

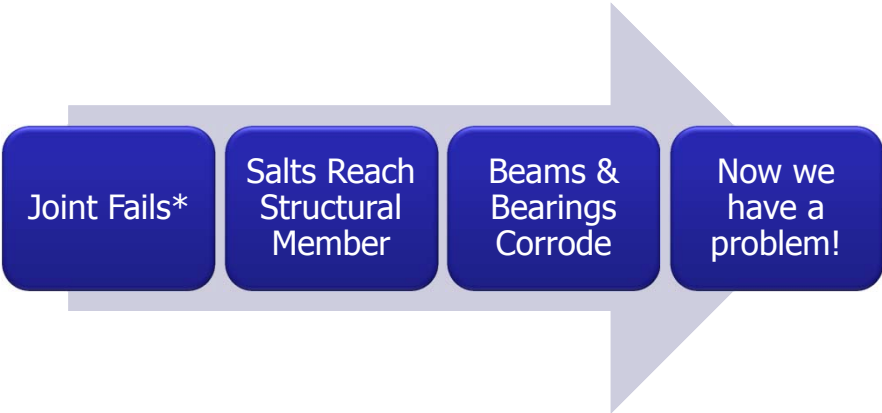
Structural Expansion Joints

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What's the big deal?





Joint Fails*

Salts Reach Structural Member

Beams & Bearings Corrode

Now we have a problem!

* Shortest Life Expectancy of all Bridge Components



Like this...



and this...



What's the plan?

- ✓ **Increase Maintenance Efforts**
 - ❑ **Expand Bridge Joint Tool Box**
 - ❑ **Provide Better Detailing**

- ✓ **Eliminate when possible!!**



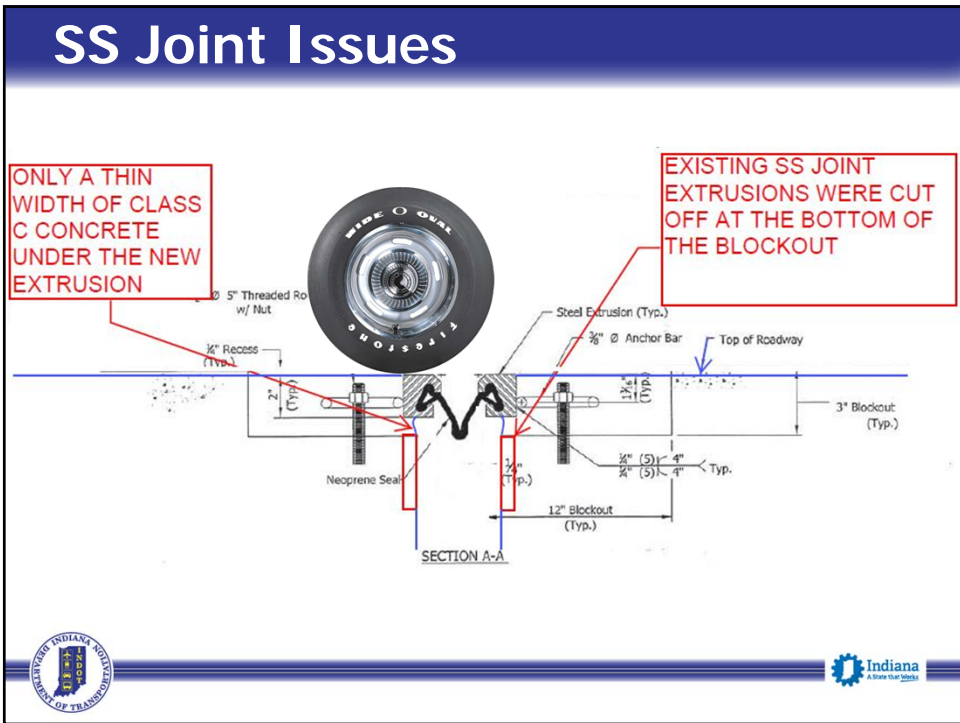
Existing Tool Box

- Expansion Joint M (Modular)**
 - Large Expansions
 - Not a lot of alternatives...

- Expansion Joint SS (Strip Seal)**
 - Fairly Dependable
 - Costly to Repair/Replace

- Expansion Joint Sealing Systems (Poured Silicone)**
 - Small Expansions
 - Installation Issues
 - Questionable Performance







Poured Silicone Issues

Opening Size at Installation

- Movement capacity reduced when installed at extreme temperatures

Skew Affects Material Width

- Large skews cause pours to be too wide

Quality Dependent on Installation

- Joint created in the field
- Movement capacity affected by shape/size of material



Poured Silicone Issues

Limitations

- Movement: +100/-50%
- Max. Opening = 3.25"
- Expansion Length < 75'
- Max. Depth: by Product

Source: Coastal Construction Products

Nosing Material Issues

Nosing Material **MUST** be placed on Horizontal Surface

Joint Sealant

Max 14"

3 1/2" min.

3 1/2" min.

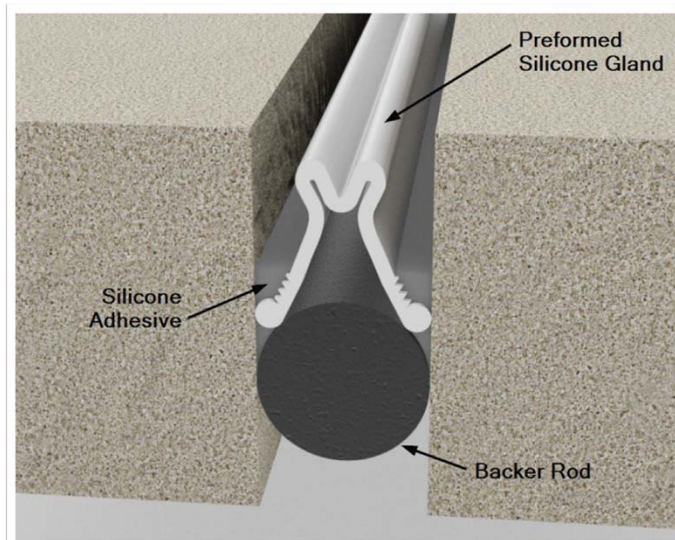
1 1/2" (Typ.)

Backer Rod

Add to the Tool Box...



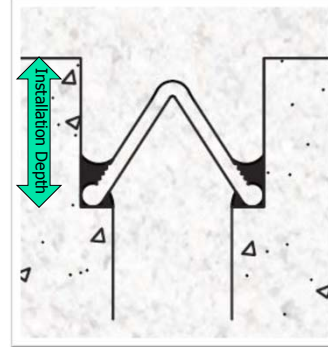
Preformed Silicone Joint



Preformed Silicone

- Expansion Lengths $\leq \pm 400'$
- Installation Width: 0.5" Min. to 5" Max.
- Provide in Plans:
 - Expansion Length
 - Existing Max. & Min. Joint Opening*
 - Note: "Minimum Installation Depth Per Manufacturer's Requirements"

*See Reference Slides and back calculate Minimum and Maximum Existing Opening



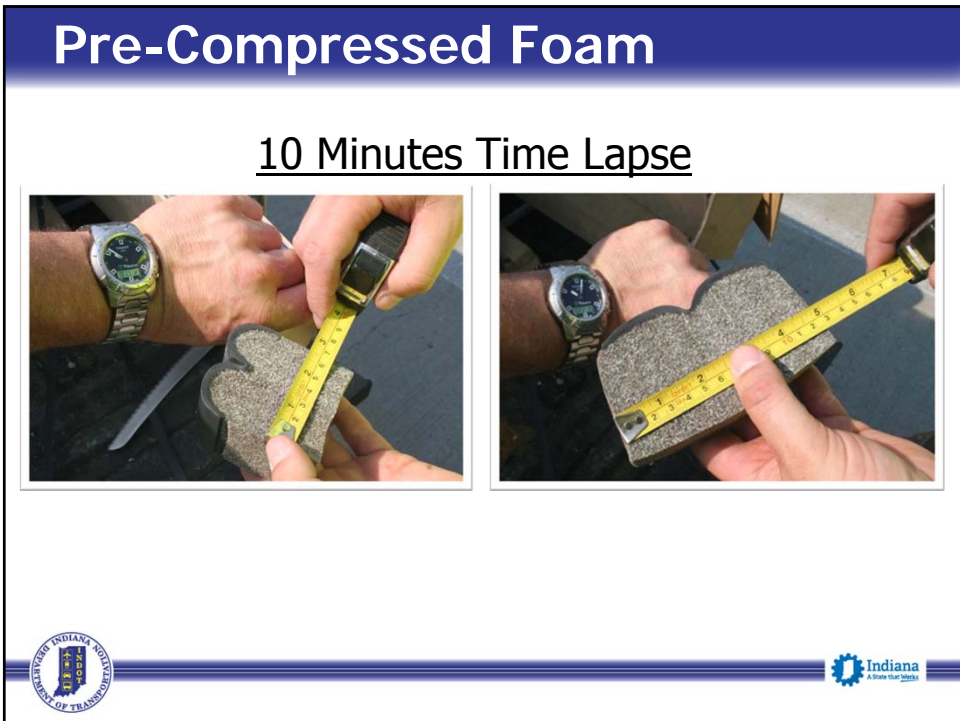
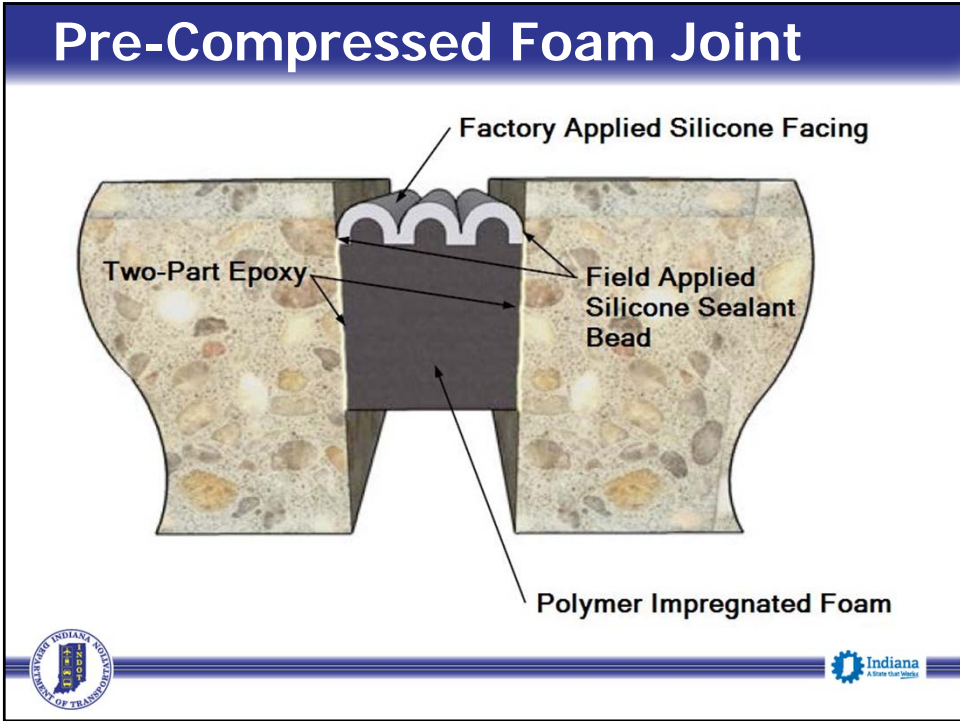
INDOT Preferred Installation
Resting on Ledge



Preformed Silicone

- Pay Item: 724-12157
- No Bid History....YET!
 - \$102-165/Lft (as different pay item)
- Unique Provision
- Suppliers
 - DS Brown: V-Seal
 - R.J. Watson: Silicoflex Joint Sealing System
 - Watson Bowman: Wabo SPS Preformed Silicone Joint Seal System
 - Silicone Specialties: SILSPEC Silicone Strip Seal
- Must provide patching or concrete reconstruction items when necessary





Pre-Compressed Foam

- Expansion Lengths $\leq 400'$
- 50% Contraction/50% Expansion
 - (from Width @ **Mean** Temperature)
- Provide in Plans:
 - Thermal Movement Range
 - Existing Opening at 60°*
 - Minimum Recess Below Grade
 - 1/2" min. for $\leq 1.25"$ wide seals
 - 3/4" min. for $\geq 1.5"$ wide seals

*See Reference Slides






Table Source: EMSEAL Tech Data Sheet

Nominal Material Size <small>(Joint Size at Mean T°F)</small>	Depth of Seal	Min. Joint <small>(closes to)</small>	Max. Joint <small>(opens to)</small>
<small>The following sizes are supplied in on 12-LF (3.65 M) reels. See BEJS-ON-A-REEL information sheet.</small>			
1/2" <small>(12mm)</small>	1 3/4" <small>(45mm)</small>	1/4" <small>(6mm)</small>	3/4" <small>(20mm)</small>
3/4" <small>(20mm)</small>	1-3/4" <small>(45mm)</small>	3/8" <small>(10mm)</small>	1-1/8" <small>(28mm)</small>
1" <small>(25mm)</small>	1 3/4" <small>(45mm)</small>	1/2" <small>(12mm)</small>	1-1/2" <small>(40mm)</small>
1-1/4" <small>(30mm)</small>	2" <small>(50mm)</small>	5/8" <small>(15mm)</small>	1-7/8" <small>(47mm)</small>
<small>The following sizes are supplied in shrink-wrapped sticks of 6.56 ft.(2M):</small>			
1-1/2" <small>(40mm)</small>	2 1/2" <small>(65mm)</small>	3/4" <small>(20mm)</small>	2-1/4" <small>(55mm)</small>
1-3/4" <small>(45mm)</small>	2-1/2" <small>(65mm)</small>	7/8" <small>(22mm)</small>	2-5/8" <small>(68mm)</small>
2" <small>(50mm)</small>	2-1/2" <small>(65mm)</small>	1" <small>(25mm)</small>	3" <small>(75mm)</small>
2-1/4" <small>(55mm)</small>	2-1/2" <small>(65mm)</small>	1-1/8" <small>(28mm)</small>	3-3/8" <small>(60mm)</small>
2-1/2" <small>(65mm)</small>	2-3/4" <small>(70mm)</small>	1-1/4" <small>(30mm)</small>	3-3/4" <small>(95mm)</small>
2-3/4" <small>(70mm)</small>	2-3/4" <small>(70mm)</small>	1-3/8" <small>(35mm)</small>	4-1/8" <small>(105mm)</small>
3" <small>(75mm)</small>	2-3/4" <small>(70mm)</small>	1-1/2" <small>(40mm)</small>	4-1/2" <small>(115mm)</small>
3-1/4" <small>(85mm)</small>	3-1/2" <small>(90mm)</small>	1-5/8" <small>(42mm)</small>	4-7/8" <small>(120mm)</small>
3-1/2" <small>(90mm)</small>	3-1/2" <small>(90mm)</small>	1-3/4" <small>(45mm)</small>	5-1/4" <small>(135mm)</small>
3-3/4" <small>(95mm)</small>	3-1/2" <small>(90mm)</small>	1-7/8" <small>(47mm)</small>	5-5/8" <small>(140mm)</small>
4" <small>(100mm)</small>	3-1/2" <small>(90mm)</small>	2" <small>(50mm)</small>	6" <small>(150mm)</small>

• For sizes not shown consult EMSEAL.
 • Select nominal material size to correspond to joint-gap size at mean temperature.

Pre-Compressed Foam

- Pay Item: 724-12103
- \$50-55/Lft (2 contracts as of Dec 16 Letting)
- Unique Provision
- Suppliers
 - EMSEAL: BEJS System
 - Watson Bowman: Wabo HSeal
 - LymTal International: Iso-Flex Precom H-SL
- Must provide patching or concrete reconstruction items when necessary

Comparison Summary		
Poured Silicone	Preformed Silicone	Precompressed Foam
<input type="checkbox"/> Expansion Lengths < 75'	<input type="checkbox"/> Exp. Length ≤ 400'	<input type="checkbox"/> Exp. Length ≤ 400'
<input type="checkbox"/> Movement +100%/-50%	<input type="checkbox"/> Movement Model Specific	<input type="checkbox"/> Movement +100%/-50%
<input type="checkbox"/> Max. Opening = 3.25"	<input type="checkbox"/> Max. Opening = 4½"	<input type="checkbox"/> Max. Opening = 6"
<input type="checkbox"/> Requires Conc. Or Nosing	<input type="checkbox"/> Can attach to SS Extrusion	<input type="checkbox"/> Can attach to SS Extrusion
<input type="checkbox"/> \$65-\$175/Lft	<input type="checkbox"/> \$100-\$165/Lft	<input type="checkbox"/> \$50-\$55/Lft
<input type="checkbox"/> Field Fabricated	<input type="checkbox"/> Single Piece Gland	<input type="checkbox"/> Field Spliced Sections
<input type="checkbox"/> 2-3 Year Life Expectancy	<input type="checkbox"/> Unknown Design Life	<input type="checkbox"/> Unknown Design Life
	<input checked="" type="checkbox"/> Better Choice @ ledge	<input checked="" type="checkbox"/> Better Choice @ extrusion

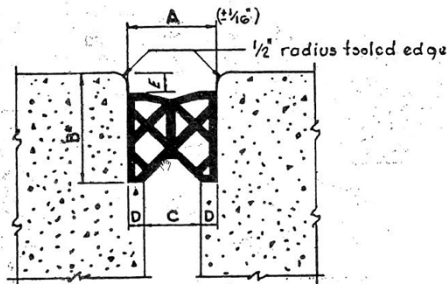
- ## Improved Plan Details
- Provide Expansion Length and Opening Size @ Mean Temperature
 - Require nosing be placed on horizontal surface
 - Mechanical Anchor Bolts for Concrete Patches without Exposed Rebar
 - Build or Reuse a Ledge when feasible

MOT Resources

- **Safety is Paramount**
 - Construction Worker
 - Traffic/Public
- **Truck Mounted Attenuator Provision**
 - On the Unique Provisions samples index
- **Work Zone Traffic Control Guidelines**
 - www.in.gov/indot/files/WorkZoneTCH.pdf
 - Must still be detailed in plans



Reference – Existing Opening



EXP. JOINT TYPE BS

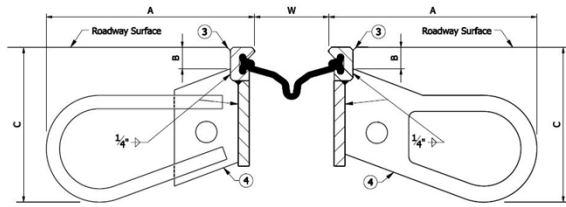
*To be determined in the field, see the Special Provisions.

Bridge Seal	A	B	C	D	E
BS 2	1"	*	0"	1/2"	1/2" (+1/4"-0)
BS 6	1 5/8"	*	7/8" ±	3/8"	1/2" (+1/4"-0)
BS 8	2"	*	1 1/4" ±	3/8"	1/2" (+1/4"-0)
BS 9	2 5/8"	*	1 5/8" ±	1/2"	3/4" (+1/4"-0)
BS 11	3 1/8"	*	2 1/8" ±	1/2"	3/4" (+1/4"-0)



Source: 1992 INDOT Standard Drawing

Reference – Existing Opening



INSTALLATION DETAIL

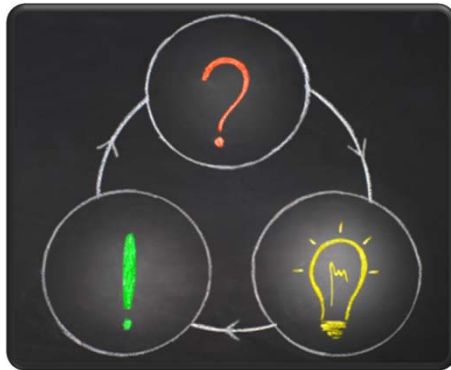
Source: Std. Dwg. 724-BSSJ-04

JOINT SETTING TABLE

Ambient Temperature °F	DIMENSION "W"		
	Expansion Length		
	100'-200'	200'-300'	300'-400'
120°	2 ¹ / ₈ "	1 ⁵ / ₁₆ "	1 ¹ / ₂ "
100°	2 ⁷ / ₈ "	1 ³ / ₄ "	1 ¹ / ₈ "
80°	2 ¹¹ / ₁₆ "	2 ³ / ₁₆ "	1 ¹¹ / ₁₆ "
60°	3"	2 ⁵ / ₈ "	2 ¹ / ₄ "
40°	3 ⁵ / ₁₆ "	3 ¹ / ₁₆ "	2 ¹³ / ₁₆ "
20°	3 ⁹ / ₁₆ "	3 ¹ / ₂ "	3 ³ / ₈ "
0°	3 ⁷ / ₈ "	3 ⁵ / ₁₆ "	4"



Questions/Thoughts/Concerns



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