SLIP JOINT WITH LESS THAN 1/4 IN BOND BREAKING MEDIUM

LEGEND

- THICKENED EDGE EXPANSION OR SLIP JOINT
- DOWELED CONSTRUCTION JOINT
- CONSTRUCTION OR CONTRACTION JOINT WITH TIE BARS
- DOWELED CONTRACTION JOINT
- REINFORCEMENT REQUIRED FOR ODD-SHAPED SLABS

NOT TO SCALE

TYPICAL LAYOUT OF JOINTS AT INTERSECTION

DATE
OCTOBER 2016

FIGURE
14-1
REINFORCING STEEL IS CARRIED THROUGH THE LONGITUDINAL CONTRACTION JOINT

CROSS-SECTION

PLAN-VIEW

DOWELS: NO. 5 PLAIN STEEL BARS
30" IN LENGTH, AND SPACED ON 30" CENTERS

END REINFORCING STEEL 3" FROM JOINT

NOTE: DOWELS REQUIRED IN TRANSVERSE CONTRACTION JOINTS IN ALL REINFORCED CONCRETE PAVEMENTS

NOT TO SCALE

REINFORCED RIGID PAVEMENT
WITH TWO TRAFFIC LANES

DATE
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FIGURE
14-3A
DOELED CONSTRUCTION JOINT
LONGITUDINAL CONTRACTION JOINT
REINFORCED STEEL

CROSS-SECTION

PLAN-VIEW

- DOWELS: NO. 5 PLAIN STEEL BARS
  30" IN LENGTH, AND SPACED ON 30" CENTERS

☒ END REINFORCING STEEL 3" FROM JOINT

NOTES: REINFORCING STEEL IS CARRIED THROUGH THE LONGITUDINAL CONTRACTION JOINT ONLY.

DOELED CONSTRUCTION JOINTS IN CONCRETE PAVEMENTS WITH 4 OR MORE LANES.

NOT TO SCALE

REINFORCED RIGID PAVEMENT
WITH TWO TRAFFIC LANES

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FIGURE
14-3B
REINFORCING STEEL IS CARRIED THROUGH THE LONGITUDINAL CONTRACTION JOINT

CROSS-SECTION

STEEL REINFORCEMENT

LONGITUDINAL CONTRACTION JOINT

CURB & GUTTER

TRAFFIC LANE

DOWELED CONTRACTION JOINTS

TRAFFIC LANE

25 FT MIN - 75 FT MAX

SHOULDER

PLAN-VIEW

DOWELS: NO. 5 PLAIN STEEL BARS
30" IN LENGTH, AND SPACED ON 30" CENTERS

END REINFORCING STEEL 3" FROM REAR FACE OF CURB. DOWELS REQUIRED IN TRANSVERSE CONTRACTION JOINTS IN ALL REINFORCED CONCRETE PAVEMENTS.
DETAIL A

THICKENED-EDGE EXPANSION JOINT

FILLET

1' MIN.
2' MAX.

TRAFFIC LANE

DETAIL B

LONGITUDINAL CONTRACTION JOINT

1'-0" MIN

90°

RAD. OF FILLET

DOWELED CONTRACTION JOINT

DETAIL C

DOWELED CONSTRUCTION JOINT

3'-0" MIN

RAD. OF FILLET

DOWELED CONTRACTION JOINT

NOT TO SCALE

LAYOUT OF JOINTS AT THE INTERSECTION OF REINFORCED RIGID PAVEMENT

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FIGURE
14-5B
CROSS - SECTION

PLAN - VIEW

DOWELS: NO. 5 PLAIN STEEL BARS
30" IN LENGTH, AND SPACED ON 30" CENTERS

TIE BARS: NO. 5 DEFORMED STEEL BARS
30" IN LENGTH, AND SPACED ON 30" CENTERS

NOT TO SCALE
CROSS SECTION

DOWELED CONSTRUCTION JOINT

PLAN VIEW

DOWELS: NO. 5 PLAIN STEEL BARS
30" IN LENGTH, AND SPACED ON 30" CENTERS

TIE BARS: NO. 5 DEFORMED STEEL BARS
30" IN LENGTH, AND SPACED ON 30" CENTERS

NOT TO SCALE

PLAIN CONCRETE PAVEMENTS WITH PARKING
ALL TRANSVERSE CONSTRUCTION JOINTS IN NON-REINFORCED PAVEMENTS TO BE DOWELED BUTT JOINTS.

LAST TRANSVERSE CONTRACTION JOINT IS DOWELED.

LONGITUDINAL CONTRACTION JOINTS REQUIRED:
1. IF PAVING LANE WIDTH EXCEEDS MAXIMUM JOINT SPACING
2. IF 16' OR LESS FROM FREE EDGE OF PAVED AREAS GREATER THAN 100' WIDE, TIE WITH 5/8" DIAMETER 30' LONG DEFORMED TIE BARS.
WHERE PAVEMENT EXTENSION IS FEASIBLE, OUTSIDE EDGES WILL BE DOWELED, THICKENED EDGE OR WITH TIES FOR SLABS LESS THAN 8" THICK.

EXPANSION JOINTS WILL BE USED TO PROTECT ABUTTING STRUCTURES OR AT INTERSECTIONS WITH NON-PARALLEL PAVING LINES WHEN NEW PAVEMENT IS LESS THAN 10" THICK AND PLACED IN COLD WEATHER.

TRANSVERSE EXPANSION JOINTS WILL BE DOWELED EXCEPT TRANSVERSE EXPANSION JOINT 75' - 100' BACK FROM EDGE WILL BE USED IF SLIPPAGE AT INTERSECTION IS REQUIRED (SUCH AS AT ANGULAR INTERSECTION OF PAVEMENTS).

2. LONGITUDINAL EXPANSION JOINTS WILL BE THICKENED EDGE.

LONGITUDINAL CONSTRUCTION JOINTS BETWEEN PAVING LANE: DOWELED THICKENED EDGE, OR KEYED.
NOTE: IF NON-REINFORCED PAVEMENT IS LESS THAN 9" DO NOT USE KEYED JOINTS.

NOT TO SCALE

JOINT LAYOUT FOR VEHICULAR PARKING AREAS
DATE
OCTOBER 2016
FIGURE
16-2
NO. 5 DEFORMED STEEL TIE BARS 2'-6" LONG AND SPACED 2'-6" ON CENTERS, USED ONLY IN JOINTS 15 FEET OR LESS FROM FREE EDGES OF PAVED AREAS GREATER THAN 100 FEET IN WIDTH.

LONGITUDINAL

SEE JOINT SEALANT
FIGURE 16-7

EITHER ONE PIECE OR THREADED SPLIT-TYPE DOWEL MAY BE USED

PAINT & LIGHTLY OIL ONE END OF DOWEL

D* DENOTES DOWEL DIAMETER

TRANSVERSE

NOT TO SCALE
SEE JOINT SEALANT
FIGURE 16-7

EITHER ONE PIECE OR
THREADED SPLIT-TYPE
DOWEL MAY BE USED

PAINT & LIGHTLY OIL
ONE END OF DOWEL

D* DENOTES DOWEL DIAMETER

DOWELED TRANSVERSE OR LONGITUDINAL

SEE JOINT SEALANT
FIGURE 16-7

BUTT JOINT

NOT TO SCALE

CONSTRUCTION JOINTS FOR
PLAIN CONCRETE PAVEMENTS

DATE
OCTOBER 2016

FIGURE
16-4A
SEE JOINT SEALANT
FIGURE 16-7

A TOLERANCE OF ±1/16" MAY BE ALLOWED
FOR KEY DIMENSIONS AND LOCATION

KEYED LONGITUDINAL

SEE JOINT SEALANT
FIGURE 16-7

A TOLERANCE OF ±1/16" MAY BE ALLOWED
FOR KEY DIMENSIONS AND LOCATION

KEYED THICKENED EDGE LONGITUDINAL
THICKENED EDGE LONGITUDINAL

SEE JOINT SEALANT
FIGURE 16-7

SEE JOINT SEALANT
FIGURE 16-7

EXISTING PAVEMENT

NEW PAVEMENT

MID PT OF BAR

NOTE 1

6" MIN OR
1.25hd - he

1" +/-

6" MIN

5 FT MIN.

2/3 x + 1/8"

NO. 5 DEFORMED STEEL BARS 2' LONG, SPACED ON 1'-6"
CENTERS, AND PLACED PARALLEL TO THICKENED EDGE.

NOTE 1: PLACEMENT AND CONSOLIDATION OF THE NEW CONCRETE UNDER EXISTING PAVEMENT SHOULD BE CARRIED OUT IMMEDIATELY PRIOR TO CONSTRUCTION OF THE NEW PAVEMENT. PLACEMENT OPERATIONS SHOULD BE TIMED SO THAT THE INITIAL CONCRETE IS STILL PLASTIC WHEN THE REMAINDER OF THE CONCRETE PAVEMENT IS PLACED.

SPECIAL JOINT BETWEEN NEW AND EXISTING
PAVEMENT TRANSVERSE AND LONGITUDINAL

NOT TO SCALE

CONSTRUCTION JOINTS FOR
PLAIN CONCRETE PAVEMENTS

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FIGURE
16-4C
DOWELED JOINT BETWEEN NEW AND EXISTING PAVEMENT

THICKENED EDGE JOINT BETWEEN NEW AND EXISTING PAVEMENT

* NOTE: THIS TYPE JOINT SHOULD BE USED ONLY WHEN EXISTING PAVEMENT IS TO BE REPLACED IN A SHORT PERIOD OF TIME, SINCE WITHOUT LOAD TRANSFER IT WILL DETERIORATE QUICKLY!
SEE JOINT SEALANT
FIGURE 16-7

h_d
1.25h_d

5 FT MIN.
3/4 IN MIN.

LONGITUDINAL

NOT TO SCALE

EXPANSION JOINTS FOR
PLAIN CONCRETE PAVEMENTS

DATE
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FIGURE
16-5
THE BOND-BREAKING MEDIUM WILL BE EITHER A HEAVY COATING OF BITUMINOUS MATERIAL NOT LESS THAN 1/16 INCH IN THICKNESS WHEN JOINTS MATCH OR A NORMAL NONEXTRUDING-TYPE EXPANSION JOINT MATERIAL NOT LESS THAN 1/4-INCH IN THICKNESS WHEN JOINTS DO NOT MATCH.
CONTRACTION JOINT

CONSTRUCTION JOINT

EXPANSION JOINT

W = WIDTH OF SEALANT RESERVOIR (3/4")
D = DEPTH OF SEALANT (1.0 TO 1.5 x W)
T = DEPTH OF INITIAL SAWCUT OR INSERT TYPE JOINT FORMER (CONTRACTION JOINT)
  a. 1/4 SLAB THICKNESS FOR PAVEMENTS LESS THAN 12 INCHES
  b. 3 INCHES FOR PAVEMENTS 12-18 INCHES *
  c. 1/6 SLAB THICKNESS FOR PAVEMENTS MORE THAN 18 INCHES *
* DESIGNER MAY WANT TO CONSIDER REQUIRING 1/4 SLAB THICKNESS

NOTE: TOP OF SEALANT WILL BE 1/8-IN. TO 1/4-IN. BELOW TOP OF PAVEMENT.
CONTRACTION JOINT

CONSTRUCTION JOINT

EXPANSION JOINT

W = WIDTH OF SEALANT RESERVOIR (3/4"
D = DEPTH OF SEALANT (1.0 TO 1.5 x W)
T = DEPTH OF INITIAL SAWCUT OR INSERT TYPE JOINT FORMER (CONTRACTION JOINT)
   a. 1/4 SLAB THICKNESS FOR PAVEMENTS LESS THAN 12 INCHES
   b. 3 INCHES FOR PAVEMENTS 12-18 INCHES *
   c. 1/6 SLAB THICKNESS FOR PAVEMENTS MORE THAN 18 INCHES *

* DESIGNER MAY WANT TO CONSIDER REQUIRING 1/4 SLAB THICKNESS

NOTE: TOP OF SEALANT WILL BE 1/8-IN. TO 1/4-IN. BELOW TOP OF PAVEMENT.
D, W, AND T DIMENSIONS: AS RECOMMENDED BY MANUFACTURER
D = 1.5 INCHES MINIMUM
W = 3/4 INCHES MINIMUM

TOP OF PREFORMED SEAL WILL BE 1/8 - 1/4 INCH BELOW PAVEMENT SURFACE

COMPRESSION SEAL MUST BE IN COMPRESSION AT ALL TIMES.
SEE JOINT SEALANT
FIGURE 16-7

NOTE: SAW CUT WILL NOT EXTEND BELOW THE REINFORCING STEEL.

LONGITUDINAL

SEE JOINT SEALANT
FIGURE 16-7

REINFORCING STEEL IS NOT CARRIED THROUGH THE JOINT

EITHER ONE PIECE OR THREADED SPLIT-TYPE DOWEL MAY BE USED

PAINT & OIL ONE END OF DOWEL

D* DENOTES DOWEL DIAMETER

TRANSVERSE

SEE JOINT SEALANT
FIGURE 16-7

NO. 5 DEFORMED STEEL TIE BARS 30" LONG AND SPACED 30" ON CENTERS

TIED LONGITUDINAL

NOT TO SCALE

CONTRACTION JOINTS FOR REINFORCED CONCRETE PAVEMENTS

DATE
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FIGURE
17-1
NO GROOVE OR JOINT SEAL PROVIDED

REINFORCING STEEL IS CARRIED THROUGH THE JOINT

D* DENOTES DOWEL DIAMETER

DOWELED TRANSVERSE

SEE JOINT SEALANT FIGURE 16-7

REINFORCING STEEL IS NOT CARRIED THROUGH THE JOINT

D* DENOTES DOWEL DIAMETER

DOWELED TRANSVERSE OR LONGITUDINAL

CONSTRUCTION JOINTS FOR REINFORCED CONCRETE PAVEMENTS

DATE OCTOBER 2016

FIGURE 17-2A
A tolerance of ± 1/16" may be allowed for key dimensions and location.
A vertical tolerance of ± 1/4" is allowed for placement of the tie bar.

KEYED AND TIED LONGITUDINAL

A tolerance of ± 1/16" may be allowed for key dimensions and location.

KEYED THICKENED EDGE LONGITUDINAL

CONSTRUCTION JOINTS FOR REINFORCED CONCRETE PAVEMENTS

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FIGURE: 17-2B
THICKENED EDGE LONGITUDINAL

SEE JOINT SEALANT
FIGURE 16-7

REINFORCING STEEL
FORMED BUTT JOINT
5 FT MIN.

EXISTING PAVEMENT

NEW PAVEMENT

MID PT
OF BAR

NOTE 1

6" MIN OR
1.25h_d - h_e

1" +/-

2/3 X + 1/8"

6" MIN
5 FT MIN.

NO. 5 DEFORMED STEEL BARS 2' LONG,
SPACED ON 1'-6" CENTERS, AND PLACED
PARALLEL TO THICKENED EDGE.

NOTE 1: PLACEMENT AND CONSOLIDATION OF THE NEW CONCRETE UNDER
EXISTING PAVEMENT SHOULD BE CARRIED OUT IMMEDIATELY PRIOR TO
CONSTRUCTION OF THE NEW PAVEMENT. PLACEMENT OPERATIONS SHOULD
BE TIMED SO THAT THE INITIAL CONCRETE IS STILL PLASTIC WHEN THE
REMAINDER OF THE CONCRETE PAVEMENT IS PLACED.

SPECIAL JOINT BETWEEN NEW AND EXISTING PAVEMENT
TRANSVERSE AND LONGITUDINAL

CONSTRUCTION JOINTS FOR
REINFORCED CONCRETE PAVEMENTS

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FIGURE
17-2C
THICKENED EDGE JOINT BETWEEN NEW AND EXISTING PAVEMENT

DOWELED JOINT BETWEEN NEW AND EXISTING PAVEMENT

* NOTE: THIS TYPE JOINT SHOULD BE USED ONLY WHEN EXISTING PAVEMENT IS TO BE REPLACED IN A SHORT PERIOD OF TIME, SINCE WITHOUT LOAD TRANSFER IT WILL DETERIORATE QUICKLY!

D DENOTES DOWEL DIAMETER, EITHER ONE PIECE OR THREADED SPLIT-TYPE DOWELS MAY BE USED.
SEE JOINT SEALANT

REINFORCING STEEL IS NOT CARRIED THROUGH THE JOINT

REINFORCING STEEL

5 FT MIN.

3/4" MIN

LONGITUDINAL

\[ \frac{h_d}{4} + 1" \]

\[ 1.25h_d \]

\[ 3" \]
DEPTH OF FROST PENETRATION INTO SUBGRADE

RECOMMENDED TRANSITION (TO BE UNDERCUT AND REPLACED WITH MATERIAL SIMILAR TO ADJACENT FILL)

75 TO 100' +/-
TYPICAL INTERIOR SUBDRAIN FOR RIGID PAVEMENT
(FROST AREAS, DEPTH OF FROST < DEPTH TO PIPE)

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FIGURE
20-7C
TYPICAL INTERIOR SUBDRAIN FOR FLEXIBLE PAVEMENT
(FROST AREAS, DEPTH OF FROST < DEPTH OF PIPE)

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FIGURE: 20-9C

NOT TO SCALE
3% SLOPE MIN
ASPHALT SURFACE

AGGREGATE BASE COURSE
DAYLIGHT IF POSSIBLE

20" MIN

DAYLIGHT IF POSSIBLE

DRAINAGE LAYER (4" MIN)

SEPARATION LAYER
(4" MIN)

NONFROST SUSCEPTIBLE FILL
FILTER IF REQUIRED

1

4

DEPTH OF FROST

BACKFILL (OPEN GRADED MATERIAL OR RAPID DRAINING MATERIAL)

6" MIN PIPE
FILTER FABRIC

SUBGRADE (F3 OR F4)

3" MIN

TYPICAL EDGE SUBDRAIN FOR FLEXIBLE PAVEMENT
(FROST AREAS)

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FIGURE
20-10B

NOT TO SCALE
DRAINAGE TRENCH

LARGE RADIUS BEND
MIN 30" RADIUS