

Bridge Bearing Maintenance

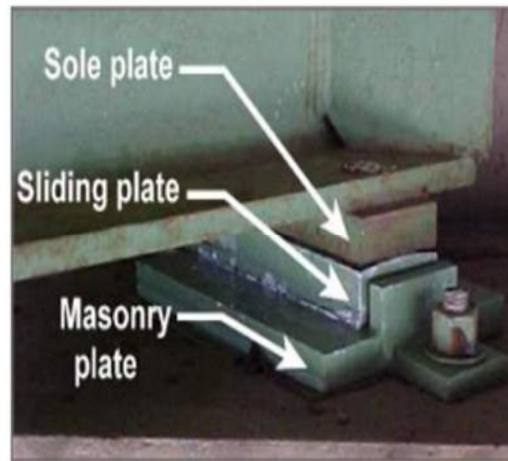


Figure 1 - Sliding Bearing. Source MnDOT.



Bridge Preservation Partnership
Local Agency Outreach Working Group



House Keeping

- Let us know what topic you'd like to see next.
- Add your contact info in the chat for future invites.
- Trainings every other month.



TYPE QUESTIONS INTO
THE CHAT.



THE PRESENTATION
WILL BE RECORDED
AND MADE AVAILABLE.



Bridge Preservation Partnership (BPP)

Collaboration & Cooperation



DOTs



Local Agencies



FHWA



Academia



Industry



Consultants



OVERVIEW –

- Types of Bearings Fixed vs Expansion
- What happens when bearings stop working?
- Common Maintenance Activities
- Bearing Replacements:





What are Bearing For?

- Gets the loads from the superstructure down to the substructure
- Let's the bridge move...
- Or keeps it from moving



Types

Fixed

- Resist movement but permit rotation of the superstructure due to deflections or bending.

Expansion

- Permit both rotation and translation of the superstructure.

Generally, end rotation not required for spans under 40 feet.

Types of Bearings

Bearing Movement

Fixed:	Rotation	
Expansion:	Rotation	
	Longitudinal movement	
	Transverse movement	

Types of Bearings: Slider

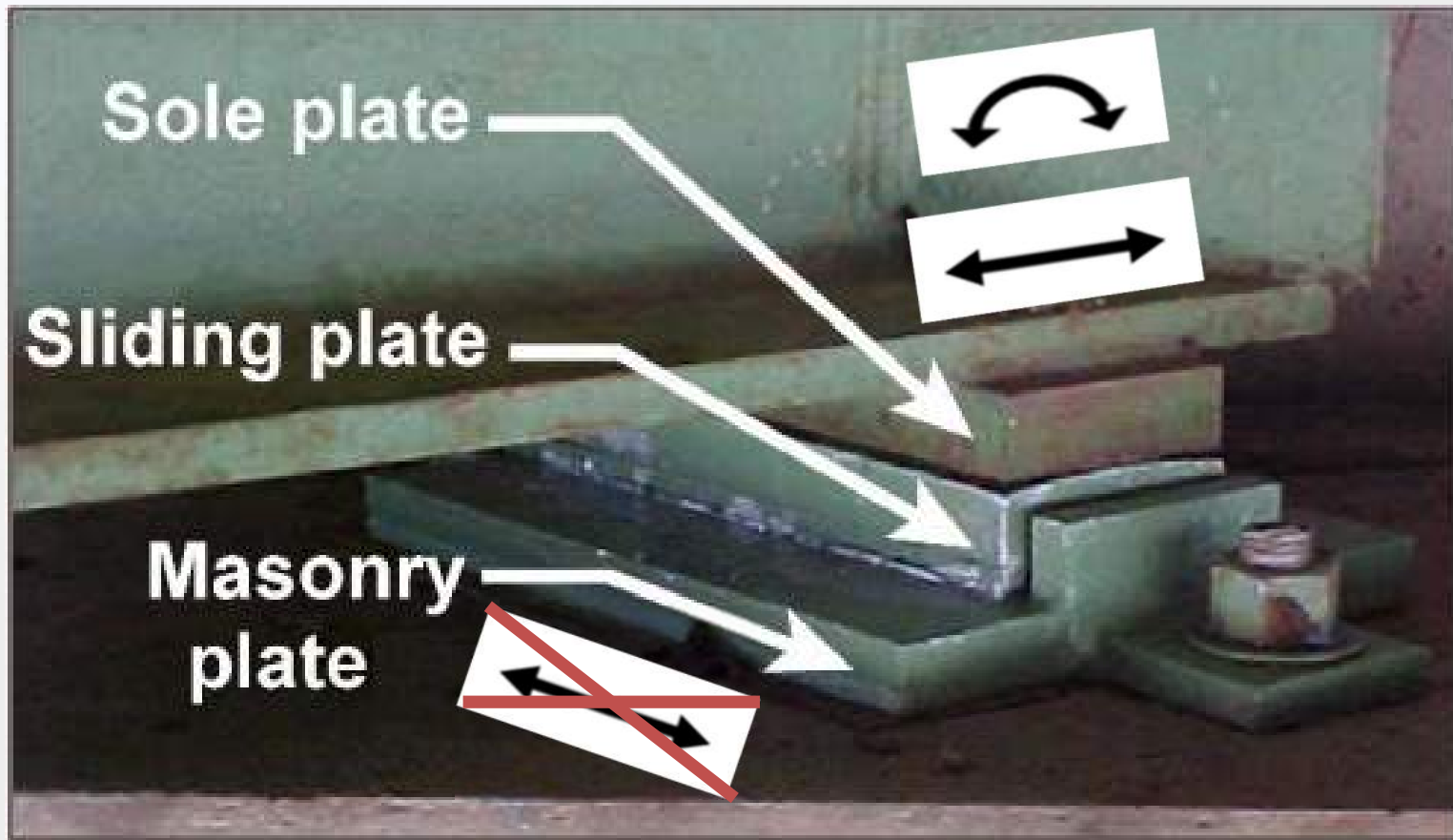


Figure 1 - Sliding Bearing. Source MnDOT.

Types of Bearings: Rocker

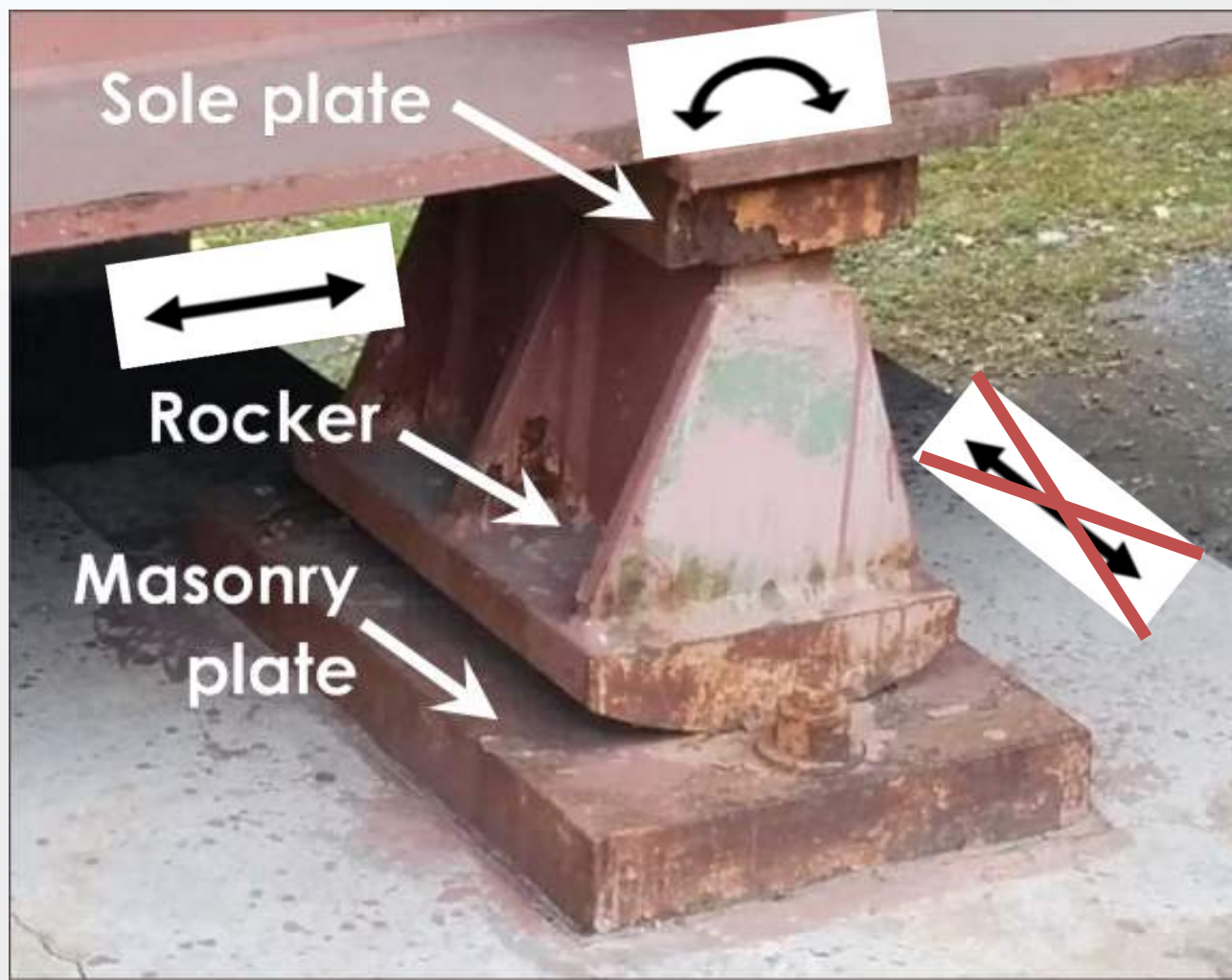


Figure 2 - Rocker Bearing. Source GPI.

Types of Bearings: Roller

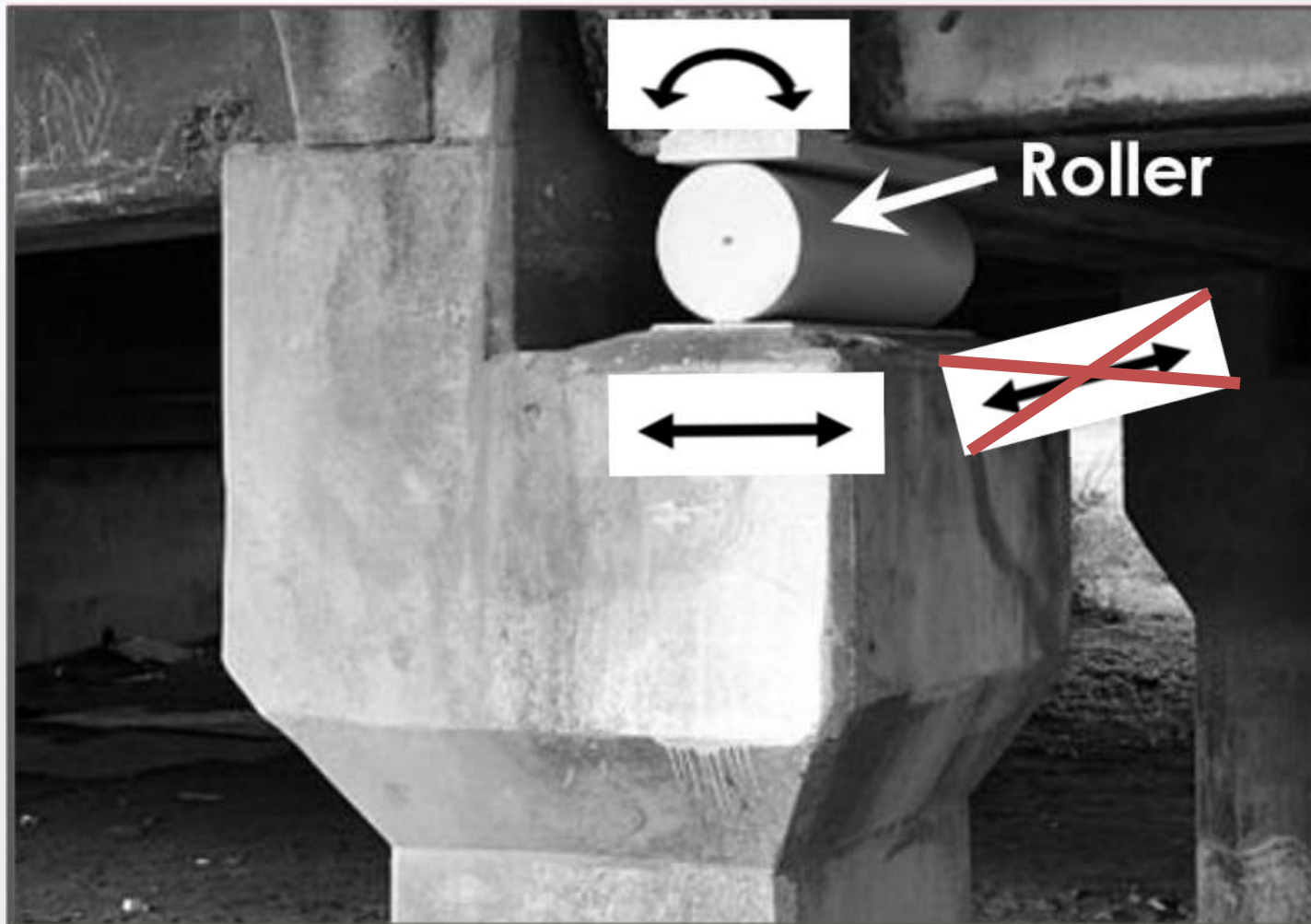
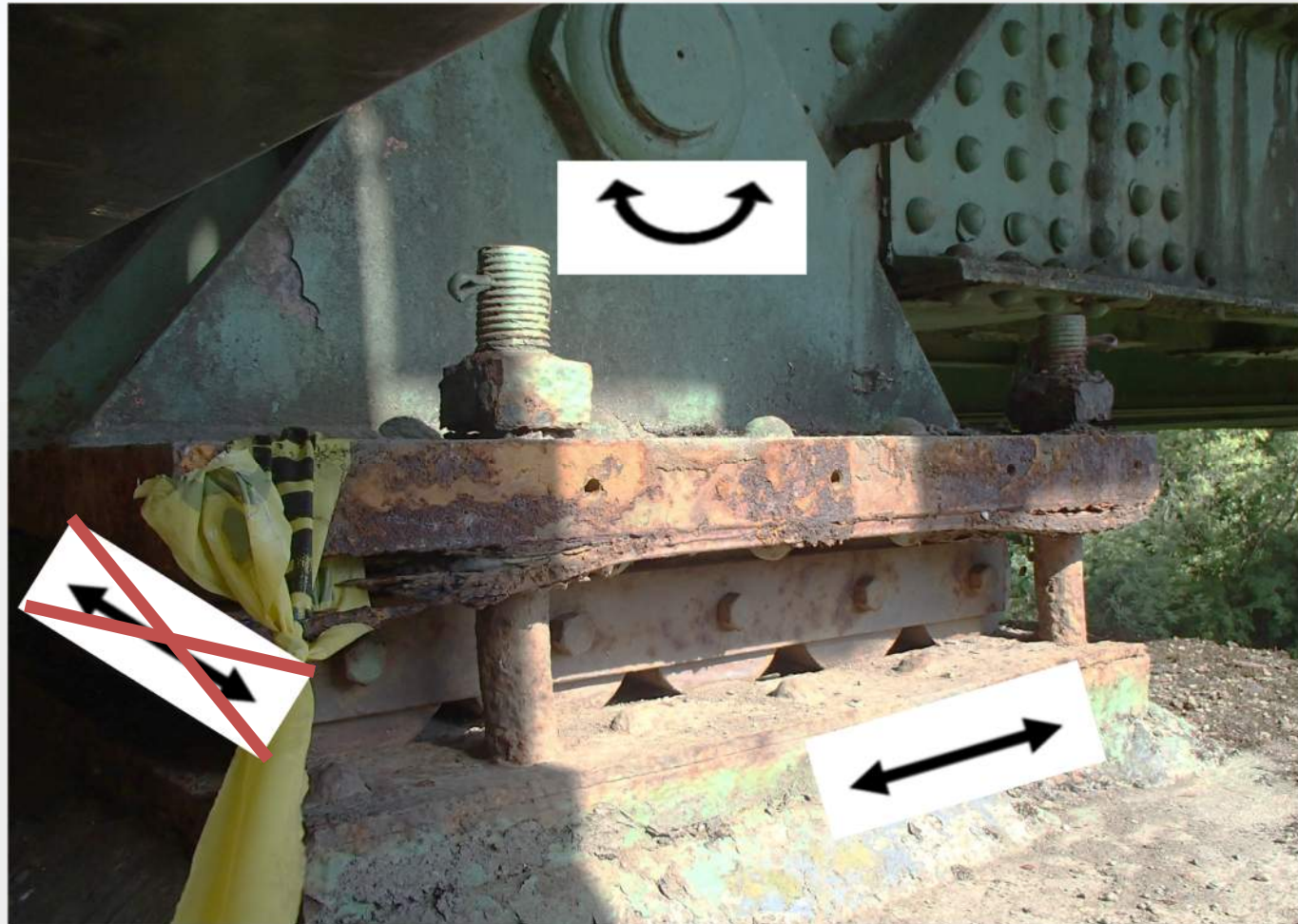
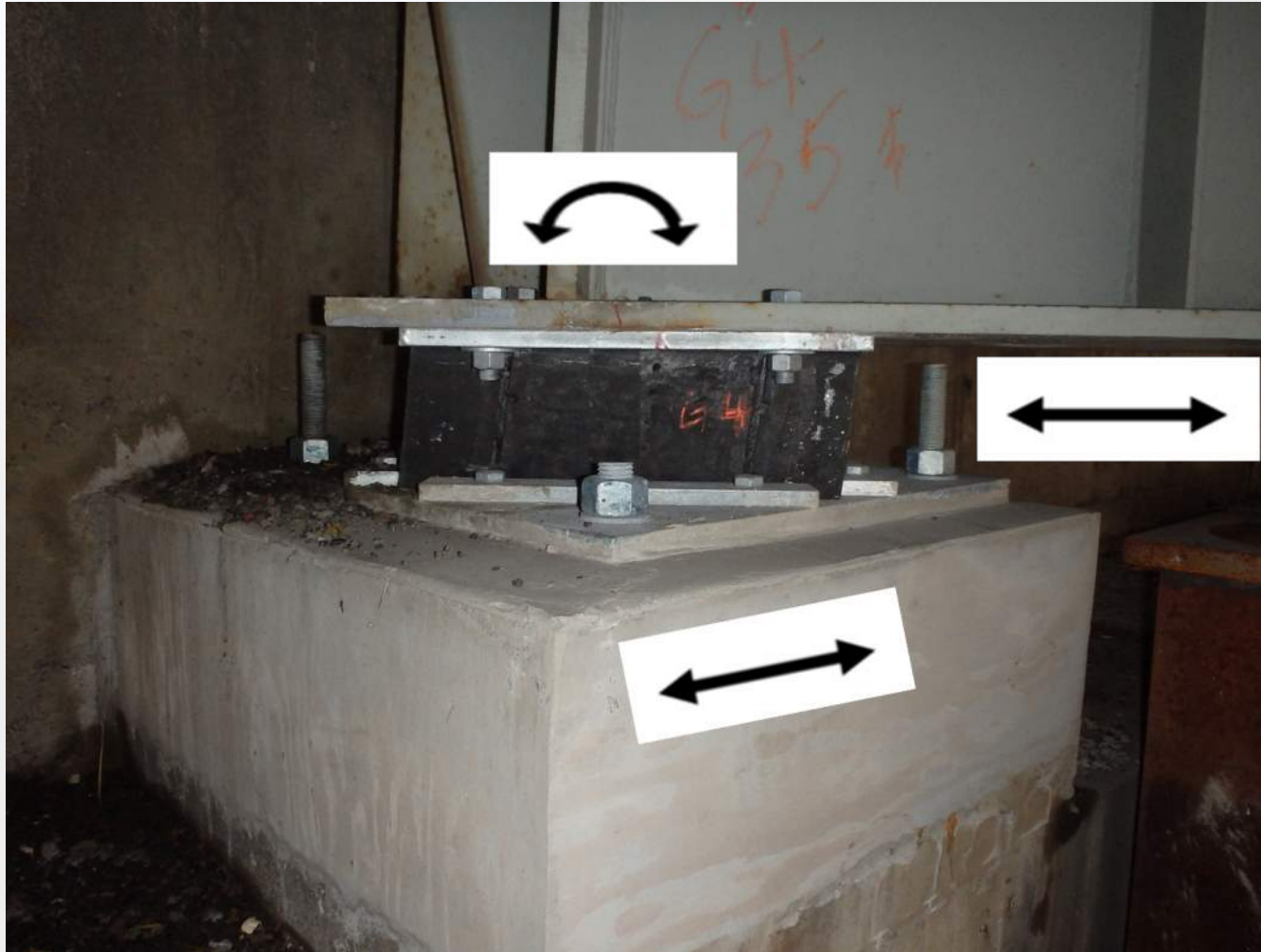


Figure 4 - Roller Bearing. Source P. Feller.

Types of Bearings: Nested Roller



Types of Bearings: Elastomeric



Types of Bearings: Isolation



Bearing problems

- “Frozen” transmit tremendous forces.
 - Forces due to the expansion and shrinking of bridges during heating and cooling cycles.
- Misalignment (Usually due to poor construction)
- Movement beyond capabilities
- Materials failure



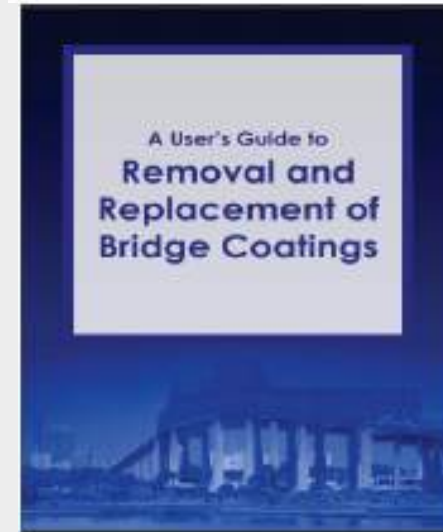
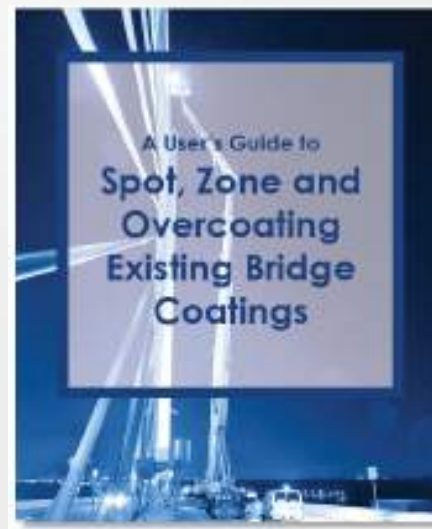
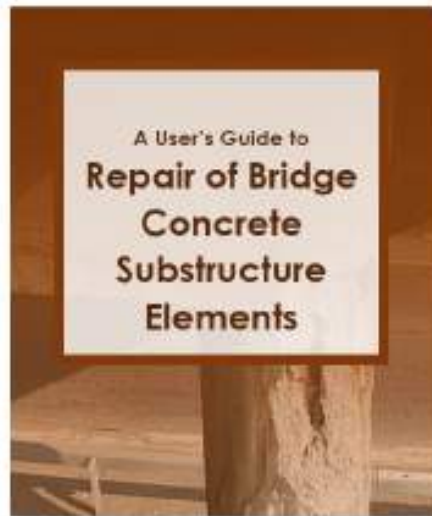
Bearing Problems: Corrosion



Bearing Problems: Too Much Movement



Preservation Pocket Guides



Intent of the Pocket Guides

- Installation guidelines
- Equipment and tools
- Limitations & restrictions
- Avoiding potential failure mechanisms
- Recommended training
- Required technical support
- Quality Control



Bearing maintenance

- Keep it clean and free of debris



Bridge Washing

A User's Guide to **BRIDGE CLEANING**



CONTENTS

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Background	2
Accumulation of Contaminants	5
Planning and Preparation	6
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Bridge Cleaning & Washing

Benefits:

- Flushing and washing reduces the potential of chloride intrusion in deck.
- Essential for proper joint and bearing movement.
- Extend the life of steel coating systems.



Bridge Cleaning & Washing

Things to Consider:

- Follow state and federal regulations. (Some debris may be hazardous)
- Sweep and collect large debris for disposal.
- Flush during high water flow to minimize environmental impact.
- Clean on regular cycle of avoid large build-up with hand removal



Bridge Bearings

A User's Guide to Maintenance and Repair of Bridge Bearings

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Bearings: Common Maintenance

- Cleaning:
 - Maintains proper function
 - Reduces the chances of the bearing “freezing”
 - If the bearing is frozen, the bridge may need to be jacked to facilitate the removal, cleaning and repainting before reinstallation.
- Anchor Bolt Tightening:
 - Loose anchor bolts may cause damage to other components of the bridge in addition to the bearing
 - Retighten anchor bolts as directed



Bearing Painting: Before



Bearing Painting: After



Bearing Lubrication:

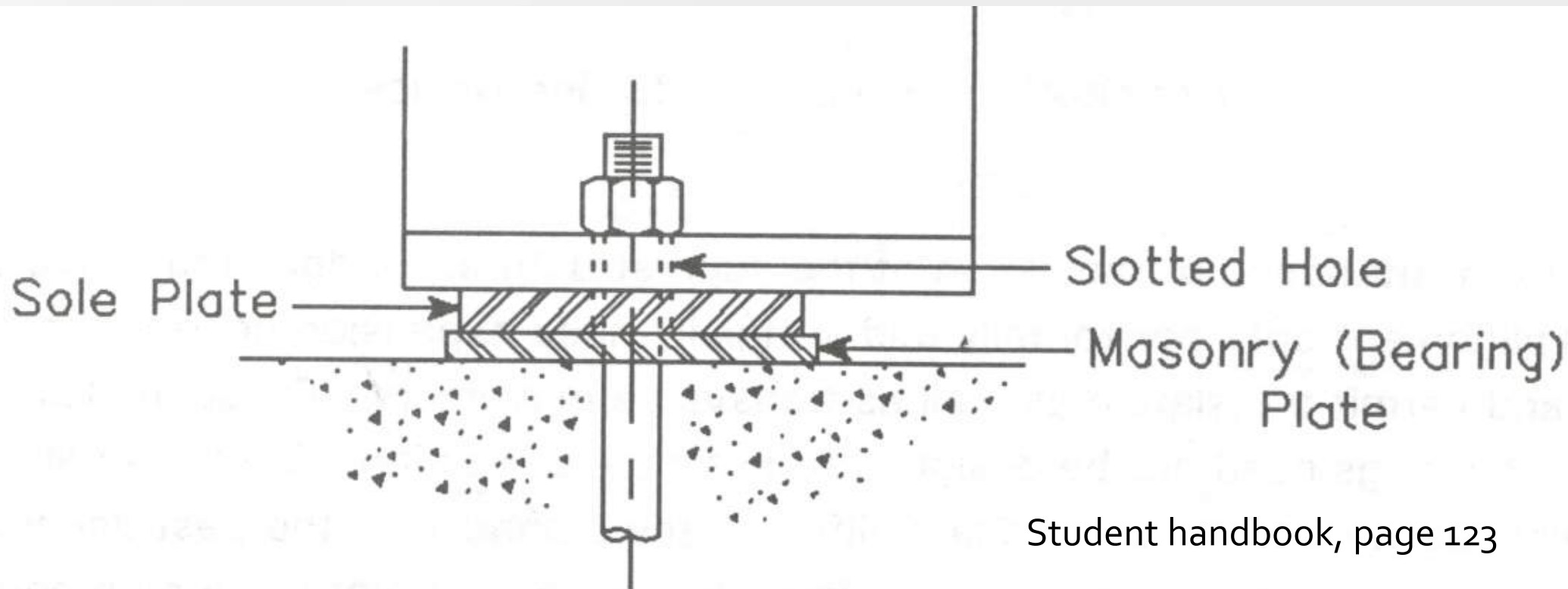


Figure 8 - Bearing Lubrication. Source GPI.

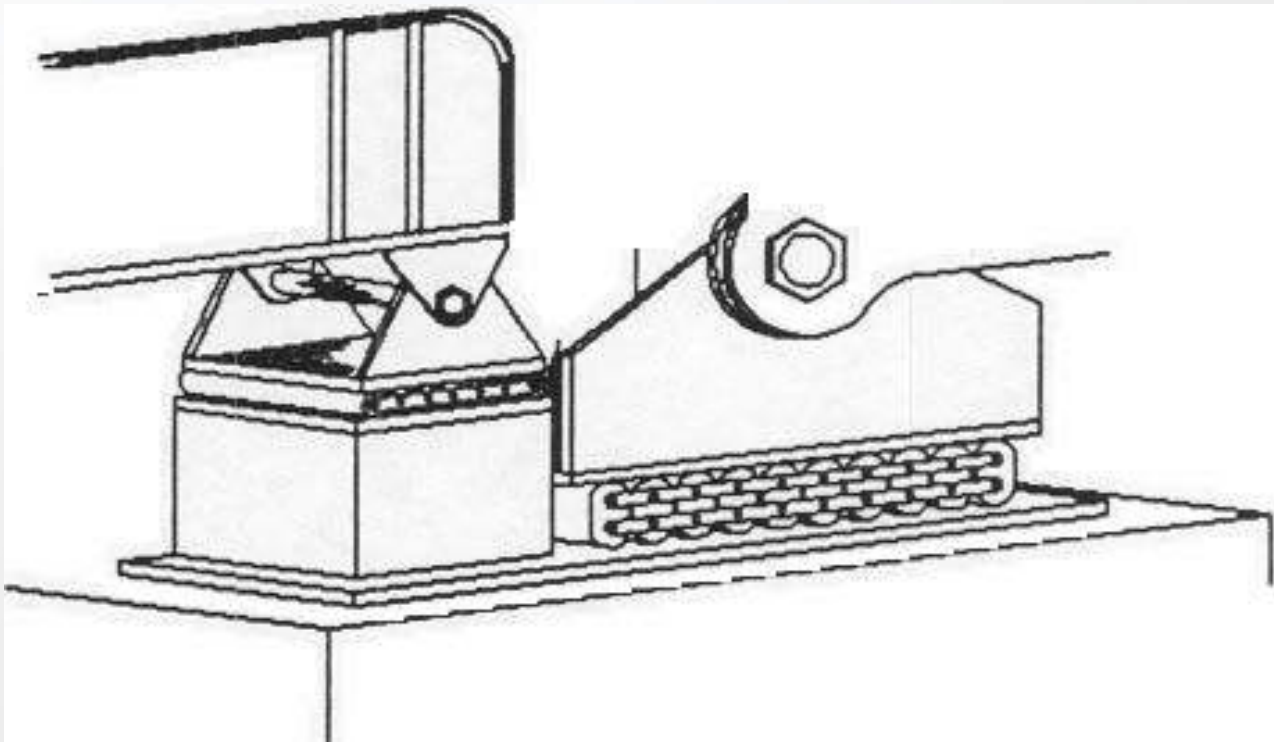
- Jack to provide clearance.
- Clean first by flushing, power washing or compressed air.
- Lubricant can utilize grease, oil, graphite, or as directed.
- Some bearings have grease fittings.

Sliding plate bearing maintenance

- Slightly round one bearing surface to reduce binding
- Add a thin sheet of lead between the plates
- Reduce friction with self-lubricating bronze or PTFE pad and a stainless steel mating

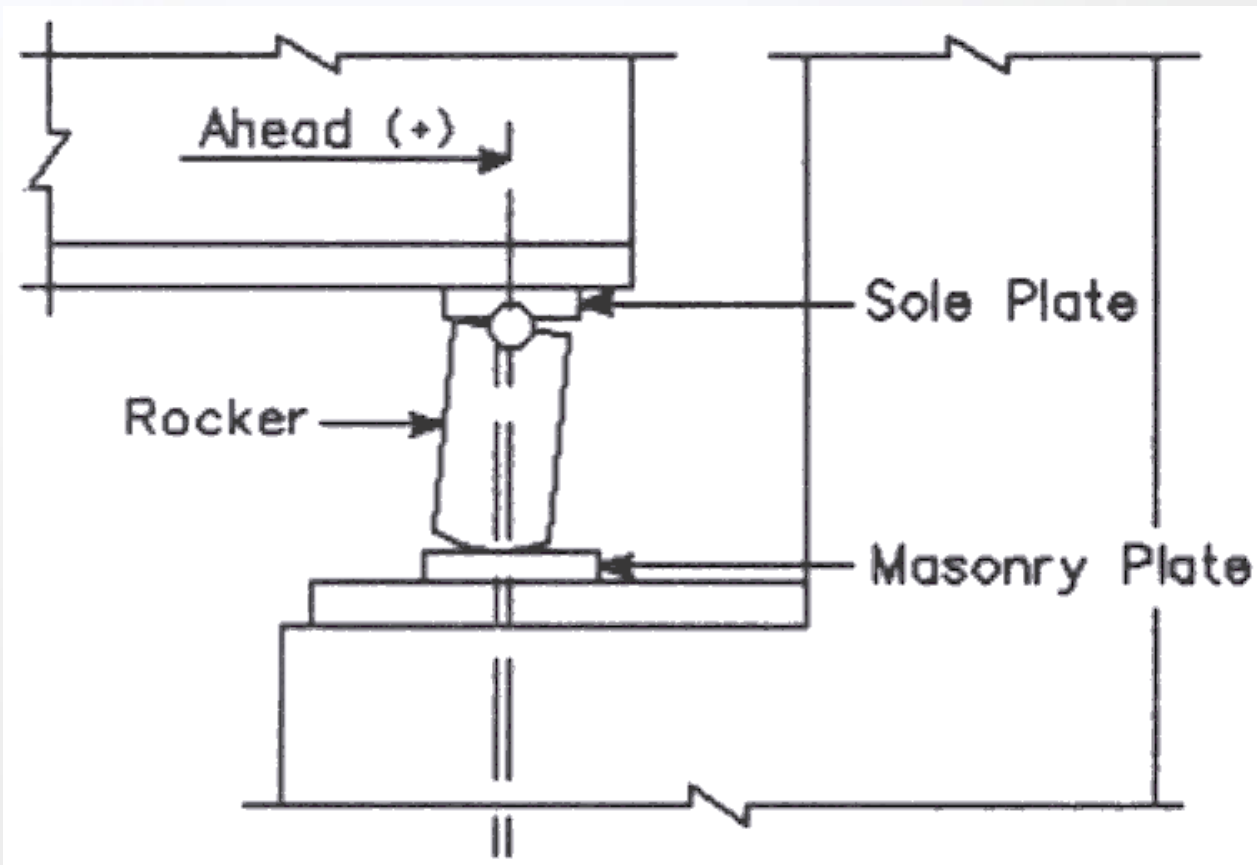


Roller bearing maintenance



- Hard to maintain
- Keep area clean and painted
- Limited access for lubrication
- Remove and refurbish

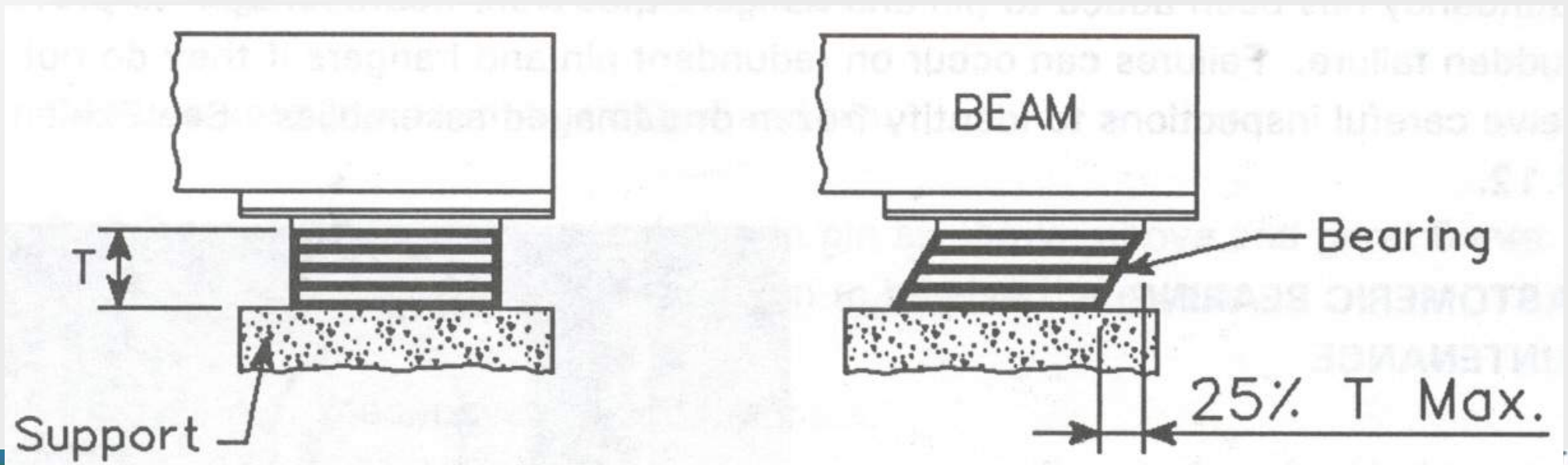
Rocker bearing maintenance



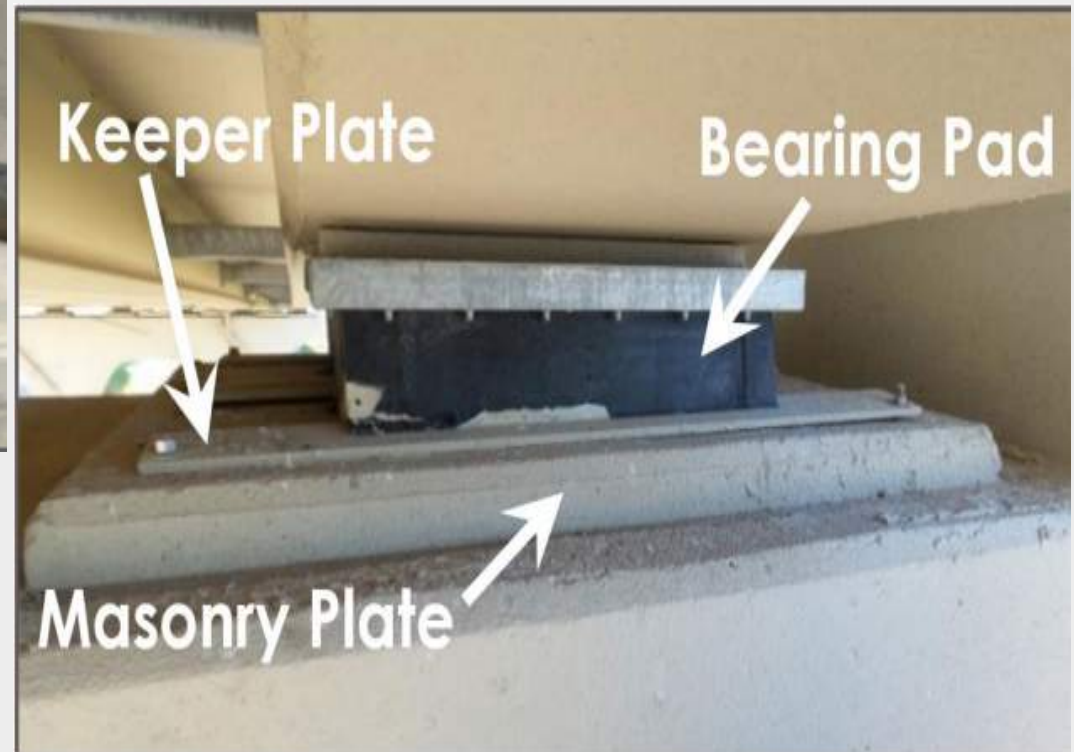
- Can be unstable beyond normal movement
- Keep clean, lubricated, and painted
- Remove debris

Elastomeric bearing maintenance

- Elastic pads with or without embedded steel plates
- Maintenance is rarely necessary unless it “walks out” of position.



Bearings: Install Keeper Plate



Bearings Replacements:



- Consult an Engineer
- Lift all beams at once to avoid damage
- Most old bridges weren't design to facilitate jacking.

Jacking the bridge: Example of a complex setup



Mission Bridge: Bearing Replacement Case Study



- Long Span Post Tensioned Box Girder Bridge



Mission Bridge: Bearing Replacement Case Study



Ref: Google Maps



Mission Bridge: Bearing Replacement Case Study



Rocker Bearings:



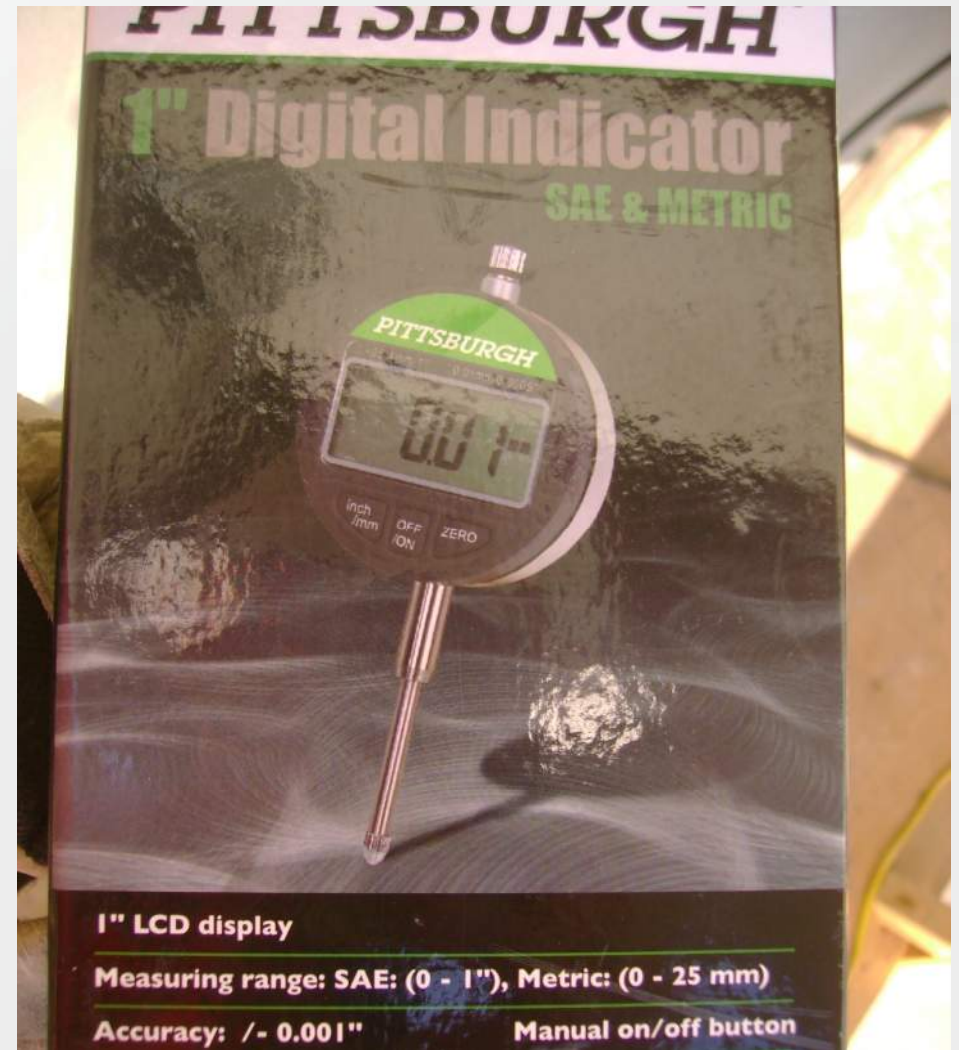
Jacking the Bridge – 4 200 ton jacks



Note the steel blockouts for traffic



Carefully Monitor the movement



Bearings are Out



Need to Remove the Steel Plates still



Wire Saw



Wire Saw:





Elastomeric Bearing Pads



Note the new concrete pedestal



Checking spacing and alignment before setting down



Setting the bridge down



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Questions?

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