It is said, the great legendary coach, Vince Lombardi - at the very beginning of every season gathered up all his players – and said…..

“This is a Football.”

He was stressing – FUNDAMENTALS.
Bridge Joint Locations

This is a Bridge Joint

Abutment Side

Bridge Side
Bridge Expansion Joints Locations

Bridge Joint

Pier
Supporting Spans
Bridge Expansion Joint Locations

Crappy Old Bridge, Being torn down.

This Joint is located at An Abutment.

Fancy New Bridge
Both these joints are located at abutments.

Another Bridge Joint, way down here.
Life Spans

Bridge = 75 to 100 Years

Bridge Joints = 15 to 25 Years
# Types of Expansion Joints

<table>
<thead>
<tr>
<th>Types</th>
<th>Movement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compression Seal</td>
<td>Smallest amount of movement.</td>
</tr>
<tr>
<td>Gland Seal</td>
<td>Medium movement.</td>
</tr>
<tr>
<td>Finger Joint</td>
<td>Large movement.</td>
</tr>
<tr>
<td>Pour In Place Seal</td>
<td>Small movement.</td>
</tr>
<tr>
<td>Slab Over Backwall</td>
<td>Small movement.</td>
</tr>
<tr>
<td>Modular Joints</td>
<td>Very large movement.</td>
</tr>
</tbody>
</table>

The Big 3

- Compression Seal
- Gland Seal
- Modular Joints
Types of Expansion Joints

Finger Joint

5” +/-

Compression Seal

1” +/-
Types of Expansion Joints

Gland Seal

2 ½ “ +/-

View from underneath
Components Of An Expansion Joint

- Header or Nosing
- Steel Armor
- Neoprene Seal, Either Compression Or Gland.
Components Of An Expansion Joint

Finger Joint

There is no seal on A Finger Joint.

Sometimes NO Header or Nosing.
There is no neoprene seal on a finger joint.

But there is an neoprene or curtain underneath it.
Here is a curtain protecting a bearing beneath the Finger Joint.

Drainage from the roadway is expected to fall through.
Here is a combination curtain-trough protecting the bearing area.

Drainage from the Roadway is expected to fall through.
Compression & Gland Seals are expected to keep water on the bridge.

These type of joints make use of the Bridge Drains on the bridge deck.
In this case, the joint is a Compression Seal. A Gland Seal is similar.
Pour In Place Seals
Used often when steel joint is uneven across the roadway.

We also use –
The Hot Rubber Machine!

1½” +/-
The best joint is NO JOINT. Slab over backwall design.

Normally the joint would be here

Minimal Movement
Modular Expansion Joints – very few.

Series of Rails & Seals.
Summary of Joint Types

• Compression Seal
• Gland Seal
• Finger Joint
• Pour In Place Joint (\& Hot Rubber)
• Elimination of joint entirely – by placing concrete slab over the backwall.
• Modular Joint
Why Are Expansion Joints There?

- Allow Bridge to expand and contract with temperature changes.
- Protect Bearings that are holding up bridge span.
- Protect Steel & Concrete Structures underneath that are holding up the bridge.

View underneath Max Wilder Bridge showing result of leaky joint seal.

Bridge Preservation!
Bridge spans move with temperature.

Cold

Bridge gets shorter.

Therefore, the Joint gets bigger.

Hot

Bridge gets longer.

Therefore, the Joint gets smaller

Expansion Joints allow this to happen under control.
On an incredibly hot day, would expect the gap to be large, or small?
Bridge Preservation

Bad things happen without proper Bridge Joint performance.
Damaged Bearings Caused By Drainage Through Failing Joint
Joint Leakage Leads to Steel Deterioration

Sandy River
Deteriorated Steel Superstructure Caused by Leaky or Missing Joint Seals

Martin’s Point Bridge, Portland-Falmouth
Damaged Bearings Joint Drainage

Stillwater Bridge, Old Town
Steel Superstructure Deterioration – Through Joint Leakage

Big Holes, Repair Needed.

High Bridge, Rumford
Concrete Substructures Deteriorate From Joint Leakage
Serious Pier Deterioration

What likely was the cause?

Stockton Springs
Pier Deterioration From Joint Leakage

Compression Seal Joint

Stockton Springs
Transportation Worker Involvement

Most of the Time

- Wash Neoprene & Rubber Seals.
- Wash Curtain & Troughs – Finger Joint.
- Replacing Seals – Compression & Gland.
- Removing and Replacing Headers or Nosings. Usually an EMERGENCY.
Transportation Worker Involvement

Occasionally

• Installing a Pour In Place Seal.

• Replacing or Adding Curtains & Troughs.

• Advanced Repairs – Replacing Entire Joints or Modifying Steel of a Joint.
Washing is needed to clean out seals.

Rails or steel armor

Debris

Neoprene Seal

Our Goal is Wash the bridge once per year.
Gland Seal Replacement
Combination Lubricant/Adhesive

Starts out a lubricant, ends up an adhesive. No smoke break.
Joint Problems
Unidentified Bridge & Tukey’s Bridge, Portland

Closed Up

Missing Steel
Expansion Joint Problems

Seal Falling Out

Header Peeling Up
Emergency Header Repair on Frank J. Wood Bridge
Donny McKenna in action.

Max Wilder Bridge, Arrowsic
Removal of Header or Nosing

Max Wilder
Bridge

BTW - This existing material is steel.

Exposed Rebar in this case

Max Wilder Bridge
09/09/2011
Replacement of Header (Nosing)

In this case, Rapid Set DOT Repair Mix.

Max Wilder Bridge
09/09/2011
<table>
<thead>
<tr>
<th>New Capital Projects</th>
<th>Bridge Maintenance Repair</th>
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<tbody>
<tr>
<td>WaboCrete II</td>
<td>Silspec 900</td>
</tr>
<tr>
<td>Delcrete</td>
<td>Rapid Set DOT Repair Mix</td>
</tr>
<tr>
<td>E-Crete No. 57</td>
<td>P430 by EMACO</td>
</tr>
<tr>
<td>Ply-Krete FS</td>
<td>Dragon – 4hr Concrete Mix</td>
</tr>
<tr>
<td></td>
<td>Etc.</td>
</tr>
</tbody>
</table>

“At M & O - we like to experiment & we have to move fast.”
Pour In Place Seals
Used often when steel joint is uneven across the roadway.

2-Component Silicone Rubber Sealant
Advanced Repairs

MDOT Bridge Program Contracts Out A Portion.

MDOT M & O Accomplishes A Portion.

Field Modifications of Steel

New Armored Expansion Device
DOT Crew converts expansion joint to Slab-Over-Backwall. No Joint.

Joint along here has been removed.
Rehabilitation – New Header
Material & Modified Armor

Elastomeric Concrete
Modified Steel Armor
Tukey’s Bridge, Portland
Rehabilitation of Existing Joint Armor

Headers removed & will be replaced

Steel has been welded on to existing armor
Curb & Sidewalk Treatment Varies

Nothing is ever easy.
Test

- Multiple Guess or True or False
- 15 Questions.