Expansion Joint Gland Replacement and Pressure Relief Joints

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MDOT
Michigan Department of Transportation

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BRIDGE FIELD SERVICES

Expansion Joint Gland Replacement

Expansion Joint Gland Replacement

- Why?
- Gland Replacement can be performed by agency, contract agency, or by a contractor
- Special Provision for Replacing Bridge Expansion Joint Neoprene Gland
- Removal and Installation of the Gland

Gland Replacement

- An entire expansion joint may not require replacement if adjacent concrete is sound, rail is intact, and deck grades remain unchanged

MICHIGAN
DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION
FOR
REPLACING BRIDGE EXPANSION JOINT NEOPRENE GLAND

DES:AM 1 of 1 C&T:APPR:JFS:EMB:03-14-06

a. Description. This work includes all the materials, equipment and labor required for removing and replacing existing neoprene glands in bridge expansion joint devices as shown on the plans.

b. Materials. The neoprene gland will be supplied by the Department.

c. Construction. Removal of the existing neoprene glands shall be performed by hand tools or other means that will not damage the existing device, as approved by the Engineer. Care shall be taken not to damage the existing steel anchorage or the joint plates. Damage to the existing joint device shall be repaired at the Contractor's expense.

The Contractor shall install the neoprene gland in accordance with the manufacturer's shop drawings and recommendations. The neoprene gland shall be installed in one continuous piece across the deck, including barriers and sidewalks if applicable, and as shown in the plans, unless otherwise approved by the Engineer. Prior to the installation of the neoprene gland, the remaining portions of the expansion joint device shall be free of all dirt, oil, standing water, or foreign matter that could be detrimental to the sealing capability of the neoprene gland. Use compressed air to blow away any remaining debris. Where the new neoprene gland is to be locked into a milled or extruded steel rail, a lubricant-adhesive conforming to subsection 914.04D of the Standard Specifications for Construction shall be used. The area of steel rail and the neoprene gland which will be in contact with each other shall be cleaned with toluene or other approved solvent prior to installing the neoprene gland.

d. Measurement and Payment. The completed work as described will be measured and paid for at the contract unit price for the following contract item (pay item):

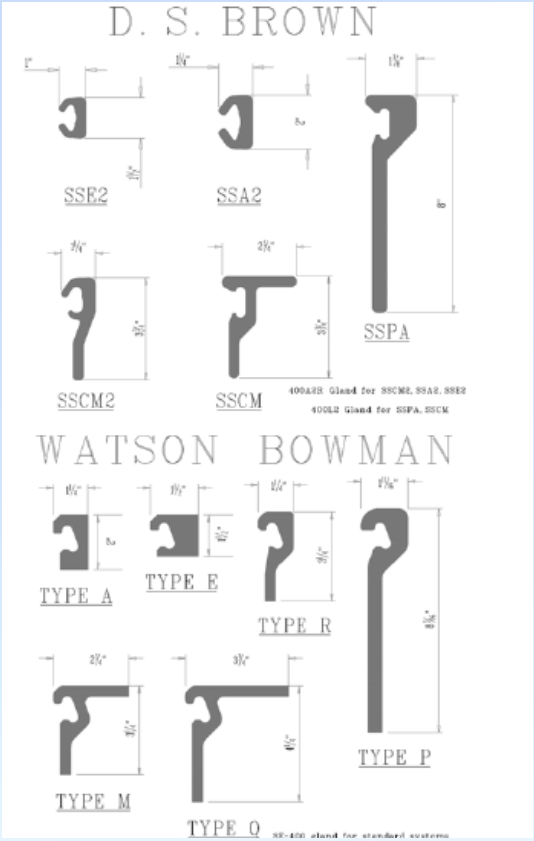
Contract Item (Pay Item)	**Pay Unit**
Expansion Joint Device Neoprene Gland, Remove and Replace	Foot

Expansion Joint Device Neoprene Gland, Remove and Replace will be measured and paid for at the contract unit price for each foot of seal removed and replaced. Removal and replacement of the expansion joint device neoprene gland includes all materials, equipment and labor to remove the existing gland, clean the joint device and installation of the new neoprene gland. This work does not include the payment for the new neoprene gland.

Expansion Joint Gland

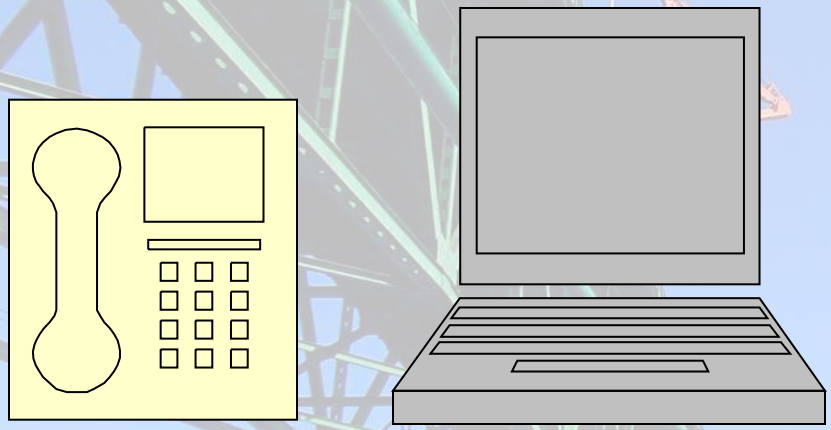
Step 1 – Ensure Rail is Secure

Step 2 - Determine Joint Profile



Expansion Joint Gland

Step 3 – Order Gland and Lubricant



Step 4 - Determine Replacement Limits

Expansion Joint Gland

Step 5 – Cut Down Center

Step 6- Remove from Rail

Expansion Joint Gland

Step 7- Clean the Channels

Step 8 – Unroll and Lubricate the Gland

Expansion Joint Gland

Step 9 – Install Gland

- Install the gland in one continuous piece (if possible)

Expansion Joint Gland

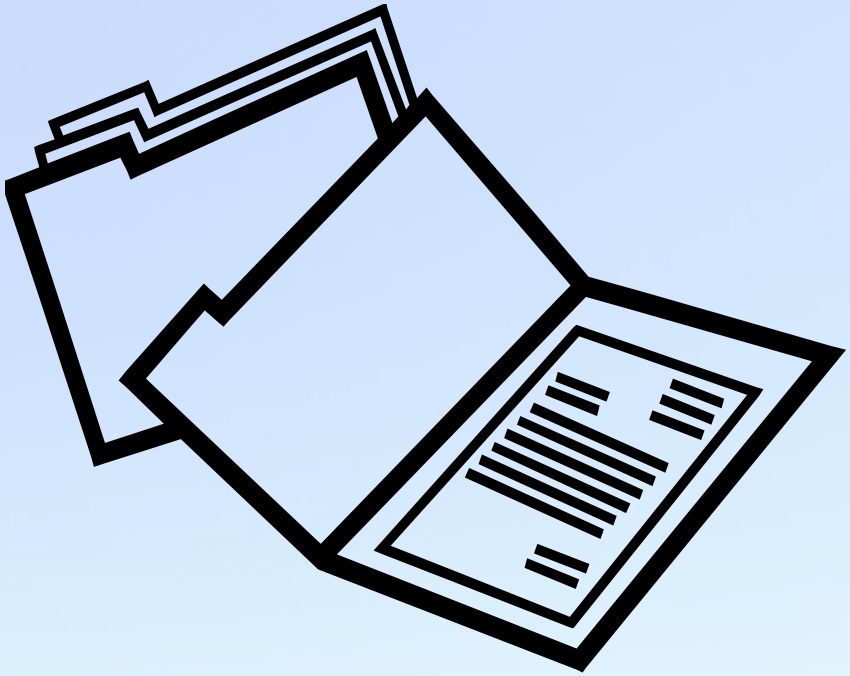
Installation Tool

Installation Tool - Tire Spoon

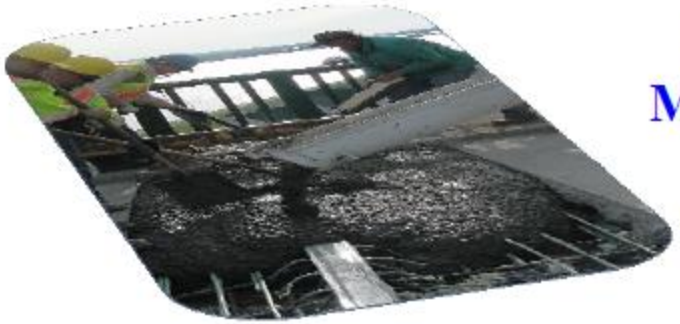
Expansion Joint Gland

Step 10 – Splice

- If the gland is not continuous and requires splicing, see Product Data Sheet and follow manufacturers approved methods for gland splicing.



Reference – MDOT Structure Maintenance Bulletin – January 2012



Structure Maintenance Bulletin

January 2012

Replacing Strip Seal Glands

Improper installation, environmental deterioration, or neglected debris removal are factors that contribute to strip seal gland failures. Replacing a gland requires effort, and doing it correctly the first time is imperative. Correctly matching the style of gland to be purchased to the existing steel armor will reduce repeated trips, sore backs, and money. The majority of strip seal expansion joint systems in use today are manufactured by DS Brown and Watson Bowman. The profiles of each manufacturer appear similar, but close examination is required to determine the gland to be inserted.

STEP 1. Ensure Rail Is Secure

Pressure Relief Joints

Pressure Relief Joints

- Why Install?
- Details
- Special Provision
- Installation

Why Install Pressure Relief Joints?

- Damaged Railing
- Abutment Delamination and Spalling
- Temporary Supports and Slope Paving Washouts
- Damaged and Offset Bridge Barrier
- Closed Pin and Hangers During Cold Weather
- Tilted Rockers
- Buckling Beams
- Approach Settlement

Pressure

- Pressure exerted by a typical 9” concrete approach slab.
- 432,000 lbs/ft

Damaged Railing

Abutment Delamination and Spalling

Temporary Supports

Slope Paving Washout

Damaged and Offset Bridge Barrier

Closed Pin and Hangers During Cold Weather

Tilted Rockers

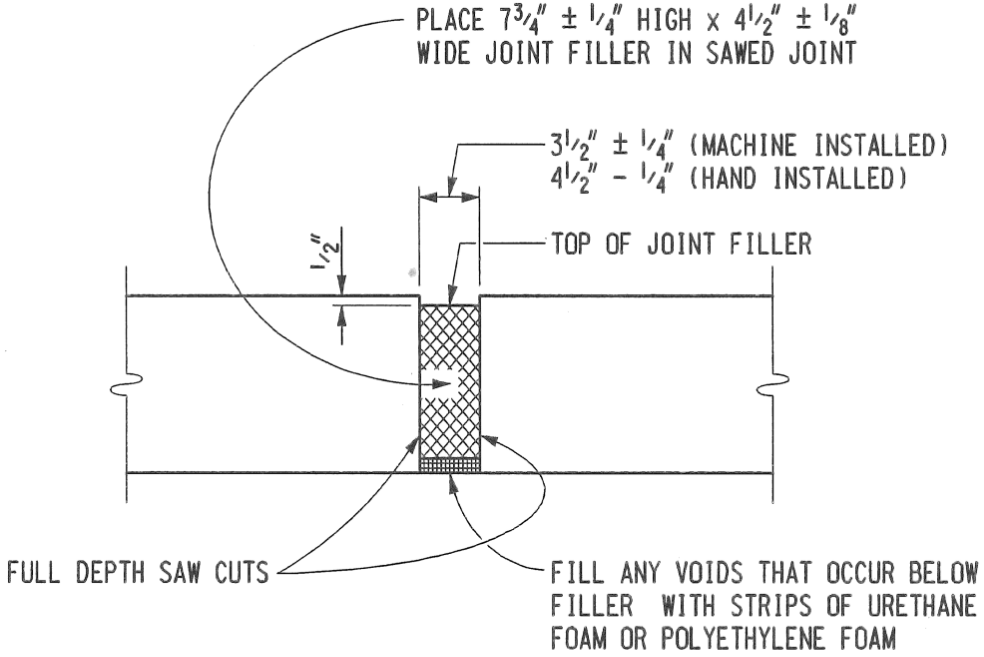
Buckled Beams

Approach Settlement

Pressure Relief Joint

- Michigan DOT Standard Plan
  - Concrete Pavement Repair (R-44-F) sheet 6 of 6
- Approach Pavement Joints
- MDOT White Paper
  - Alleviating the Effects of Pavement Growth on Structures

Pressure Relief Joint



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

MICHIGAN
DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION
FOR
APPROACH PAVEMENT JOINTS

DES:JAG 1 of 1 C&T:APPR:JFS:MJE:09-21-05

a. Description. The purpose of this work is to provide pressure relief joints in the concrete pavement at the bridge approach. Perform this work in accordance with the Sections 602 and 603 of the Standard Specifications for Construction except as modified herein.

b. Materials. Joint filler shall be cellular polyurethane designed for pressure relief joints in concrete pavements and conform to the requirements of ASTM D 3204, and exhibit the following typical properties:

Average Density	7 - 10 pounds per cubic foot
Weight per foot	1.625 - 2.0 pounds
Compressive Strength, psi, ASTM D3574 And ASTM D 1056	
At 25% deflection	5 ± 2
At 65% deflection	12 ± 4
Recovery, %min, ASTM D2406	90
Water Absorption, AASHTO T-42	30% void Max

Materials supplied shall be new Tamms Flex Lok® or approved equal.

c. Construction. Extend saw cut through the underlying Portland cement concrete as shown on the plans. Construct all relief joints to the limits and dimensions shown on the plans and installation requirements of the joint filler manufacturer as approved by the Engineer.

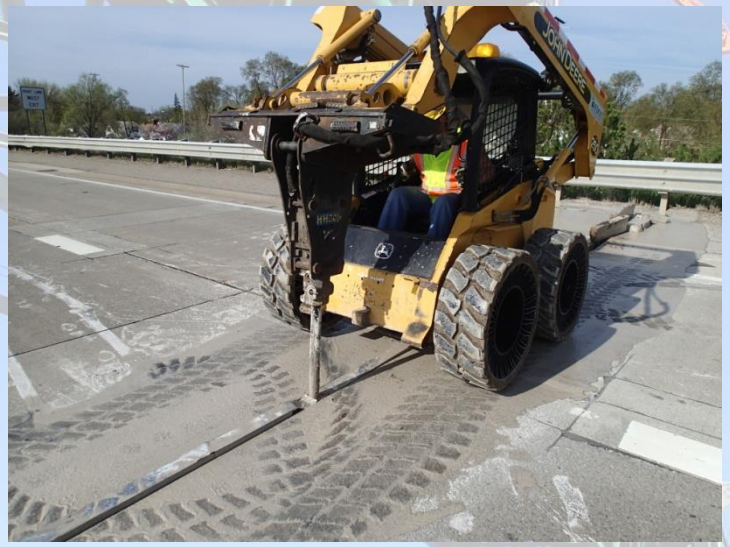
d. Measurement and Payment. The completed work as described will be paid for at the contract unit price for the following contract item (pay item):

Contract Item (Pay Item)	**Pay Unit**
Joint, Pressure Relief, 4 inch	Foot

Payment for **Approach Pavement Joints** includes all materials, equipment, and labor necessary to complete the work according to this special provision. The length of **Approach Pavement Joints** will be measured and paid for in linear feet.

Pressure Relief Joint- Saw cutting

Pressure Relief Joint – Pavement Removal

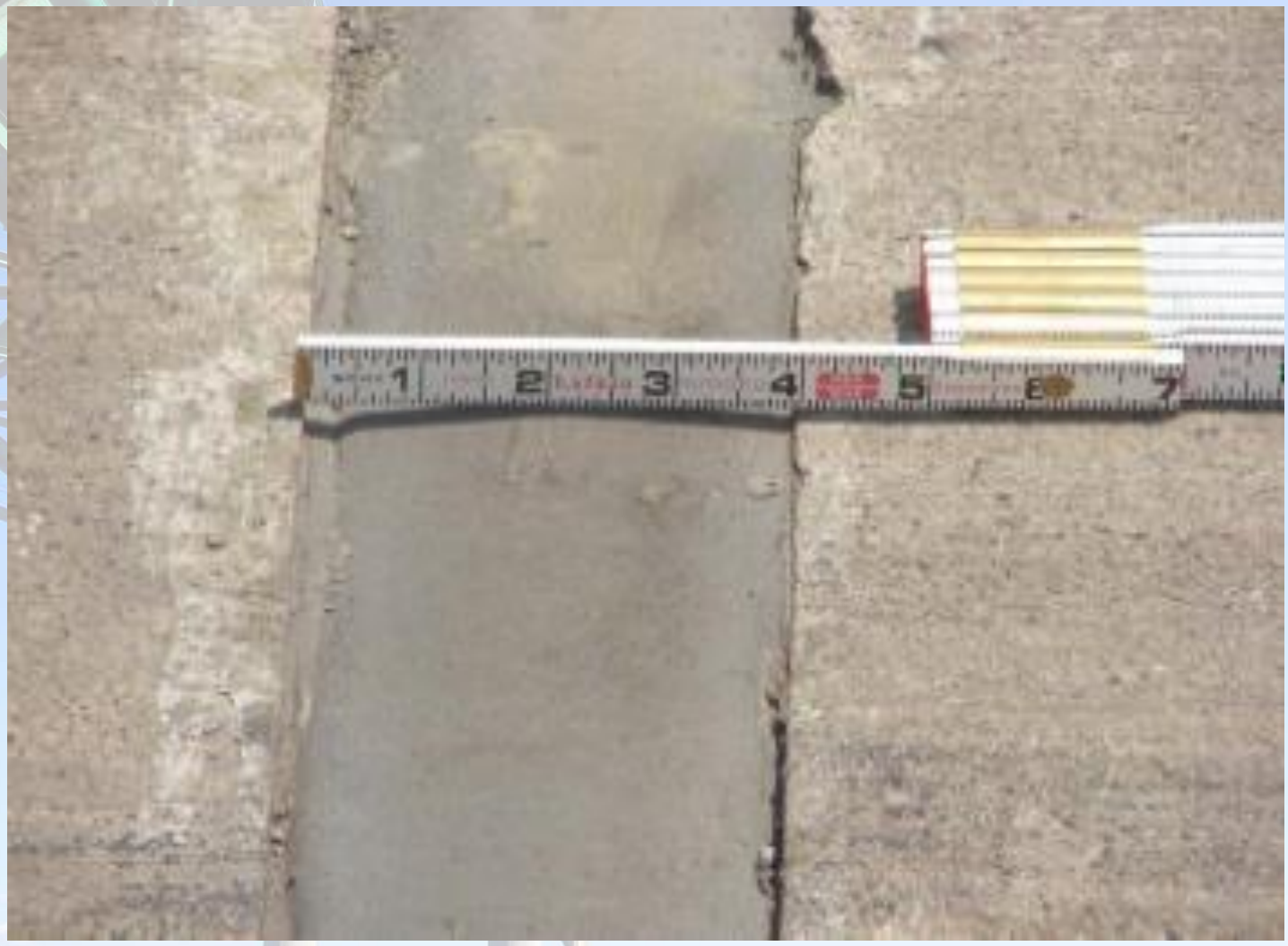


Pressure Relief Joint – Sand Blasting

Pressure Relief Joint – Installation

Pressure Relief Joint- Installation Trouble

Pressure Relief Joint – Installed 4” Opening



Pressure Relief Joint - Monitoring

Pressure Relief Joint Installation

- MDOT Maintenance Crews installed over 1980 lineal feet (lft) of Pressure Relief Joints at 19 Structures in 2013.
- MDOT Bridge Construction Repair Project on the I-96 Corridor to be let in 2014 has over 3100 lft of Pressure Relief Joint to be installed.

Thanks

- Thanks to Corey Rogers, Andrew Bouvy, Paul Schiefer and Jason DeRuyver for the Photos

Reference

Region Bridge Support Unit
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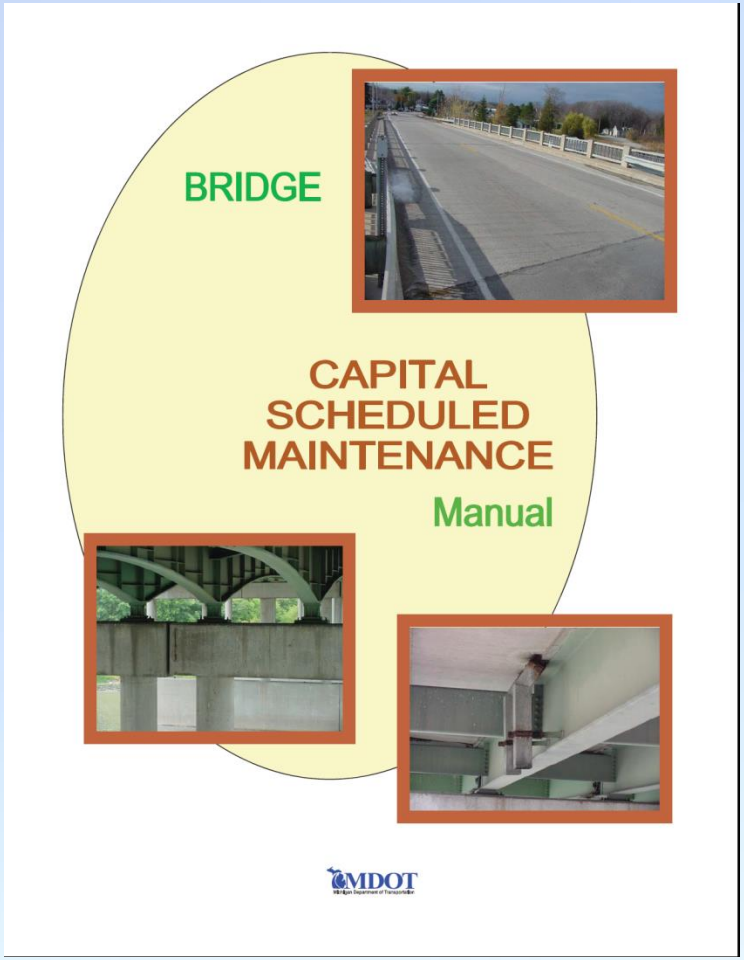
Alleviating the Effects of Pavement Growth on Structures

January 2012



Questions?

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