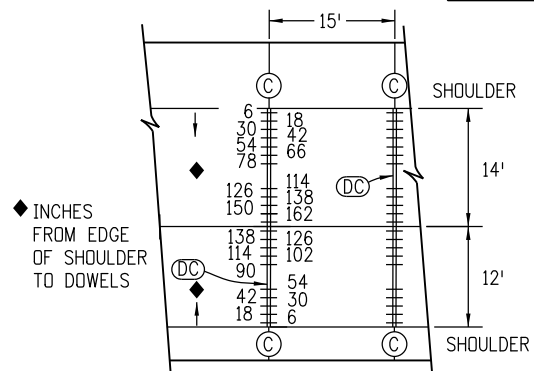


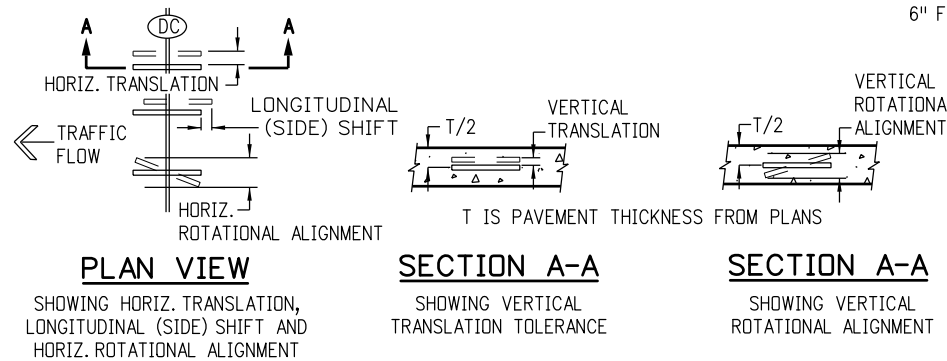
TYPICAL JOINT LAYOUT FOR CONCRETE ROADWAY WITH CONCRETE SHOULDERS

GENERAL NOTES

- THIS STANDARD PLAN DOES NOT APPLY TO THIN CONCRETE OVERLAYS (WHITETOPPING).
- LOCATE (T) JOINT AT A (C) JOINT OR A MINIMUM OF 6 FT. FROM A (C) JOINT.
- THIS JOINT LAYOUT SHALL BE USED AS A STANDARD OF THE JOINT LAYOUT FOR THE PROJECT. IF THE CONTRACTOR PROPOSES VARIATIONS FROM THIS STANDARD OR THE PROJECT HAS UNUSUAL OR IRREGULAR CONDITIONS NOT COVERED HEREIN, THE CONTRACTOR SHALL PREPARE A PAVEMENT JOINT LAYOUT FOR APPROVAL BY THE ENGINEER. SLABS 14 FT. IN WIDTH SHALL BE CONSTRUCTED ONLY WHERE DESIGNATED ON THE PLANS.
- ON MULTILANE DIVIDED HIGHWAYS, THE MULTILANE DIRECTIONAL PAVEMENT AND BOTH SHOULDERS SHALL BE PLACED WITH (E) LONGITUDINAL SAWED CONTRACTION JOINTS.
- ON MULTILANE DIVIDED HIGHWAYS SEPARATED BY A CONCRETE BARRIER, A (D) JOINT SHALL BE CONSTRUCTED AT ONE OF THE BARRIER FACES.
- (D) JOINTS SHALL BE CONSTRUCTED BETWEEN THE TWO OPPOSING DIRECTIONS OF TRAVEL ON A MULTILANE UNDIVIDED HIGHWAY WHEN ALL OF THE FOLLOWING APPLY:
 - PAVEMENT IS CONTINUOUS ACROSS BOTH DIRECTIONS OF TRAVEL.
 - THERE IS NO MEDIAN BARRIER.
 - THE WIDTH OF THE PAVEMENT IN ONE DIRECTION IS GREATER THAN 80 FEET.
- ON VARIABLE WIDTH SLABS, THE 2 FT. OR 4 FT. END OF SLAB WIDTH DIMENSION MAY VARY ±6 INCHES.
- (L) JOINTS ARE TO BE USED WHEN A TRAFFIC LANE IS ADDED SEPARATELY, OR FOR TAPERS, OR FOR SPEED CHANGE LANES. ALTERNATIVE LONGITUDINAL JOINT LOCATIONS AT SPEED CHANGE LANES MAY BE USED IF APPROVED.
- WHERE (DC) JOINTS ARE SHOWN IN THE SHOULDER, THE DOWEL BARS WILL BE PLACED ON 12" CENTERS STARTING 6" FROM THE ROADWAY (E) JOINT.



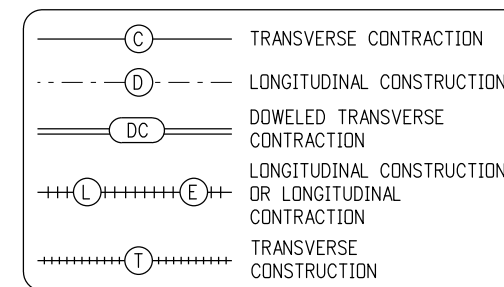
DOWEL BAR DETAIL FOR (DC) JOINT WITH 14 FT. AND 12 FT. LANES



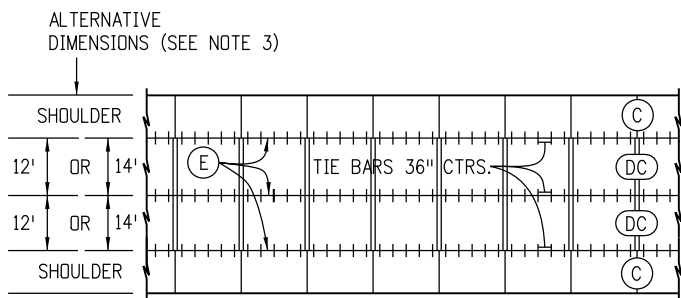
DETAILS ILLUSTRATING DOWEL PLACEMENT TOLERANCES
SEE SUBSECTION 412.13(b)2 FOR ALLOWED TOLERANCE VALUES.

JOINT LEGEND

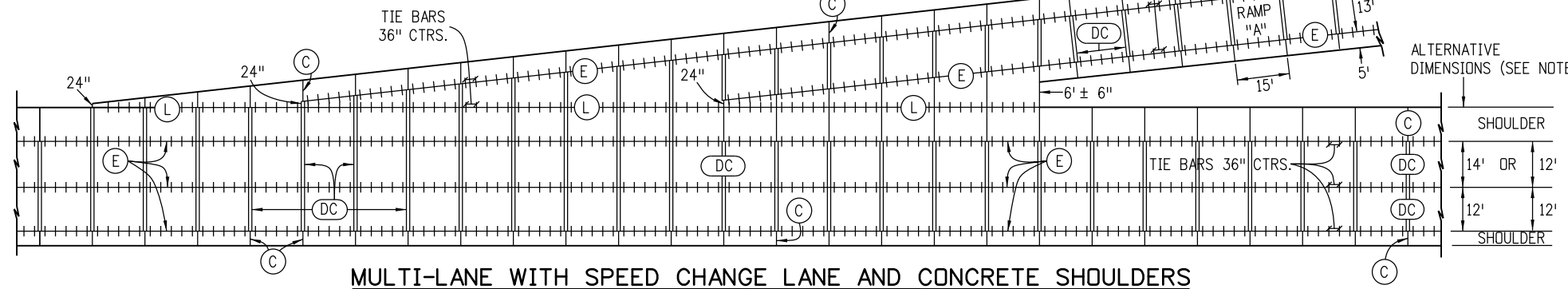
(SEE SHEET 5 FOR JOINT DETAILS)



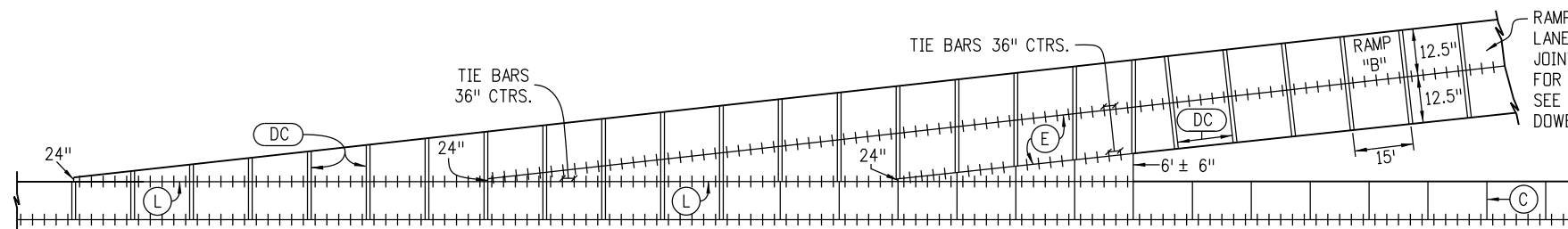
RAMP AND SPEED CHANGE LANE DIMENSIONING FOR JOINTS ONLY. SEE PLANS FOR STRIPING LOCATIONS. SEE SHEET 2 FOR RAMP DOWEL BAR DETAILS.



RURAL TWO-LANE



MULTI-LANE WITH SPEED CHANGE LANE AND CONCRETE SHOULDERS



OPTIONAL LONGITUDINAL JOINT IN CENTER FOR SINGLE LANE SPEED CHANGE LANE

RAMP AND SPEED CHANGE LANE DIMENSIONING FOR JOINTS ONLY. SEE PLANS FOR STRIPING LOCATIONS. SEE SHEET 2 FOR RAMP DOWEL BAR DETAILS.

Computer File Information

Creation Date: 07/04/06	Initials: DD
Last Modification Date: 07/19/12	Initials: LTA
Full Path: www.dot.state.co.us/DesignSupport/	
Drawing File Name: 412010105.dgn	
CAD Ver.: MicroStation V8	Scale: Not to Scale Units: English

Sheet Revisions

Date:	Comments
07/09/09	Increased T spacing from (C) from 2' to 6'.
12/08/10	Revised Note 4, added 5 and 6.
06/16/11	Dowel Placement Tolerances
07/29/11	Changed (C) to (DC) ramps joints.
07/19/12	Changed Tie Bar spacing from 30" to 36".

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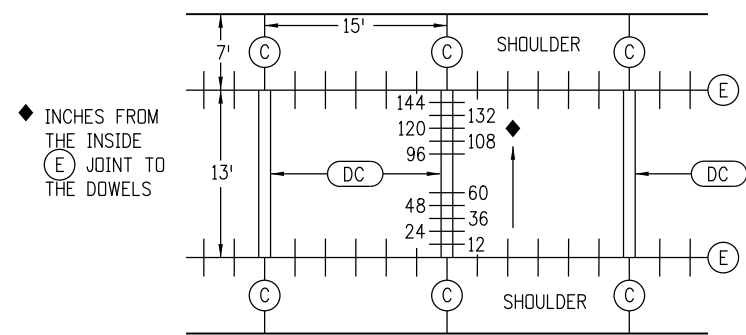
CONCRETE PAVEMENT JOINTS

Issued By: Project Development Branch on July 04, 2006

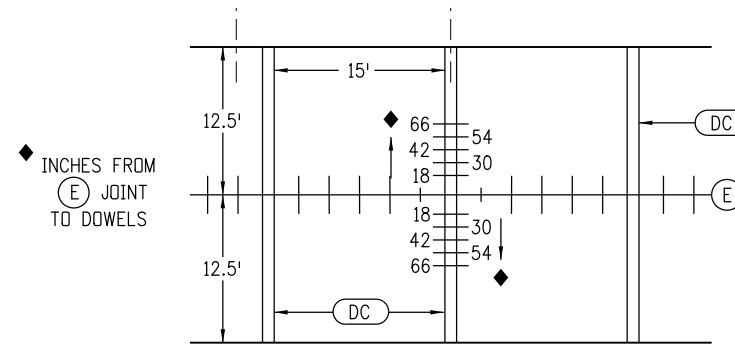
STANDARD PLAN NO.

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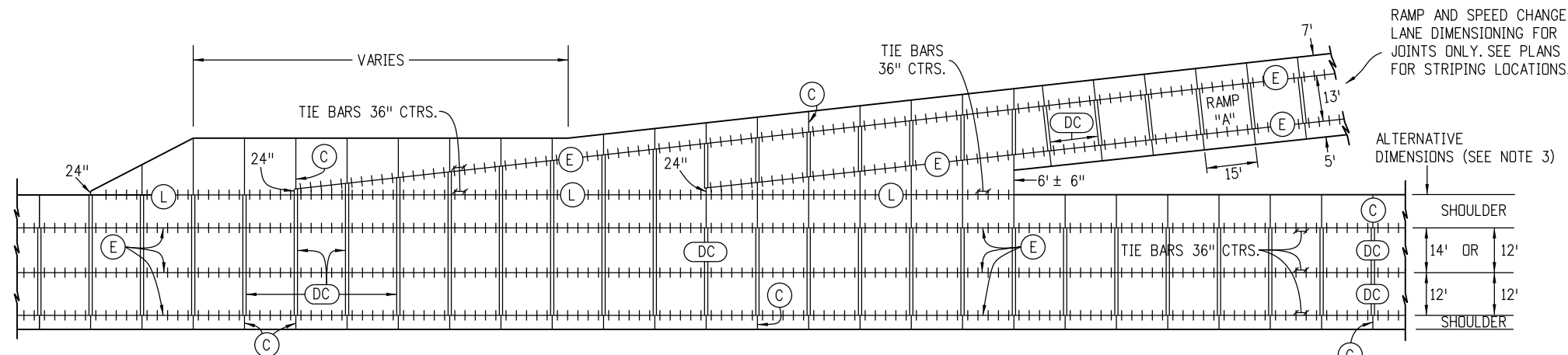
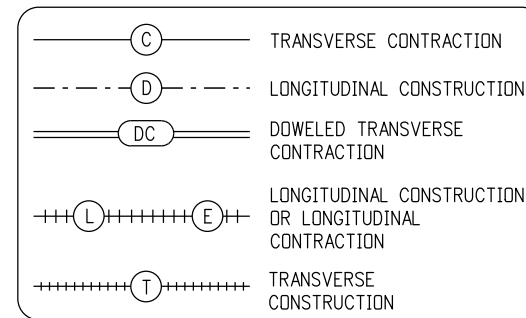
RAMP "A" DOWEL BAR DETAIL FOR DC JOINT WITH A 13 FT. LANE



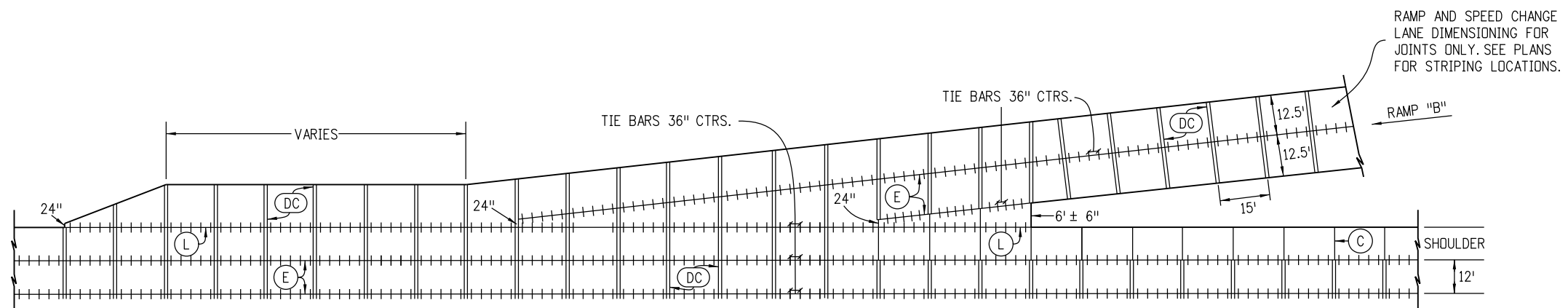
RAMP "B" DOWEL BAR DETAIL FOR DC JOINT WITH CENTER LONGITUDINAL SPLIT LANE

JOINT LEGEND

(SEE SHEET 5 FOR JOINT DETAILS)



MULTI-LANE WITH ACCELERATION AND DECELERATION LANES AND CONCRETE SHOULDERS



OPTIONAL LONGITUDINAL JOINT IN CENTER FOR SINGLE LANE ACCELERATION AND DECELERATION LANE

Computer File Information

Creation Date: 07/04/06 Initials: DD
 Last Modification Date: 07/19/12 Initials: LTA
 Full Path: www.dot.state.co.us/DesignSupport/
 Drawing File Name: 412010205.dgn
 CAD Ver.: MicroStation V8 Scale: Not to Scale Units: English

Sheet Revisions

Date:	Comments
(R-X) 07/29/11	Changed (C) to (DC) ramp joints.
(R-X) 07/29/11	Added ramp dowel bar details.
(R-X) 07/19/12	Changed Tie Bar spacing from 30" to 36".
(R-X)	

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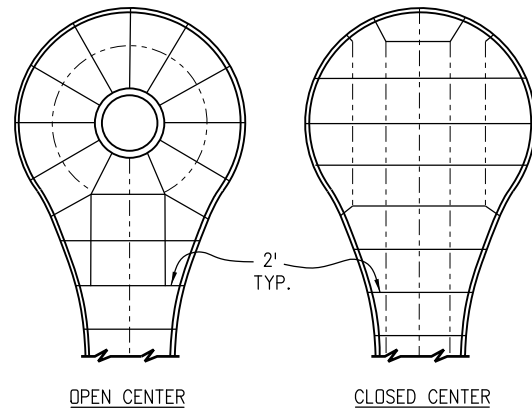
CONCRETE PAVEMENT JOINTS

Issued By: Project Development Branch on July 04, 2006

STANDARD PLAN NO.

M-412-1

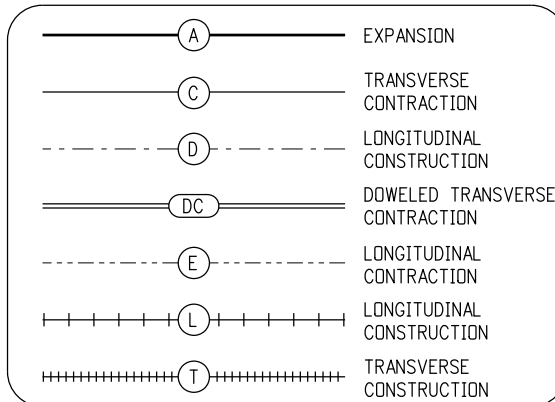
Sheet No. 2 of 5



CUL-DE-SAC

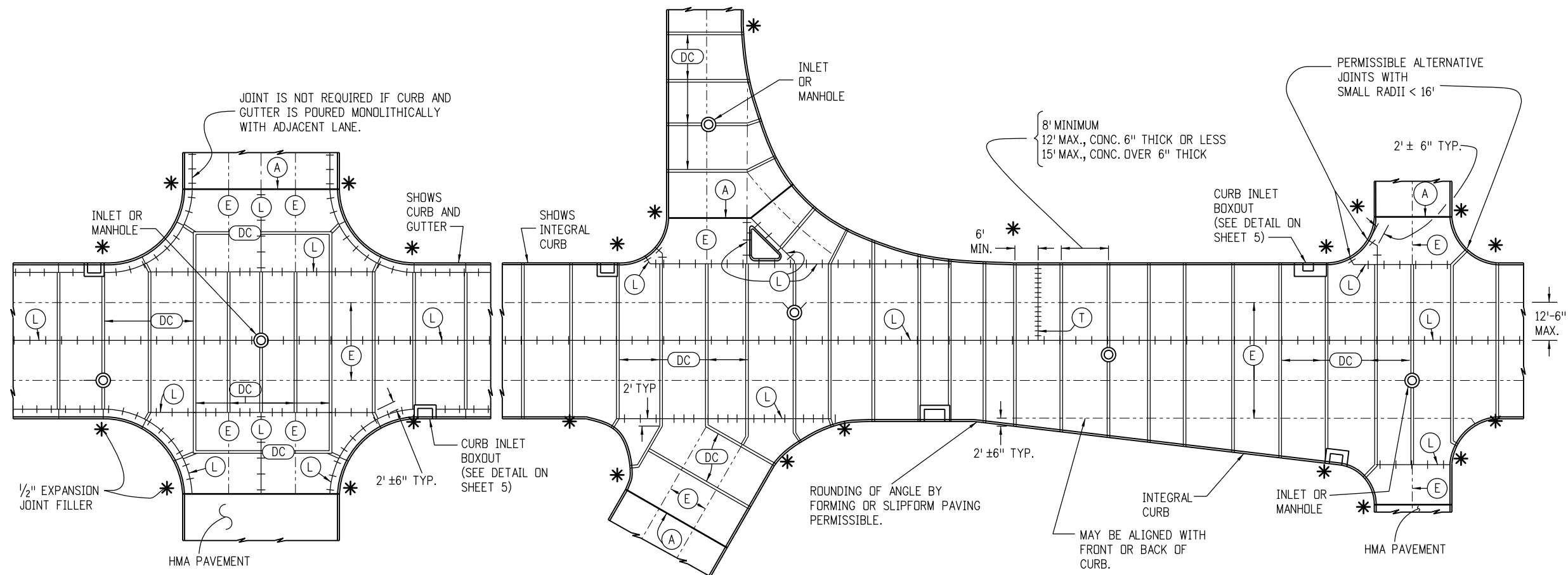
JOINT LEGEND

(SEE SHEET 5 FOR JOINT DETAILS)



NOTES

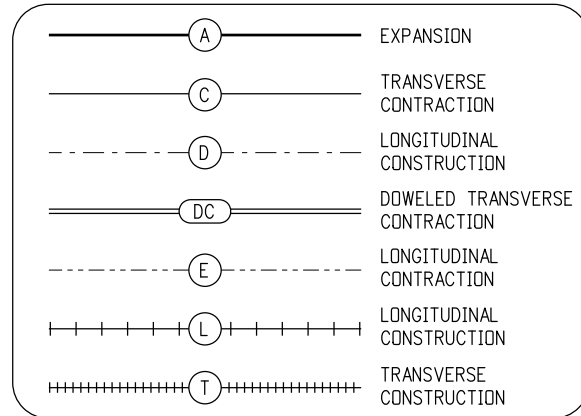
1. LONGITUDINAL JOINTS SHALL BE PLACED ADJACENT TO LANE MARKINGS WHEN POSSIBLE, AND HAVE A MAXIMUM SPACING OF 12 FT.-6 IN. (15 FT. IS PERMITTED WITH MONOLITHIC CURB AND GUTTER).
2. CONSTRUCT TRANSVERSE JOINTS PERPENDICULAR TO THE CENTERLINE OF PAVEMENT AND EXTEND THROUGH THE CURB OR CURB AND GUTTER.
- * 3. PLACE 1/2 IN. MIN. EXPANSION JOINT FILLER IN TOP 6 IN. OF CURB JOINT AT INTERSECTION RETURN RADIUS POINTS.
4. THE CONTRACTOR SHALL, UNLESS OTHERWISE SHOWN ON THE PLANS, SELECT AND USE A BOND BREAKER AT INLETS, MANHOLES AND SIMILAR SIZE STRUCTURES. SMALLER STRUCTURES SUCH AS VALVE AND MONUMENT BOXES SHALL NOT REQUIRE A BOND BREAKER.
5. WHERE A LONGITUDINAL JOINT PASSES LESS THAN 1 FT. FROM A CAST-IN-PAVEMENT MANHOLE OR SIMILAR SIZE STRUCTURE, A TYPICAL 2 FT. RADIAL JOINT, AS SHOWN IN THE DETAILS, SHALL BE USED.
6. TRANSVERSE JOINTS SHALL EITHER INTERSECT THE CENTER OF CIRCULAR MANHOLES AND INLETS OR BE AT LEAST 4 FT. AWAY FROM THE EDGE OF CIRCULAR MANHOLES. SEE CURB INLET BOXOUT DETAIL ON SHEET 5.
7. LOCATE (T) JOINT AT A (DC) JOINT OR A MINIMUM OF 6 FT. FROM A (DC) JOINT.
6. THE ENGINEERS SHALL HAVE AN OPTION TO USE INDIVIDUAL DOWELS IN THE DC JOINT ON SHORT RUN (2' ± 6") TO CURB RADIUS RETURNS.



TYPICAL CURBED PAVEMENT JOINT LAYOUT

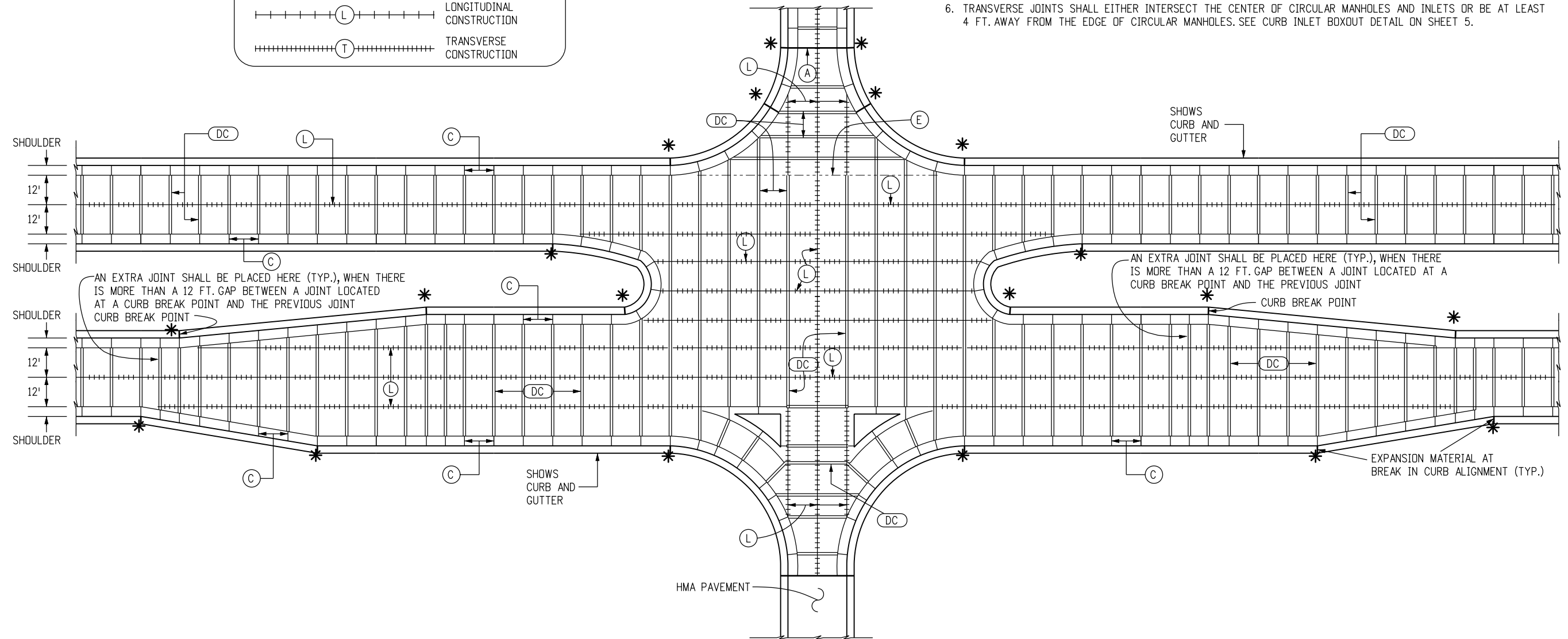
Computer File Information		Sheet Revisions		<p>Colorado Department of Transportation 4201 East Arkansas Avenue Denver, Colorado 80222 Phone: (303) 757-9083 Fax: (303) 757-9820</p>	<p>CONCRETE PAVEMENT JOINTS</p>	STANDARD PLAN NO.	
Creation Date: 07/04/06	Initials: DD	Date:	Comments			M-412-1	
Last Modification Date: 07/19/12	Initials: LTA	07/09/09	Increased spacing (T) from (DC) from 2 ft. to 6 ft.				
Full Path: www.dot.state.co.us/DesignSupport/		12/08/10	Replaced centerline (D) joint with (C) joint.				
Drawing File Name: 412010305.dgn		07/29/11	Changed (C) to (DC) ramp joints.			Sheet No. 3 of 5	
CAD Ver.: MicroStation V8	Scale: Not to Scale Units: English	<p>Project Development Branch DD/LTA</p>		<p>Issued By: Project Development Branch on July 04, 2006</p>			

JOINT LEGEND
(SEE SHEET 5 FOR JOINT DETAILS)



NOTES

- LONGITUDINAL JOINTS SHALL BE PLACED ADJACENT TO LANE MARKINGS WHEN POSSIBLE, AND HAVE MAXIMUM SPACING OF 12 FT.-6 IN. (15 FT. IS PERMITTED WITH MONOLITHIC CURB AND GUTTER).
- CONSTRUCT TRANSVERSE JOINTS PERPENDICULAR TO THE CENTERLINE OF PAVEMENT AND EXTEND THROUGH THE CURB OR CURB AND GUTTER.
- PLACE 1/2 IN. MIN. EXPANSION JOINT FILLER IN TOP 6 IN. OF CURB JOINT AT INTERSECTION RETURN RADIUS POINTS.
- THE CONTRACTOR SHALL, UNLESS OTHERWISE SHOWN ON THE PLANS, SELECT AND USE A BOND BREAKER AT INLETS, MANHOLES AND SIMILAR SIZE STRUCTURES. SMALLER STRUCTURES SUCH AS VALVE AND MONUMENT BOXES DO NOT REQUIRE A BOND BREAKER.
- WHERE A LONGITUDINAL JOINT WOULD PASS LESS THAN 1 FT. FROM A CAST-IN-PAVEMENT MANHOLE OR SIMILAR SIZE STRUCTURE, A TYPICAL 2 FT. RADIAL JOINT, AS SHOWN IN THE DETAILS, SHALL BE USED.
- TRANSVERSE JOINTS SHALL EITHER INTERSECT THE CENTER OF CIRCULAR MANHOLES AND INLETS OR BE AT LEAST 4 FT. AWAY FROM THE EDGE OF CIRCULAR MANHOLES. SEE CURB INLET BOXOUT DETAIL ON SHEET 5.



MULTI-LANE INTERSECTION WITH SPEED CHANGE LANE AND CONCRETE SHOULDERS

Computer File Information	
Creation Date: 07/04/06	Initials: DD
Last Modification Date: 07/19/12	Initials: LTA
Full Path: www.dot.state.co.us/DesignSupport/	
Drawing File Name: 412010405.dgn	
CAD Ver.: MicroStation V8 Scale: Not to Scale Units: English	

Sheet Revisions	
Date:	Comments
(R-X) 07/29/11	Changed © to (DC) ramp joints.
(R-X) 07/29/11	Changed © to (L) joints.
(R-X) 07/29/11	Revised Approach Road with (L) joints.
(R-X)	

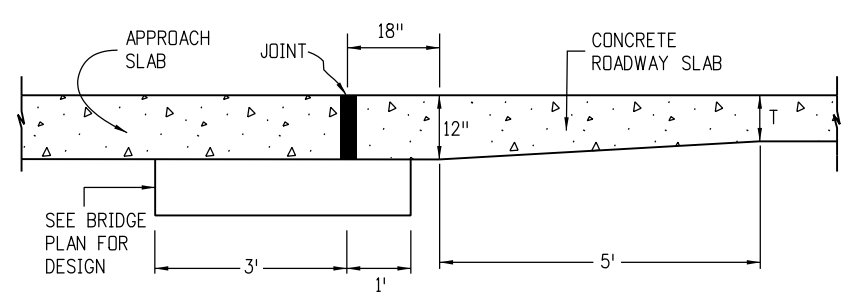
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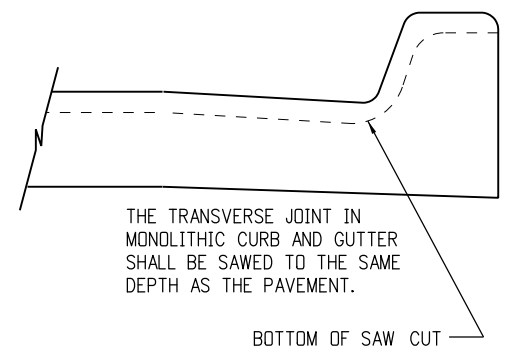
CONCRETE PAVEMENT JOINTS

Issued By: Project Development Branch on July 04, 2006

STANDARD PLAN NO.
M-412-1
Sheet No. 4 of 5



BRIDGE APPROACH



NOTE

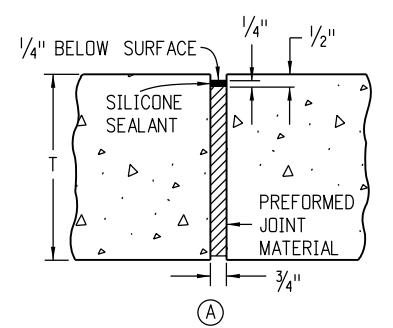
PAVEMENT THICKNESS (T), SHALL BE AS SHOWN ON THE PLANS.

PAVEMENT THICKNESS (T)	DOWEL BAR DIAMETER
T < 8 IN.	1 IN.
8 IN. ≥ T ≤ 10 IN.	1.25 IN.
10 IN. > T ≤ 15 IN.	1.50 IN.

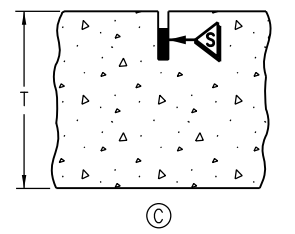
REINFORCING SIZE TABLE

TIE BAR SIZE IS NO. 5 WHEN PAVEMENT IS PLACED ON UNBOUND BASES.

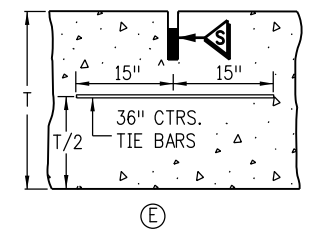
TIE BAR IS NO. 6 WHEN PAVEMENT IS PLACED ON LIME TREATED SOIL, ASPHALT OR CEMENT TREATED, MILLED ASPHALT, OR RECYCLED ASPHALT BASES.



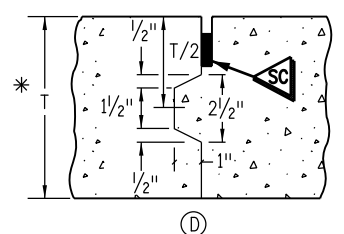
EXPANSION JOINT



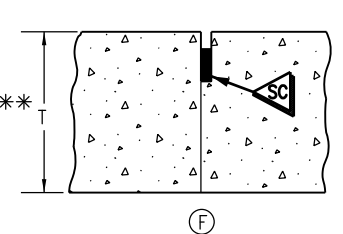
TRANSVERSE CONTRACTION JOINT
(TRANSVERSE WEAKENED PLANE JOINT)



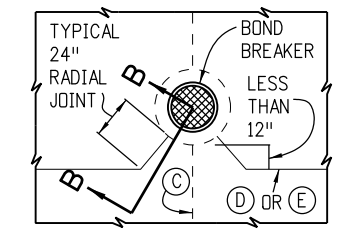
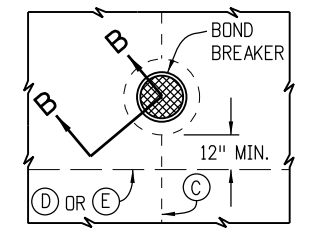
LONGITUDINAL CONTRACTION JOINT
(LONGITUDINAL WEAKENED PLANE JOINT)



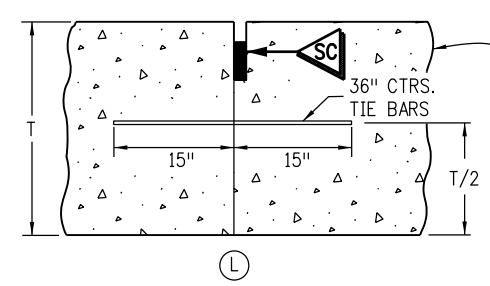
LONGITUDINAL CONSTRUCTION JOINT
* USE ONLY IF T ≥ 8 IN.
FORM ONLY FEMALE KEYWAY



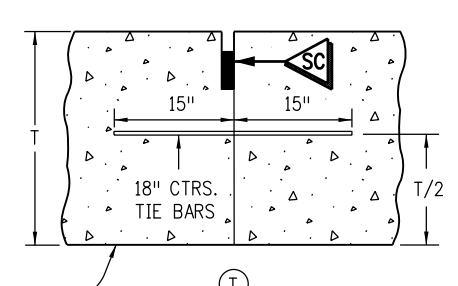
LONGITUDINAL CONSTRUCTION JOINT
** USE ONLY IF T < 8 IN.



INLET OR MANHOLE CAST IN PAVEMENT

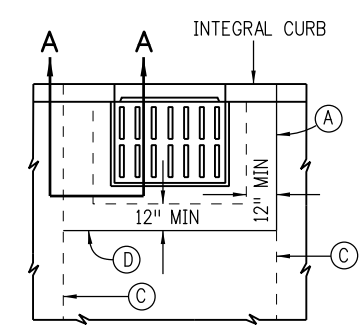


LONGITUDINAL CONSTRUCTION JOINT



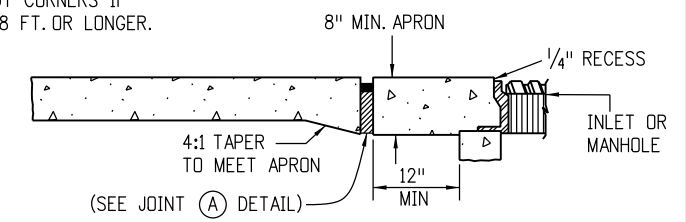
TRANSVERSE CONSTRUCTION JOINT

A KEYWAY IS ALLOWED TO FACILITATE USE OF BENT TIE BARS OR APPROVED TWO PIECE CONNECTORS

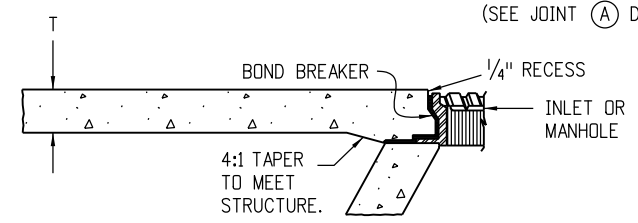


CURB INLET BOXOUT

INSTALL TRANSVERSE JOINT AT BOTH BOXOUT CORNERS IF BOXOUT IS 8 FT. OR LONGER.

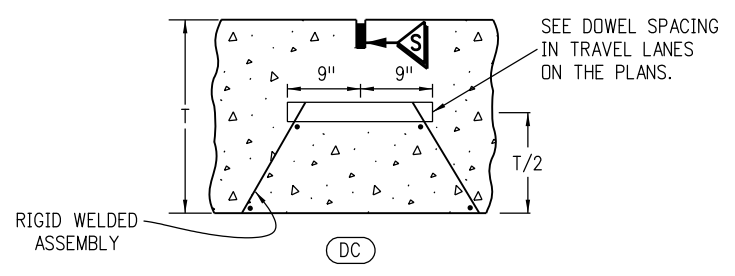


SECTION A-A

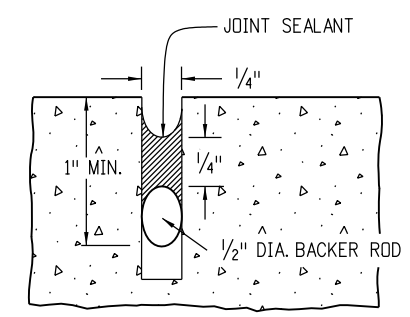


SECTION B-B

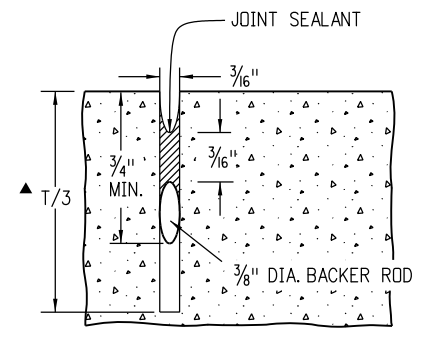
BOND BREAKER SHALL BE COMPOSED OF PLASTIC SHEET, BUILDING PAPER OR OTHER APPROVED MATERIAL THAT PREVENTS BONDING.



DOWELED TRANSVERSE CONTRACTION JOINT



SEAL AT CONSTRUCTION JOINT



SAWED JOINT
▲ SHALL BE 0.4T FOR LONGITUDINAL JOINTS ALONG SLABS 14 FT. IN WIDTH.

Computer File Information

Creation Date: 07/04/06	Initials: DD
Last Modification Date: 07/19/12	Initials: LTA
Full Path: www.dot.state.co.us/DesignSupport/	
Drawing File Name: 412010505.dgn	
CAD Ver.: MicroStation V8	Scale: Not to Scale Units: English

Sheet Revisions

Date:	Comments
07/19/12	Changed Tie Bar spacing from 30" to 36".
	Modified the Reinforcing Size Table.

Colorado Department of Transportation

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CONCRETE PAVEMENT JOINTS

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