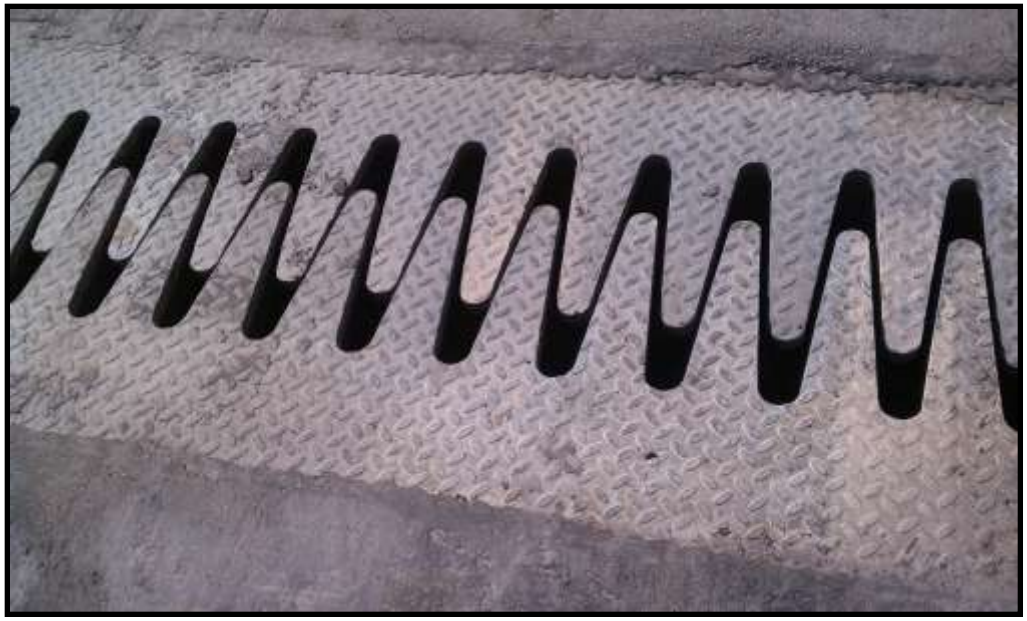
Introduction
To
Bridge Joints



Part of The Bridge College Presentations

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

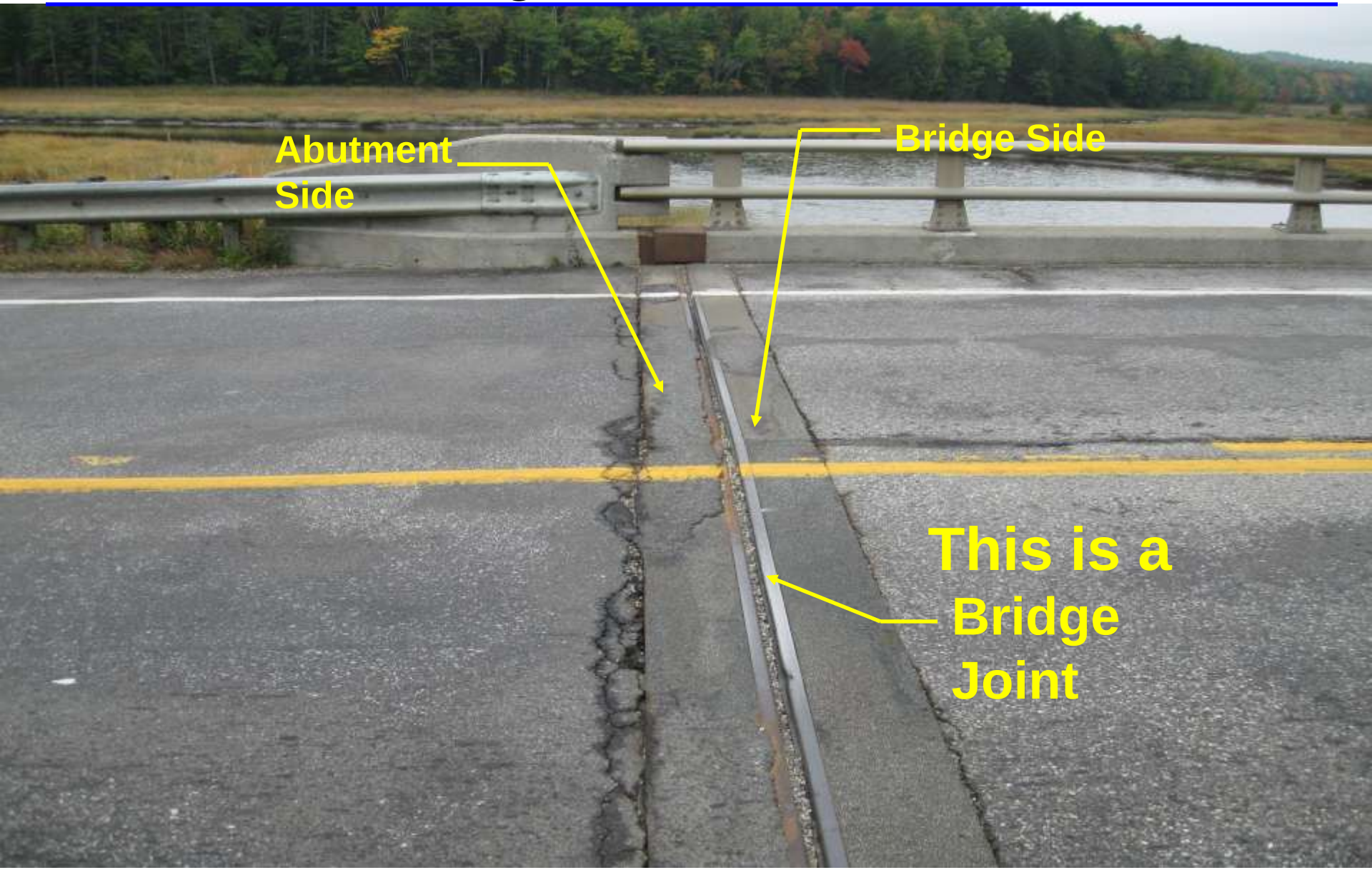
and said…..

"This is a Football."

He was stressing –

FUNDAMENTALS.

Bridge Joint Locations



Bridge Expansion Joints Locations

Bridge Expansion Joint Locations

Bridge Joint Locations

Life Spans

Bridge = 75 to 100 Years

Bridge Joints = 15 to 25 Years

Types of Expansion Joints

- **Compression Seal** — Smallest amount of movement.
- **Gland Seal** — Medium movement.
- **Finger Joint** — Large movement.

The Big 3

- **Pour In Place Seal** — Small movement.
- **Slab Over Backwall** — Small movement.
- **Modular Joints** — Very large movement.

Types of Expansion Joints

Finger Joint

5” +/-

Compression Seal

1” +/-

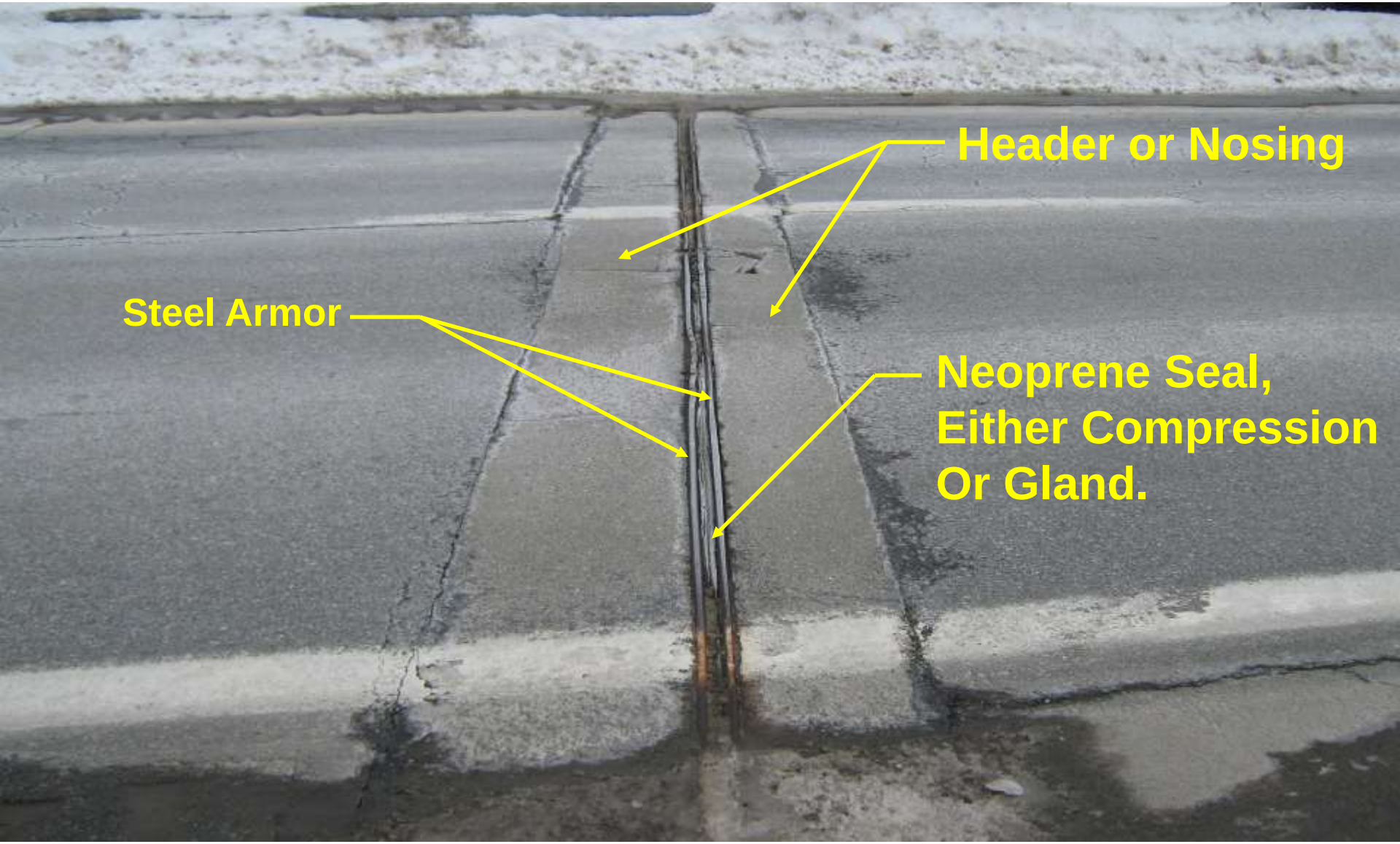
Types of Expansion Joints

Gland Seal

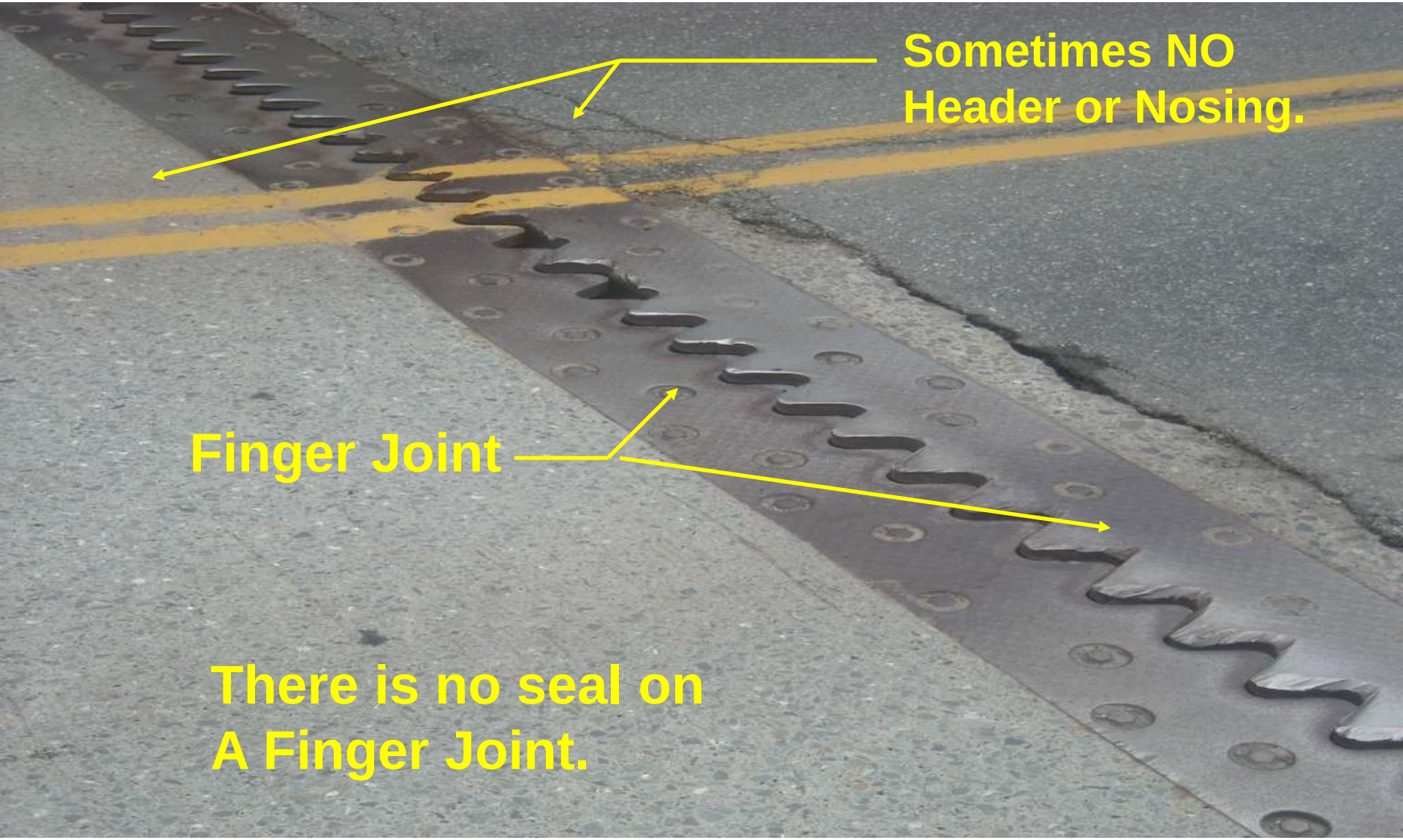
2 ½ “ +/-

View from underneath

Components Of An Expansion Joint



Components Of An Expansion Joint




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.

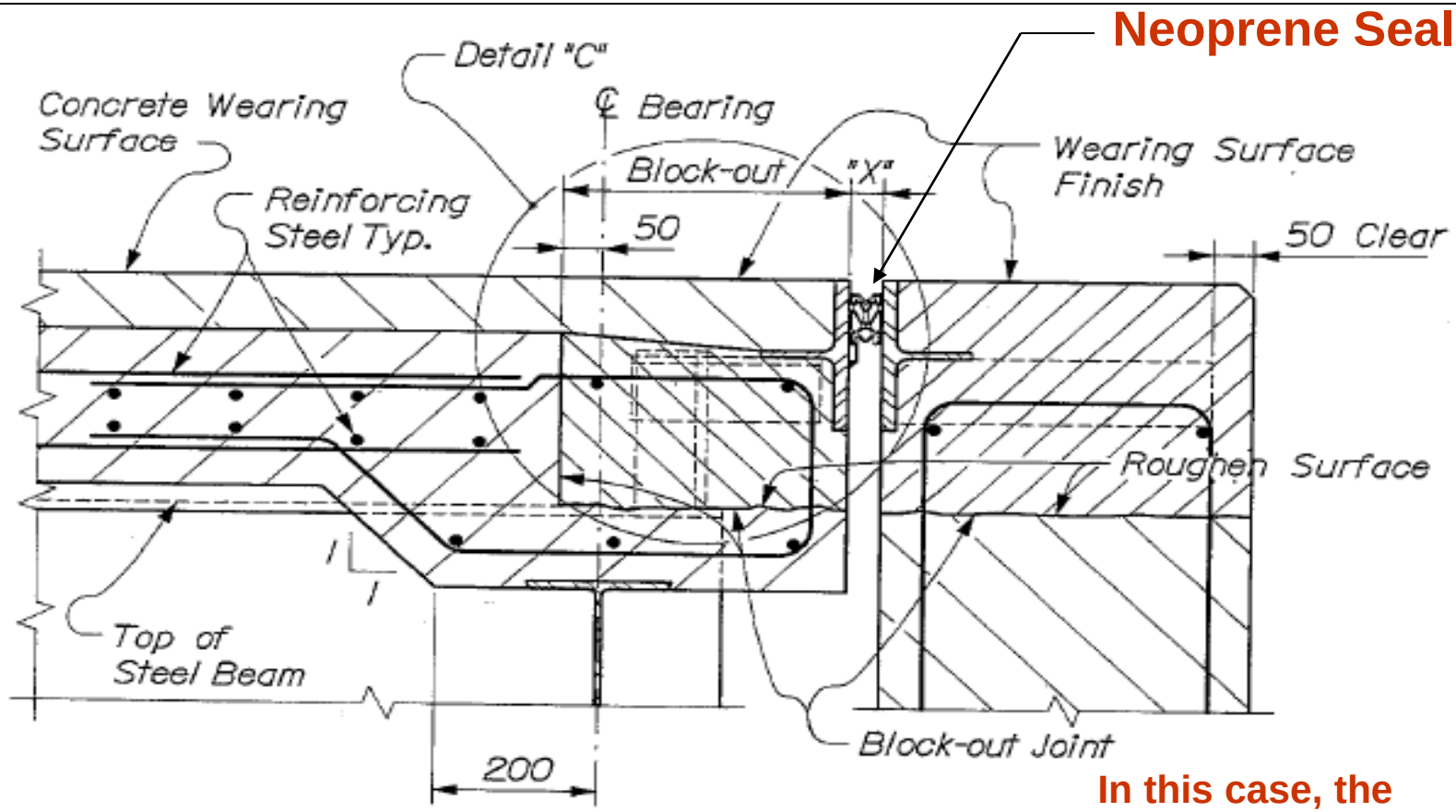
Here is a combination curtain-trough protecting the bearing area.

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.

Cross Section View of Joint



Section B-B / 520(08)
(Showing Concrete Wearing Surface)

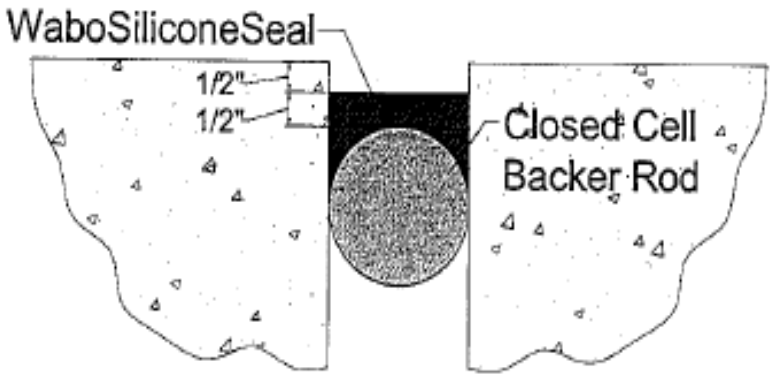
In this case, the joint is a Compression Seal. A Gland Seal is similar.

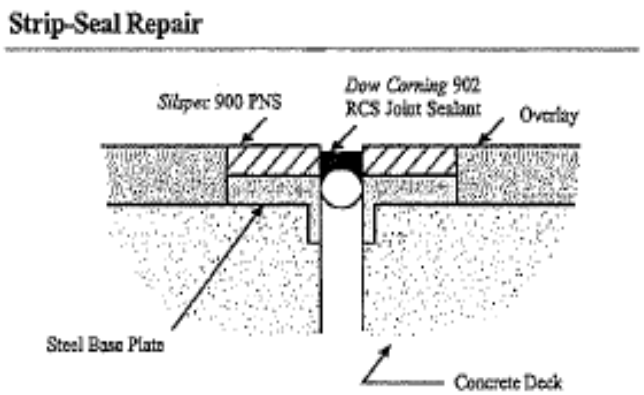
Pour In Place Seals

Used often when steel joint is uneven across the roadway.

We also use –
The Hot Rubber Machine!

1 ½ “ +/-





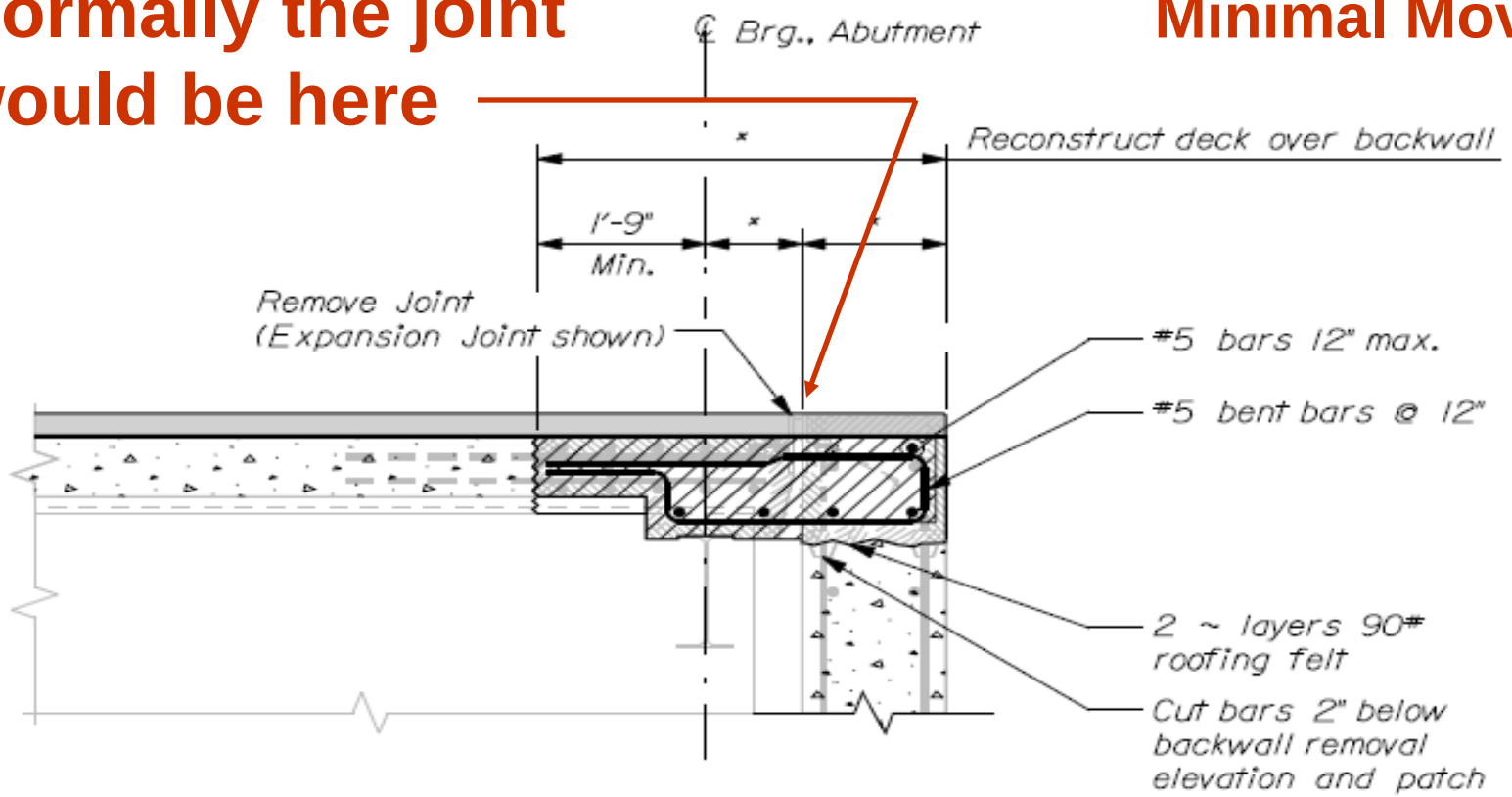
WaboSiliconeSeal

XJS®Expansion Joint System

The best joint is NO JOINT. Slab over backwall design.

Normally the joint would be here

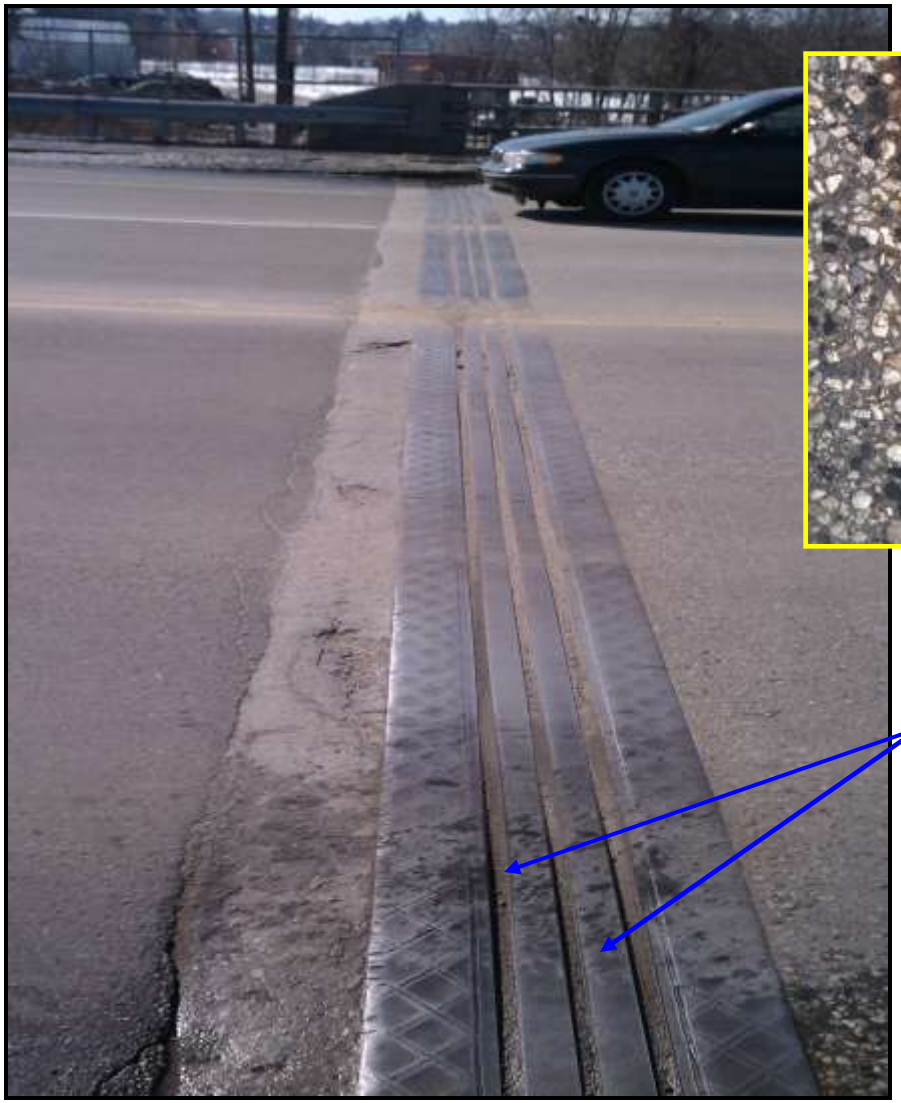
Minimal Movement



OVER BACKWALL BRIDGE JOINT MODIFICATION - GENERIC

"x" Field verify dimensions

Modular Expansion Joints – very few.



Series of Rails & Seals.

Lewiston-Auburn

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?

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

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

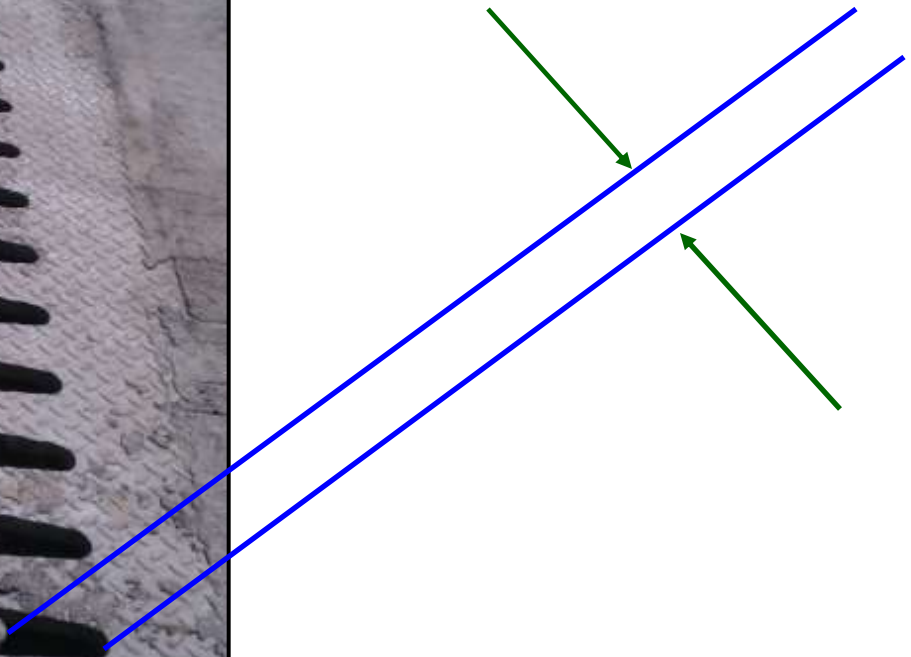
Bridge Preservation!

Bridge spans move with temperature.

Cold	Hot
Bridge gets shorter.	Bridge gets longer.
Therefore, the Joint gets bigger.	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

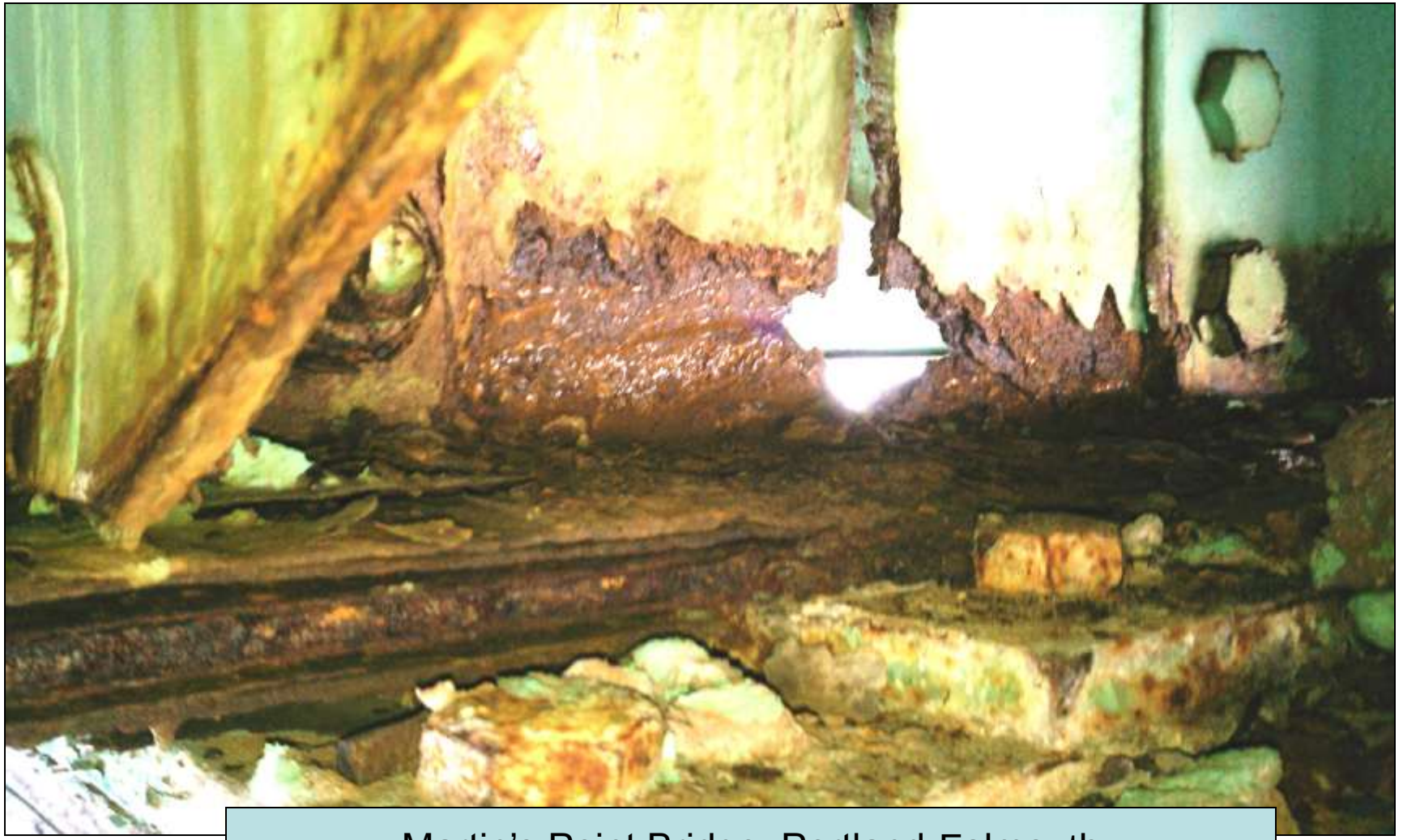
Bad things happen without proper Bridge Joint performance.

Damaged Bearings Caused By Drainage Through Failing Joint

Sandy River Bridge, New Sharon


Joint Leakage Leads to Steel Deterioration
Sandy River

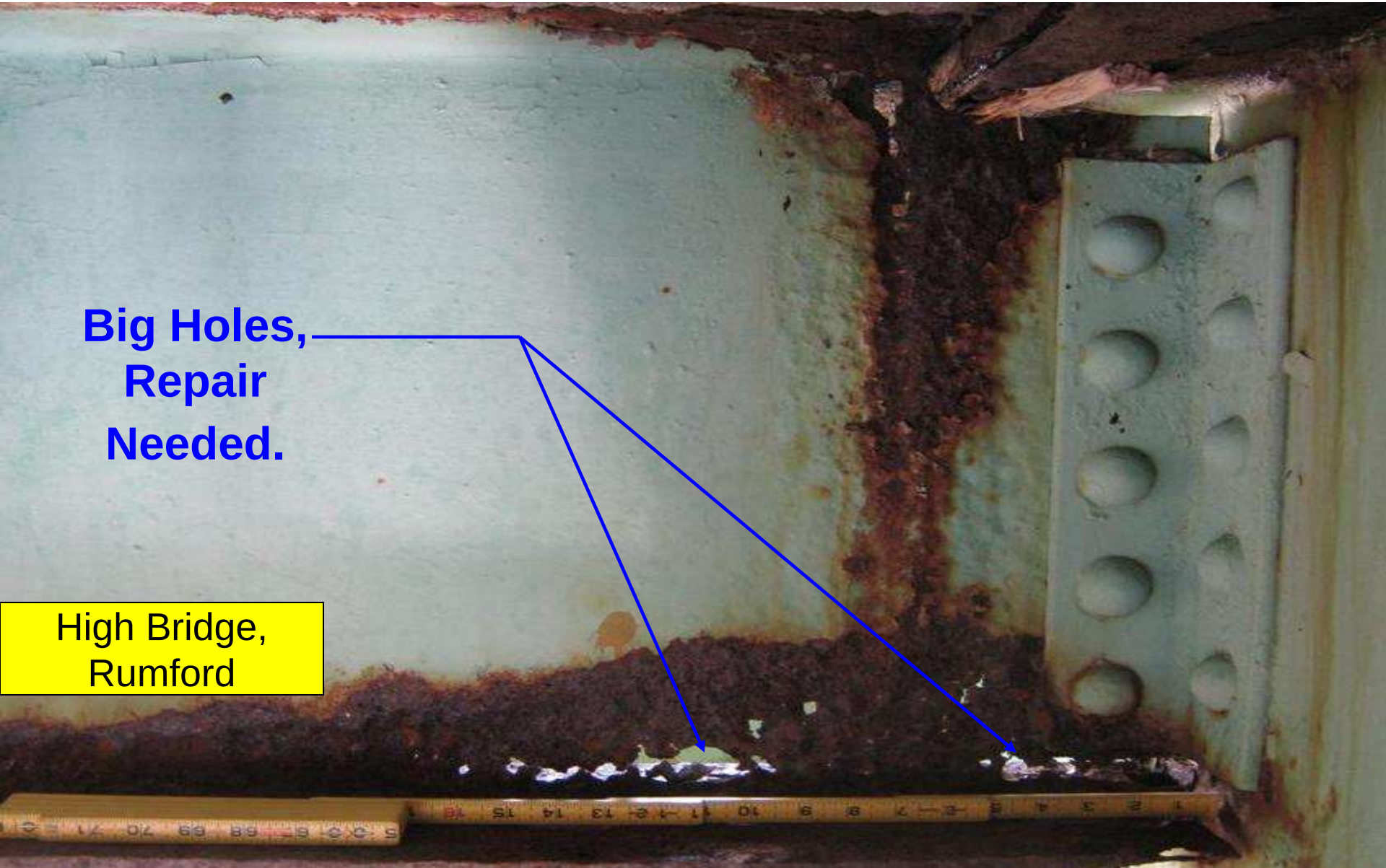
Deteriorated Steel Superstructure Caused by Leaky or Missing Joint Seals



Martin's Point Bridge, Portland-Falmouth

Damaged Bearings Joint Drainage

Steel Superstructure Deterioration – Through Joint Leakage



Concrete Substructures Deteriorate From Joint Leakage


Serious Pier Deterioration
What likely was the cause?
Stockton Springs

Pier Deterioration From Joint Leakage

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.

Gland Seal Replacement

Combination Lubricant/Adhesive

Starts out a lubricant, ends up and 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

Header Failure

Frank J. Wood Bridge, Topsham

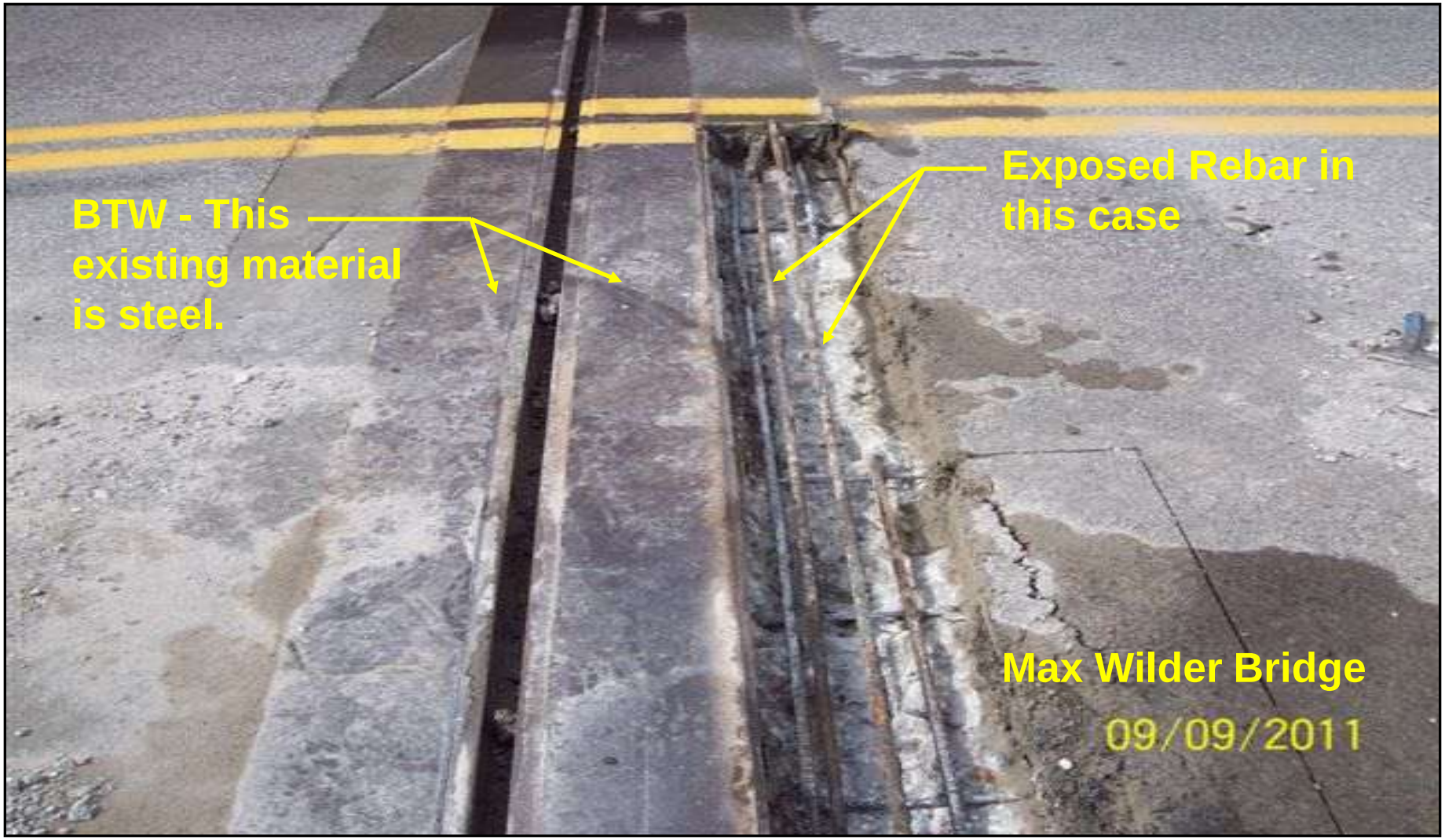
Header Failure & Removal

Emergency Header Repair on Frank J. Wood Bridge

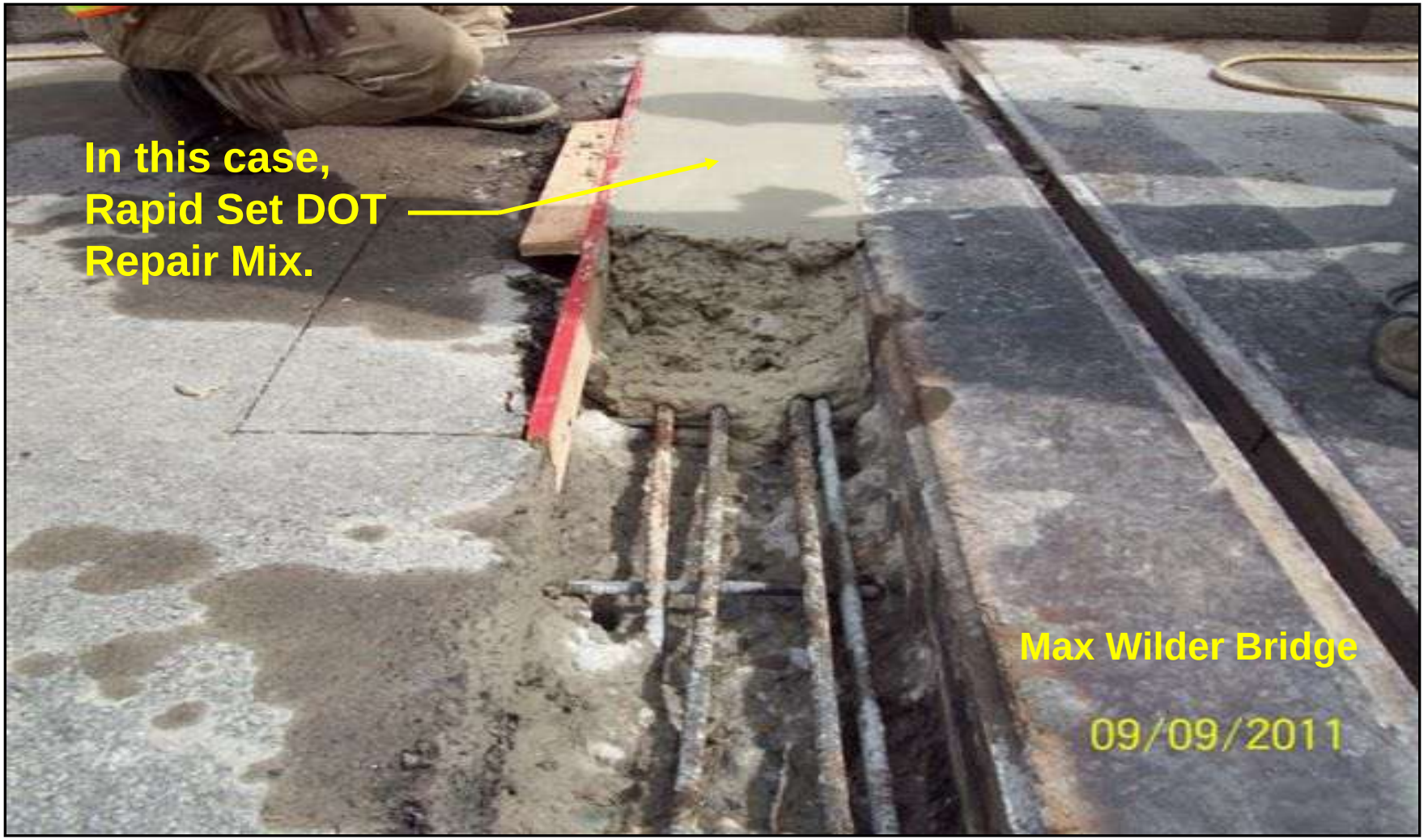

Heat
Header
Steel Joint
Material


Donny McKenna in action.
Max Wilder Bridge, Arrowsic

Removal of Header or Nosing



Replacement of Header (Nosing)



Header or Nosing Material Used

New Capital Projects

WaboCrete II

Delcrete

E-Crete No. 57

Ply-Krete FS

Bridge Maintenance Repair

Silspec 900

Rapid Set DOT Repair Mix

P430 by EMACO

Dragon – 4hr Concrete Mix

Etc.

"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.

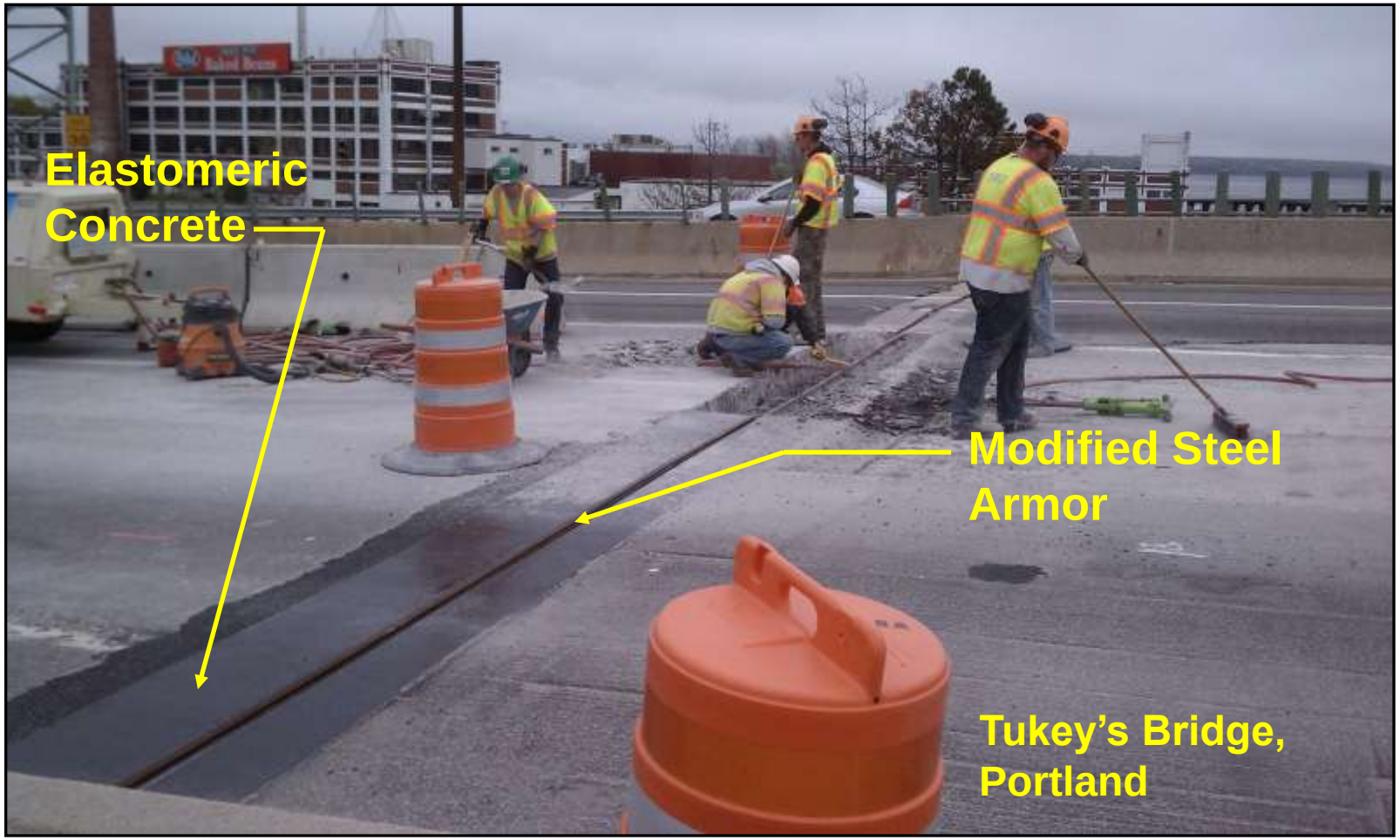
Field Modifications of Steel

MDOT M & O
Accomplishes A Portion.

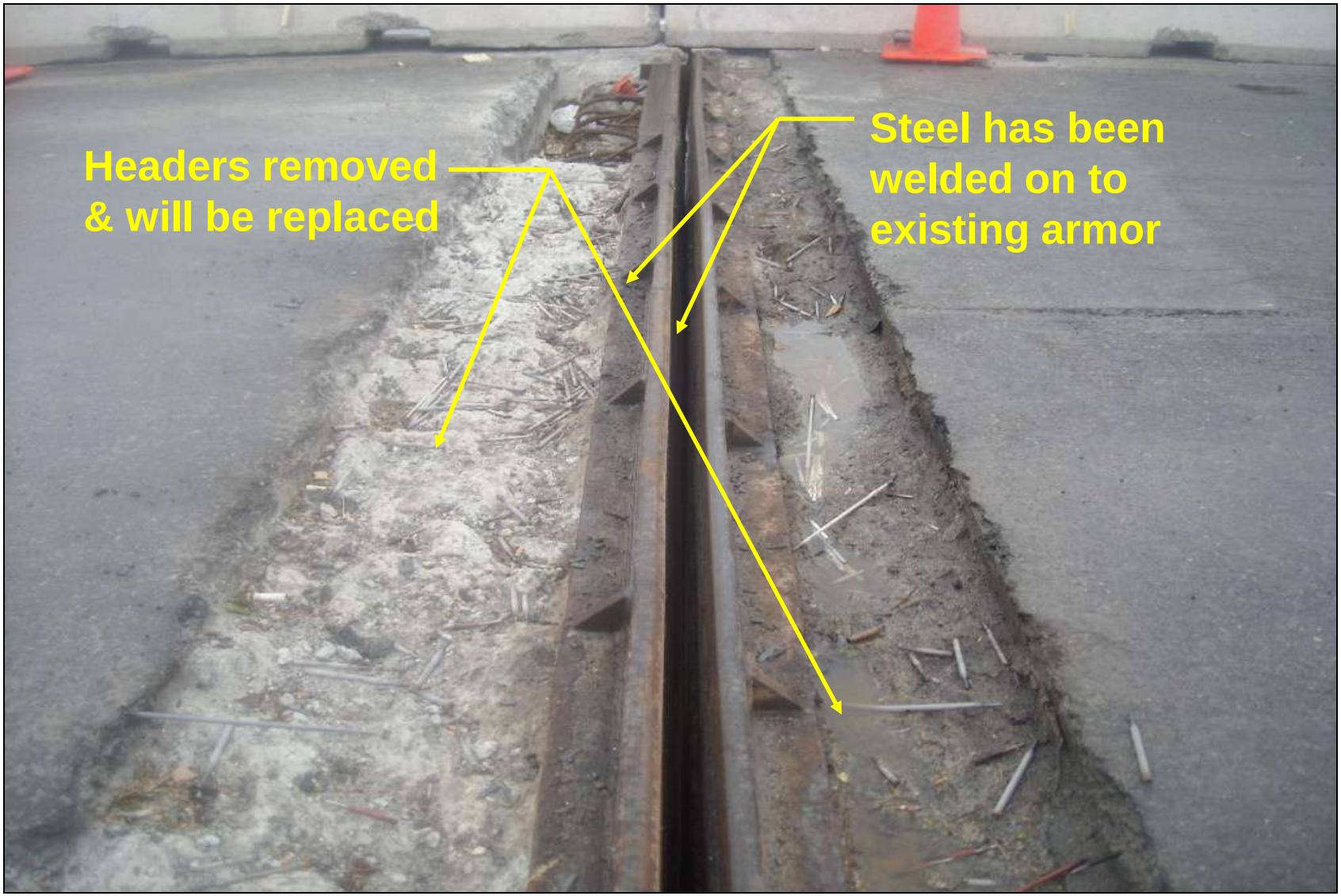
New Armored Expansion Device

DOT Crew converts expansion joint to Slab-Over-Backwall. No Joint.

Rehabilitation – New Header Material & Modified Armor



Rehabilitation of Existing Joint Armor



Curb & Sidewalk Treatment Varies

Test

- Multiple Guess or
  True or False
- 15 Questions.