

CDOT EXPANSION JOINTS

LEARNING OBJECTIVES:

WHY DO WE NEED THEM?

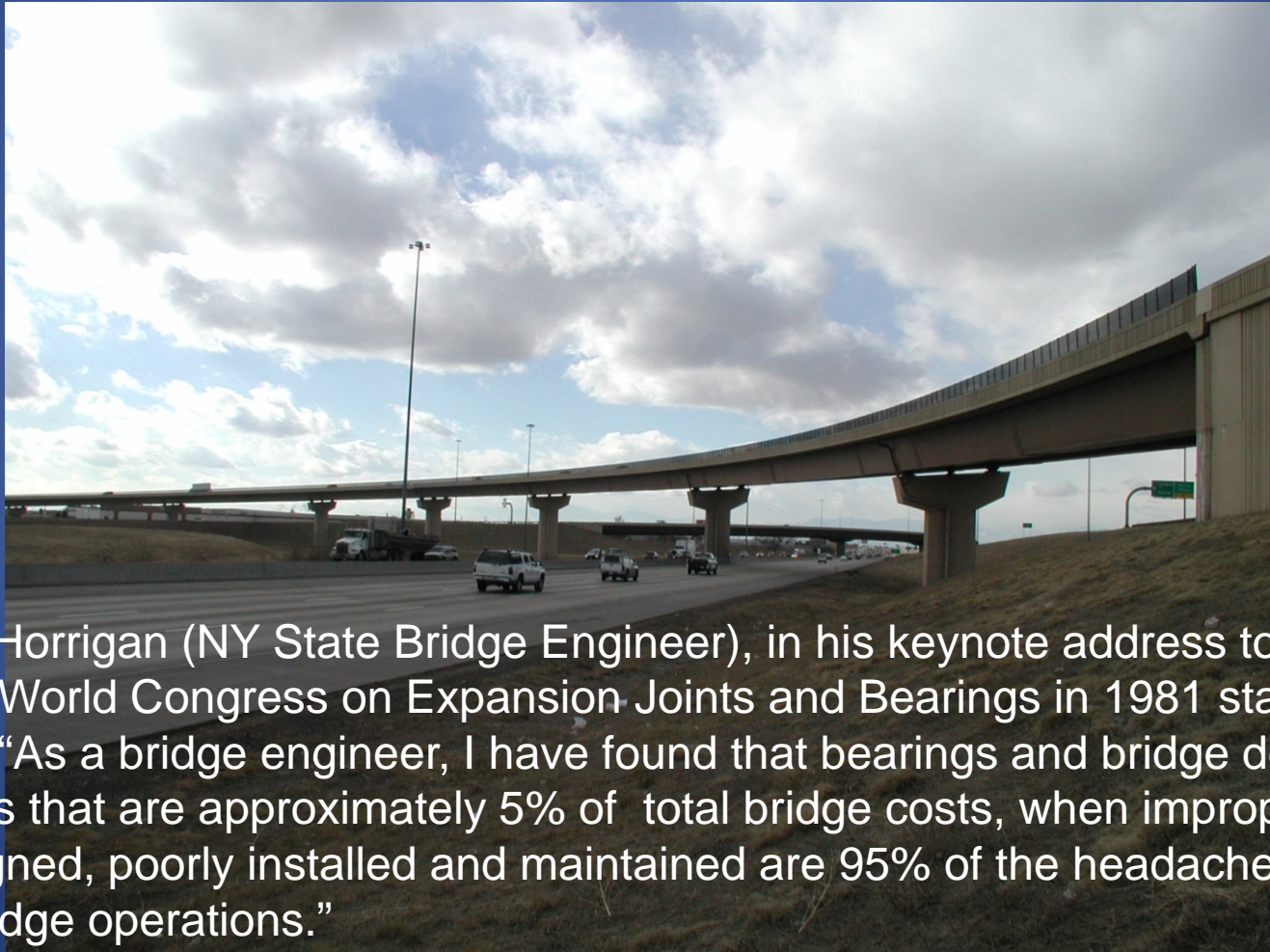
WHAT DO THEY DO?

WHY DON'T THEY LAST?

HOW DO WE INSTALL THEM?



CDOT EXPANSION JOINTS



E.V. Horrigan (NY State Bridge Engineer), in his keynote address to the First World Congress on Expansion Joints and Bearings in 1981 stated that, “As a bridge engineer, I have found that bearings and bridge deck joints that are approximately 5% of total bridge costs, when improperly designed, poorly installed and maintained are 95% of the headaches of bridge operations.”

CDOT EXPANSION JOINTS

GLENWOOD CANYON



ROADWAY

BEARING BELOW

CDOT EXPANSION JOINTS

VAIL PASS



ROADWAY

BEARING BELOW

CDOT EXPANSION JOINTS

C-470



ROADWAY

BEARING BELOW

CDOT EXPANSION JOINTS

ELEVATED I-70



ROADWAY

STRUCTURE BELOW

CDOT EXPANSION JOINTS

DENVER STREETS



ROADWAY

STRUCTURE BELOW

CDOT EXPANSION JOINTS

BRIDGE EXPANSION DEVICE FUNCTION

1. ACCOMMODATE BRIDGE MOVEMENT DUE TO THERMAL LOADS, LIVE LOADS, SHRINKAGE, SHORTENING, CREEP, ETC.
2. PROTECT BRIDGE COMPONENTS BELOW WEARING SURFACE FROM CORROSION.

Note that the expansion device is part of the wearing surface!

COMPROMISE OF EITHER FUNCTION SHOULD TRIGGER IMMEDIATE JOINT REPLACEMENT!

CDOT EXPANSION JOINTS

BRIDGE EXPANSION DEVICE WEAR



CDOT EXPANSION JOINTS

BRIDGE EXPANSION DEVICE WEAR



EXPANSION JOINT THEORY



THERMAL EXPANSION:

Steel coefficient of expansion:
 0.0000065

Concrete coefficient of expansion:
 0.0000059

100 ft steel bridge (100°F) = 0.78"

100 ft concrete bridge (100°F) = 0.708"

EXPANSION JOINT THEORY

PAVEMENT GROWTH:

SECTION 14: JOINTS AND BEARINGS

14-13

14.5.1.2—Structural Design

C14.5.1.2

Joints and their supports shall be designed to withstand force effects for the appropriate design limit state or states over the range of movements for the appropriate design limit state or states, as specified in Section 3. Resistance factors and modifiers shall be taken as specified in Sections 1, 5, 6, 7, and 8, as appropriate.

In snow regions, joint armor, armor connections, and anchors shall be designed to resist force effects that may be imposed on the joints by snagging snowplow blades. The edgebeams and anchorages of strip seals and MBJS with a skew exceeding 20 degrees in snow regions that do not incorporate protection methods such as those discussed in Article 14.5.3.3 shall be designed for the strength limit

The strength limit state for the edgebeams of strip seals and MBJS and anchorage to the concrete or other elements should be checked with this snowplow load if the skew of the joint exceeds 20 degrees relative to a line transverse to the traveling direction. For smaller skews, the blades, which are skewed, will not strike an edgebeam all at once. Protection methods such as those discussed in Article 14.5.3.3 may eliminate the need to design for this snowplow load.

Snowplow blade angles vary regionally. Unless protection methods such as those discussed in Article 14.5.3.3 are used, agencies should avoid MBJS installations with skew that is within three degrees of the

Rigid approach pavements composed of cobblestone, brick, or jointed concrete will experience growth or substantial longitudinal pressure due to restrained growth. To protect bridge structures from these potentially destructive pressures and to preserve the movement range of deck joints and the performance of joint seals, either effective pavement pressure relief joints or pavement anchors should be provided in approach pavements, as described in *Transportation Research Record 1113*.

consolidation and stabilization of subsoils;

- Structural restraints; and
- Static and dynamic structural responses and their interaction.

foundation types will affect the magnitude of bearing movement and the bearing forces opposing movement.

Rigid approach pavements composed of cobblestone, brick, or jointed concrete will experience growth or substantial longitudinal pressure due to restrained growth. To protect bridge structures from these potentially destructive pressures and to preserve the movement range of deck joints and the performance of joint seals, either effective pavement pressure relief joints or pavement anchors should be provided in approach pavements, as described in *Transportation Research Record 1113*.



EXPANSION JOINT THEORY

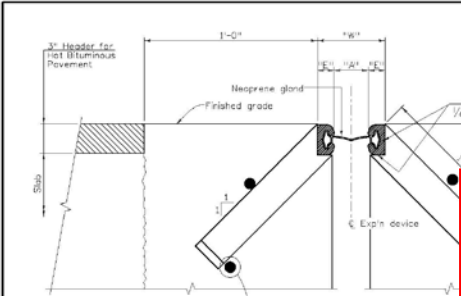
PAVEMENT GROWTH:



3 ½" OFFSET DUE TO PAVEMENT GROWTH IN 10 YEARS!

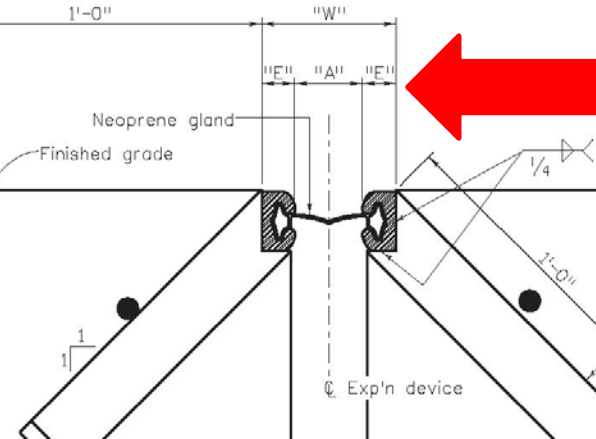
CDOT EXPANSION JOINTS

CDOT STANDARD B-518-1



SECTION THRU STRIP SEAL BRIDGE EXPANSION DEVICE
Section taken perpendicular to \perp exp'n device

#5 @ (Typ.) (Ref. 4)
Placed as shown



1'-0" "W" "A"

Neoprene gland
Finished grade

Exp'n device

1'-0"

B-518-1
(Use with B-518-1A or B-518-1B)

Device shall be installed on grade, as and grade of the deck.
Device has attained initial set, the expansion device proper position shall be removed.
Surfaces in contact with either

piece
ard

piece
ard

Top of header and sleeper stem with
shown scheme.

EXPANSION MATERIALS


- 1. SS-2
- 2. A
- 3. Material S400-A Strip Seal

STR. TEMP	"A"	"W"*
-30° F		
0° F		
30° F		
60° F		
90° F		
120° F		

* For E = 1 1/4" (Min.)

* For L = 24" (Min.)

CAL ANCHOR BAR DETAIL



1/2" x 2" x 1-3/4" Anchor Bar (Typ.)

4x4 beam, @ 7/16" holes for all-thread rods (Cut all-thread rods flush with top of concrete for finished joint)

Blasting as req'd, nailed to beam

Approach slab

Sleeper slab

Const. joint

1/2" Plywood nailed to bulkhead forms (not shown)

10 - 12# Nails spaced @ shown (Typ. each side)

3/4" Plywood gasket each side

4" x 4" Post

1/4" Diagonal nailed to rear and front

2x4 x continuous all plate nailed to posts

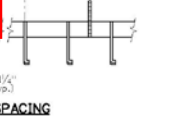
1/2" Exp'n anchors with washers @ 3'-6" centered on all plate

NOTES:

- Provide expansion device support as shown at 6'-0" intervals.
- For reinforcing see approach slab details.

Concrete shall be placed after expansion device has been adjusted to proper grade and approved by the engineer using the Grade Projection Scheme.

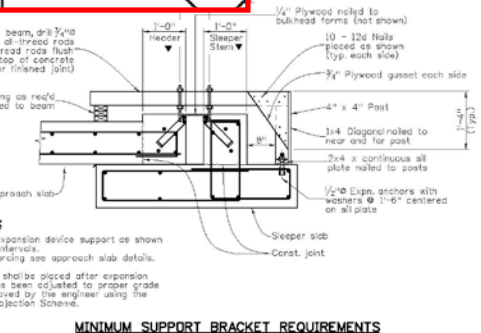
ANCHOR BAR SPACING



1/2" x 2" x 1-3/4" Anchor Bar (Typ.)

Spacing

MINIMUM SUPPORT BRACKET REQUIREMENTS




Print Date: 10/29/2007

Drawing File Name: Sheet_B-518-1.dwg

Horiz. Scale: 1:1

Vert. Scale: As Noted

Unit Information: Unit Leader Initials

Sheet Revisions		Colorado Department of Transportation	As Constructed	BRIDGE EXPANSION DEVICE (0 - 4 INCH)		Project No./Code
Delete	Comments			No Revisions:	Design:	
		4201 East Arkansas Avenue Room 303 Denver, CO 80222-3400 Phone: 303-757-9352 FAX: 303-757-9197	Revised:	Designer: XXXXXXXX	Structure: X-XX-XX	
		 Staff Bridge Branch	Valid:	Detailer: XXXXXXXX	Numbers: X-XX-XX	
		Initials		Sheet Subst: Bridge	Subst Sheets: 800 of	Sheet Number

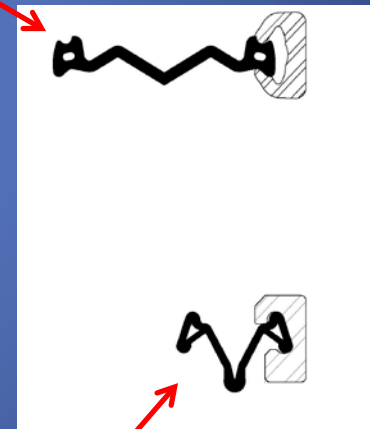
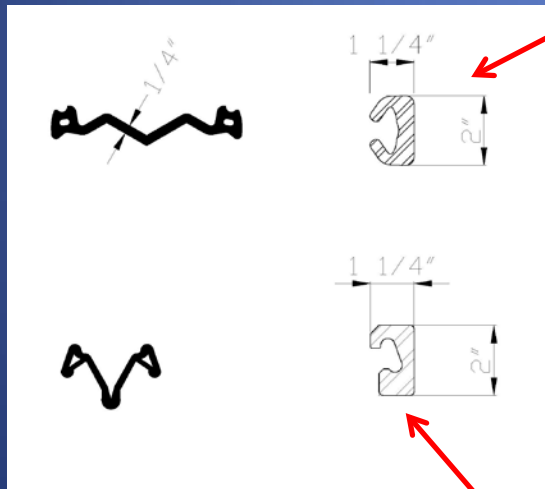
CDOT EXPANSION JOINTS

STEEL RAIL SHAPES:

DIMENSIONS

INSTALLED

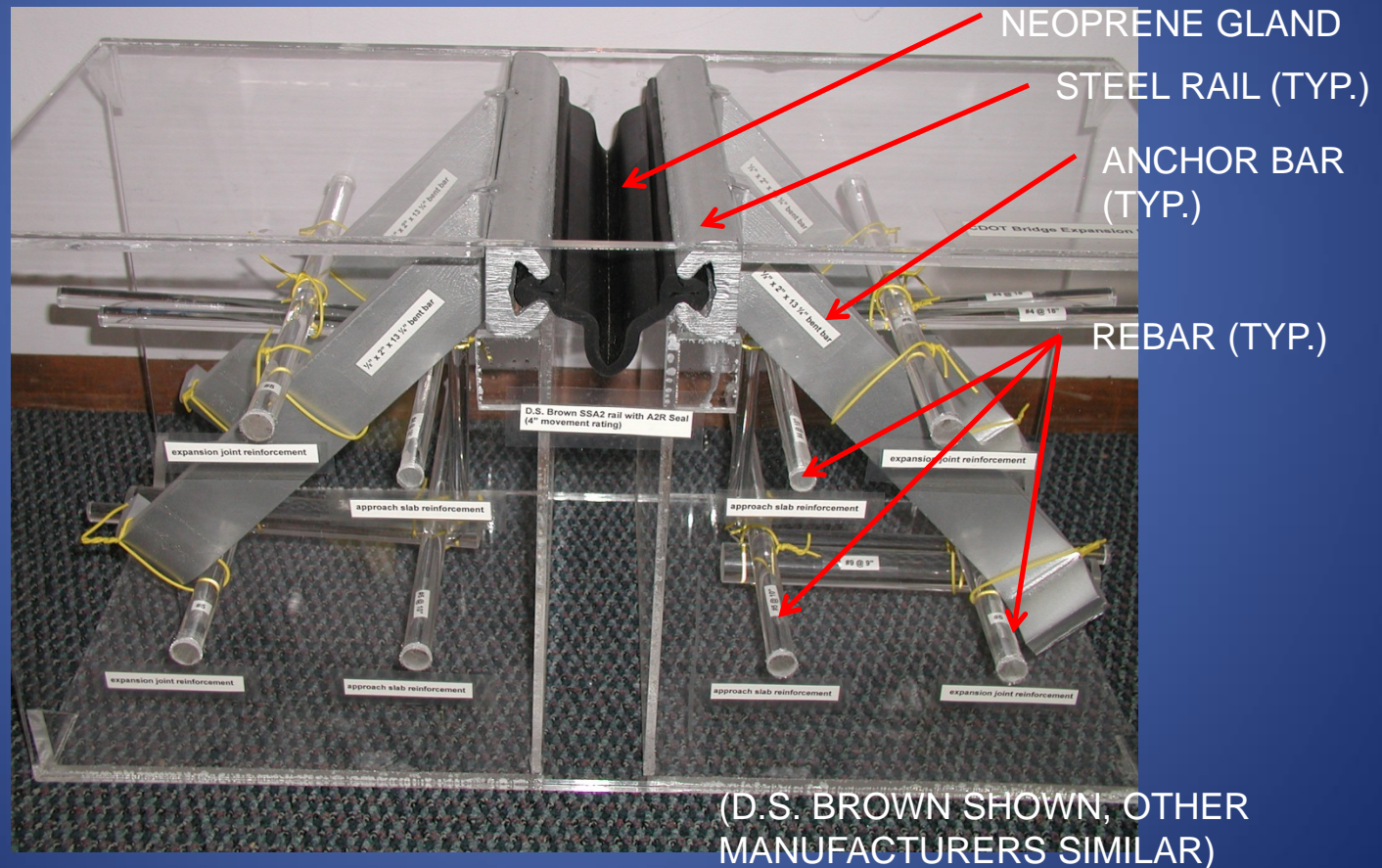
D.S. BROWN



WATSON-BOWMAN-ACME

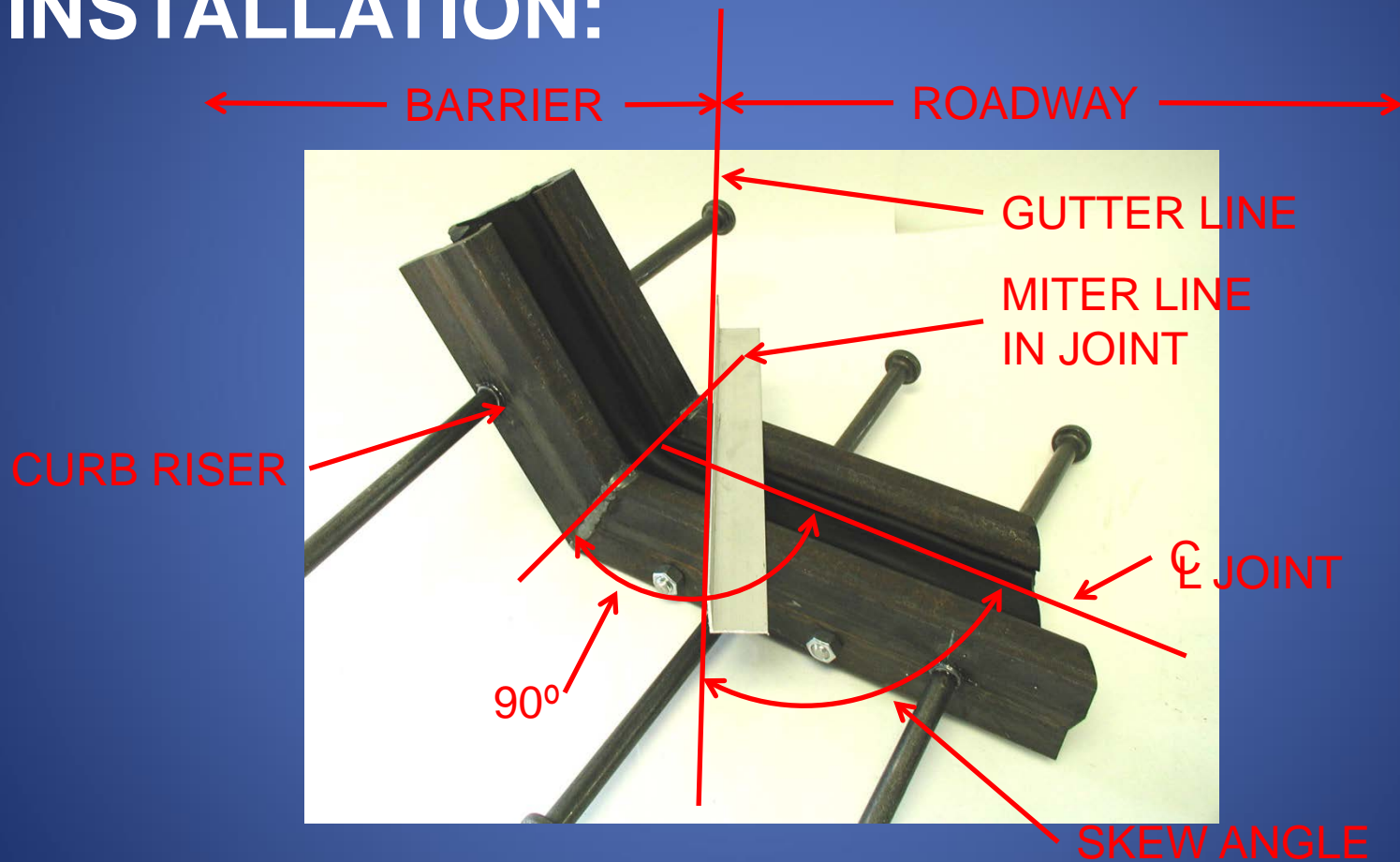
CDOT EXPANSION JOINTS

BRIDGE EXPANSION DEVICE (0-4")



CDOT EXPANSION JOINTS

INSTALLATION:



CDOT EXPANSION JOINTS

RAMP PROJECTS

<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th colspan="2" style="text-align: center;">Oversight / NHS</th> </tr> <tr> <td style="font-size: small;">FHWA REGION VIII OVERSIGHT?</td> <td style="text-align: center;"> <input checked="" type="checkbox"/> NO <input type="checkbox"/> YES </td> </tr> <tr> <td style="font-size: small;">NATIONAL HIGHWAY SYSTEM?</td> <td style="text-align: center;"> <input type="checkbox"/> NO <input checked="" type="checkbox"/> YES </td> </tr> </table>	Oversight / NHS		FHWA REGION VIII OVERSIGHT?	<input checked="" type="checkbox"/> NO <input type="checkbox"/> YES	NATIONAL HIGHWAY SYSTEM?	<input type="checkbox"/> NO <input checked="" type="checkbox"/> YES	<p>DEPARTMENT OF TRANSPORTATION STATE OF COLORADO</p> <p>HIGHWAY CONSTRUCTION BID PLANS OF PROPOSED FEDERAL AID PROJECT NO. BR 0704-237 INTERSTATE HIGHWAY NO. 70 AND PENA BLVD. ADAMS AND ARAPAHOE COUNTY CONSTRUCTION PROJECT CODE NO. 19901</p>	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th colspan="2" style="text-align: left;">Related Projects:</th> </tr> <tr> <td style="font-size: x-small;">P. E. UNDER PROJECT:</td> <td style="text-align: right;">BR 0704-237</td> </tr> <tr> <td style="font-size: x-small;">Project Number:</td> <td style="text-align: right;">19901</td> </tr> <tr> <td style="font-size: x-small;">Project Code:</td> <td style="text-align: right;">19901</td> </tr> <tr> <th colspan="2" style="text-align: left;">R.O.W. Projects:</th> </tr> <tr> <td style="font-size: x-small;">R.O.W. Project Description:</td> <td></td> </tr> </table>	Related Projects:		P. E. UNDER PROJECT:	BR 0704-237	Project Number:	19901	Project Code:	19901	R.O.W. Projects:		R.O.W. Project Description:																									
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RAMP
REGION 1
PACKAGE B
AD PLANS

CDOT EXPANSION JOINTS

RAMP STANDARD DRAWING

COLORADO PROJECT NO. BR 0704-237
SUBACCOUNT NO. 19901

January 30, 2014

REVISION OF SECTION 518 BRIDGE EXPANSION DEVICE

Section 518 of the Standard Specifications is hereby revised for this project as follows:

In subsection 518.04, delete the second paragraph and replace with the following:

The device shall consist of a continuous premolded elastomeric expansion joint seal (also called neoprene gland) and steel extrusions as shown on the plans, required by the manufacturer, or specified herein for attaching the elastomeric expansion joint to the steel armor or anchors. The expansion device shall have a rated range of movement of 4 inches including rotations.

In subsection 518.04, delete the fourth paragraph and replace with the following:

Steel extrusions and cover plates shall conform to the specifications of ASTM A588, whereas other structural steel shall conform to the specifications of ASTM A709 Grade 36 or ASTM A588. Fabrication and welding of structural steel shall conform to the requirements of Section 509. The material designations for all steel components shall be shown in the Contractor's shop drawings.

In subsection

All steel
after fabrica
joint shall

In subsection

The Contractor
expansion
welding
for pro
drawing

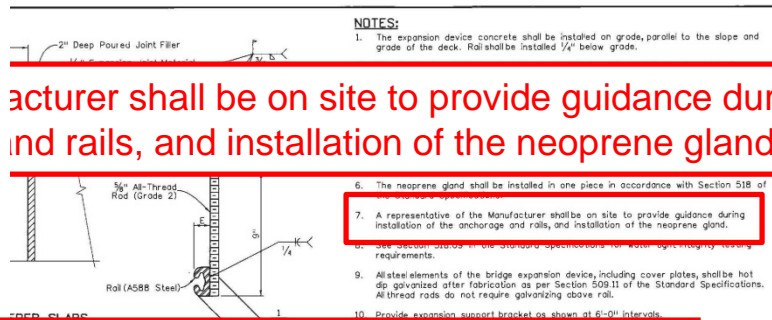
Where curb or

In subsection

The manufacturer
representative
provide
provide
assist
procedures.

The initial installations of expansion devices shall be performed by the Contractor in the presence of a representative of the manufacturer. This representative shall be experienced in such installations and provide information to the Contractor on handling and installation procedures. The representative shall provide information to the Engineer on inspection of the expansion device installation and shall provide assistance until the Contractor and the Engineer agree that they understand this installation and inspection procedures.

END OF SECTION REVISION



EXP. SLABS

3 SPACING

Concrete shall be placed after expansion device has been adjusted to proper grade.

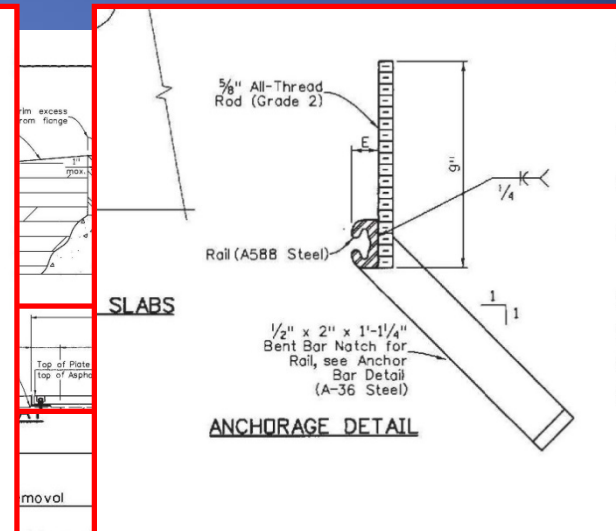
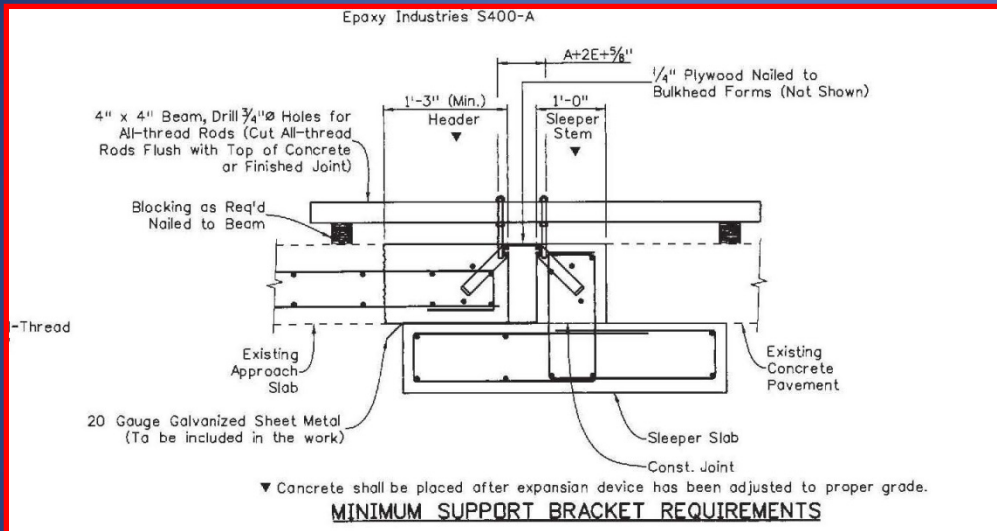
MINIMUM SUPPORT BRACKET REQUIREMENTS

Colorado Department of Transportation	As Constructed	I-70/PENA BLVD BRIDGE EXPANSION DEVICE (0-4 INCH V.L. OF S)	Project No./Code
2000 South Holly Street Denver, CO 80222 Phone 303-767-6966	Revised: 1/30/14 1953	Designer: J. Walker Checker: J. Walker Detailer: J. Walker Scale: 1/4" = 1'-0"	19901

Where is the Temp chart?

CDOT EXPANSION JOINTS

TEMPORARY BRIDGE DECK



slab at existing expansion joint temporary pavement. The concrete headers by 1/2". Or requirement shall be performed.

Anchors for panels shall be filled with non-shrink epoxy grout.

For details of anti-slip coating.

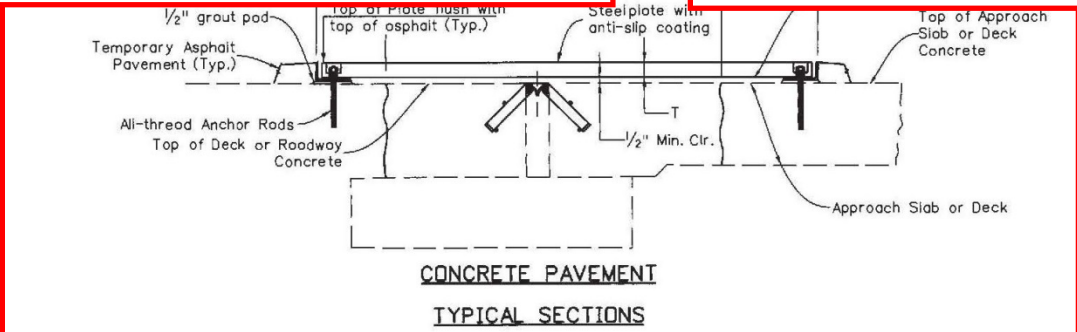
Payment for Temporary Bridge removal of the steelplates on neoprene pads, anti-slip coating and temporary striping.

Contractor may propose on during replacement; however, pre-tagged mixes will not be approved.

After completion of work, site coordinate with CDOT Maintenance.

Print Date: 1/23/2014
File Name: 19901Temp_Bridge_Deck
Horiz. Scale: 1:1

DAVIN RYAN ASSOCIATES
132 27th Street, SE
Denver, Colorado 80202
Phone: 303.733.8800



CDOT EXPANSION JOINTS

REASON FOR TEMPORARY BRIDGE DECK:



ALLOW TIME TO PERFORM WORK

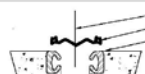
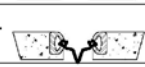



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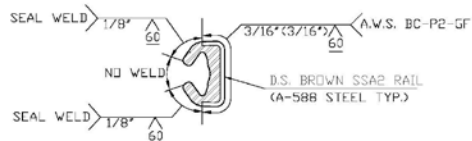
SHOP DRAWINGS REQUIRED

GENERAL NOTES

1. CONTRACTOR SHALL VERIFY ALL DIMENSIONS IN THE FIELD. DISCREPANCIES SHALL BE IMMEDIATELY BROUGHT TO THE ATTENTION OF BOWMAN CONSTRUCTION SUPPLY AND THE ENGINEER.
2. A REPRESENTATIVE OF BOWMAN CONSTRUCTION SUPPLY SHALL BE PRESENT DURING INSTALLATION.
3. SSA2 RAILS SHALL BE FABRICATED IN MAXIMUM 23'-0" LENGTHS. FABRICATION SHALL BE IN ACCORDANCE WITH SECTION S09 OF THE CDOT STANDARD SPECIFICATIONS.
4. AFTER FABRICATION, EXPANSION DEVICE SHALL BE GALVANIZED TO ASTM A123.
5. "W" AND "A" DIMENSIONS ARE TEMPERATURE DEPENDENT. INTERPOLATE AS NECESSARY. SEE SPECIFICATIONS TO DETERMINE STRUCTURE TEMPERATURE.
6. MINIMUM GAP WIDTH FOR A2R AND A2R-XTRA SEALS SHALL BE 1/2" MEASURED FROM STEEL RAIL TO STEEL RAIL. MAXIMUM WIDTH SHALL BE 4 1/2" FOR A2R SEAL AND 7 1/2" FOR A2R-XTRA SEAL. GAP WIDTHS OUTSIDE THESE PARAMETERS MAY CAUSE JOINT FAILURE. MINIMUM GAP WIDTH FOR EASY INSTALLATION IS 1 1/2".
7. EXPANSION DEVICE GUTTER LINE SHALL BE RECESSED 1/4" MINIMUM BEHIND CONCRETE GUTTER LINE. RECESS VARIES FROM ONE SIDE OF JOINT TO OTHER SIDE OF JOINT FOR SKEWED EXPANSION DEVICES. SEE PLAN DETAILS.
8. SSA2 STEEL RAILS SHALL BE INSTALLED 1/4" BELOW CONCRETE, PARALLEL TO SLOPE AND GRADE OF THE ROADWAY.
9. FABRICATED SSA2 RAILS MAY BE FIELD CUT TO ACCOMMODATE ROADWAY CROWNS, SLOPE BREAKS, AND CONSTRUCTION PHASING. SAW CUT DO NOT BURN AND FIELD WELD PER FIELD WELD DETAIL.
10. MASK OFF GROOVE IN SSA2 RAILS OR INSERT 3/4"Ø BACKER ROD TO PREVENT CONCRETE INTRUSION INTO GROOVE OF SSA2 RAIL.
11. PLACE AND CURE CONCRETE ACCORDING TO SPECIFICATIONS.
12. IMMEDIATELY AFTER CONCRETE ACHIEVES INITIAL SET, REMOVE ALL RIGID SUPPORTS THAT SPAN THE EXPANSION GAP.
13. SEAL SHALL BE FIELD INSTALLED BY THE CONTRACTOR CONTINUOUS FROM END OF JOINT TO END OF JOINT. FACTORY VULCANIZED HORIZONTAL MITERS ARE REQUIRED FOR HORIZONTAL TURNS GREATER THAN 35°. NO FIELD SPLICING OR PATCHING SHALL BE ALLOWED UNLESS SPECIFICALLY CALLED FOR IN THE PLANS.
14. BEFORE INSTALLATION OF SEAL, CLEAN ALL AREAS OF STEEL TO BE IN CONTACT WITH THE SEAL.
15. LAY OUT SEAL ADJACENT TO EXPANSION DEVICE TO CHECK LENGTH AND PERFORMANCE OF ANY TURNS. SEE SEAL INSTALLATION DIAGRAM.
16. LUBRICANT ADHESIVE SHALL BE DELASTIBOND 1520 AND SHALL BE A ONE-PART POLYURETHANE ADHESIVE CONFORMING TO ASTM D4070.
17. APPLY LUBRICANT ADHESIVE FOR ONLY 3-4 FEET AT A TIME. WORK BOTH SIDES OF SEAL SIMULTANEOUSLY.
18. SEAL SHALL BE FULLY INSTALLED PRIOR TO PLACEMENT OF ANY SIDEWALKS, MEDIANS, CURBS, ETC., ABOVE EXPANSION DEVICE. GAP WIDTH SHALL BE AT LEAST "W" WIDE ABOVE EXPANSION DEVICE. NO CONCRETE OR OTHER FOREIGN MATERIAL MAY BE PERMANENTLY PLACED ON TOP OF SEAL.
19. MATERIAL CERTIFICATIONS SHALL BE SUPPLIED FOR ALL PERMANENT MATERIALS.

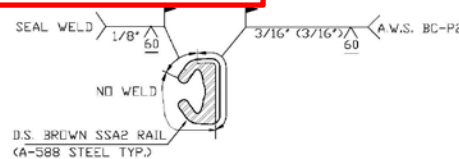
A2R GLAND INSTALLATION INSTRUCTIONS

- STEP 1**
- 
- EXPANSION JOINT
A2R SEAL
SSA2 RAIL (TYP.)
BEGINNING AT TURNS, FOLD SEAL IN HALF LONGITUDINALLY AND PLACE INTO JOINT OPENING
- STEP 2**
- 
- PUSH SEAL DOWN INTO JOINT OPENING UNTIL THE LUG OF THE A2R SEAL CATCHES IN THE GROOVE OF THE SSA2 RAIL.
- STEP 3**
- 
- LUBRICANT ADHESIVE APPLICATION AREA
- STEP 4**
- 
- TYPICAL ANGLE OF PRESSURE (SYM ABOUT EXPANSION DEVICE)
PUSH LATERALLY WITH PRY BAR OR SIMILAR TOOL TO "ROLL" THE TOP LUG OF THE A2R SEAL INTO THE GROOVE OF THE SSA2 RAIL.
- STEP 5**
- 
- COMPLETED INSTALLATION--NOTE A2R SEAL FITS SNUGLY AGAINST SSA2 RAIL



SHOP WELD DETAIL

ALL SHOP WELD BUTT JOINTS SHALL BE SINGLE V-GROOVE WELDS BC-P2-GF WITH MC-706 WIRE ELECTRODE. NO WELD IN INTERIOR OF RAIL WHERE IN CONTACT WITH RUBBER SEAL.



FIELD WELD DETAIL

ALL FIELD WELD BUTT JOINTS SHALL BE SINGLE V-GROOVE WELDS BC-P2 WITH E-7018 ELECTRODE. NO WELD IN INTERIOR OF RAIL WHERE IN CONTACT WITH RUBBER SEAL.

THIS SPACE FOR REVIEW STAMP

CADD FILE: 000281-HJING
DATE OF LAST REVISION: 1-21-10

NO.	DESCRIPTION	DATE
1	DESCRIPTION	DATE
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DESCRIPTION OF MATERIALS:
BRIDGE EXPANSION DEVICE (0-4')--D.S. BROWN
SSA2 RAIL WITH A2R SEAL

PROJECT: CDOT PROJECT IN-0251-166
LOCATION: I-25 SOUTHBOUND,
LAS ANIMAS COUNTY, COLORADO

STRUCTURE: P-18-DE, -CF, -CL, -EJ, -BL DWG BY: RUM CHK BY: SHEETNO: OF 36 DATE: 1-8-10

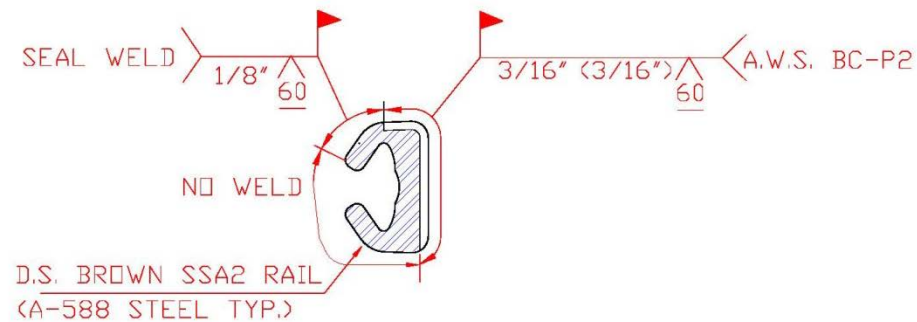
CDOT EXPANSION JOINTS

SHOP DRAWING DETAILS:

1. CONTRACTOR SHALL VERIFY ALL DIMENSIONS IN THE FIELD. DISCREPANCIES SHALL BE IMMEDIATELY BROUGHT TO THE ATTENTION OF BOWMAN CONSTRUCTION SUPPLY AND THE ENGINEER.
2. A REPRESENTATIVE OF BOWMAN CONSTRUCTION SUPPLY SHALL BE PRESENT DURING INSTALLATION.
3. SSA2 RAILS SHALL BE FABRICATED IN MAXIMUM 23'-0" LENGTHS. FABRICATION SHALL BE IN ACCORDANCE WITH SECTION 509 OF THE CDOT STANDARD SPECIFICATIONS.
4. AFTER FABRICATION, EXPANSION DEVICE SHALL BE GALVANIZED TO ASTM A123.
5. "W" AND "A" DIMENSIONS ARE TEMPERATURE DEPENDENT. INTERPOLATE AS NECESSARY. SEE SPECIFICATIONS TO DETERMINE STRUCTURE TEMPERATURE.
6. MINIMUM GAP WIDTH FOR A2R AND A2R-XTRA SEALS SHALL BE 1/2" MEASURED FROM STEEL RAIL TO STEEL RAIL. MAXIMUM WIDTH SHALL BE 4 1/2" FOR A2R SEAL AND 7 1/2" FOR A2R-XTRA SEAL. GAP WIDTHS OUTSIDE THESE PARAMETERS MAY CAUSE JOINT FAILURE. MINIMUM GAP WIDTH FOR EASY INSTALLATION IS 1 1/2"
7. EXPANSION DEVICE GUTTER LINE SHALL BE RECESSED 1/4" MINIMUM BEHIND CONCRETE GUTTER LINE, RECESS VARIES FROM ONE SIDE OF JOINT TO OTHER SIDE OF JOINT FOR SKEWED EXPANSION DEVICES. SEE PLAN DETAILS.
8. SSA2 STEEL RAILS SHALL BE INSTALLED 1/4" BELOW CONCRETE, PARALLEL TO SLOPE AND GRADE OF THE ROADWAY.
9. FABRICATED SSA2 RAILS MAY BE FIELD CUT TO ACCOMMODATE ROADWAY CROWNS, SLOPE BREAKS, AND CONSTRUCTION PHASING. SAW CUT (DO NOT BURN) AND FIELD WELD PER FIELD WELD DETAIL.
10. MASK OFF GROOVE IN SSA2 RAILS (OR INSERT 3/4"Ø BACKER ROD) TO PREVENT CONCRETE INTRUSION INTO GROOVE OF SSA2 RAIL.
11. PLACE AND CURE CONCRETE ACCORDING TO SPECIFICATIONS.
12. IMMEDIATELY AFTER CONCRETE ACHIEVES INITIAL SET, REMOVE ALL RIGID SUPPORTS THAT SPAN THE EXPANSION GAP.
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19. MATERIAL CERTIFICATIONS SHALL BE SUPPLIED FOR ALL PERMANENT MATERIALS.

CDOT EXPANSION JOINTS

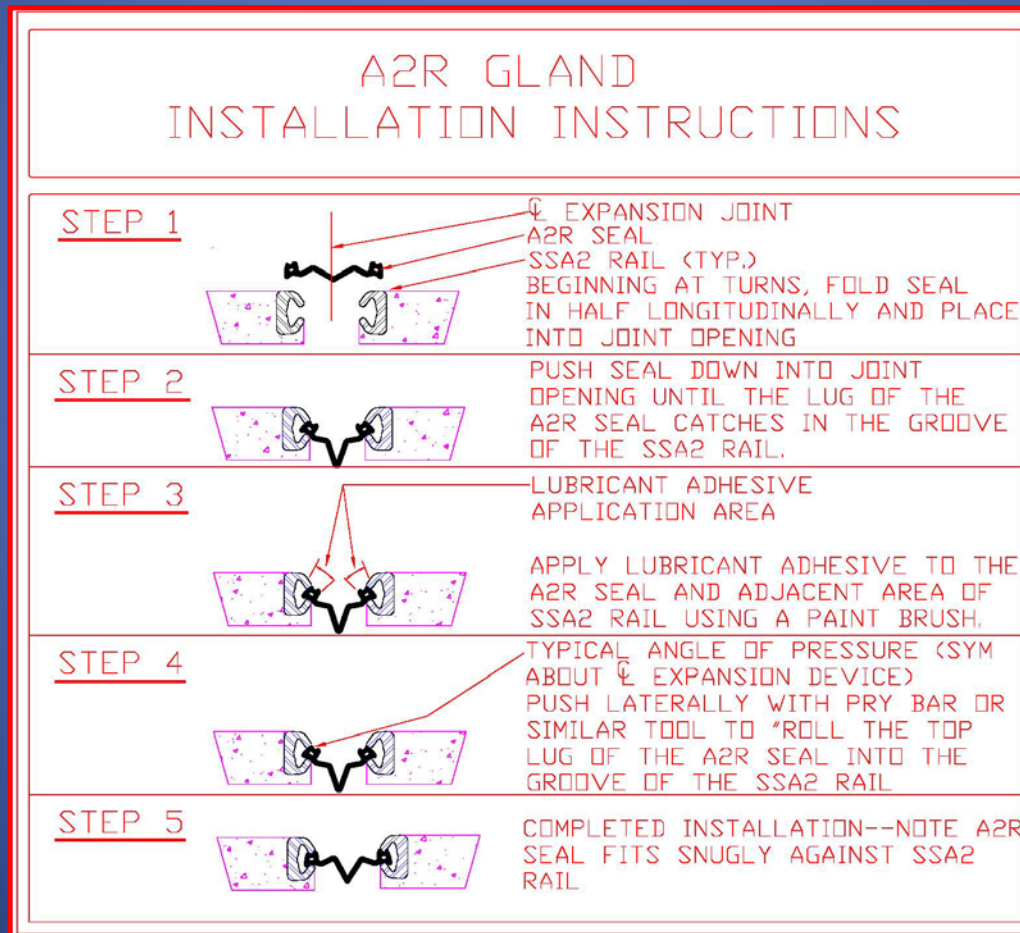
SHOP DRAWING DETAILS:



FIELD WELD DETAIL

CDOT EXPANSION JOINTS

SHOP DRAWING DETAILS:



CDOT EXPANSION JOINTS

INSTALLATION:

NO SHARPS!

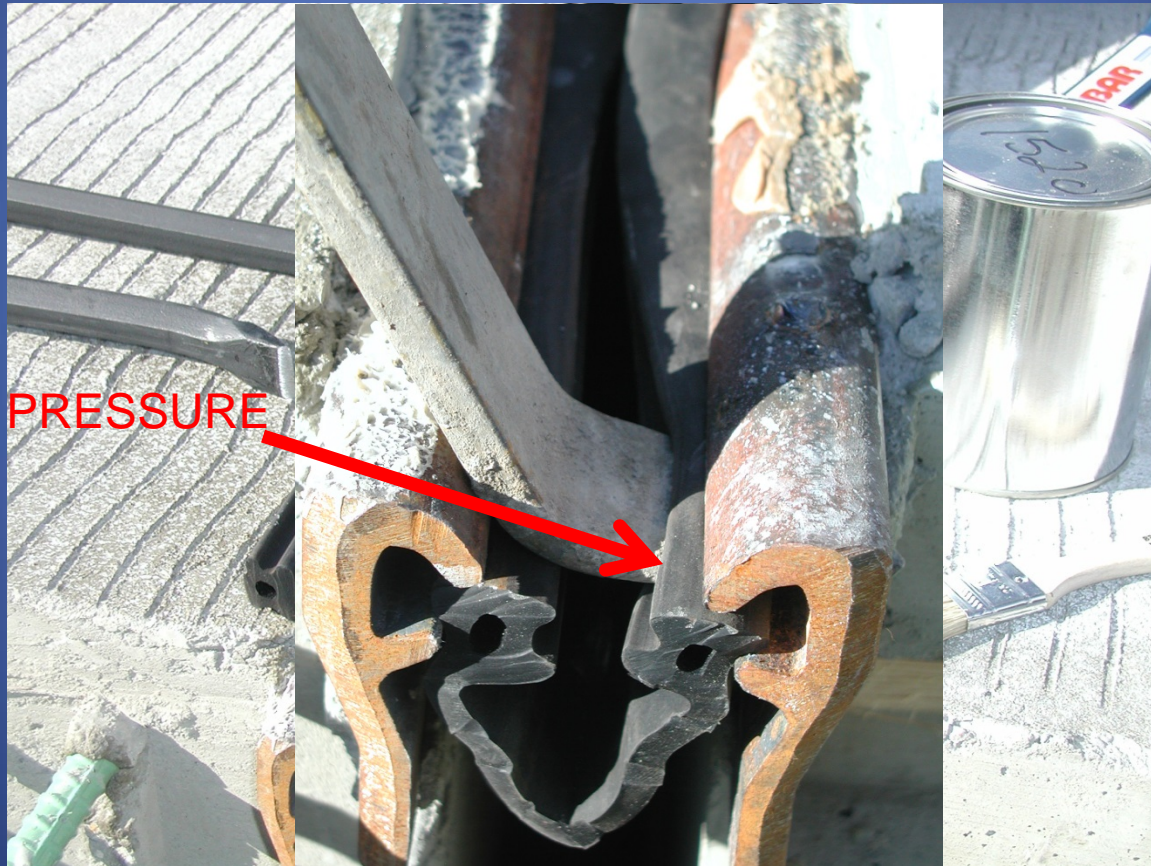


TYPICAL TOOLS

CDOT EXPANSION JOINTS

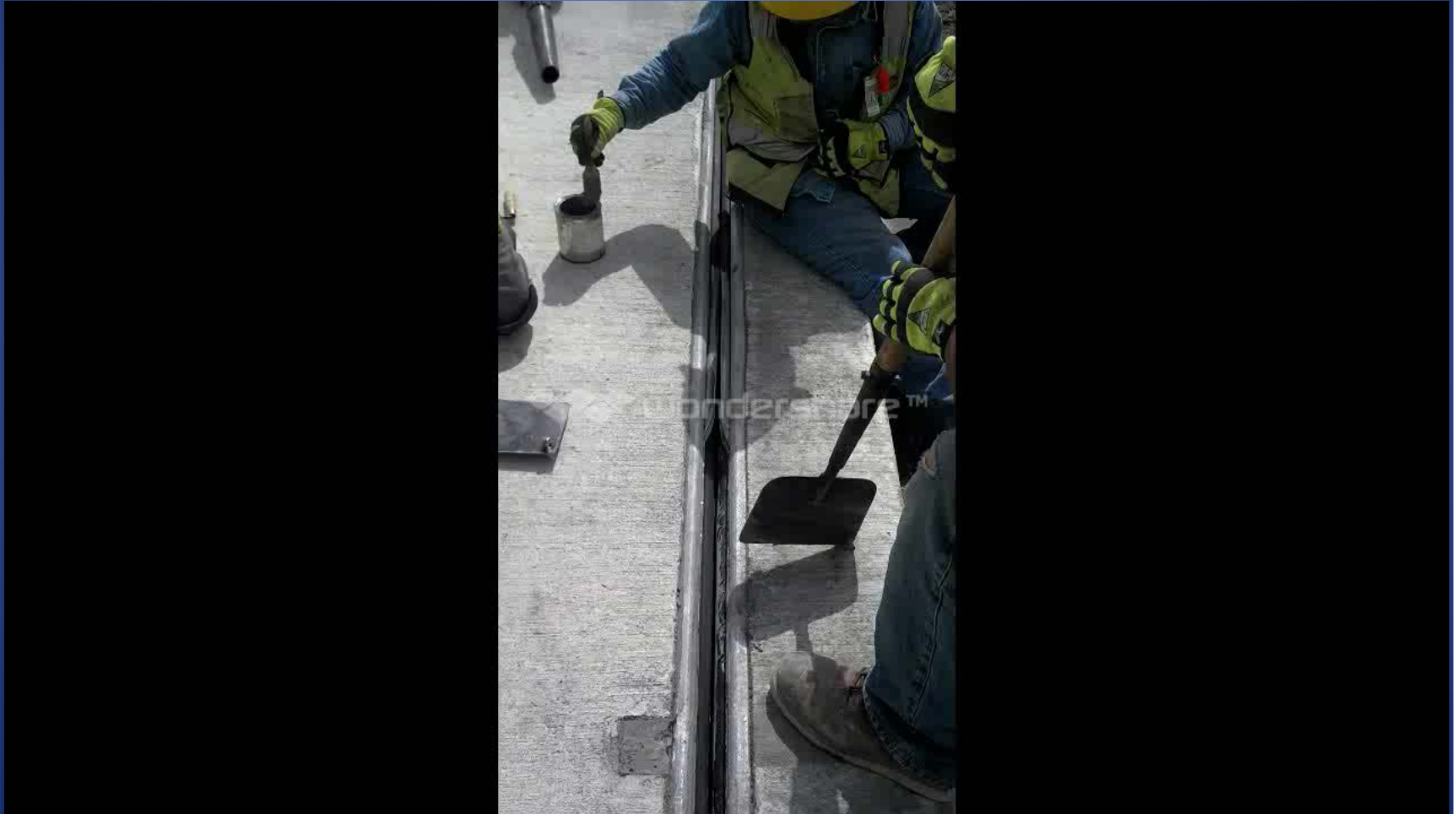
INSTALLATION:

ANGLE OF PRESSURE



CDOT EXPANSION JOINTS

INSTALLATION:



CDOT EXPANSION JOINTS

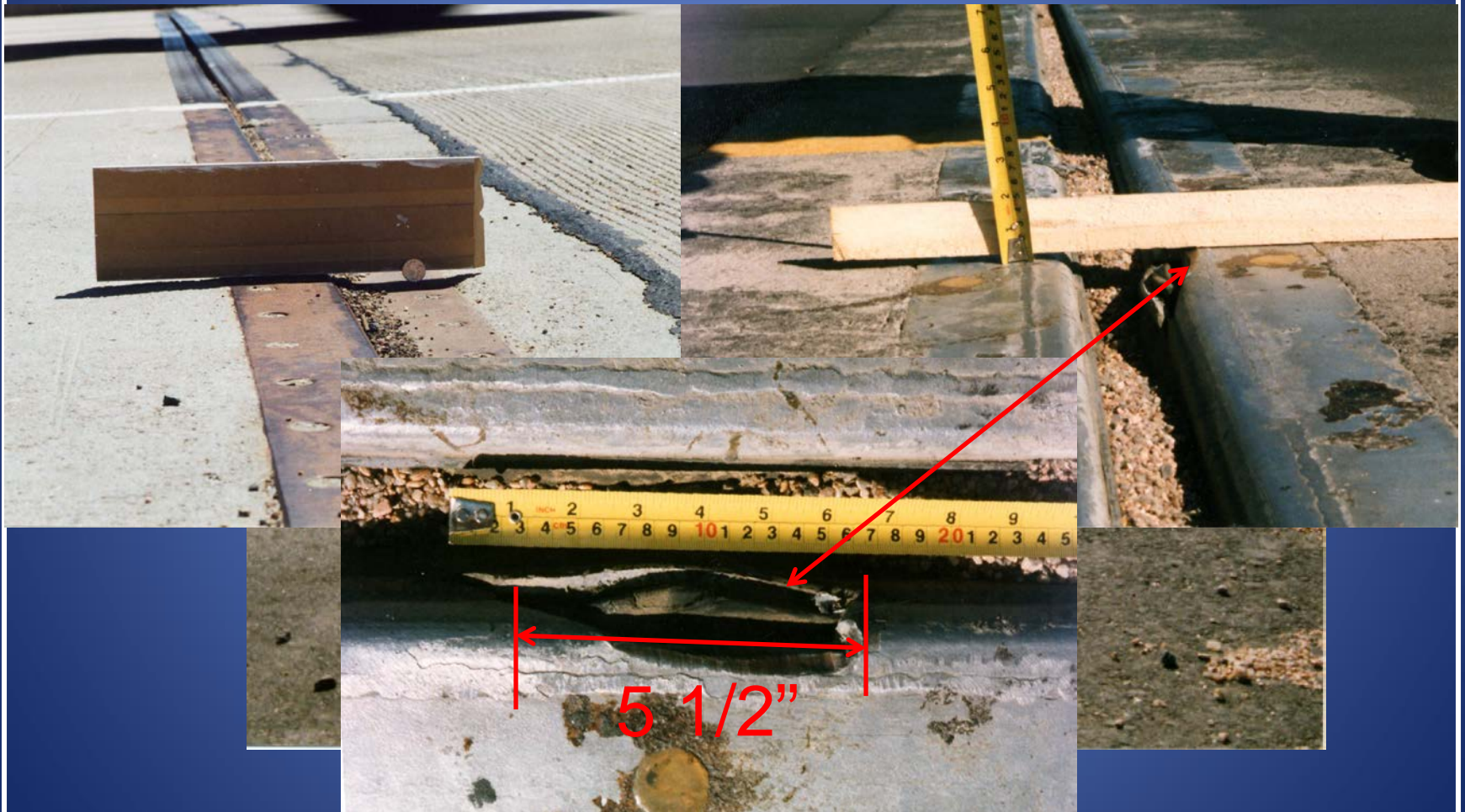
PHASED CONSTRUCTION



DO NOT CUT GLAND!

CDOT EXPANSION JOINTS

WHAT CAN GO WRONG-1: APPROACH



CDOT EXPANSION JOINTS

WHAT CAN GO WRONG-2:



POOR CONCRETE CONSOLIDATION

CDOT EXPANSION JOINTS

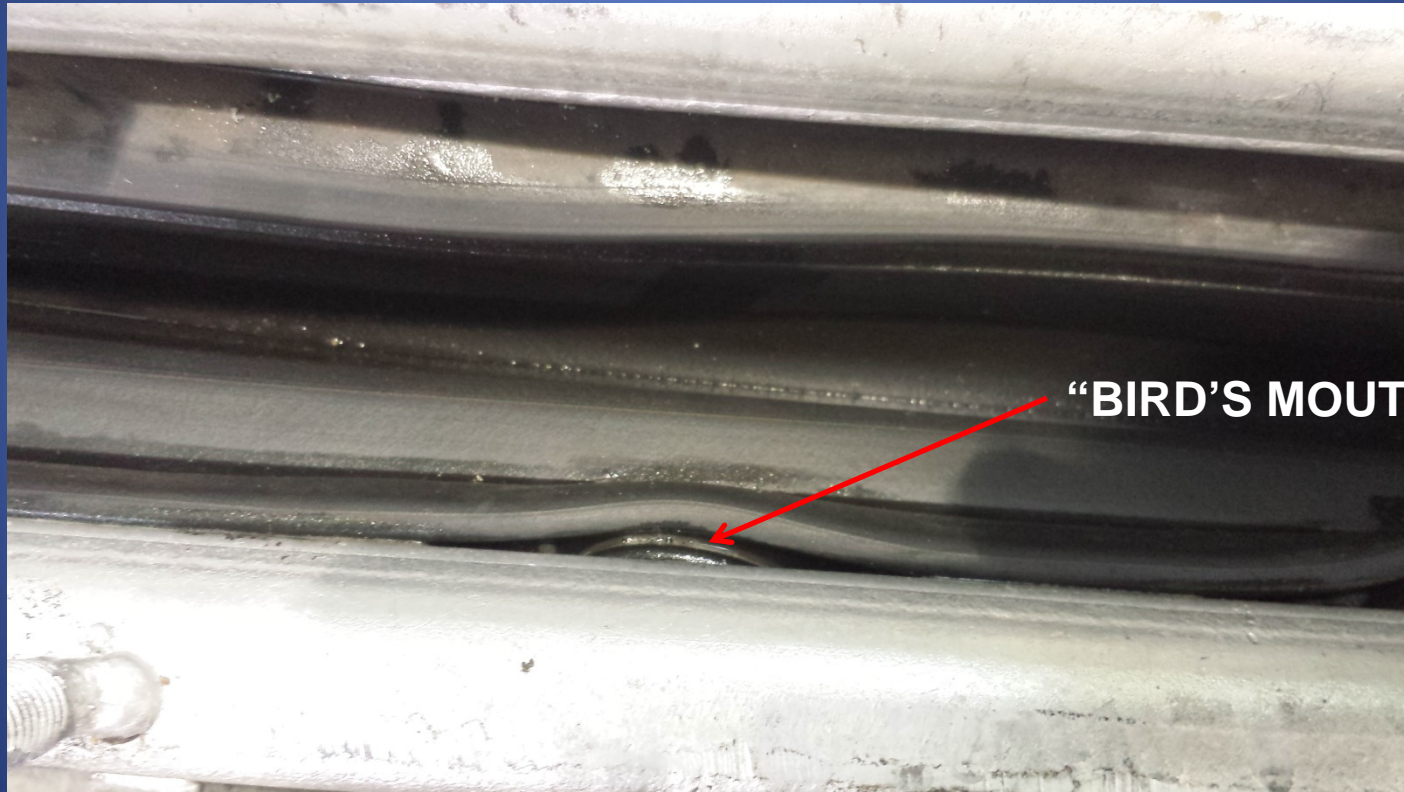
WHAT CAN GO WRONG-3:



INADEQUATE REBAR

CDOT EXPANSION JOINTS

WHAT CAN GO WRONG-4:

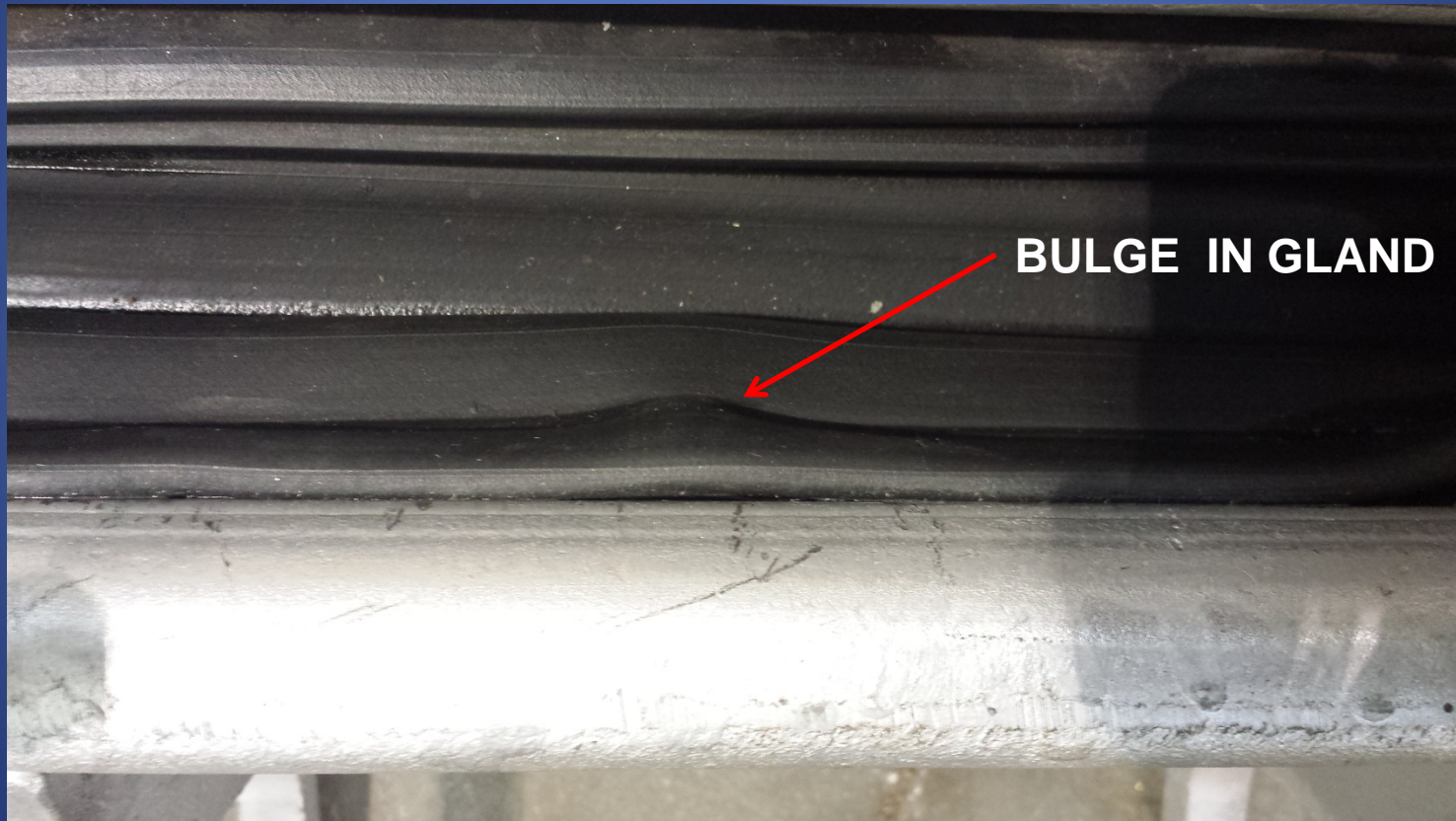


CAUSED BY:

- WORK TOO FAST
- OBSTRUCTION IN RAIL (WELD, STONE, ETC.)

CDOT EXPANSION JOINTS

WHAT CAN GO WRONG-5:



CAUSED BY:

- OBSTRUCTION IN GROOVE (STONE, ETC.)

CDOT EXPANSION JOINTS

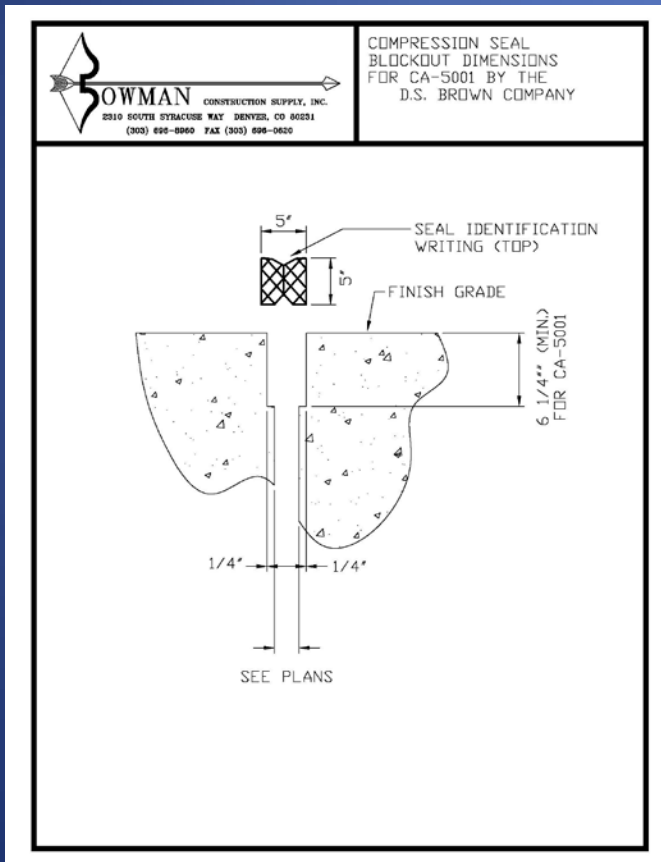
COMPRESSION SEALS



LARGER SIZED SEALS ARE USED FOR RELIEF JOINTS

CDOT EXPANSION JOINTS


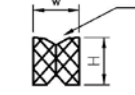
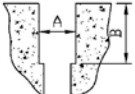
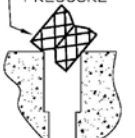
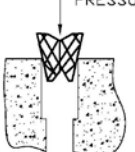
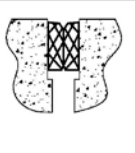
COMPRESSION SEALS



Delastic® Seal	Delastic® SEAL CHARACTERISTICS			JOINT DESIGN CRITERIA		
	Nominal Width (W)	Nominal Height (H)	Max. Movement	Narrowest Opening (A)	Widest Opening (A)	Minimum Depth (B)
CV-1250	1.25 (32)	1.25 (32)	0.50 (13)	0.56 (14)	1.06 (27)	1.63 (41)
CV-1625	1.63 (41)	1.88 (48)	0.60 (15)	0.73 (19)	1.38 (35)	2.25 (57)
CV-1752	1.75 (44)	1.75 (44)	0.70 (18)	0.79 (20)	1.49 (38)	2.40 (61)
CV-2000	2.00 (51)	2.00 (51)	0.75 (19)	0.95 (24)	1.70 (43)	2.75 (70)
CV-2250	2.25 (57)	2.33 (59)	0.90 (23)	1.01 (26)	1.91 (49)	3.00 (76)
CV-2502	2.50 (64)	2.50 (64)	1.00 (25)	1.13 (29)	2.13 (54)	3.20 (81)
CV-3000	3.00 (76)	3.25 (83)	1.20 (31)	1.34 (34)	2.55 (65)	4.25 (108)
CV-3500	3.50 (89)	3.50 (89)	1.40 (36)	1.58 (40)	2.98 (76)	4.45 (113)
CV-4000	4.00 (102)	4.00 (102)	1.65 (42)	1.75 (44)	3.40 (86)	5.63 (143)
CV-4500	4.50 (114)	4.50 (114)	2.20 (56)	2.03 (52)	3.83 (97)	6.13 (156)
CA-5001	5.00 (127)	5.00 (127)	2.35 (60)	1.90 (48)	4.25 (108)	6.25 (159)
CA-6000	6.00 (152)	6.00 (152)	2.90 (74)	2.20 (56)	5.10 (129)	7.75 (197)

CDOT EXPANSION JOINTS

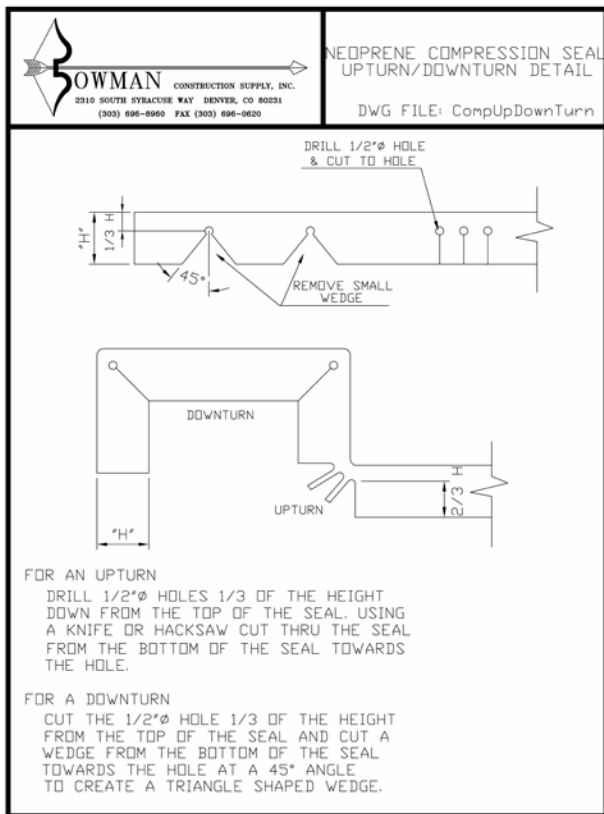
COMPRESSION SEALS

 <p>SOWMAN CONSTRUCTION SUPPLY, INC. 2510 SOUTH STURGEON WAY DENVER, CO 80231 (303) 690-8900 FAX (303) 690-0820</p>	<p>COMPRESSION SEAL INSTALLATION</p> <p>DWG FILE: COMP SEAL INSTALLATION</p>
 <p>SEAL IDENTIFICATION WRITING</p> 	<p>NOTE SEAL IS ALWAYS LARGER THAN GAP; CHECK MOVEMENT CAPACITY AND DEPTH OF SEATS.</p> <p>PROPER ORIENTATION OF SEAL HAS WRITING SIDE OF SEAL UP (SEAL DEFORMS DOWNWARD-- AWAY FROM WRITING--DURING COMPRESSION).</p>
 <p>PRESSURE</p>	<p>APPLY LUBRICANT ADHESIVE TO SEAL AND BLOCKOUT FOR TWO OR THREE FEET AT A TIME. INSERT ONE BOTTOM CORNER OF SEAL INTO BLOCKOUT.</p>
 <p>PRESSURE</p>	<p>COMPRESS OTHER BOTTOM CORNER OF SEAL INTO BLOCKOUT. APPLY PRESSURE WITH BAR OR SIMILAR TOOL AT CENTER OF SEAL ONLY TO ACHIEVE COLLAPSE OF SEAL SO IT WILL SLIDE DOWN INTO BLOCKOUT.</p>
	<p>COMPLETED INSTALLATION. SEAL SHOULD BE RECESSED APPROX 3/16" BELOW FINISH GRADE. NOTE SEAL DOES NOT REST UPON SEATS!</p>



CDOT EXPANSION JOINTS

COMPRESSION SEALS



CDOT EXPANSION JOINTS

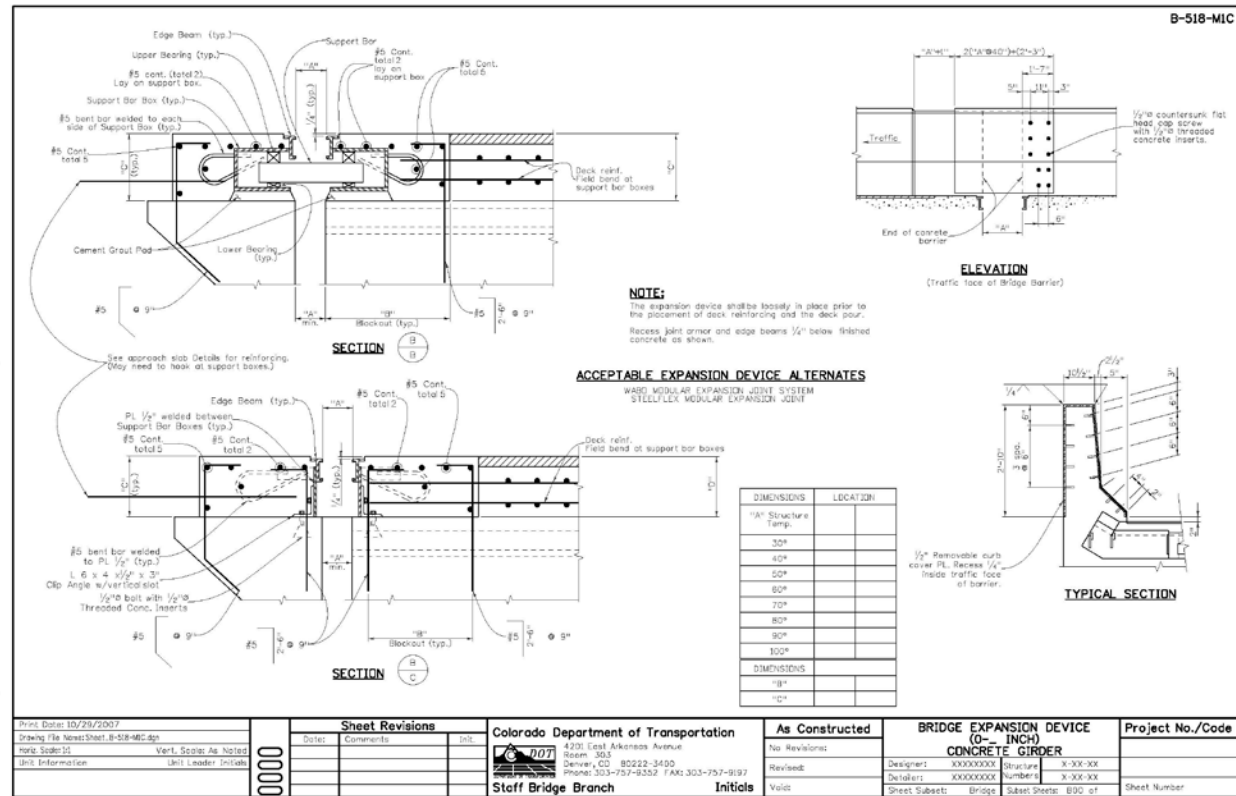
COMPRESSION SEALS

WHAT CAN GO WRONG-4:

- INCORRECT GAP WIDTH
- INCONSISTENT BLOCKOUT
- UPSIDE DOWN INSTALLATION
- SPALLED CONCRETE

CDOT EXPANSION JOINTS

MODULAR JOINTS



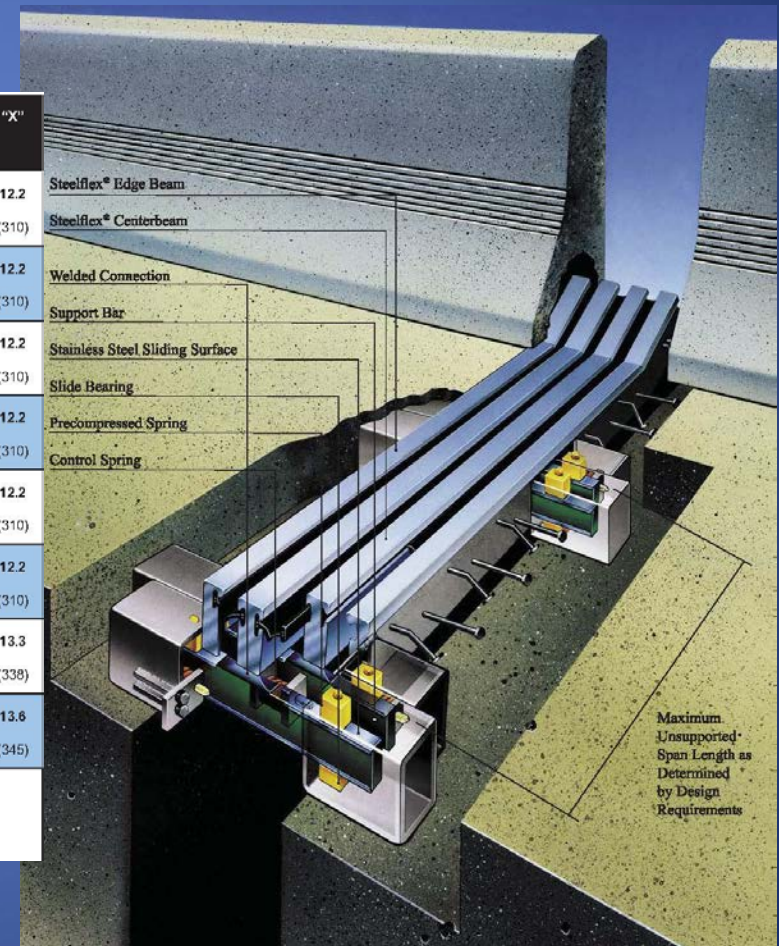
MANUFACTURER'S TECH REP REQUIRED!

CDOT EXPANSION JOINTS

MODULAR JOINTS

Joint Device Symbol	Model Number	Total Movement	Cells	"A" Blockout Depth	"B" Blockout Width	"C" Min.	"C" Max.	"W" Mid Temp	"X"
	D-160	6.30 (160)	2	14 (356)	15 (391)	3.35 (85)	5.71 (145)	8.17 (208)	12.2 (310)
	D-240	9.45 (240)	3	14 (356)	18 (457)	4.92 (125)	9.65 (245)	12.24 (311)	12.2 (310)
	D-320	12.60 (320)	4	14 (356)	22 (559)	6.50 (165)	13.78 (350)	16.32 (415)	12.2 (310)
	D-400	15.75 (400)	5	14 (356)	25 (635)	8.07 (205)	17.91 (455)	20.39 (519)	12.2 (310)
	D-480	18.90 (480)	6	14 (356)	28 (711)	9.65 (245)	21.85 (555)	24.47 (622)	12.2 (310)
	D-560	22.05 (560)	7	14 (356)	31 (787)	11.22 (285)	25.98 (660)	28.54 (725)	12.2 (310)
	D-640	25.20 (640)	8	15.25 (387)	34 (864)	12.80 (325)	30.12 (765)	32.62 (829)	13.3 (338)
	D-720	28.35 (720)	9	15.5 (394)	37 (940)	14.37 (365)	34.06 (865)	36.69 (932)	13.6 (345)

Dimensions are based on design provisions in NCHRP Report 402.
 Dimensions are based on 0 degree skew.
 Bold numbers represent inches; metric (mm) shown in parentheses.
 Shallower depths (X) may be possible upon special request.



CDOT EXPANSION JOINTS

MODULAR JOINTS



CDOT EXPANSION JOINTS

SUMMARY:

- **MANY ITEMS OUTSIDE OF BID ITEM HAVE A PROFOUND AFFECT UPON EXPANSION JOINT PERFORMANCE AND LONGEVITY!**
 - POOR EXISTING CONCRETE
 - REMOVAL TECHNIQUE MAY COMPROMISE EXISTING CONCRETE
 - POOR EXISTING REBAR
 - POOR APPROACH TO JOINT (SURVEY)
 - POOR CONCRETE CURE
 - IMPROPER GLAND INSTALLATION
 - CUTS, NICKS, BULGES
 - IMPROPER GAP (DIM "A")

CDOT EXPANSION JOINTS

Questions?