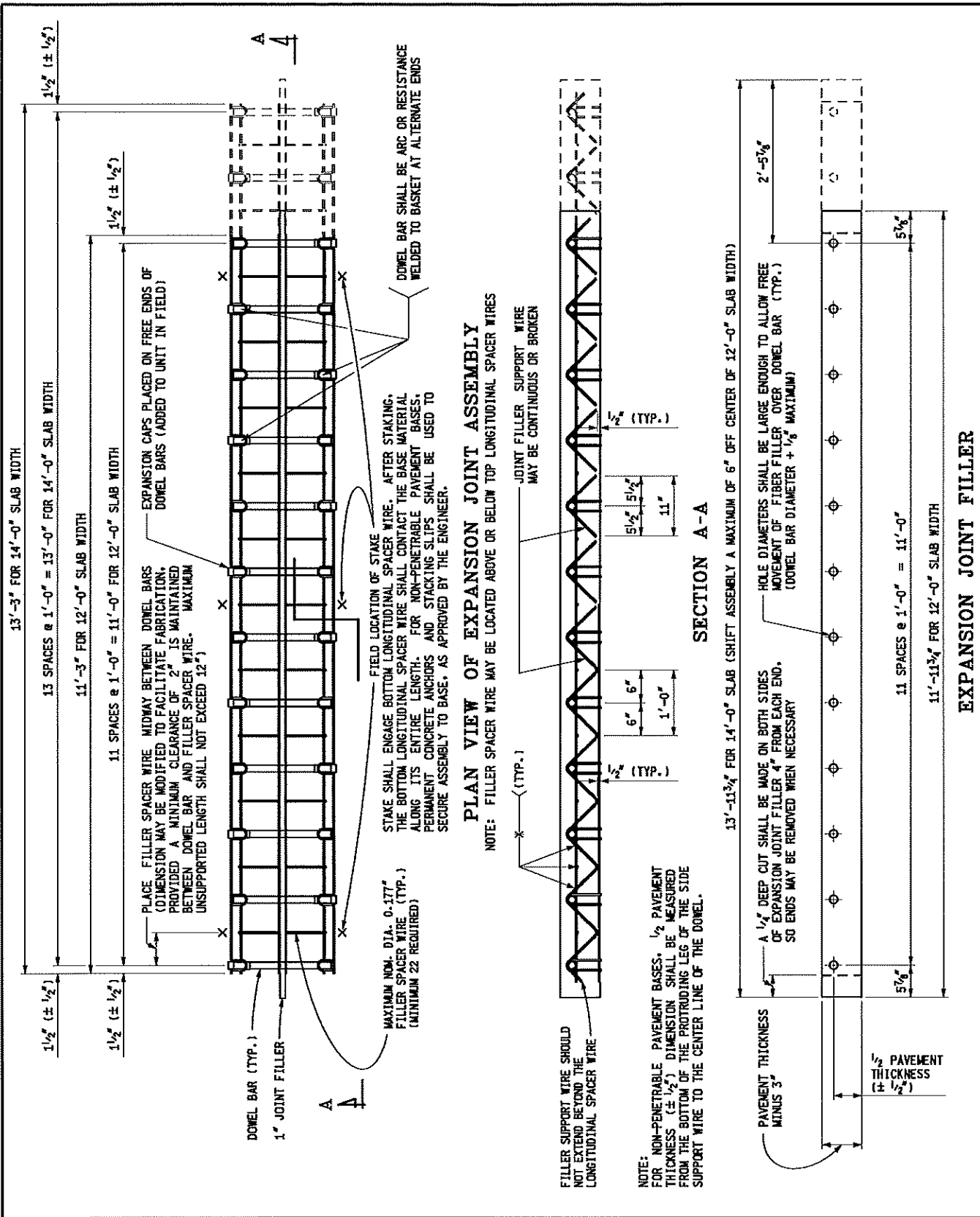
JOINTS SHALL NOT BE SEALED IN CONCRETE BASE COURSE.

WHEN CONCRETE SHOULDERS ARE CAST SEPARATELY FROM MAINLINE CONCRETE PAVEMENT, A KEYWAY MAY BE USED TO FACILITATE THE PLACING OF LANE TIES. WHEN A KEYWAY GROOVE IS USED, IT SHALL BE CONTINUOUS AND UNIFORM.

THE LOCATION OF TRANSVERSE JOINTS IN CONCRETE SHOULDERS SHALL MATCH THE LOCATION OF ADJACENT TRANSVERSE PAVEMENT JOINTS. CORRESPONDING CONCRETE SHOULDER AND PAVEMENT JOINTS SHALL BE (C3p) SHOULDER WITH (Cp) PAVEMENT, (E4) SHOULDER WITH (E2) PAVEMENT, AND (E3) BEING THE SAME IN BOTH SHOULDER AND PAVEMENT.

DEFORMED BARS FOR TRANSVERSE END OF POUR JOINTS (DRILLED IN METHOD) SHALL BE GROUTED INTO EXISTING PAVEMENT WITH A GROUT SELECTED FROM THE PREQUALIFIED MATERIALS LISTED IN THE DEPARTMENT'S "MATERIALS SOURCE GUIDE" UNDER ADHESIVE SYSTEMS FOR GROUTING DOWEL BARS AND TIE BARS FOR FULL-DEPTH PAVEMENT REPAIRS.

MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF DEVELOPMENT STANDARD PLAN FOR			
<b>TRANSVERSE PAVEMENT JOINTS (PLAIN CONCRETE PAVEMENT)</b>			
2-21-2018 F.H.W.A. APPROVAL	9-25-2017 PLAN DATE	R-39-K	SHEET 5 OF 5



**MDOT**  
Michigan Department of Transportation

PREPARED BY  
DESIGN DIVISION

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CHECKED BY: M.K.P.

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APPROVED BY: Gregg Brunner, P.E.  
DIRECTOR, BUREAU OF FIELD SERVICES

APPROVED BY: Bradley C. Wierfsma  
DIRECTOR, BUREAU OF DEVELOPMENT

MICHIGAN DEPARTMENT OF TRANSPORTATION  
BUREAU OF DEVELOPMENT STANDARD PLAN FOR

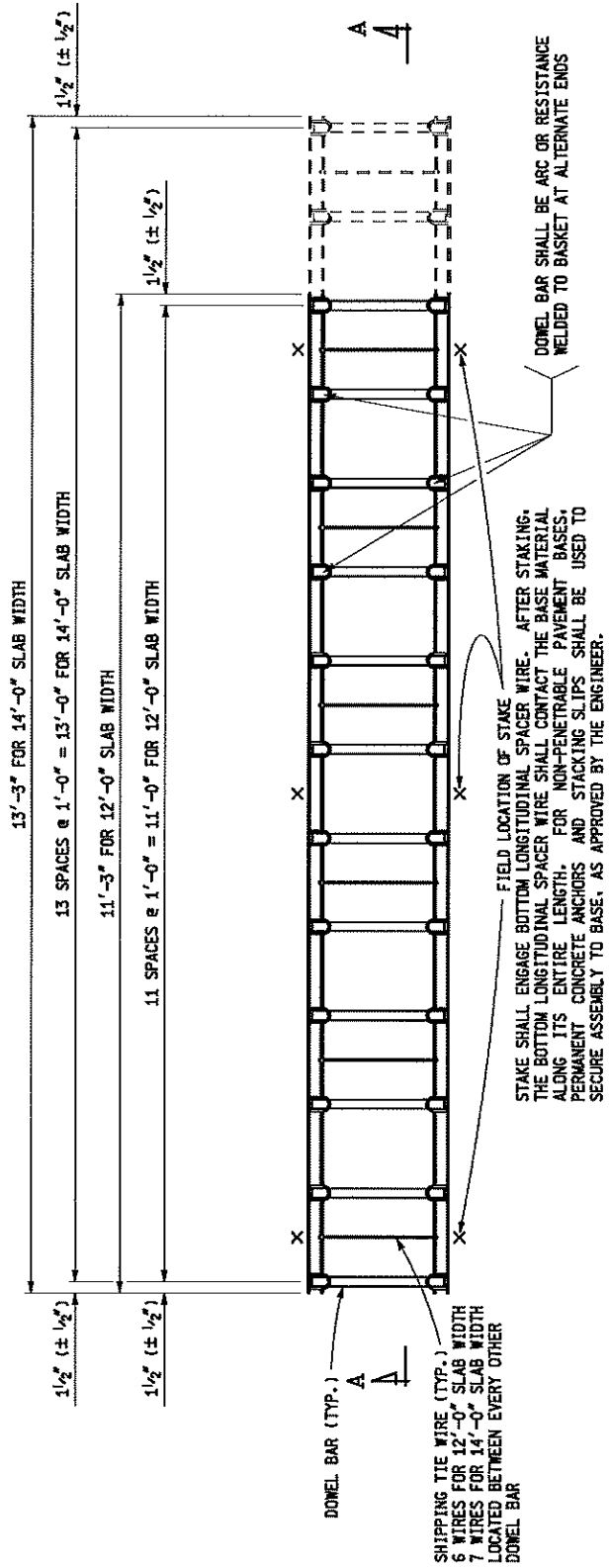
**LOAD TRANSFER ASSEMBLIES  
FOR TRANSVERSE JOINTS**

4-7-2022  
F.H.W.A. APPROVAL

10-1-2021  
PLAN DATE

**R-40-I**

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1 OF 4



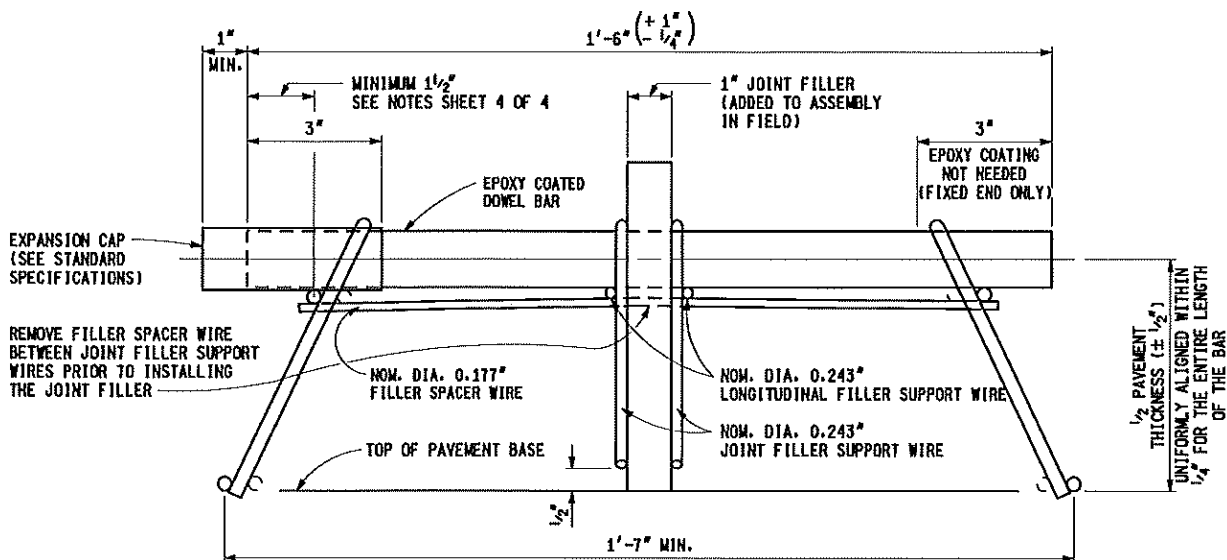
**PLAN VIEW OF CONTRACTION JOINT ASSEMBLY**

NOTE: SHIPPING TIE WIRES MAY BE LOCATED ABOVE OR BELOW TOP LONGITUDINAL SPACING WIRES.



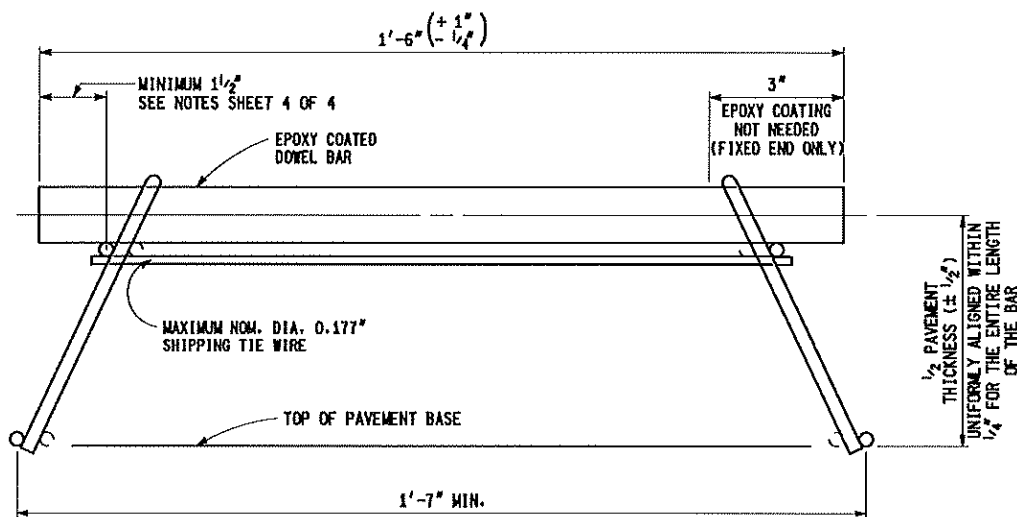
**SECTION A-A**

MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF DEVELOPMENT STANDARD PLAN FOR		
<b>LOAD TRANSFER ASSEMBLIES FOR TRANSVERSE JOINTS</b>		
4-7-2022 F.H.W.A. APPROVAL	10-1-2021 PLAN DATE	R-40-I
		SHEET 2 OF 4



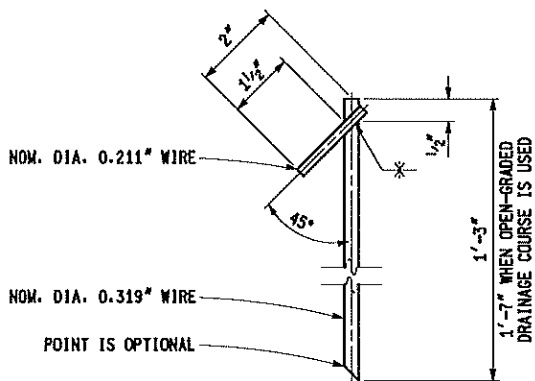
**END VIEW OF EXPANSION JOINT ASSEMBLY**

NOTE: FILLER SPACER WIRE MAY BE LOCATED ABOVE OR BELOW TOP LONGITUDINAL SPACER WIRES



**END VIEW OF CONTRACTION JOINT ASSEMBLY**

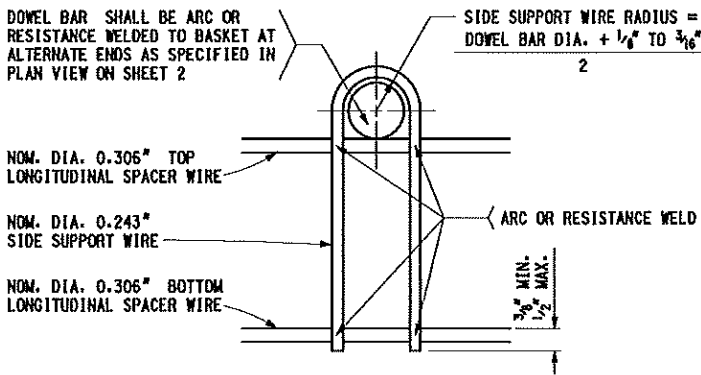
NOTE: SHIPPING TIE WIRE MAY BE LOCATED ABOVE OR BELOW TOP LONGITUDINAL SPACER WIRES



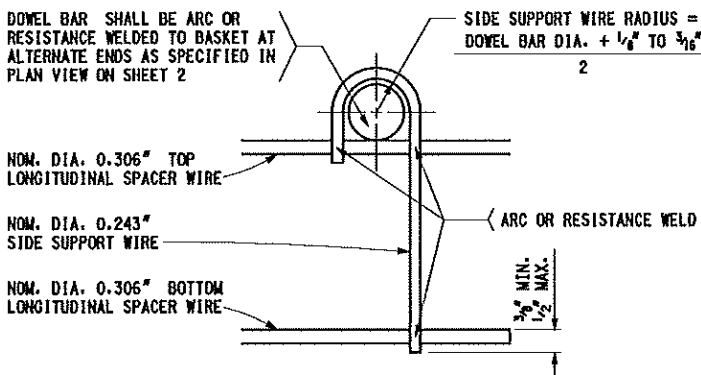
**STAKE DETAIL**

A SINGLE WIRE MAY BE USED IN LIEU OF STAKE DETAIL SPECIFIED PROVIDED A NOM. DIA. 0.319" WIRE IS USED AND BENT INTO A HOOK AT TOP END TO CONFORM TO DETAIL

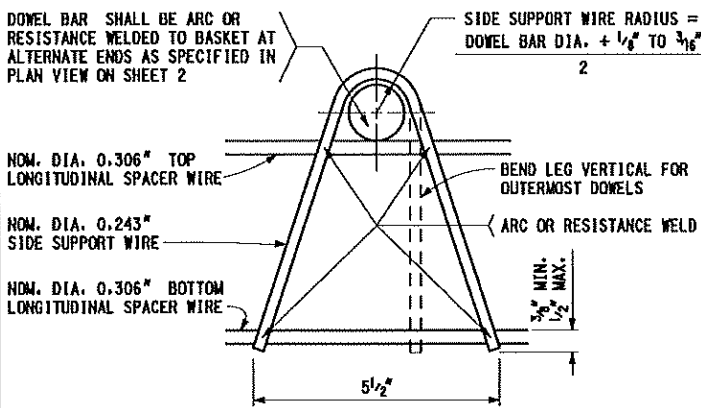
MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF DEVELOPMENT STANDARD PLAN FOR		
<b>LOAD TRANSFER ASSEMBLIES FOR TRANSVERSE JOINTS</b>		
4-7-2022 F.H.W.A. APPROVAL	10-1-2021 PLAN DATE	R-40-I
		SHEET 3 OF 4



**SIDE SUPPORT WIRE DETAIL  
U - LEG OPTION**



**SIDE SUPPORT WIRE DETAIL  
J - LEG OPTION**



**SIDE SUPPORT WIRE DETAIL  
V - LEG OPTION**

**NOTES:**

LOAD TRANSFER ASSEMBLIES SHALL BE PLACED AT RIGHT ANGLES TO THE PAVEMENT CENTERLINE.

THE SIDE SUPPORT WIRE (U-LEG, J-LEG OR V-LEG) MAY BE INSTALLED ON EITHER THE INSIDE OR THE OUTSIDE OF THE LONGITUDINAL SPACER WIRES. THE DIMENSION FROM THE END OF THE DOWEL BAR TO THE CENTER OF THE TOP LONGITUDINAL SPACER WIRE SHALL BE A MINIMUM OF 1 1/2\".

**WIRES:**

ALL WIRES SPECIFIED (EXCEPT SHIPPING TIE WIRES) ARE MINIMUM NOMINAL SIZES ALLOWED. (DO NOT EXCEED THE MAXIMUM NOMINAL DIAMETER OF 0.177\" FOR SHIPPING TIE WIRES.)

ALL WIRES SHALL CONFORM TO THE CURRENT SPECIFICATIONS FOR CARBON STEEL WIRE FOR GENERAL USE, A.S.T.M. DESIGNATION A-853, GRADE 1008 OR GREATER. UNLESS OTHERWISE SPECIFIED, MINIMUM TENSILE STRENGTH REQUIREMENTS SHALL BE 60 ksi.

ALL WIRE INTERSECTIONS ARE TO BE ARC OR RESISTANCE WELDED.

STAKES TYPICALLY APPLIED AT WORKING ENDS OF DOWELS WITH SUFFICIENT INSTALLATIONS TO PREVENT UNIT FROM OVERTURNING UNDER LOAD.

DO NOT CUT FILLER SPACER WIRES AFTER THE LOAD TRANSFER ASSEMBLY IS SET IN PLACE.

**DOWEL BARS:**

DOWEL BARS ARE TO BE ACCORDING TO THE STANDARD SPECIFICATIONS FOR CONSTRUCTION.

EPOXY COATED DOWEL BARS ARE TO BE FACTORY COATED WITH A VISIBLE COATING OF AN APPROVED BOND RELEASE AGENT, UNIFORMLY APPLIED BY DIPPING AND WITHOUT EXCESSIVE DRIPS OR THICKNESS IN SUCH A THICKNESS THAT ITS PRESENCE CAN BE READILY IDENTIFIED.

METAL EXPANSION CAPS MUST BE ENTIRELY CLOSED AT ENDS BY CRIMPING. PLASTIC CAPS MUST HAVE A POSITIVE STOP. DO NOT DRIVE CAPS BEYOND THEIR STOP. EXPANSION CAPS MUST HAVE A SUITABLE STOP TO ENSURE THAT THE END OF THE CAP MAINTAINS A DISTANCE OF 1\" (EXPANSION) FROM THE END OF THE DOWEL DURING CONCRETE PLACEMENT.

DOWEL BARS SHALL BE COATED WITH EPOXY COATING ACCORDING TO THE STANDARD SPECIFICATIONS FOR CONSTRUCTION. CUT ENDS ARE NOT REQUIRED TO BE COATED.

DOWEL BAR DIAMETER	PAVEMENT THICKNESS
1"	6" - LESS THAN 8"
1 1/4"	8" - 10"
1 1/2"	GREATER THAN 10"

DOWEL BARS SHALL BE ALIGNED PARALLEL TO EACH OTHER IN THE ASSEMBLY ON 1'-0\" ( $\pm 1/2$ ") CENTERS.

AFTER THE LOAD TRANSFER ASSEMBLY IS SET IN PLACE, DOWEL BARS SHALL REMAIN ALIGNED (PARALLEL) WITH EACH OTHER IN THE VERTICAL AND HORIZONTAL PLANES OF THE PAVEMENT TO WITHIN 1/4\" FOR THE ENTIRE LENGTH OF THE BAR.

DOWEL BARS SHALL BE PLACED AT MID DEPTH OF THE SLAB UNIFORMLY ALIGNED WITHIN 1/4\" FOR THE ENTIRE LENGTH OF THE BAR.

FOR PAVEMENTS WITH VARIABLE THICKNESS TRANSVERSELY ACROSS THE SLAB, THE TOP AND BOTTOM SURFACES OF THE DOWEL BAR SHALL BE WITHIN THE MIDDLE 1/3 OF THE PAVEMENT THICKNESS, AS APPROVED BY THE ENGINEER.

MICHIGAN DEPARTMENT OF TRANSPORTATION  
BUREAU OF DEVELOPMENT STANDARD PLAN FOR

**LOAD TRANSFER ASSEMBLIES  
FOR TRANSVERSE JOINTS**

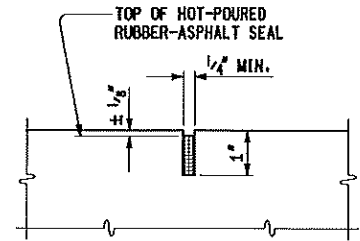
4-7-2022  
F.H.W.A. APPROVAL

10-1-2021  
PLAN DATE

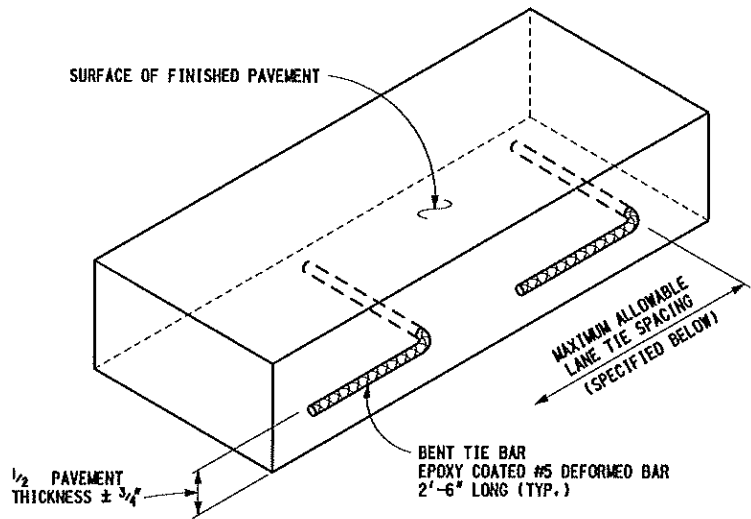
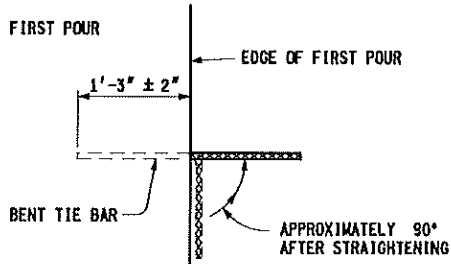
R-40-I

SHEET  
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**SYMBOL ( B )**



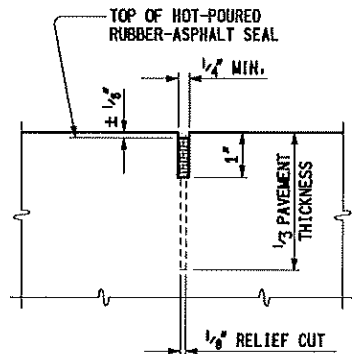
SAWED JOINT SEALED WITH HOT - Poured RUBBER - ASPHALT



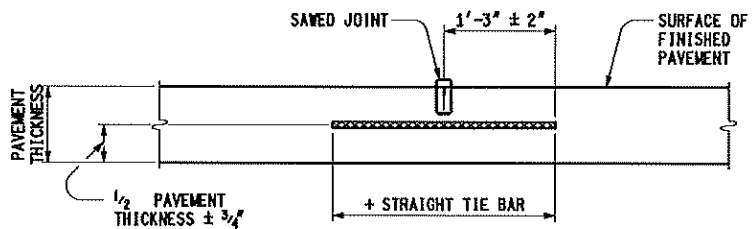
**LONGITUDINAL BULKHEAD JOINT - SYMBOL ( B )**

ALL SYMBOL (B) JOINTS SHALL BE SAWED AND SEALED EXCEPT JOINTS WITHOUT LANE TIES AND JOINTS ADJACENT TO VERTICAL FACES WHICH WOULD PROHIBIT SAWING.

**SYMBOL ( D ) AND ( S )**



SAWED JOINT SEALED WITH HOT - Poured RUBBER - ASPHALT



+ EPOXY COATED #5 DEFORMED BAR 2'-6" LONG FOR SYMBOL (D)  
EPOXY COATED #5 SMOOTH BAR 2'-6" LONG FOR SYMBOL (S)  
(MAXIMUM ALLOWABLE LANE TIE SPACING SPECIFIED BELOW)

**LONGITUDINAL LANE TIE JOINT - SYMBOL ( D )  
LONGITUDINAL SMOOTH LANE TIE JOINT - SYMBOL ( S )**

SYMBOL (D) AND SYMBOL (S) TIE BARS SHALL BE PLACED AT THE PROPER SPACING LONGITUDINALLY, AND TRANSVERSELY AT 90° WITH THE JOINT.

MAXIMUM ALLOWABLE LANE TIE SPACING SYMBOLS (B), (D), (L2), AND (S)		* TOTAL DISTANCE OF TIED JOINT FROM NEAREST FREE EDGE
(B) GRADE 40	(D), (L2), AND (S) GRADE 60	
2'-10"	3'-7"	12' OR LESS
1'-11"	2'-7"	OVER 12' THROUGH 17'
1'-5"	1'-11"	OVER 17' THROUGH 24'
1'-2"	1'-9"	OVER 24' THROUGH 28'
1'-2"	1'-4"	OVER 28' THROUGH 36'
1'-1"	1'-1"	36' OR GREATER **

\* INCLUDES ANY TIED COMBINATION OF LANE WIDTH, VALLEY GUTTER, CURB & GUTTER, OR SHOULDER

\*\* FOR WIDTHS GREATER THAN 48' USE #6 DEFORMED BARS AT 1'-2" SPACING.

**MAXIMUM ALLOWABLE LANE TIE SPACING**

**MDOT**  
Michigan Department of Transportation

PREPARED BY  
DESIGN DIVISION

DRAWN BY: B.L.T.

CHECKED BY: W.K.P.

DEPARTMENT DIRECTOR  
Kirk T. Stuede

APPROVED BY: *Randy U. Penttila*  
DIRECTOR, BUREAU OF FIELD SERVICES

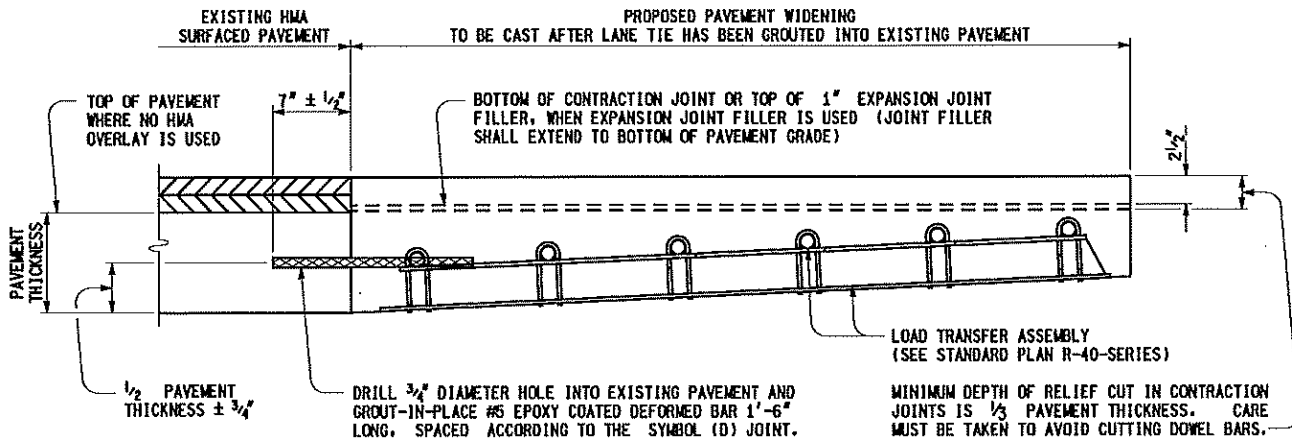
APPROVED BY: *Neil A. Van Pelt*  
DIRECTOR, BUREAU OF HIGHWAY DEVELOPMENT

MICHIGAN DEPARTMENT OF TRANSPORTATION  
BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR

**LONGITUDINAL PAVEMENT JOINTS**

9-30-2014 F.H.W.A. APPROVAL	4-22-2013 PLAN DATE	R-41-H	SHEET 1 OF 2
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## SYMBOL ( L2 )



**NOTE:**  
 SYMBOL (L2) JOINT USED FOR WIDENING CONCRETE PAVEMENTS WITHOUT HMA OVERLAYS SHALL BE SAWED AND SEALED ACCORDING TO THE SYMBOL (B) JOINT.

THE LONGITUDINAL JOINT USED FOR WIDENING EXISTING CONCRETE BASE COURSE OR CONCRETE PAVEMENT HAVING A HMA SURFACE SHALL HAVE EPOXY ANCHORED LANE TIES PLACED AS SPECIFIED.

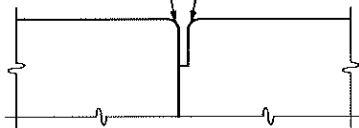
TAPERED PAVEMENT THICKNESS OVER THE DISTANCE OF PAVEMENT WIDENING OR IN ONE LANE WIDTH WHEN WIDENING IS FOR TWO OR MORE LANES.

## LONGITUDINAL BULKHEAD JOINT

FOR WIDENING EXISTING CONCRETE PAVEMENT OR CONCRETE BASE COURSE (USING EPOXY ANCHORED LANE TIES)

THE FIRST SLAB SHALL BE EDGED WITH AN EDGER HAVING A  $\frac{3}{4}$ " LIP AND A RADIUS OF  $\frac{1}{8}$ " TO  $\frac{1}{4}$ "

EDGING TOOL SHALL BE 6" x 12" AND SHALL HAVE A 1" LIP WITH A RADIUS OF  $\frac{1}{8}$ " TO  $\frac{1}{4}$ "



**METHOD OF EDGING**

**NOTES:**

ALL LANE TIE BARS SHALL BE DEFORMED EXCEPT SYMBOL (S) WHICH WILL BE SMOOTH.

THE EPOXY COATED S BARS ARE TO BE FACTORY COATED WITH AN APPROVED BOND RELEASE AGENT, UNIFORMLY APPLIED BY DIPPING AND WITHOUT EXCESSIVE DRIPS OR THICKNESS.

THE INSTALLATION OF LANE TIE BARS AND THE SAWING OF LONGITUDINAL JOINTS WILL NOT BE REQUIRED FOR TEMPORARY CONCRETE PAVEMENT UNLESS SPECIFIED ON PLANS OR IN THE PROPOSAL. THE EDGING OF TEMPORARY CONCRETE PAVEMENT WILL NOT BE REQUIRED.

FOR JOINT LAYOUT DETAILS, SEE STANDARD PLAN R-42-SERIES.

SAWING PROCEDURES AND RELATED OPERATIONS ARE DESCRIBED IN THE CURRENT STANDARD SPECIFICATIONS.

NO SAWED OR SEALED JOINT SHALL BE CONSTRUCTED BETWEEN THE PAVEMENT AND CURB OR PAVEMENT AND CURB AND GUTTER, WHERE THESE ITEMS ARE CAST INTEGRALLY.

WHEN JOINTED PLAIN CONCRETE IS SPECIFIED AT INTERSECTIONS SYMBOL (S) JOINTS ARE TO BE USED FOR THE LONGITUDINAL JOINT BETWEEN THE E2 JOINT AT THE SPRINGPOINT OF THE SIDE STREET AND THE THROUGH LANE GUTTER PAN LINE. WHEN THE E2 JOINT IS MOVED TO THE THROUGH LANE GUTTER PAN LINE USE SYMBOL (D) JOINT AS NORMALLY REQUIRED.

ALL STRAIGHT TIE BARS SHALL BE EPOXY COATED ACCORDING TO THE CURRENT STANDARD SPECIFICATIONS FOR EPOXY COATED STEEL REINFORCEMENT FOR STRUCTURES.

WHEN LANE TIES ARE GROUDED INTO AN EXISTING PAVEMENT, THE GROUT SHALL BE SELECTED FROM THE PREQUALIFIED MATERIALS LISTED IN THE DEPARTMENT'S "MATERIALS SAMPLING GUIDE" FOR LANE TIES.

IN ORDER TO AVOID CONFLICT WITH THE LOAD TRANSFER ASSEMBLY, THE PLACEMENT OF THE END LANE TIE ADJACENT TO ANY TRANSVERSE JOINT SHALL BE AS FOLLOWS:

1. WHEN MAXIMUM ALLOWABLE LANE TIE SPACING EXCEEDS 3'-4", PLACE FIRST AND LAST LANE TIE HALF THE MAXIMUM ALLOWABLE LANE TIE SPACING FROM JOINT.
2. WHEN MAXIMUM ALLOWABLE LANE TIE SPACING IS LESS THAN 3'-4", PLACE FIRST AND LAST LANE TIE A MINIMUM OF 1'-8" FROM JOINT.

IT MAY BE NECESSARY TO ADJUST THE LAST THREE LANE TIE SPACINGS TO ENSURE UNIFORM LOADING RESISTANCE ALONG THE LONGITUDINAL JOINT.

MICHIGAN DEPARTMENT OF TRANSPORTATION  
 BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR

## LONGITUDINAL PAVEMENT JOINTS

9-30-2014  
 F.H.W.A. APPROVAL


4-22-2013  
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**JOINT LEGEND ( ALL SHEETS )**

- B** LONGITUDINAL BULKHEAD JOINT.
- B1** LONGITUDINAL BULKHEAD JOINT, EXCEPT OMIT SEALS AND LANE TIES, APPLY TWO ADDITIONAL COATS OF CURING COMPOUND, AS A BOND BREAKER, AT THE RATE OF 1 GALLON PER 100 SFT PER COAT.
- BD** OPTIONAL B OR D JOINT.
- Cp** TRANSVERSE CONTRACTION JOINT WITH LOAD TRANSFER DEVICE.
- CSp** TRANSVERSE CONTRACTION JOINT WITHOUT LOAD TRANSFER DEVICE. (SHOULDERS)
- D** LONGITUDINAL LANE TIE JOINT.
- W** PLANE OF WEAKNESS JOINT.
- E2** 1" TRANSVERSE EXPANSION JOINT WITH LOAD TRANSFER DEVICE.
- E3** 1" TRANSVERSE EXPANSION JOINT WITHOUT LOAD TRANSFER DEVICE.
- E4** 1" TRANSVERSE EXPANSION JOINT WITHOUT LOAD TRANSFER DEVICE. (SHOULDERS)
- E5** 1" LONGITUDINAL SEALED EXPANSION JOINT (SEE STANDARD PLAN R-49-SERIES)
- L2** LONGITUDINAL BULKHEAD JOINT USING EPOXY ANCHORED LANE TIES.
- U** TRANSVERSE PLANE OF WEAKNESS JOINT FOR CONCRETE BASE COURSE.

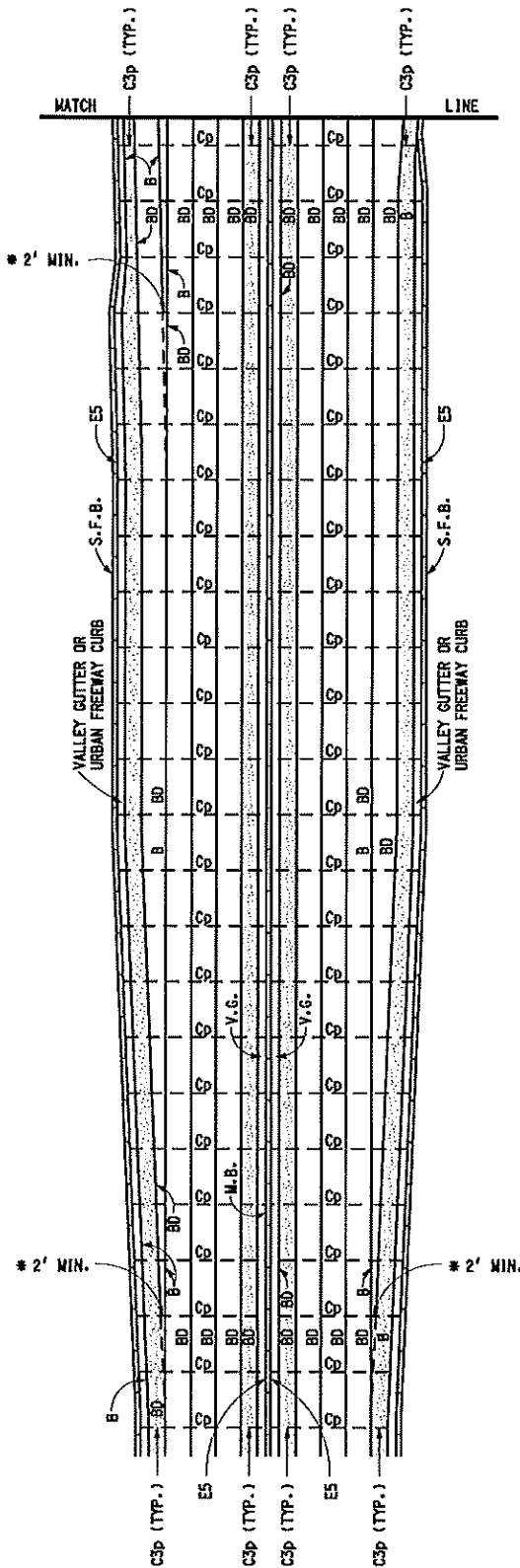
 SHOULDER

 EXISTING CONCRETE PAVEMENT

- C. & G. = CURB & GUTTER
- E.O.M. = EDGE OF METAL
- F.O.B. = FACE OF BARRIER
- M.B. = MEDIAN BARRIER
- S.F.B. = SINGLE FACE BARRIER
- V.G. = VALLEY CUTTER

\* END GORE AND RAMP TAPERS SO THAT THE LAST SECTION ENDS WITH A MINIMUM 2'-0" CUT-OFF AND IT ALIGNS WITH A TRANSVERSE PAVEMENT JOINT. EXPANSION JOINTS SHALL BE PLACED AT THE END OF PAVED GORES AS SPECIFIED ON THIS PLAN.

SEE STANDARD PLAN R-43-SERIES FOR JOINT SPACING AND STANDARD PLAN R-39-SERIES FOR CONTRACTION JOINT DESIGNS.



**JOINTS IN URBAN FREEWAY**

12', 14', OR 16' JOINT SPACING FOR JOINTED PLAIN CONCRETE PAVEMENT



PREPARED BY  
DESIGN DIVISION

DRAWN BY: B.L.T.

CHECKED BY: W.X.P.

DEPARTMENT DIRECTOR  
Kirk T. Stuede

APPROVED BY: *Randy Van Pelt*  
DIRECTOR, BUREAU OF FIELD SERVICES

APPROVED BY: *Paul A. Van Pelt*  
DIRECTOR, BUREAU OF HIGHWAY DEVELOPMENT

MICHIGAN DEPARTMENT OF TRANSPORTATION  
BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR

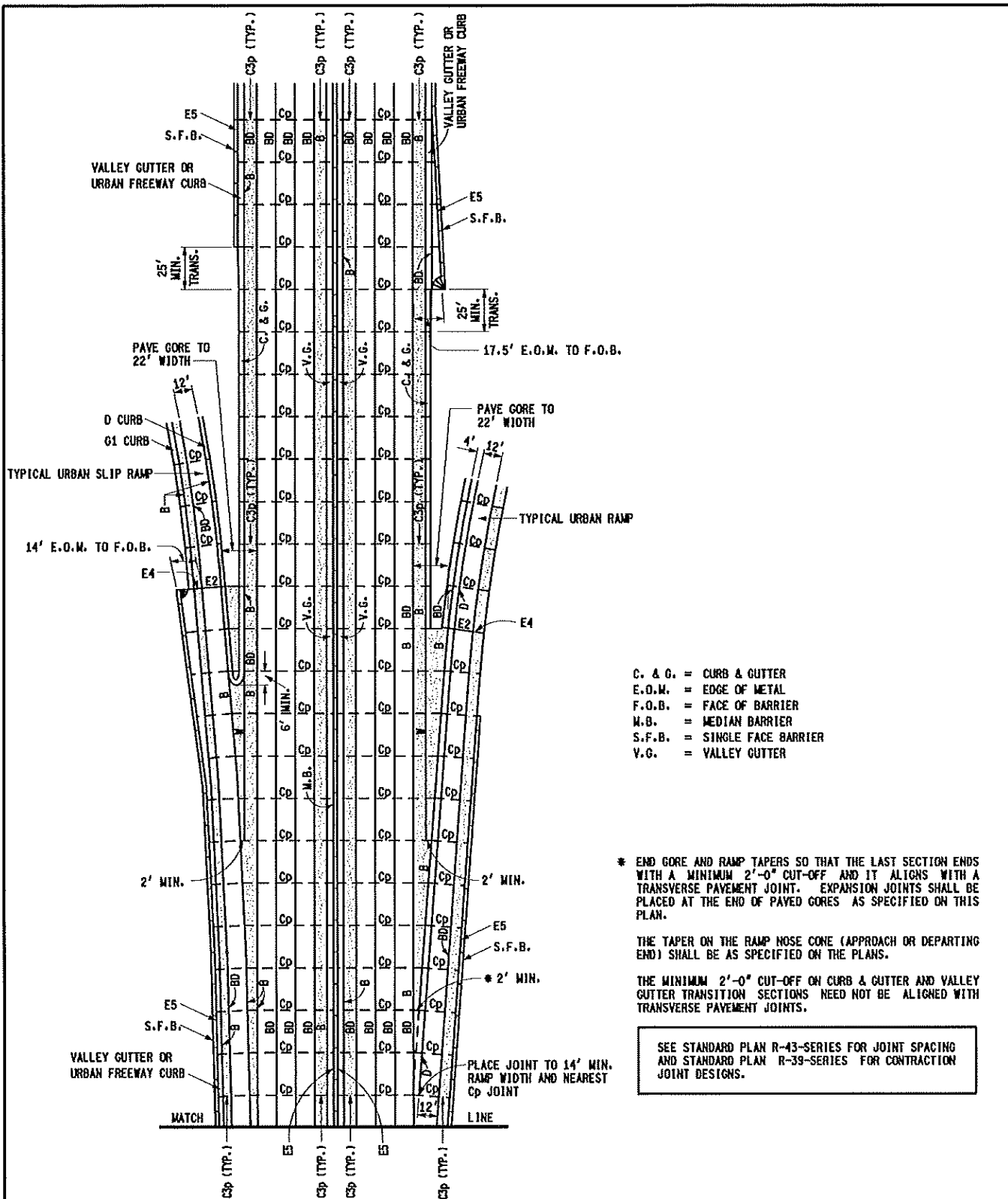
**TYPICAL JOINT LAYOUTS  
FOR CONCRETE PAVEMENT**

1-25-2013  
F.H.W.A. APPROVAL

12-6-2010  
PLAN DATE

**R-42-F**

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- C. & G. = CURB & GUTTER
- E.O.M. = EDGE OF METAL
- F.O.B. = FACE OF BARRIER
- M.B. = MEDIAN BARRIER
- S.F.B. = SINGLE FACE BARRIER
- V.G. = VALLEY GUTTER

\* END GORE AND RAMP TAPERS SO THAT THE LAST SECTION ENDS WITH A MINIMUM 2'-0" CUT-OFF AND IT ALIGNS WITH A TRANSVERSE PAVEMENT JOINT. EXPANSION JOINTS SHALL BE PLACED AT THE END OF PAVED GORES AS SPECIFIED ON THIS PLAN.

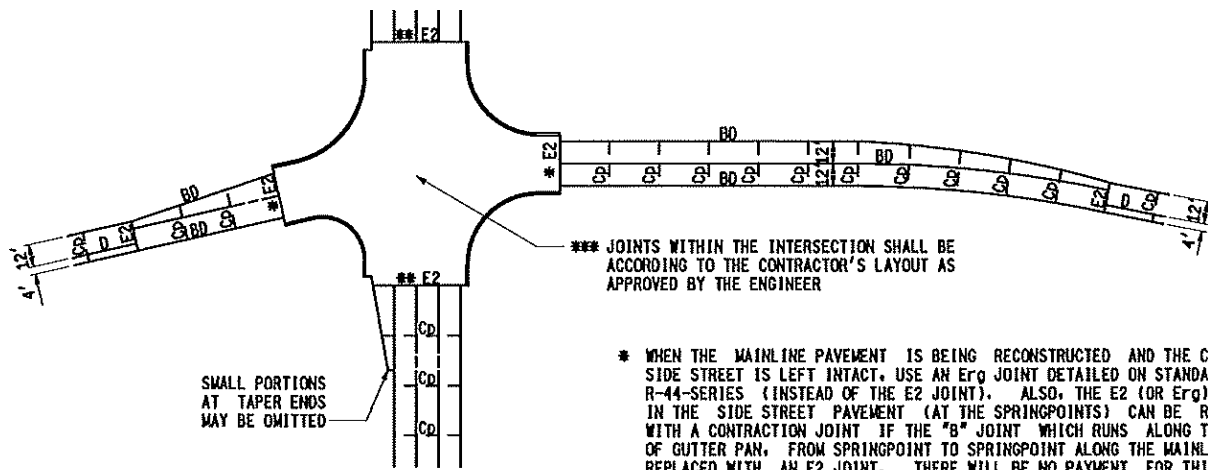
THE TAPER ON THE RAMP NOSE CONE (APPROACH OR DEPARTING END) SHALL BE AS SPECIFIED ON THE PLANS.

THE MINIMUM 2'-0" CUT-OFF ON CURB & GUTTER AND VALLEY GUTTER TRANSITION SECTIONS NEED NOT BE ALIGNED WITH TRANSVERSE PAVEMENT JOINTS.

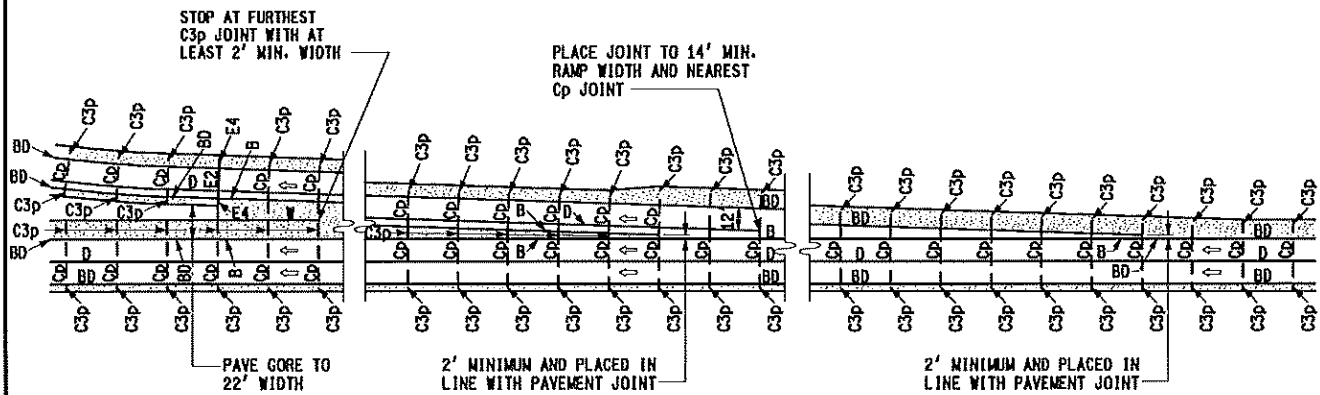
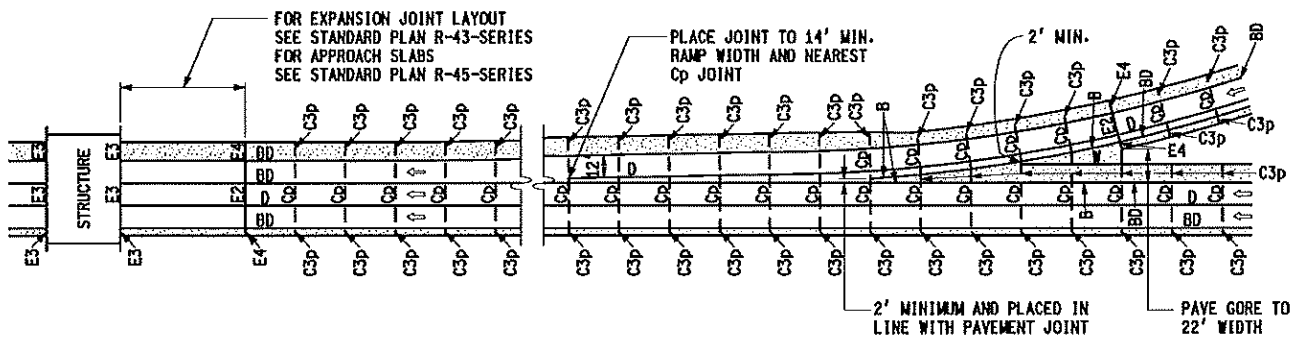
SEE STANDARD PLAN R-43-SERIES FOR JOINT SPACING AND STANDARD PLAN R-39-SERIES FOR CONTRACTION JOINT DESIGNS.

**JOINTS IN URBAN FREEWAY**  
 12', 14', OR 16' JOINT SPACING FOR JOINTED PLAIN CONCRETE PAVEMENT

MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR		
<b>TYPICAL JOINT LAYOUTS FOR CONCRETE PAVEMENT</b>		
1-25-2013 F.H.W.A. APPROVAL	12-6-2010 PLAN DATE	<b>R-42-F</b>
		SHEET 2 OF 6



- \* WHEN THE MAINLINE PAVEMENT IS BEING RECONSTRUCTED AND THE CONCRETE SIDE STREET IS LEFT INTACT, USE AN Erg JOINT DETAILED ON STANDARD PLAN R-44-SERIES (INSTEAD OF THE E2 JOINT). ALSO, THE E2 (OR Erg) JOINTS IN THE SIDE STREET PAVEMENT (AT THE SPRINGPOINTS) CAN BE REPLACED WITH A CONTRACTION JOINT IF THE "B" JOINT WHICH RUNS ALONG THE EDGE OF GUTTER PAN, FROM SPRINGPOINT TO SPRINGPOINT ALONG THE MAINLINE, IS REPLACED WITH AN E2 JOINT. THERE WILL BE NO PAYMENT FOR THIS EXTRA LENGTH OF E2 JOINT WHEN IT IS MOVED FROM THE SPRING POINT TO THE EDGE OF GUTTER PAN.
- \*\* THE E2 JOINTS IN THE MAINLINE PAVEMENT (AT THE SPRINGPOINTS) CAN BE REPLACED WITH A CONTRACTION JOINT IF THE MAINLINE IS BEING PAVED THROUGH THE INTERSECTION IN THE SAME OPERATION AS THE NON-INTERSECTION MAINLINE.
- \*\*\* THE LONGITUDINAL JOINTS IN THE SIDE STREET PORTION OF THE INTERSECTION (SPRINGPOINT TO MAINLINE GUTTER PAN LINE) SHALL BE SYMBOL (S) JOINTS, WHEN THE E2 JOINT IS MOVED TO THE GUTTER PAN LINE SYMBOL "B" OR "D" JOINTS ARE TO BE USED.



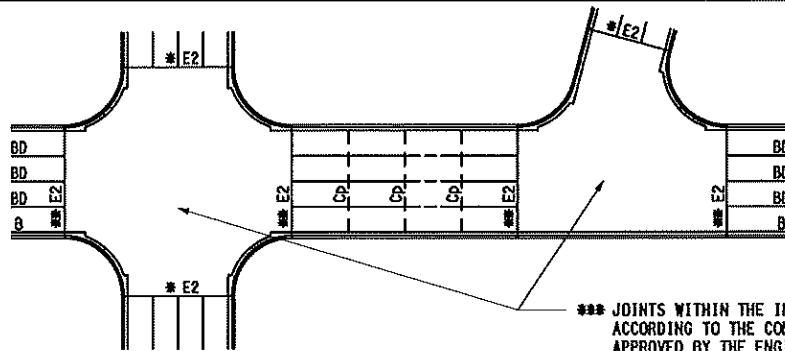
**JOINTS IN RURAL FREEWAY**  
12', 14', OR 16' JOINT SPACING FOR JOINTED PLAIN CONCRETE PAVEMENT

SEE STANDARD PLAN R-43-SERIES FOR JOINT SPACING AND STANDARD PLAN R-39-SERIES FOR CONTRACTION JOINT DESIGNS.

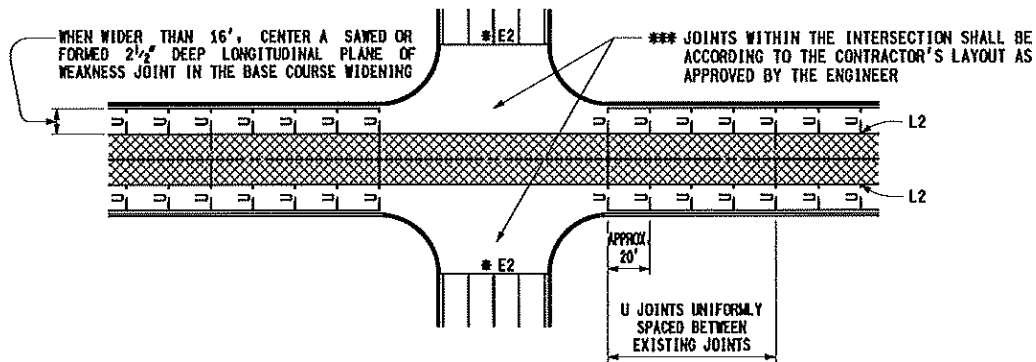
MICHIGAN DEPARTMENT OF TRANSPORTATION  
BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR

**TYPICAL JOINT LAYOUTS  
FOR CONCRETE PAVEMENT**

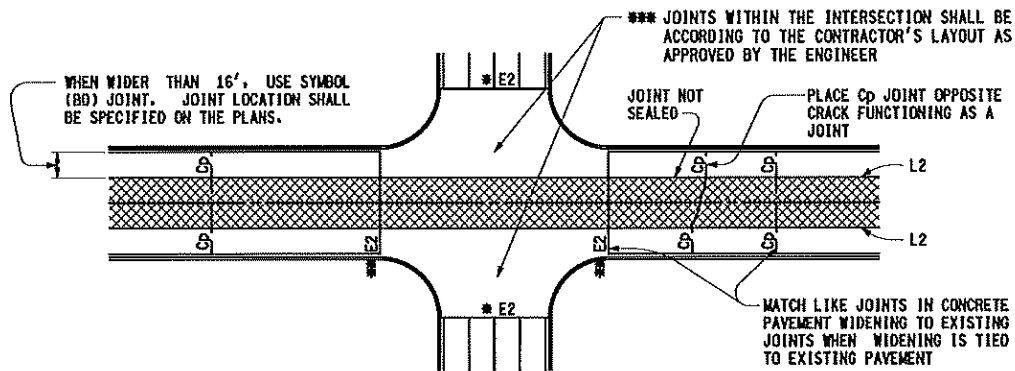
1-25-2013 F.H.W.A. APPROVAL	12-6-2010 PLAN DATE	R-42-F	SHEET 3 OF 6
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**JOINTS AT INTERSECTIONS**



**JOINTS FOR CONCRETE BASE COURSE WIDENING**



**JOINTS FOR CONCRETE PAVEMENT WIDENING**

\* WHEN THE MAINLINE PAVEMENT IS BEING RECONSTRUCTED AND THE CONCRETE SIDE STREET IS LEFT INTACT, USE AN Erg JOINT DETAILED ON STANDARD PLAN R-44-SERIES (INSTEAD OF THE E2 JOINT). ALSO, THE E2 (OR Erg) JOINTS IN THE SIDE STREET PAVEMENT (AT THE SPRINGPOINTS) CAN BE REPLACED WITH A CONTRACTION JOINT IF THE "b" JOINT WHICH RUNS ALONG THE EDGE OF GUTTER PAN, FROM SPRINGPOINT TO SPRINGPOINT ALONG THE MAINLINE, IS REPLACED WITH AN E2 JOINT. THERE WILL BE NO PAYMENT FOR THIS EXTRA LENGTH OF E2 JOINT WHEN IT IS MOVED FROM THE SPRING POINT TO THE EDGE OF GUTTER PAN.

\*\* THE E2 JOINTS IN THE MAINLINE PAVEMENT (AT THE SPRINGPOINTS) CAN BE REPLACED WITH A CONTRACTION JOINT IF THE MAINLINE IS BEING PAVED THROUGH THE INTERSECTION IN THE SAME OPERATION AS THE NON-INTERSECTION MAINLINE.

\*\*\* THE LONGITUDINAL JOINTS IN THE SIDE STREET PORTION OF THE INTERSECTION (SPRINGPOINT TO MAINLINE GUTTER PAN LINE) SHALL BE SYMBOL (S) JOINTS. WHEN THE E2 JOINT IS MOVED TO THE GUTTER PAN LINE SYMBOL "b" OR "d" JOINTS ARE TO BE USED.

MICHIGAN DEPARTMENT OF TRANSPORTATION  
BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR

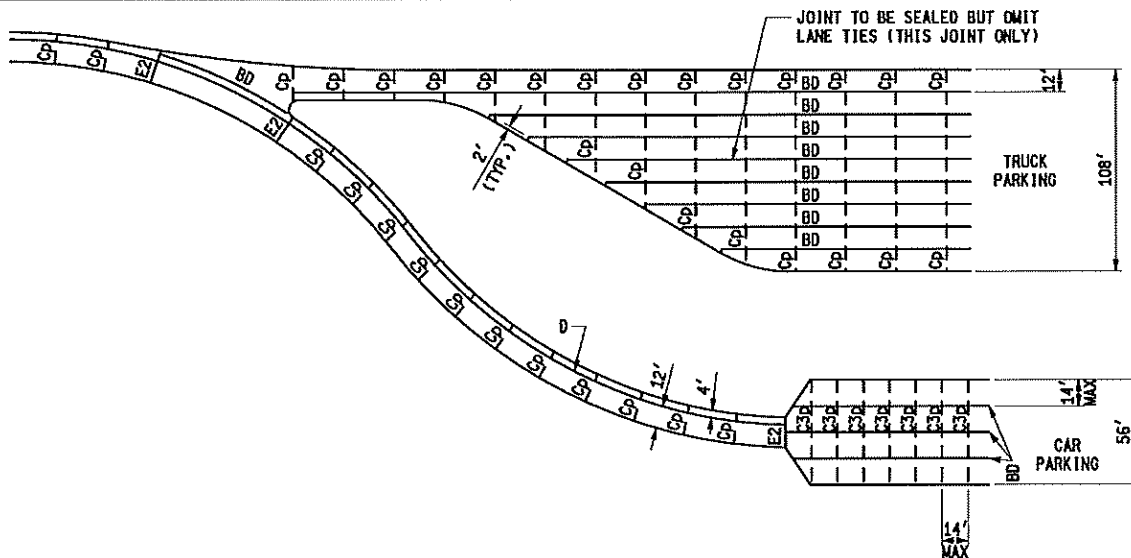
**TYPICAL JOINT LAYOUTS  
FOR CONCRETE PAVEMENT**

1-25-2013  
F.H.W.A. APPROVAL

12-6-2010  
PLAN DATE

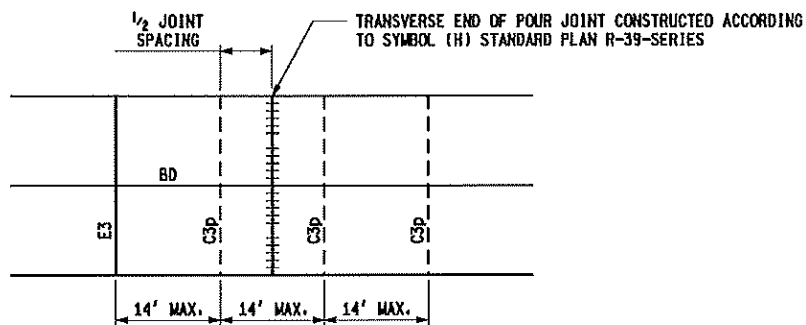
**R-42-F**

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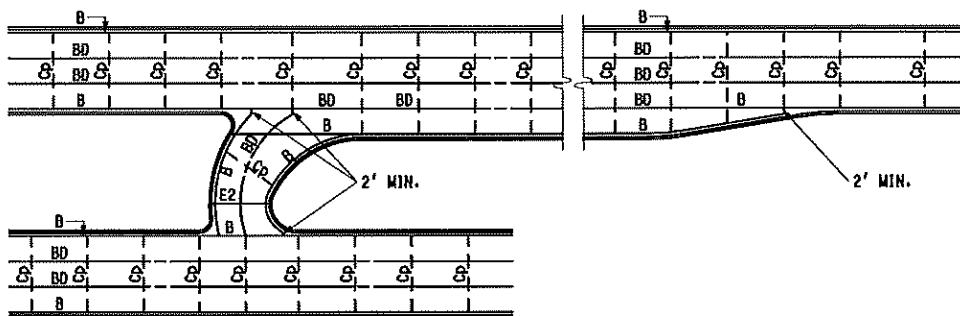


**CONCRETE PARKING AREAS AND APPROACHES**

(JOINT SPACING AS SPECIFIED IN TABLE ON R-43-SERIES)



**LOCATION OF TRANSVERSE END OF POUR JOINT**



**JOINTS FOR CONCRETE PAVEMENT CROSSOVER**

MICHIGAN DEPARTMENT OF TRANSPORTATION  
BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR

**TYPICAL JOINT LAYOUTS  
FOR CONCRETE PAVEMENT**

1-25-2013  
F.H.W.A. APPROVAL

12-6-2010  
PLAN DATE

R-42-F

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NOTES:

TRANSVERSE JOINT SPACING IN CONCRETE PAVEMENT AND CONCRETE SHOULDERS SHALL BE AS SPECIFIED IN THE PROPOSAL OR ON THE PLANS AND CONSTRUCTED ACCORDING TO STANDARD PLAN R-43-SERIES AND THIS PLAN, OR AS DIRECTED BY THE ENGINEER. THE PLACEMENT OF JOINTS IN CURB, CURB AND GUTTER OR VALLEY GUTTER SHALL BE PLACED AS SPECIFIED ON STANDARD PLAN R-30-SERIES AND R-33-SERIES. PAVEMENTS NOT CAST INTEGRALLY WITH CURB, CURB AND GUTTER, VALLEY GUTTER OR CONCRETE SHOULDER SHALL BE CONNECTED WITH A LONGITUDINAL SYMBOL (B) JOINT.

JOINTS SHALL BE CONSTRUCTED ACCORDING TO CURRENT STANDARD PLANS R-39-SERIES AND R-41-SERIES.

RAMP JOINTS SHALL BE ORIENTED 90 DEGREES TO THE ALIGNMENT EDGE OF THE RAMP UNTIL THE 2' POINT OF THE GORE. THEN, AS THE RAMP MERGES WITH THE MAINLINE, THE JOINTS SHALL BE ALIGNED 90 DEGREES TO THE MAINLINE.

BASE COURSES SHALL BE NONREINFORCED UNLESS OTHERWISE SPECIFIED ON THE PLANS.

THE LOCATION OF SYMBOLS (E2), (E3) OR (Cp) JOINTS SHALL BE ADJUSTED TO AVOID CONFLICTS WITH MANHOLES, CATCH BASINS, MONUMENT BOXES, WATER SHUT-OFFS, OR OTHER RIGID STRUCTURES. EITHER THE JOINT SHALL BE LOCATED TO INTERSECT AT THE MID POINT OF THE STRUCTURE OR THE STRUCTURE SHALL BE LOCATED IN THE CENTER OF THE PAVEMENT SLAB. SEE R-37-SERIES FOR ISOLATION JOINT DETAILS.

THE CONCRETE PAVEMENT IN THE TRUCK AND PASSENGER CAR PARKING AREAS OF REST AREAS SHALL BE TEXTURED ACCORDING TO THE CURRENT STANDARD SPECIFICATIONS FOR CONSTRUCTION.

MICHIGAN DEPARTMENT OF TRANSPORTATION  
BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR

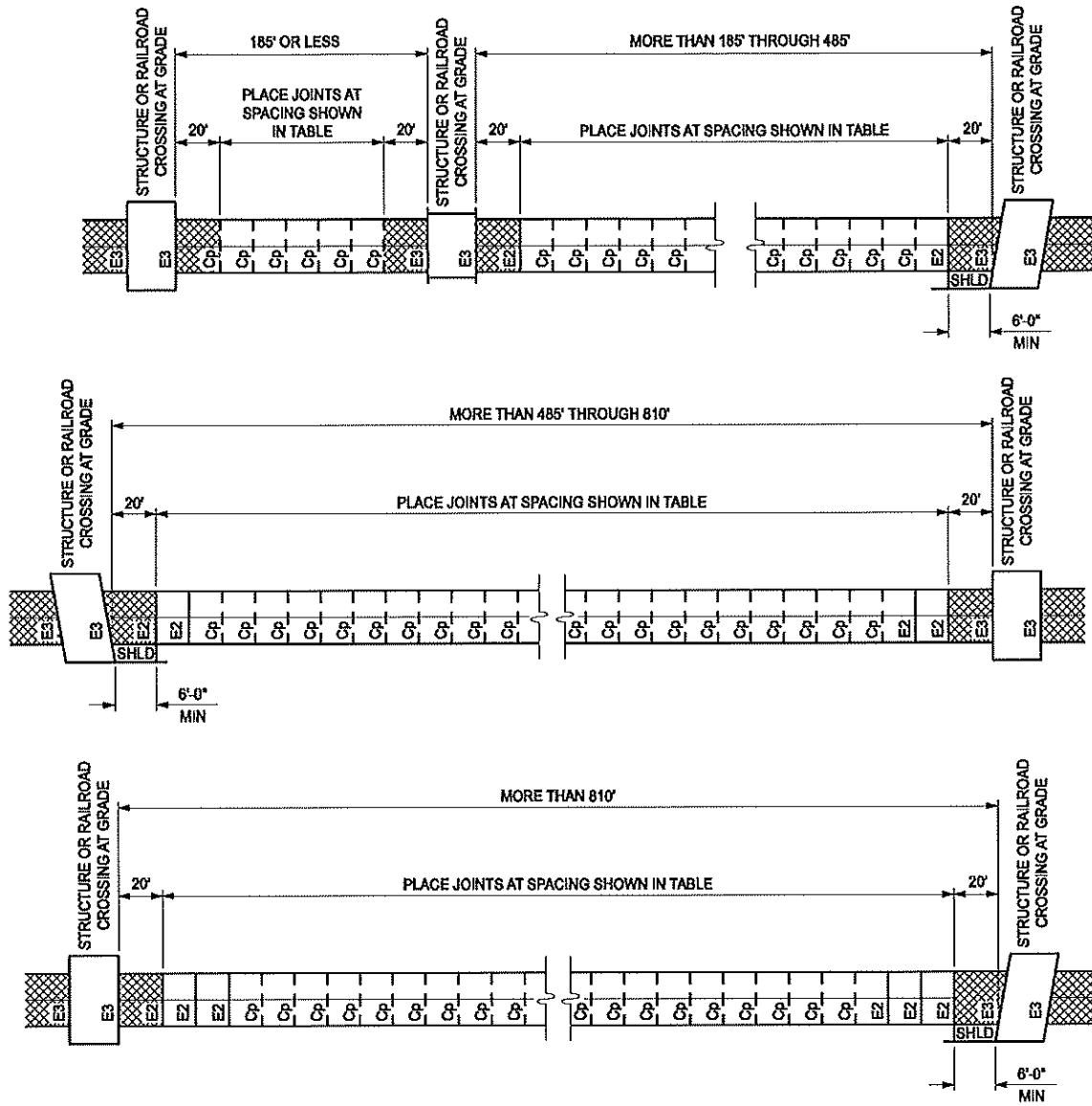
**TYPICAL JOINT LAYOUTS  
FOR CONCRETE PAVEMENT**

1-25-2013  
F.H.W.A. APPROVAL

12-6-2010  
PLAN DATE

**R-42-F**

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PLAN VIEW SHOWING TRANSVERSE JOINT LOCATIONS

NOTE:  
SEE SHEET 2 FOR DETAIL OF JOINT SPACING  
WITH INTEGRAL / SEMI-INTEGRAL ABUTMENTS  
AND SLEEPER SLAB.

JOINT LEGEND

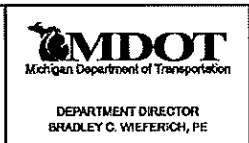
ACCORDING TO STANDARD PLAN R-39-SERIES

- (E2) 1" TRANSVERSE EXPANSION JOINT WITH LOAD TRANSFER ASSEMBLY
- (E3) 1" TRANSVERSE EXPANSION JOINT WITHOUT LOAD TRANSFER ASSEMBLY
- (Cp) TRANSVERSE CONTRACTION JOINT
- REINFORCED CONCRETE PAVEMENT ADJACENT TO BRIDGE REFERENCE LINE OR SLEEPER SLAB

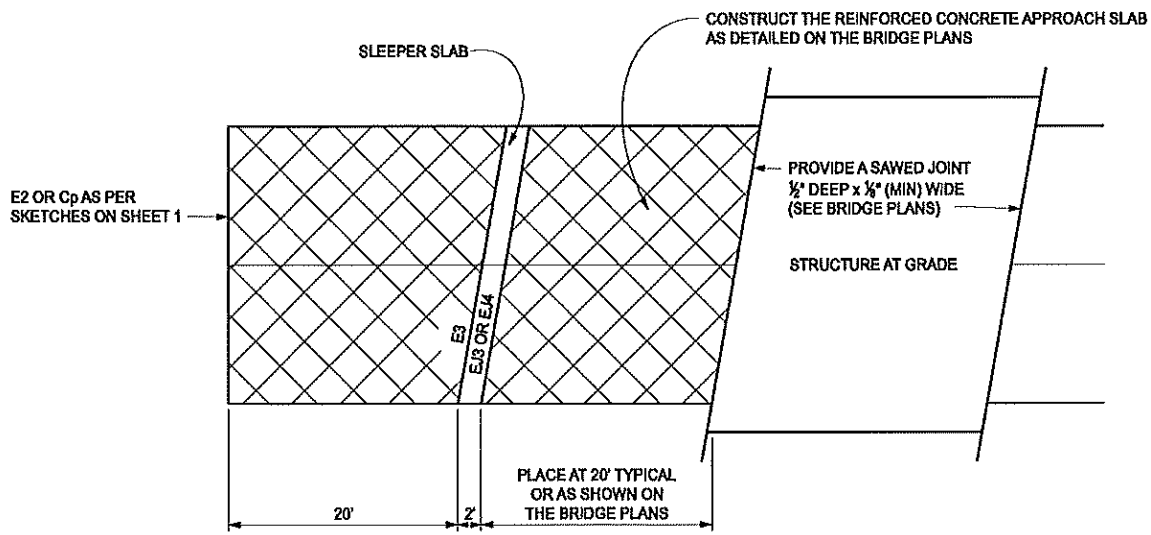
JOINTED PLAIN CONCRETE PAVEMENT	
PAVEMENT THICKNESS	JOINT SPACING
6½" TO 6¾"	12'
9" TO 11¾"	14'
12" OR MORE	16'

APPROVED BY: \_\_\_\_\_  
DIRECTOR, BUREAU OF FIELD SERVICES

APPROVED BY: \_\_\_\_\_  
DIRECTOR, BUREAU OF DEVELOPMENT



STANDARD PLAN FOR LOCATION OF TRANSVERSE JOINTS IN PLAIN CONCRETE PAVEMENT			
(SPECIAL DETAIL)	02/23/2026	<b>R-43-J</b>	SHEET
FHWA APPROVAL	PLAN DATE		1 OF 2



**JOINT SPACING WITH  
INTEGRAL / SEMI-INTEGRAL ABUTMENTS AND SLEEPER SLABS**


**NOTES:**

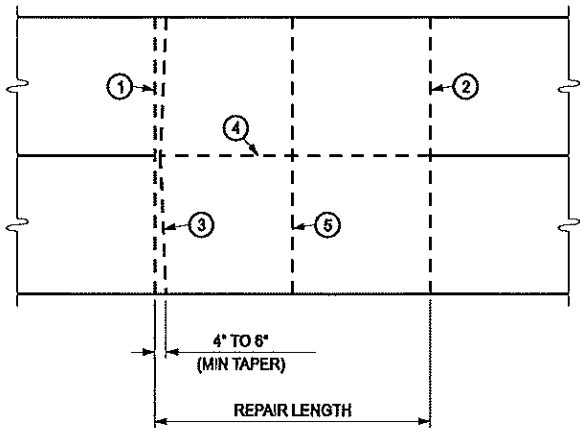
PLACE TRANSVERSE JOINTS ACCORDING TO THIS STANDARD PLAN AND STANDARD PLAN R-42-SERIES, UNLESS OTHERWISE SPECIFIED ON THE PLANS OR DIRECTED BY THE ENGINEER.

DO NOT EXCEED THE MAXIMUM JOINT SPACING SPECIFIED. WHEN AN ADJUSTMENT IS REQUIRED, MAKE IT BETWEEN CONTRACTION JOINTS, ENSURING THE ADJUSTED SPACING IS AT LEAST 6'-6".

PLACE EXPANSION JOINTS ONLY AT STRUCTURES, INTERSECTIONS, AND AT SPECIFIED LOCATIONS.

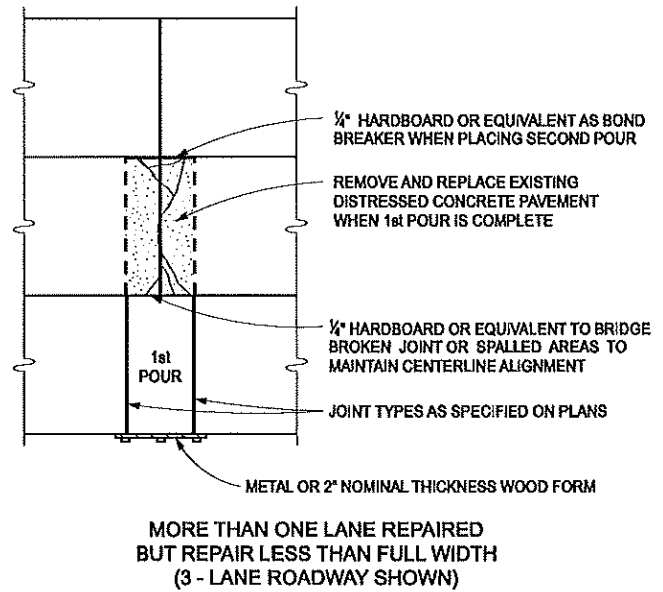
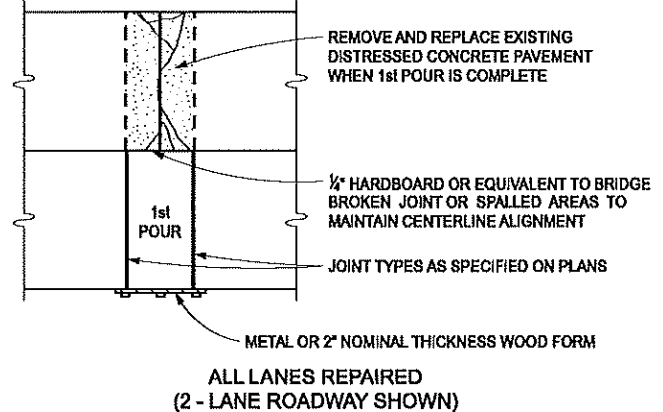
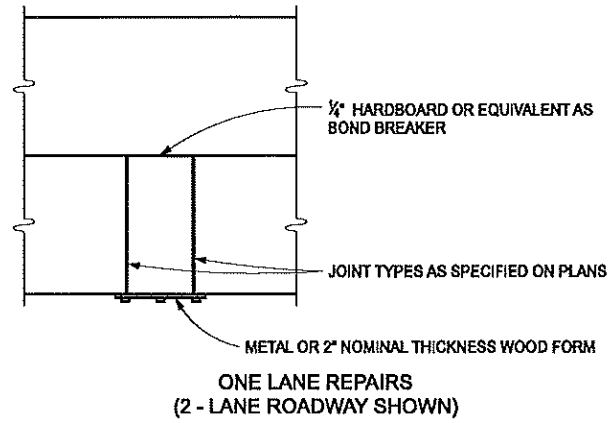
PLACE JOINTS ABUTTING RAILROAD TRACKS AS SHOWN ON STANDARD PLAN R-21-SERIES.

 DEPARTMENT DIRECTOR BRADLEY C. WIEFERICH, PE	STANDARD PLAN FOR <b>LOCATION OF TRANSVERSE JOINTS          IN PLAIN CONCRETE PAVEMENT</b>		<b>R-43-J</b>	SHEET 2 OF 2
	(SPECIAL DETAIL) FHWA APPROVAL	02/23/2026 PLAN DATE		



**SAWING DIAGRAM FOR FULL DEPTH CAST IN PLACE REPAIRS**

- ① & ② THESE SAW CUTS ARE FULL DEPTH AND PERPENDICULAR TO THE EDGE OF THE ROADWAY, WITHIN A TOLERANCE OF 1". OVERCUTTING IS ALLOWED INTO ADJACENT SHOULDERS AND WITHIN THE LIMITS OF A SUBSEQUENT REPAIR TO THE ADJACENT LANE. OUTSIDE THESE LIMITS, OVERCUTTING IS NOT ALLOWED INTO ADJACENT NON-REINFORCED CONCRETE PAVEMENTS AND IS RESTRICTED TO 3" INTO ADJACENT REINFORCED CONCRETE PAVEMENTS.
  - ③ THIS FULL DEPTH SAW CUT IS MADE TO FACILITATE OPENING A TRENCH ACROSS THE SLAB TO RELIEVE COMPRESSION IN THE PAVEMENT PRIOR TO REMOVAL OF THE FAILED AREA. THIS SAW CUT MAY BE OMITTED PROVIDED NO SPALLING OF THE REMAINING CONCRETE OCCURS. IF SPALLING DOES OCCUR, THE CONTRACTOR WILL BE REQUIRED TO MAKE THIS SAW CUT ON SUBSEQUENT REPAIRS. WHEN THIS SAW CUT IS USED AND THE ADJACENT LANE IS NOT REPAIRED, NO OVERCUTTING INTO THAT LANE IS ALLOWED.
  - ④ THIS LONGITUDINAL FULL DEPTH SAW CUT IS MADE BETWEEN LANES OR BETWEEN ANY COMBINATION OF THE FOLLOWING: LANE, RAMP, CURB, CONCRETE SHOULDER, OR PARTIAL LANE WIDTH REPAIR.
  - ⑤ IF REQUIRED, INTERMEDIATE SAW CUTS MAY BE MADE TO REMOVE A SECTION OF PAVEMENT LANE WHICH IS OVER 5'-0" IN LENGTH, TO PERMIT LOADING INTO THE HAULING UNITS.
- ADDITIONAL SAW CUTS, AT CONTRACTOR'S EXPENSE, MAY BE MADE INSIDE THE REPAIR LIMITS TO REDUCE 5'-0" BY 12'-0" OR LESS SLABS INTO SMALLER PIECES TO FACILITATE REMOVAL.



**FORMING NOTES:**  
 REMOVE STAKES USED TO HOLD HMA FILLER OR HARDBOARD IN PLACE DURING CONCRETE PLACEMENT BEFORE SCREEDING THE CONCRETE.  
 ADJACENT LANE REPAIRS MAY BE CAST INTEGRALLY, WHEN APPROVED BY THE ENGINEER.

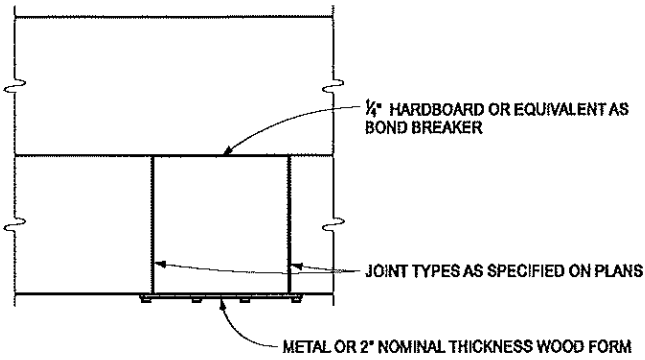
**FORMING REQUIREMENTS FOR CAST-IN-PLACE REPAIRS 12'-0" OR LESS**

APPROVED BY: \_\_\_\_\_  
 DIRECTOR, BUREAU OF FIELD SERVICES

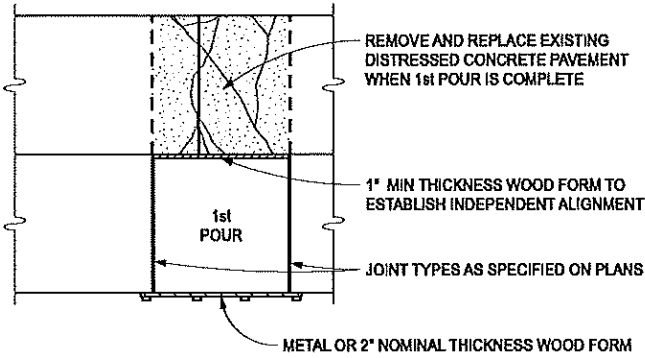
APPROVED BY: \_\_\_\_\_  
 DIRECTOR, BUREAU OF DEVELOPMENT



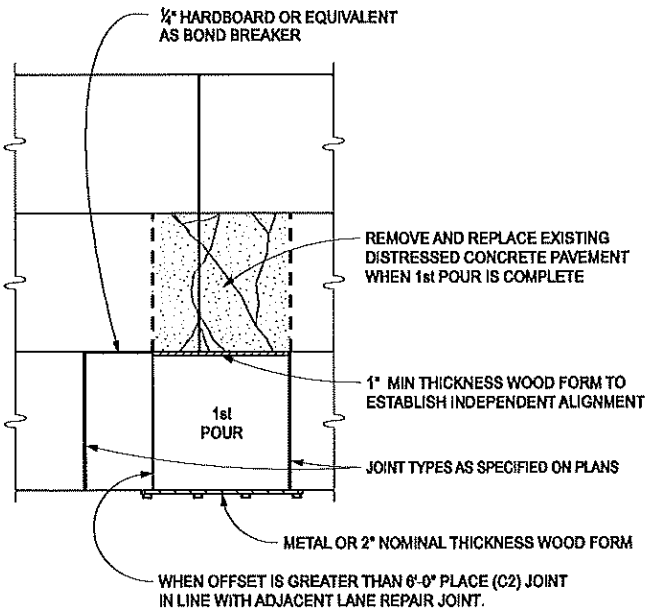
STANDARD PLAN FOR CONCRETE PAVEMENT REPAIR			
(SPECIAL DETAIL)	03/30/2026	R-44-G	SHEET 1 OF 7
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ONE LANE REPAIRS  
(2 - LANE ROADWAY SHOWN)



ALL LANES REPAIRED  
(2 - LANE ROADWAY SHOWN)



MORE THAN ONE LANE REPAIRED  
BUT REPAIRS ARE OFFSET  
(3 - LANE ROADWAY SHOWN)


FORMING NOTES:

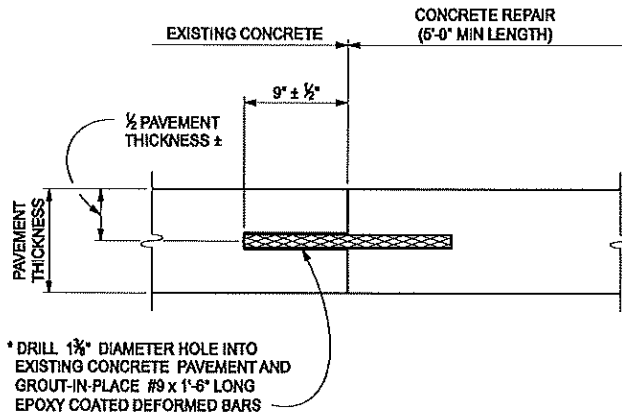
WHERE REPAIRS LONGER THAN 12'-0" ARE REQUIRED, ESTABLISH A NEW GRADE ALONG THE OLD PAVEMENT INNER JOINT LINE, INDEPENDENT OF THE OLD PAVEMENT SURFACE, TO SCREED PERPENDICULAR TO THE CENTERLINE AND INDEPENDENT OF THE OLD PAVEMENT GRADE.

REMOVE STAKES USED TO HOLD HMA FILLER OR HARDBOARD IN PLACE DURING CONCRETE PLACEMENT BEFORE SCREEDING THE CONCRETE.

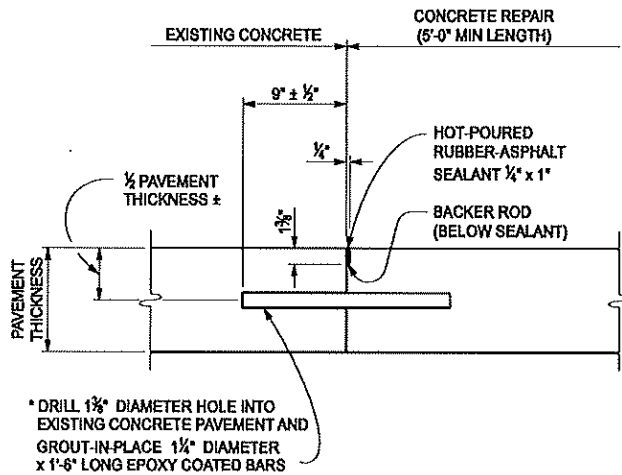
ADJACENT LANE REPAIRS MAY BE CAST INTEGRALLY, WHEN APPROVED BY THE ENGINEER.

FORMING REQUIREMENTS FOR  
CAST-IN-PLACE REPAIRS GREATER THAN 12'-0"

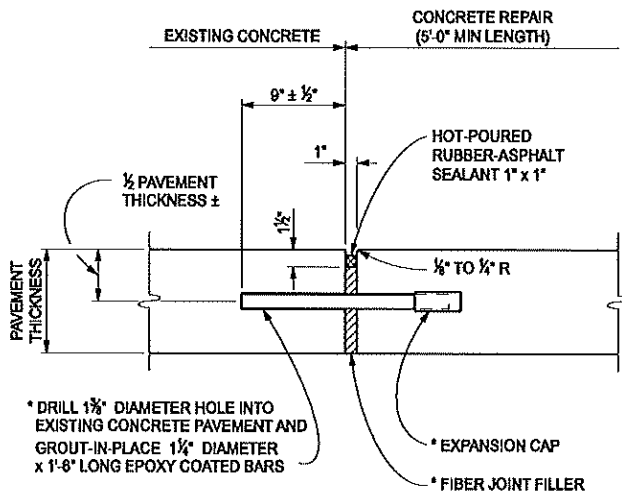
 DEPARTMENT DIRECTOR BRADLEY C. WIEFERICH, PE	STANDARD PLAN FOR CONCRETE PAVEMENT REPAIR		R-44-G	SHEET 2 OF 7
	(SPECIAL DETAIL) FHWA APPROVAL	03/30/2026 PLAN DATE		



TIED JOINT, Trg




CONTRACTION JOINT, Crg

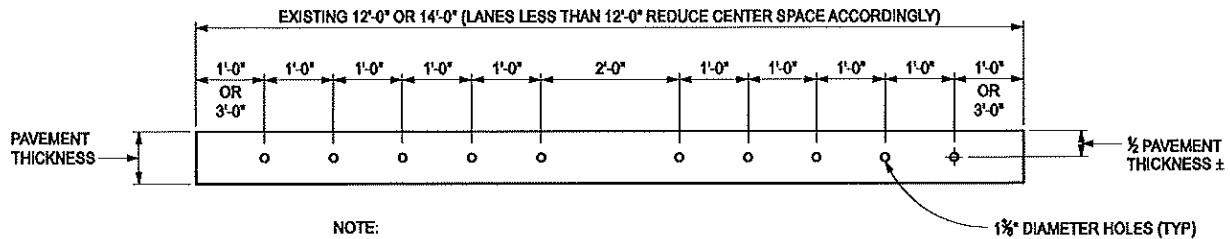


EXPANSION JOINT, Erg

\* SEE SHEET 4 OF 7 FOR BAR SPACING AND SHEET 7 OF 7 FOR NOTES.

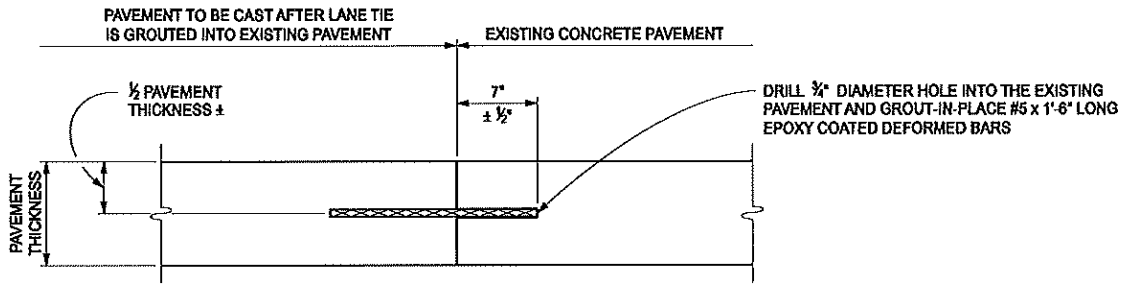
CAST-IN-PLACE REPAIR JOINTS USING GROUTED DOWEL OR DEFORMED BARS

 DEPARTMENT DIRECTOR BRADLEY C. WIEFERICH, PE	STANDARD PLAN FOR CONCRETE PAVEMENT REPAIR		
	(SPECIAL DETAIL) FHWA APPROVAL	03/30/2026 PLAN DATE	R-44-G

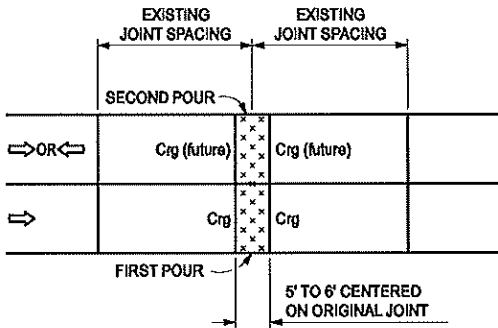


NOTE:  
 ADJUST THE HOLE SPACING 1" HORIZONTALLY, RAISED 1/2", OR LOWERED 1/2"  
 FROM THE ABOVE LOCATIONS TO AVOID DRILLING INTO THE REINFORCEMENT.

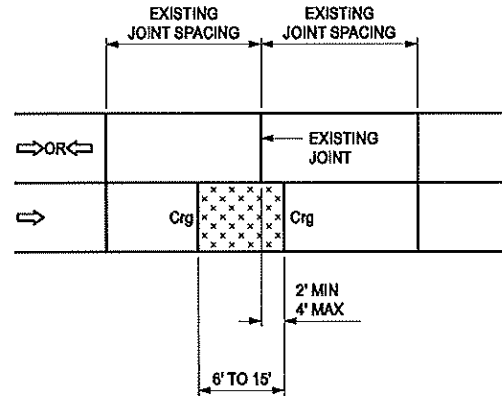
**DOWEL OR DEFORMED BAR SPACING FOR CONCRETE REPAIRS**



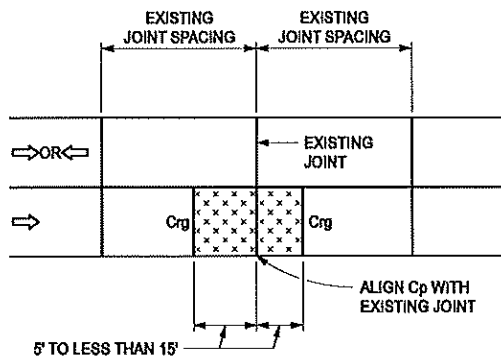
**EPOXY ANCHORED LANE TIE**



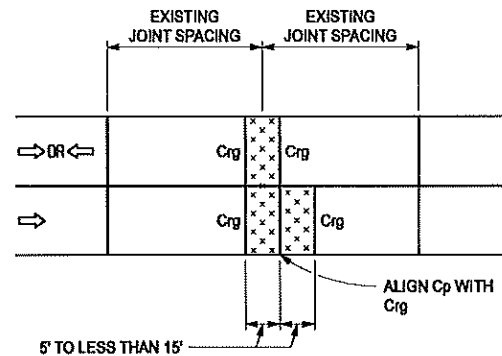
**SINGLE LANE OR FULL WIDTH REPAIR**



**REPAIR LENGTH 6' - 15' WITH ONE JOINT NEAR AN EXISTING JOINT (SINGLE LANE REPAIR)**



**REPAIR LENGTHS OVER 15' WITH Cp JOINT (SINGLE LANE REPAIR)**

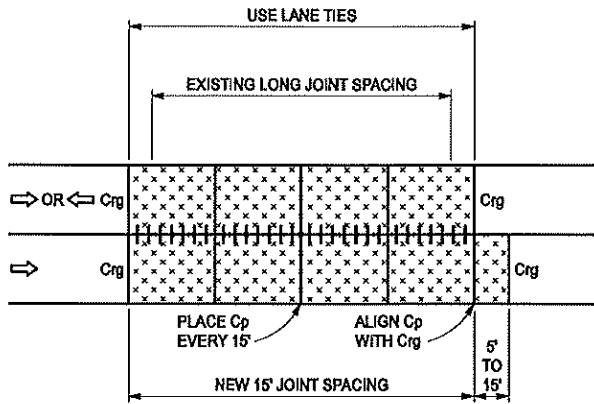


**OFFSETTING LANE REPAIRS WITH Cp JOINT**

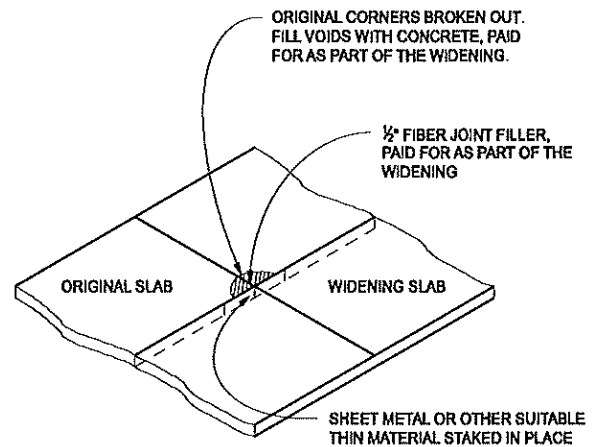
**MDOT**  
 Michigan Department of Transportation

DEPARTMENT DIRECTOR  
 BRADLEY C. WEFERICH, PE

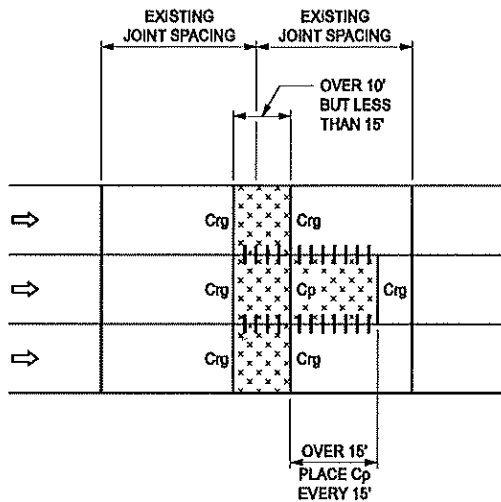
STANDARD PLAN FOR CONCRETE PAVEMENT REPAIR			
(SPECIAL DETAIL.)	03/30/2026	<b>R-44-G</b>	SHEET 4 OF 7
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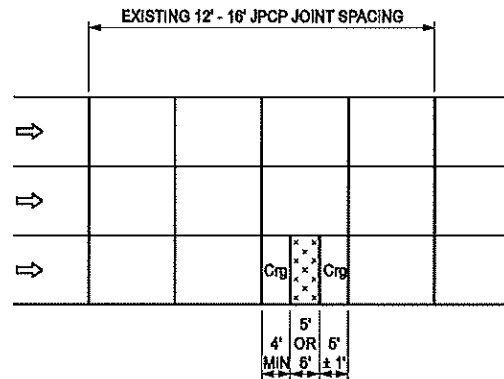
**LONG REPAIR SHOWING Cp JOINT ALIGNMENTS AND LANE TIES**



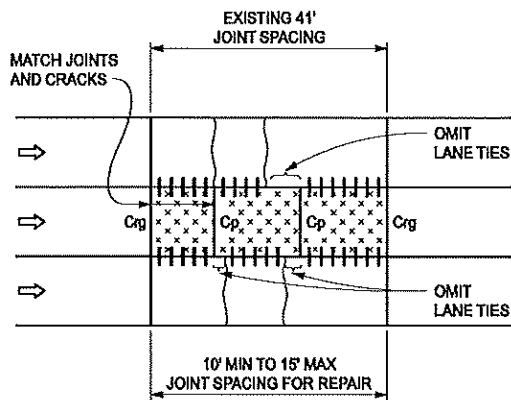
**JOINT PATCH ADJACENT TO WIDENING SLAB**



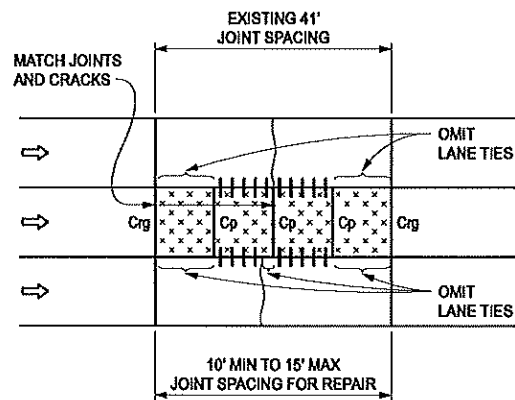
**FULL WIDTH MULTI-LANE REPAIRS WITH OFFSET IN ONE LANE**



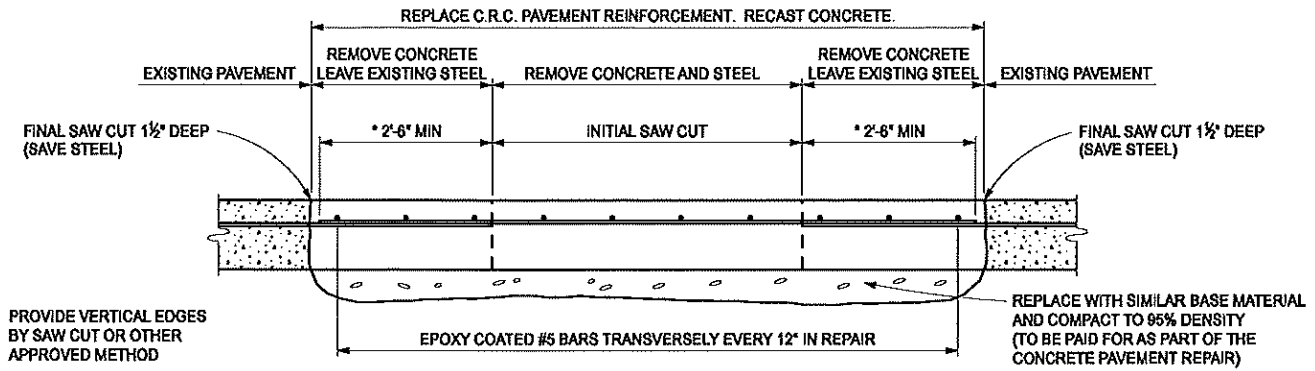
**REPAIR OF 12' - 16' JPCP WITH ONLY ONE MID-PANEL CRACK**  
 (IF THE PANEL HAS MORE THAN ONE MID-PANEL CRACK OR IF THE JOINT SPACING IS 12' REPLACE ENTIRE PANEL)  
 (SINGLE LANE OR FULL WIDTH REPAIR)



**TWO CRACK PANEL REPAIR**

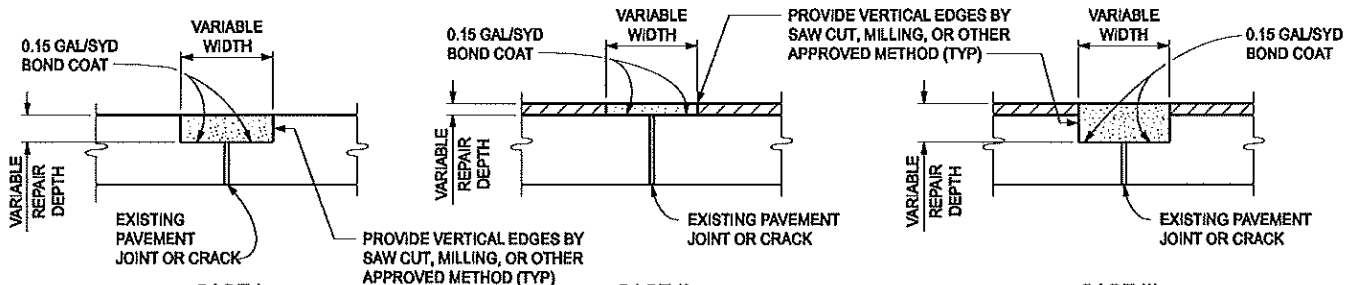


**MID PANEL CRACK REPAIR**



\* NOTE: IF EXISTING REINFORCEMENT LAPS ARE ENCOUNTERED IN THIS AREA, MOVE FINAL SAW CUT BACK TO PROVIDE MINIMUM 2'-6" LAP OF PAVEMENT REINFORCEMENT.

**REPAIRING CONTINUOUSLY REINFORCED CONCRETE**



**CASE I**

**HMA REPAIR OF CONCRETE PAVEMENT**

REMOVE LOOSE DETERIORATED CONCRETE (NOT TO EXCEED PAVEMENT THICKNESS)

**CASE II**

**HMA REPAIR OF CONCRETE PAVEMENT WITH HMA SURFACE**

REMOVE HMA OVERLAY TO CONCRETE SURFACE.

**CASE III**

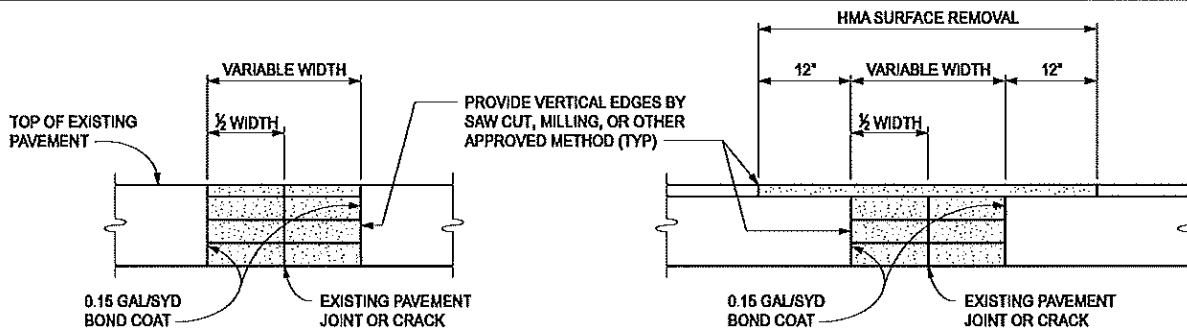
**HMA REPAIR OF CONCRETE PAVEMENT WITH HMA SURFACE**

REMOVE HMA OVERLAY AND LOOSE DETERIORATED CONCRETE. (NOT TO EXCEED PAVEMENT THICKNESS)

FOR CASES I, II, & III, REPLACE THE REMOVED MATERIAL WITH A HMA TOP COURSE MIXTURE, OR OTHER APPROVED MIXTURE. COMPACT THE HMA WITH A MACHINE VIBRATOR OR APPROVED ROLLER WITH BASE LIFT THICKNESSES NOT TO EXCEED 3" AND WITH THE TOP LIFT THICKNESS NOT TO EXCEED 2". ENSURE THE FINAL SURFACE OF THE REPAIR IS FLUSH WITH THE EXISTING PAVEMENT SURFACE.

**SURFACE REPAIR FOR JOINT OR CRACK (TRANSVERSE OR LONGITUDINAL)**

**DETAIL 7**



**CASE IV**

**FULL DEPTH HMA REPAIR OF CONCRETE PAVEMENT**

REMOVE THE DETERIORATED CONCRETE FULL DEPTH. COMPACT LOOSE EXISTING BASE. REPLACE AND COMPACT WITH HMA ANY LOST BASE.

**CASE V**

**FULL DEPTH HMA REPAIR OF CONCRETE PAVEMENT WITH HMA SURFACE**

REMOVE EXISTING HMA DETERIORATED CONCRETE PAVEMENT FULL DEPTH. COMPACT LOOSE EXISTING BASE. REPLACE AND COMPACT WITH HMA ANY LOST BASE.

FOR CASES IV & V, REPLACE THE REMOVED MATERIAL WITH A HMA TOP COURSE MIXTURE, OR OTHER APPROVED MIXTURE. COMPACT THE HMA WITH A MACHINE VIBRATOR OR APPROVED ROLLER WITH BASE LIFT THICKNESSES NOT TO EXCEED 3" AND WITH THE TOP LIFT THICKNESS NOT TO EXCEED 2". ENSURE THE FINAL SURFACE OF THE REPAIR IS FLUSH WITH THE EXISTING PAVEMENT SURFACE.

**FULL DEPTH REPAIR FOR JOINT OR CRACK (TRANSVERSE OR LONGITUDINAL)**

**DETAIL 8**



DEPARTMENT DIRECTOR  
BRADLEY C. WIEFERICH, PE

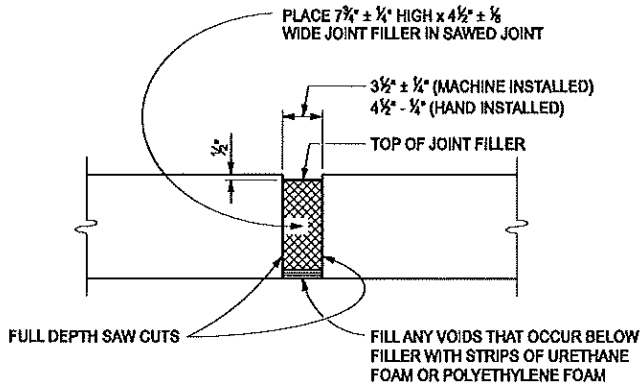
**STANDARD PLAN FOR CONCRETE PAVEMENT REPAIR**

(SPECIAL DETAIL)  
FHWA APPROVAL

03/30/2026  
PLAN DATE

**R-44-G**

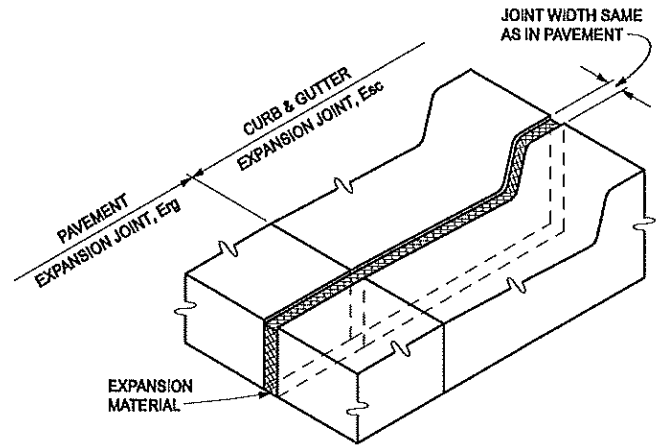
SHEET  
6 OF 7



NOTES:  
WHEN CONSTRUCTING A PRESSURE RELIEF JOINT THROUGH A CONCRETE SHOULDER, TRENCH BELOW THE CONCRETE AS NEEDED TO ALLOW ROOM FOR THE 7 3/4" FILLER.

### PRESSURE RELIEF JOINT

THIS DETAIL ALSO APPLIES TO HMA SURFACED CONCRETE PAVEMENT REQUIRING PRESSURE RELIEF JOINTS



SAW CURB, GUTTER, AND CURB FACE AS DEEP AS THE EXISTING PAVEMENT THICKNESS. CHIP OUT THE REMAINING CONCRETE AND PLACE A SUFFICIENT THICKNESS OF EXPANSION MATERIAL IN SAWED JOINT TO FILL THE GAP, AS DIRECTED BY THE ENGINEER.

### EXPANSION JOINT, Esc

#### NOTES:

ENSURE CONCRETE PAVEMENT REPAIRS (INCLUDING JOINT TYPES) OR PRESSURE RELIEF DETAILS ARE AS SPECIFIED ON THE PLANS OR IN THE LOG OF PROJECT.

IF THE EXISTING PAVEMENT HAS AN HMA SURFACE, EXTEND THE SAW CUTS THROUGH THE UNDERLYING PORTLAND CEMENT CONCRETE.

CLEAN SAW OVERCUTS IN ADJACENT LANE, SHOULDER, RAMP, AND GUTTERS THAT WILL REMAIN IN PLACE AND THEN SEAL WITH HOT-POURED RUBBER-ASPHALT.

WHEN THE CONCRETE PAVEMENT REPAIR IS CONSTRUCTED IN PREPARATION FOR AN OVERLAY, OMIT Crg JOINT RESERVOIRS AND SEALANTS AND KEEP EXPANSION JOINT (Erg) FIBER FILLER FLUSH TO THE PAVEMENT SURFACE.

ENSURE EXPANSION CAPS ARE ACCORDING TO STANDARD PLAN R-40-SERIES.

ENSURE TRANSVERSE CONTRACTION (Cp) AND EXPANSION (E2) JOINTS ARE ACCORDING TO STANDARD PLAN R-39-SERIES.

EPOXY COAT DOWEL AND DEFORMED BARS USED IN Trg, Crg, AND Erg JOINTS ACCORDING TO THE STANDARD SPECIFICATIONS FOR CONSTRUCTION.

GROUT DOWEL BARS AND DEFORMED BARS FOR TIED JOINTS INTO EXISTING PAVEMENT WITH A GROUT SELECTED FROM THE PREQUALIFIED MATERIALS LISTED IN THE DEPARTMENT'S "MATERIALS SOURCE GUIDE" UNDER ADHESIVE SYSTEMS FOR GROUTING DOWEL BARS AND TIE BARS FOR FULL-DEPTH CONCRETE PAVEMENT REPAIRS.

ENSURE THE BACKER ROD MEETS THE REQUIREMENTS OF THE STANDARD SPECIFICATIONS FOR CONSTRUCTION.

ENSURE THE SAME JOINT TYPE EXTENDS ACROSS ADJACENT LANE REPAIRS.

AFTER GROUTING IN-PLACE, APPLY RC-250 OR AN APPROVED BOND BREAKER TO THAT PORTION OF Crg AND Erg DOWEL BARS THAT EXTEND INTO THE CAST CONCRETE.

DISTRIBUTE 1' OF Erg EXPANSION JOINTS THROUGHOUT A 1000' SECTION OF REPAIRED CONCRETE PAVEMENTS.

WHERE THERE ARE NO REPAIR LOCATIONS WITHIN A 1000' LENGTH, NO EXPANSION SPACE WILL BE PROVIDED.

EXTEND EXPANSION JOINT FILLER THE FULL DEPTH OF THE REPAIR AND ENSURE IT IS FLUSH WITH THE EXISTING PAVEMENT SURFACE. PRIOR TO SEALING, REMOVE THE JOINT FIBER FILLER AT THE PAVEMENT SURFACE BY CUTTING 1" WIDE AND 1 1/2" DEEP TO PERMIT THE PLACEMENT OF THE HOT-POURED RUBBER ASPHALT SEALANT. ENSURE HOLES IN EXPANSION JOINT FILLER HAVE A 1 1/2" MAXIMUM DIAMETER AND ARE ALIGNED TO FIT DRILLED HOLES IN CONCRETE.

CONSTRUCT Erg JOINTS ONLY WHEN THEY EXTEND ACROSS ALL LANES, RAMPS, OR SHOULDERS.

WHEN Erg JOINTS ARE PLACED ADJACENT TO CONCRETE CURB AND GUTTER THAT IS NOT REQUIRED TO BE REMOVED, CONSTRUCT AN Esc JOINT IN THE CURB AND GUTTER.

BLAST CLEAN (ABRASIVE) JOINT RESERVOIRS FOR THE HOT-POURED RUBBER-ASPHALT SEALANT, FOLLOWED BY A FINAL CLEANING OF OIL-FREE COMPRESSED AIR PRIOR TO SEALING.

SPACE LANE TIES (TO ADJACENT PAVEMENT LANE, WHEN REQUIRED) ACCORDING TO STANDARD PLAN R-41-SERIES, EXCEPT THAT THE FIRST LANE TIE ADJACENT TO A TRANSVERSE JOINT IS INSTALLED AT A DISTANCE OF 1'-8" FROM THE JOINT. WHEN BOTH SIDES OF A LONGITUDINAL JOINT ARE POURED INTEGRALLY, ENSURE LANE TIES ARE STRAIGHT DEFORMED EPOXY COATED BARS AND CAST-IN-PLACE AS SPECIFIED ON STANDARD PLAN R-41-SERIES. WHEN ADJACENT LANES ARE CAST SEPARATELY, GROUT-IN-PLACE LANE TIES AS SPECIFIED ON THIS PLAN. SELECT GROUT FROM THE PREQUALIFIED MATERIALS LISTED IN THE DEPARTMENT'S "MATERIALS SOURCE GUIDE", UNDER LANE TIES.

STENCIL THE MONTH AND YEAR OF CASTING AND STATION NUMBER (IF REMOVED) ON EACH CONCRETE REPAIR.

USE JOINTED PLAIN CONCRETE PAVEMENT FOR ALL REPAIRS.



DEPARTMENT DIRECTOR  
BRADLEY C. WIEFERICH, PE

### STANDARD PLAN FOR CONCRETE PAVEMENT REPAIR

(SPECIAL DETAIL)  
FHWA APPROVAL

03/30/2026  
PLAN DATE

R-44-G

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