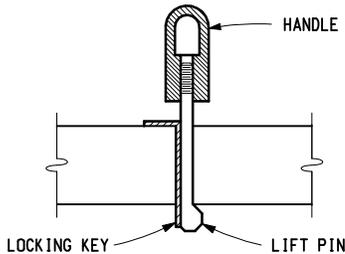


**PLAN OF SAWING DIAGRAM**

THIS METHOD OF REMOVING DISTRESSED CONCRETE SHALL BE USED IN CONJUNCTION WITH FULL DEPTH CAST-IN-PLACE REPAIRS LESS THAN 50'-0" LONG AND IS OPTIONAL FOR REPAIRS OVER 50'-0" IN LENGTH.

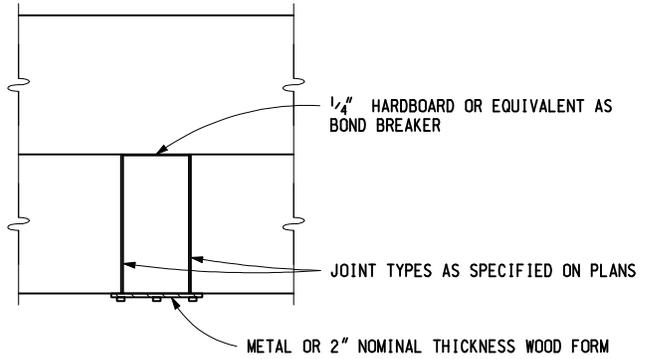
- ① & ② THESE SAW CUTS SHALL BE FULL DEPTH AND PERPENDICULAR TO THE EDGE OF THE ROADWAY, WITHIN A TOLERANCE OF 1". NO OVERCUTTING INTO ADJACENT LANES SHALL BE MADE UNLESS THE OVERCUT IS WITHIN THE LIMITS OF A SUBSEQUENT REPAIR TO THE ADJACENT LANE. SHOULDER OVERCUTS WILL BE ALLOWED.
- ③ THIS FULL DEPTH SAW CUT IS MADE TO FACILITATE OPENING A TRENCH ACROSS THE SLAB TO RELIEVE COMPRESSION IN THE PAVEMENT PRIOR TO LIFTING OUT 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 SHALL BE MADE.
- 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 6'-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 6'-0" BY 12'-0" OR LESS SLABS INTO SMALLER PIECES TO FACILITATE REMOVAL.

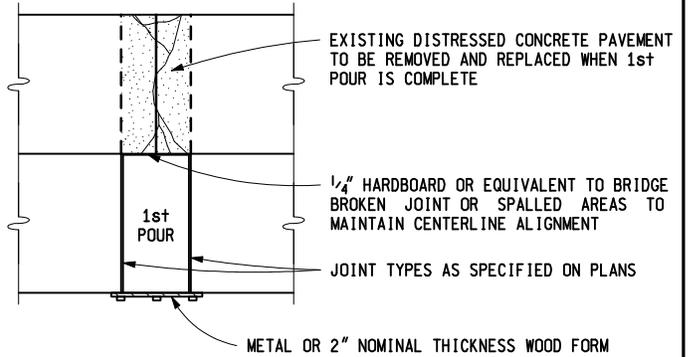


**SCHEMATIC OF TYPICAL LIFT PIN ASSEMBLY**

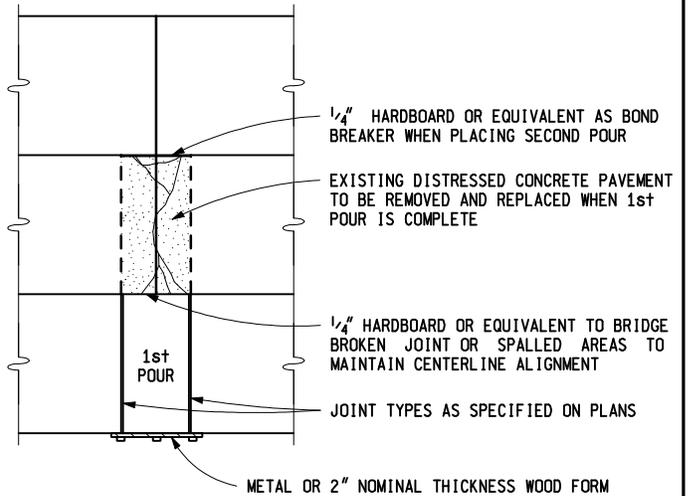
**SAWING DIAGRAM & LIFT PIN FOR REMOVING OLD SLAB**



**ONE LANE REPAIRS  
(2 - LANE ROADWAY SHOWN)**



**ALL LANES REPAIRED  
(2 - LANE ROADWAY SHOWN)**



**MORE THAN ONE LANE REPAIRED  
BUT REPAIR LESS THAN FULL WIDTH  
(3 - LANE ROADWAY SHOWN)**

**FORMING NOTES:**

STAKES USED TO HOLD HMA FILLER OR HARDBOARD IN PLACE DURING CONCRETE PLACEMENT SHALL BE REMOVED 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**



PREPARED BY  
DESIGN DIVISION

DRAWN BY: B.L.T.

CHECKED BY: W.K.P.

DEPARTMENT DIRECTOR  
Kirk T. Steudle

APPROVED BY: John C. Friend  
ENGINEER OF DELIVERY

APPROVED BY: Paul A. Van Pelt  
ENGINEER OF DEVELOPMENT

MICHIGAN DEPARTMENT OF TRANSPORTATION  
BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR

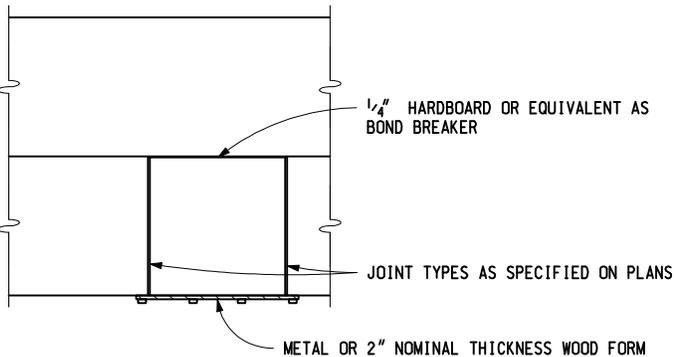
**CONCRETE PAVEMENT REPAIR**

9-10-2010  
F.H.W.A. APPROVAL

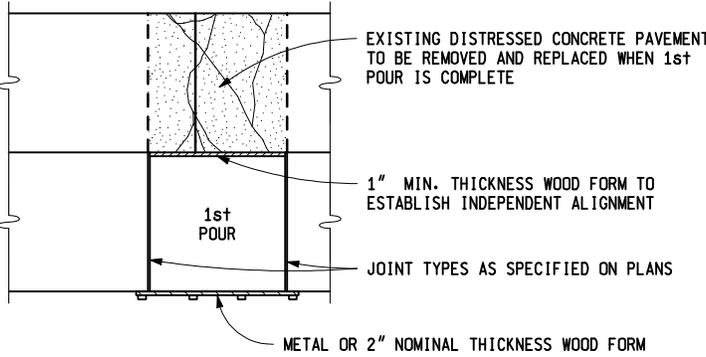
8-9-2010  
PLAN DATE

**R-44-F**

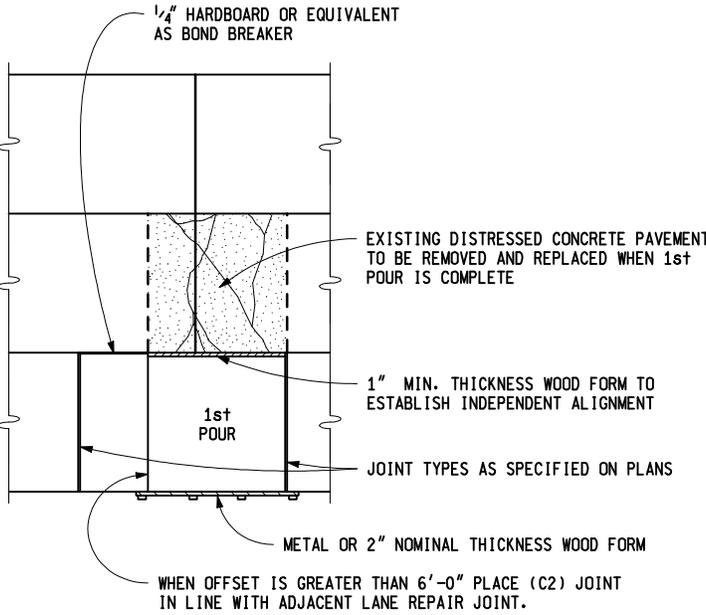
SHEET  
1 OF 6



**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)**

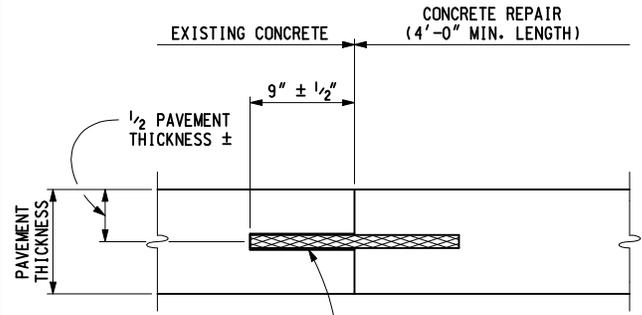
**FORMING NOTES:**

WHERE REPAIRS LONGER THAN 12'-0" ARE REQUIRED, A NEW GRADE MUST BE ESTABLISHED ALONG THE OLD PAVEMENT INNER JOINT LINE INDEPENDENT OF THE OLD PAVEMENT SURFACE, SO THAT SCREEDING MAY BE DONE PERPENDICULAR TO THE CENTERLINE AND INDEPENDENT OF THE OLD PAVEMENT GRADE.

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

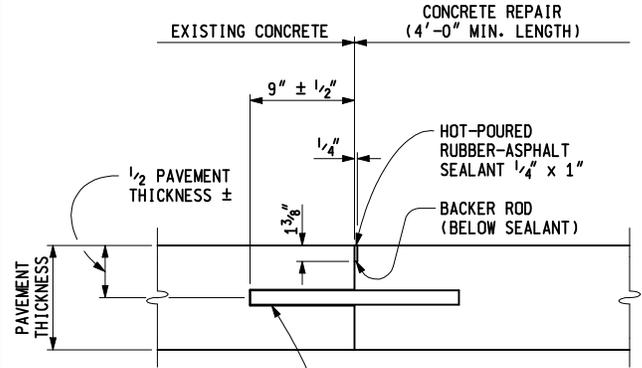
ADJACENT LANE REPAIRS MAY BE CAST INTEGRALLY, WHEN APPROVED BY THE ENGINEER.

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



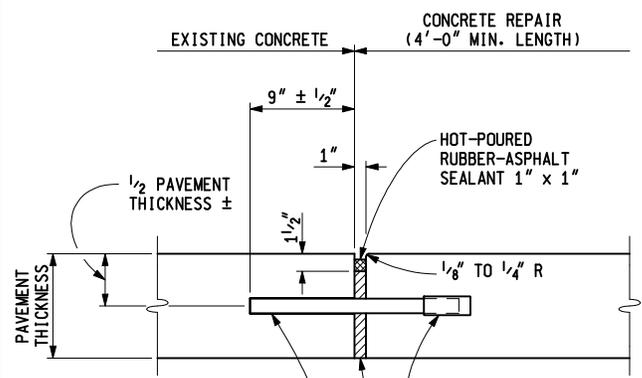
\* DRILL 1 3/8" DIAMETER HOLE INTO EXISTING CONCRETE PAVEMENT AND GROUT-IN-PLACE #9 x 1'-6" LONG EPOXY COATED DEFORMED BARS

**TIED JOINT, Trg**



\* DRILL 1 3/8" DIAMETER HOLE INTO EXISTING CONCRETE PAVEMENT AND GROUT-IN-PLACE 1 1/4" DIAMETER x 1'-6" LONG EPOXY COATED BARS

**CONTRACTION JOINT, Crg**



\* DRILL 1 3/8" DIAMETER HOLE INTO EXISTING CONCRETE PAVEMENT AND GROUT-IN-PLACE 1 1/4" DIAMETER x 1'-6" LONG EPOXY COATED BARS

\* EXPANSION CAP  
\* FIBER JOINT FILLER

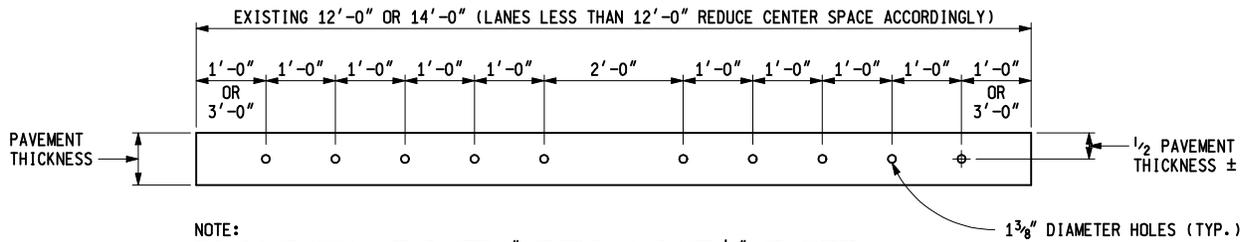
**EXPANSION JOINT, Erg**

\* SEE SHEET 3 OF 6 FOR BAR SPACING AND SHEET 6 OF 6 FOR NOTES.

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

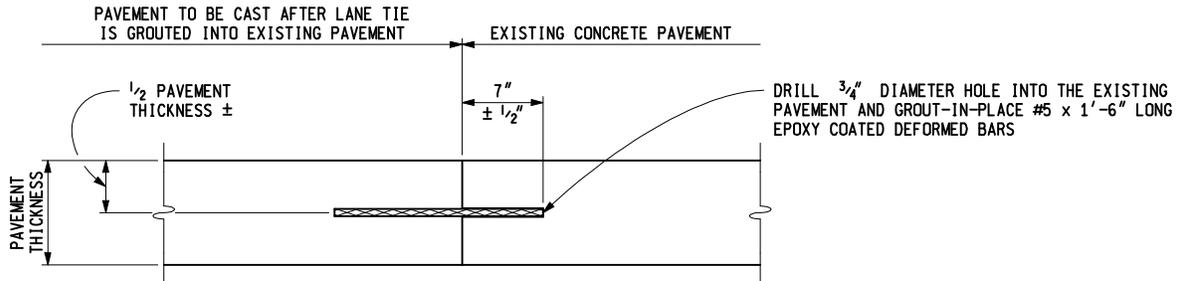
MICHIGAN DEPARTMENT OF TRANSPORTATION  
BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR

**CONCRETE PAVEMENT REPAIR**

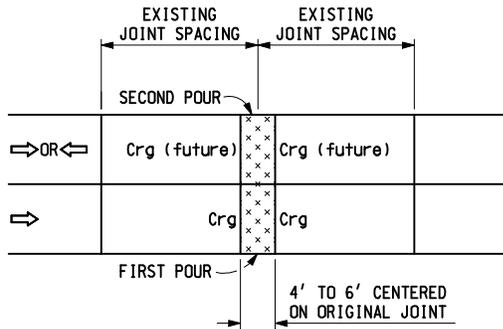


NOTE:  
THE HOLE SPACING MAY BE ADJUSTED 1" HORIZONTALLY, RAISED 1/2", OR LOWERED 1/2" FROM THE ABOVE LOCATIONS TO AVOID DRILLING INTO THE REINFORCEMENT.

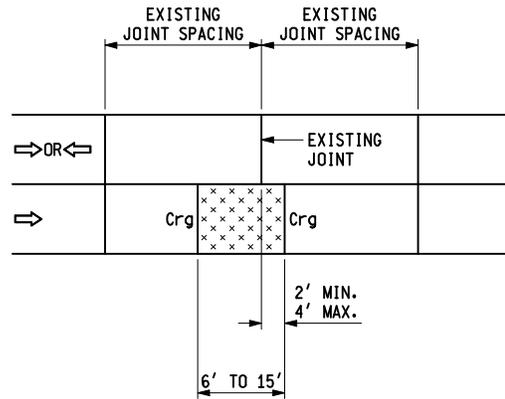
### DOWEL OR DEFORMED BAR SPACING FOR CONCRETE REPAIRS



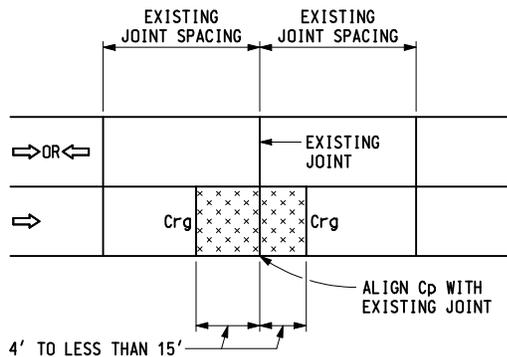
### EPOXY ANCHORED LANE TIE



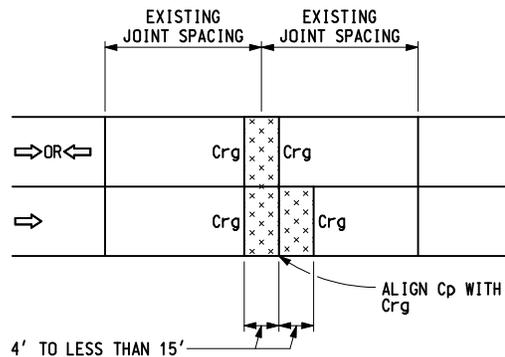
SINGLE LANE OR FULL WIDTH REPAIR



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

MICHIGAN DEPARTMENT OF TRANSPORTATION  
BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR

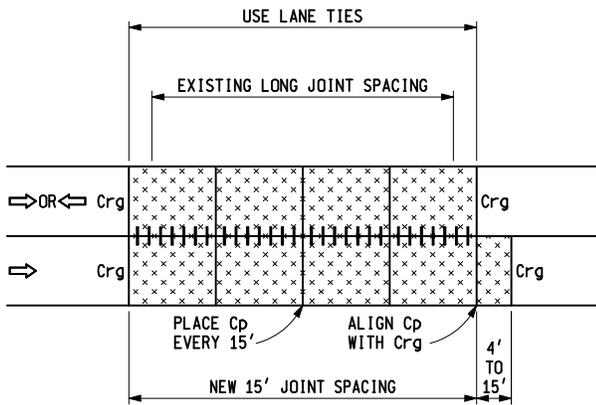
## CONCRETE PAVEMENT REPAIR

9-10-2010  
F.H.W.A. APPROVAL

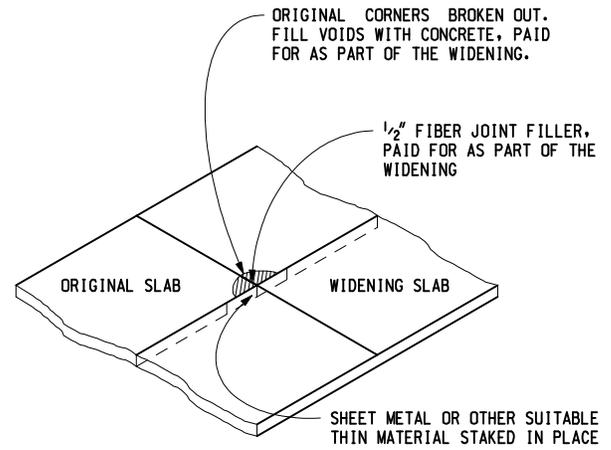
8-9-2010  
PLAN DATE

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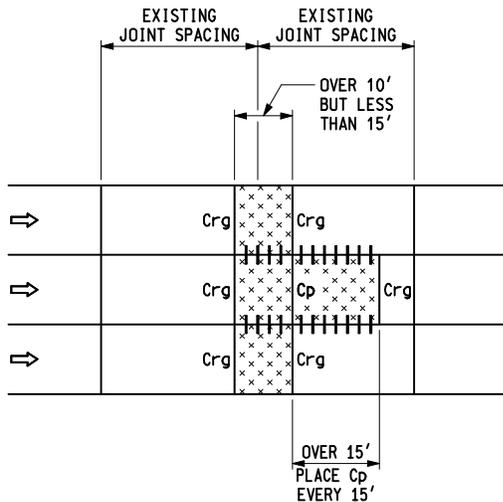
SHEET  
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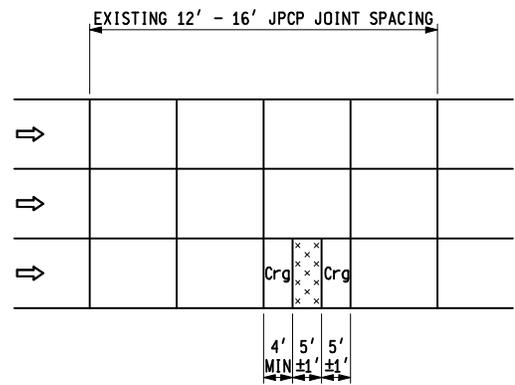
**LONG REPAIR SHOWING  
Cp JOINT ALIGNMENTS AND LANE TIES**



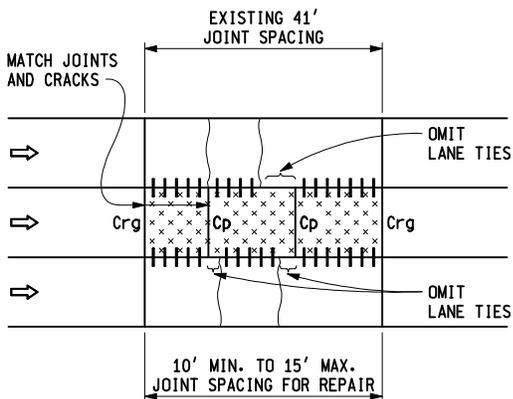
**JOINT PATCH ADJACENT TO WIDENING SLAB**



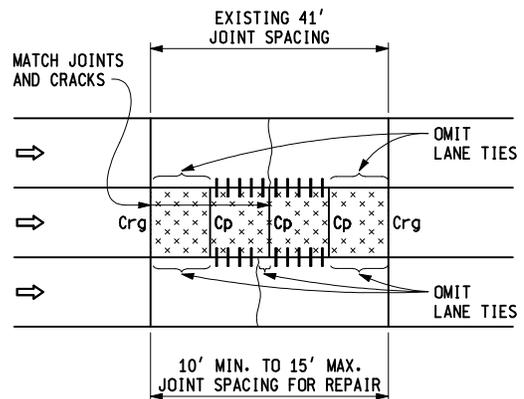
**FULL WIDTH MULTI-LANE REPAIRS  
WITH OFFSET IN ONE LANE**



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



**TWO CRACK PANEL REPAIR**



**MID PANEL CRACK REPAIR**

MICHIGAN DEPARTMENT OF TRANSPORTATION  
BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR

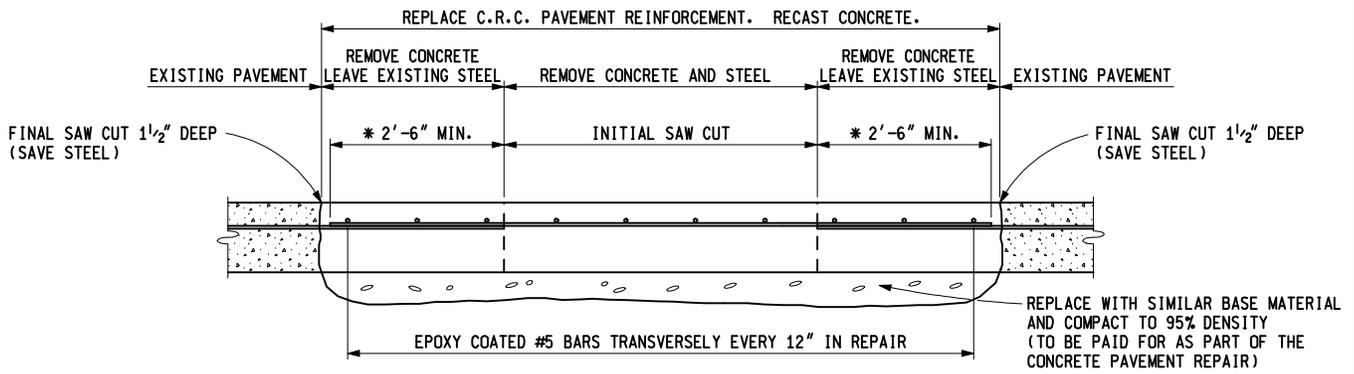
**CONCRETE PAVEMENT REPAIR**

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F.H.W.A. APPROVAL

8-9-2010  
PLAN DATE

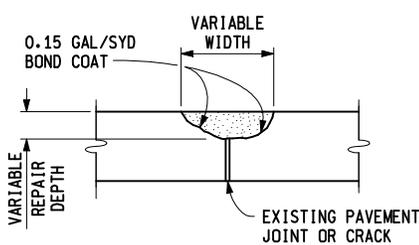
**R-44-F**

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

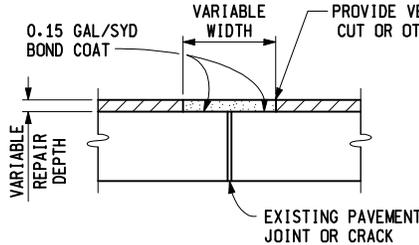
**REPAIRING CONTINUOUSLY REINFORCED CONCRETE**



**CASE I**

HMA REPAIR OF CONCRETE PAVEMENT

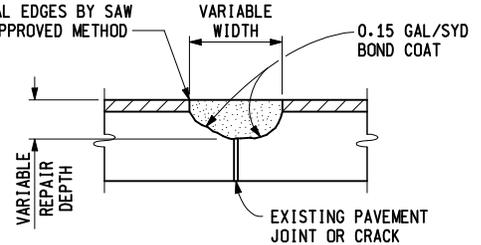
REMOVE LOOSE DETERIORATED CONCRETE. (NOT TO EXCEED PAVEMENT THICKNESS)



**CASE II**

HMA REPAIR OF CONCRETE PAVEMENT WITH HMA SURFACE

REMOVE HMA OVERLAY TO CONCRETE SURFACE.



**CASE III**

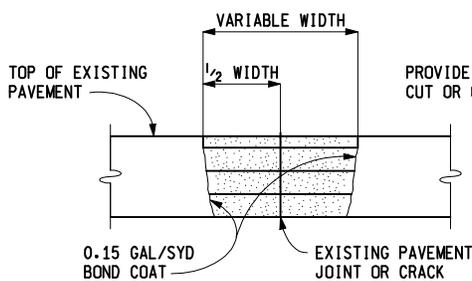
HMA REPAIR OF CONCRETE PAVEMENT WITH HMA SURFACE

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

FOR CASES I, II, & III, THE REMOVED MATERIAL SHALL BE REPLACED WITH A HMA TOP COURSE MIXTURE. THE HMA SHALL BE COMPACTED 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". THE FINAL SURFACE OF THE REPAIR SHALL BE FLUSH WITH THE EXISTING PAVEMENT SURFACE.

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

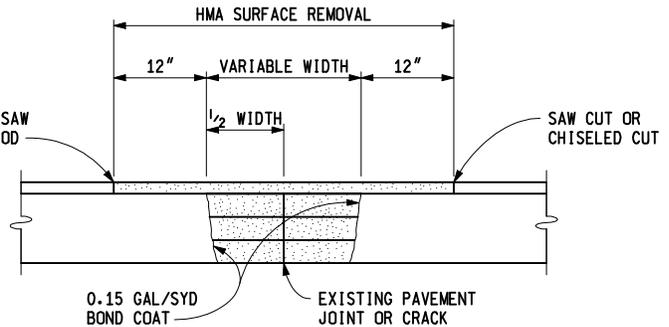
**DETAIL 7**



**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, THE REMOVED MATERIAL SHALL BE REPLACED WITH A HMA TOP COURSE MIXTURE. THE HMA SHALL BE COMPACTED 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". THE FINAL SURFACE OF THE REPAIR SHALL BE FLUSH WITH THE EXISTING PAVEMENT SURFACE.

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

**DETAIL 8**

MICHIGAN DEPARTMENT OF TRANSPORTATION  
BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR

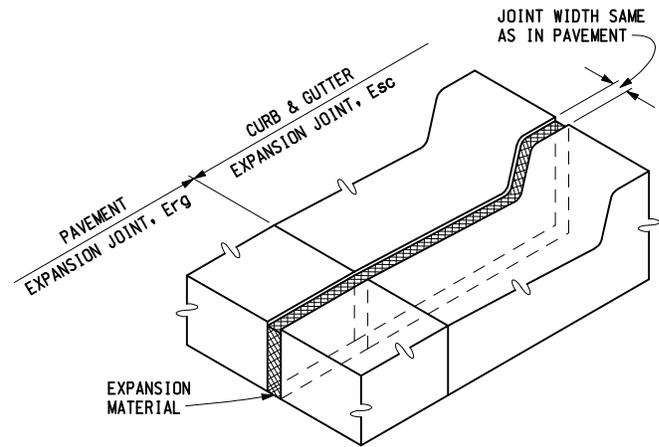
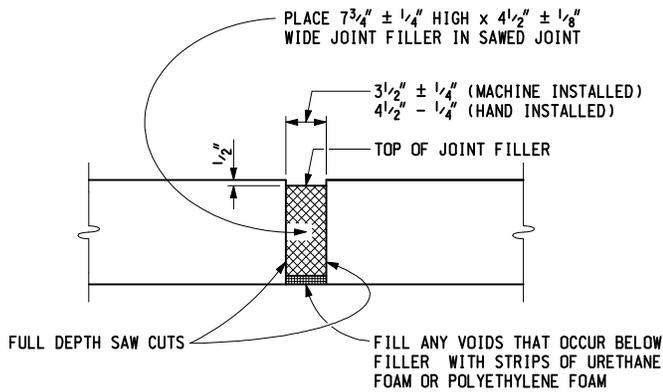
**CONCRETE PAVEMENT REPAIR**

9-10-2010  
F.H.W.A. APPROVAL

8-9-2010  
PLAN DATE

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NOTES:  
WHEN PRESSURE RELIEF JOINT IS TO BE CONSTRUCTED THROUGH CONCRETE SHOULDER, TRENCHING BELOW CONCRETE MAY BE NECESSARY TO ALLOW ROOM FOR 7 1/4" FILLER.

### PRESSURE RELIEF JOINT

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

CURB, GUTTER, AND CURB FACE SHALL BE SAWED AS DEEP AS THE EXISTING PAVEMENT THICKNESS. THE REMAINING CONCRETE SHALL BE CHIPPED OUT AND EXPANSION MATERIAL OF SUFFICIENT THICKNESS SHALL BE PLACED IN SAWED JOINT TO FILL THE GAP AS DIRECTED BY THE ENGINEER.

### EXPANSION JOINT, Esc

#### NOTES:

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

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

SAW OVERCUTS IN ADJACENT LANE, SHOULDER, RAMP, AND GUTTERS THAT WILL REMAIN IN PLACE, SHALL BE CLEANED AND THEN SEALED WITH HOT-POURED RUBBER-ASPHALT.

WHEN THE CONCRETE PAVEMENT REPAIR IS CONSTRUCTED IN PREPARATION FOR AN OVERLAY, Crg JOINT RESERVOIRS AND SEALANTS SHALL BE OMITTED AND EXPANSION JOINTS (Erg) SHALL HAVE THE FIBER JOINT FILLER KEPT FLUSH TO THE PAVEMENT SURFACE.

EXPANSION CAPS SHALL BE ACCORDING TO STANDARD PLAN R-40-SERIES.

TRANSVERSE CONTRACTION Cp AND EXPANSION E2 JOINTS SHALL BE ACCORDING TO STANDARD PLAN R-39P-SERIES.

DOWEL AND DEFORMED BARS USED IN Trg, Crg, AND Erg JOINTS SHALL BE EPOXY COATED ACCORDING TO THE CURRENT STANDARD SPECIFICATIONS.

DOWEL BARS AND DEFORMED BARS FOR TIED JOINTS 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 CONCRETE PAVEMENT REPAIRS.

THE BACKER ROD SHALL MEET THE REQUIREMENTS OF THE STANDARD SPECIFICATIONS FOR CONSTRUCTION.

THE SAME TYPE JOINT SHALL EXTEND ACROSS ADJACENT LANE REPAIRS.

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

REPAIRED CONCRETE PAVEMENTS REQUIRE THAT 1" OF Erg EXPANSION JOINTS BE DISTRIBUTED THROUGHOUT A GIVEN 1000' SECTION.

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

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

Erg JOINTS SHALL BE CONSTRUCTED 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, AN Esc JOINT SHALL BE CONSTRUCTED IN THE CURB AND GUTTER.

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

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

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

ALL REPAIRS WILL BE JOINTED PLAIN CONCRETE PAVEMENT.

MICHIGAN DEPARTMENT OF TRANSPORTATION  
BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR

## CONCRETE PAVEMENT REPAIR

9-10-2010  
F.H.W.A. APPROVAL

8-9-2010  
PLAN DATE

R-44-F

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