Expansion Joints
Learning Objectives

• What are Expansion Joints?
• Where are they?
• What do they look like?
• What they do and how to maintain them
Expansion Joints are...

A mechanical device in a bridge deck designed solely for the purpose of making a Bridge maintenance workers life miserable.
Expansion Joints, What are they?

Bridge expansion joints are a mechanical device installed in a bridge to allow for continuous traffic between structures while allowing for expansion and contraction due to temperature changes, deflections caused by live loads, and longitudinal forces caused by vehicular traffic.
Expansion Joints, What are they?
Common Header Failures
Header in need of repair
Repairing Joint Headers
Repairing a Joint Header with Concrete, or Elastomeric Concrete
Repairing Headers

1. Remove existing header using 60lb jackhammer
2. Mark and saw cut clean edge
3. Clean block out
4. Form the joint
Preparation to Replace the Header Video
If Using Elastomeric

1. Coat substrate with primer
2. Place polymer concrete header and allow to cure in accordance with manufacturer’s recommendations
3. Seal header
If Using Concrete

1. Use an approved concrete from the QPL, (Qualified Products List).

2. Match concrete surface to deck grade
Anatomy of a Joint

Joint Bars - Extruded
Anatomy of a Joint

Joint Bars – Armored Corner
Anatomy of a Joint

Joint Bars - Modular
Anatomy of a Joint

Joint bars-Modular
Anatomy of a Joint

Seal Material – Poured Seal
Poured Seal

- Allows small movement, up to 1\(\frac{1}{2}\)"
- Easily repaired by removing the damaged, cleaning and re-pouring the seal.
Replacing Poured Seals

• Hot poured sealants
• Cold poured sealants
Pourable Sealant Installation

1. Remove old sealants and debris from joint
2. Sandblast the joint surfaces
3. Inspect the joint surfaces to assure complete removal
4. Install backer rod
5. Pour sealant over the backer rod
6. Allow sealant to cure
Failing Poured Joint Seal
Poured Seal
Anatomy of a Joint

Seal Material – Compression Seal
Anatomy of a Joint

Seal Material – Compression Seal
Compression Joint Seal

- Relies on compression to maintain watertightness
- Is inserted into the joint using lubricants which may also serve as adhesives
Compression Joint Seal
Compression Joint Seal
Compression Joint Seal
Replacing Foam Compression Seal Video
Asphaltic Plug Joint

• Generally used when Asphalt Concrete Wearing Surface (ACWS) is applied.
• Can accommodate movement up to 2 1/2”
Good Plug Joint
Failing Plug Joint
Failing Plug Joint
Failing Plug Joint
Replacing Asphaltic Plug Joints

1. Saw-cut and remove the wearing surface
2. Clean and dry block out, and repair concrete
3. Place backer rod
4. Flood joint with heated binder material
5. Install bridging plate, place binder
6. Coat aggregate
7. Place coated aggregate in block out
8. Heat binder, flood block out
9. Repeat until block out is filled
10. Place anti-tracking material
Replacing Asphaltic Plug Joints
Replacing Asphaltic Plug Joints
Replacing Asphalting Plug Joints
Plug Joint Details

Greater than 2”
Replacing Asphaltic Plug Joints Video
Plug Joint Maintenance

- Seal adhesion
- Seal damage
- Seal cracking
Strip Seal
Extruded steel bars with seal
Strip Seal

SECTION A-A
WATSON-BOWMAN-ACME
TYPE "A2"
WITH S-400 GLAND
USED 1974 - 1990
IN 540 BRIDGES

LEWIS ENGINEERING COMPANY
LENCO TYPE "W"
WITH L-400 GLAND
USED 1978 - 1995
IN 785 BRIDGES

D.S. BROWN "SS"
WITH A-400 GLAND
USED 1980 - 1988
IN 243 BRIDGES

D.S. BROWN "RS3"
WITH A-400 GLAND
USED 1987 - 1989
IN 66 BRIDGES

D.S. BROWN TYPE "SSA"
WITH 400L GLAND
USED 1989 - 1995
IN 163 BRIDGES

WATSON-BOWMAN-ACME
TYPE "A3" WITH
SE-400 GLAND
USED 1989 - PRESENT
IN 44 BRIDGES
COMMERCIAL FABRICATORS INC.
TYPE "CF/ACME A3" WITH
AS-400 GLAND

USED 1996 - 1994 IN 162 BRIDGES
(ACME "A" IDENTICAL - USED IN 45 BRIDGES)

D.S. BROWN "SSA2"
WITH 400A2R" GLAND

USED 1993 - PRESENT

D.S. BROWN
STEELFLEX MODULAR
EXPANSION JOINT SYSTEM
WITH 1.2-400 GLAND
Strip Seal Damage
Failed Strip seal
Replacing Strip Seals
Strip Seal Gland Pull Outs, Rips and Tears

Repair Materials and Procedures
Strip Seal Replacement
Modular Expansion Joint
Watson Bowman Modular Device

**Design Features**

- Large movement system for use on heavy traffic conditions
- 30 year history of success
- Rugged design mechanically locks all seal profiles for water tightness
- Recommended for new installations and retrofit projects
- Engineered for durability and versatility
- Neoprene box seal provides double layer protection

**System Dimension Table**

<table>
<thead>
<tr>
<th>Model Number</th>
<th>Min. Movement</th>
<th>Nom.</th>
<th>Max.</th>
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<tbody>
<tr>
<td>D900</td>
<td>0.000</td>
<td>5.000</td>
<td>10.250</td>
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Contact your WBA Representative with your specific design requirements.
Modular Joint
Finger Joints
Common Expansion Joint Defects

• Impact Damage
• Leakage
• Seal Adhesion
• Seal Damage
• Seal Cracking
• Debris Impaction
• Adjacent Deck or Header
• Metal Deterioration or Damage
Leakage
Locating & Controlling Moisture Threats
Common Maintenance Techniques

- Washing to remove debris
- Cleaning out drainage systems
- Replacing seals
Condition of Seal: What to Look For

• Seal adhesion
• Seal damage
• Seal cracking
Thank you