

Factors to Consider for Preserving Bearing Assemblies and Expansion Joint Systems

Mark Kaczinski, P.E.

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Importance of Bearing & Expansion Joint Systems

- Joints & bearings are an important part of a bridge structural system
 - Typically represent about 1 to 2% of total bridge cost
 - Design and detailing not well understood by many bridge engineers
 - Often criticized for poor performance



Importance of Bearing & Expansion Joint Systems

- Satisfactory long-term performance for expansion joints & bearings can be achieved through the following:
 1. Select the correct system
 2. Install properly
 3. Follow maintenance guidelines



1. Select the Correct System

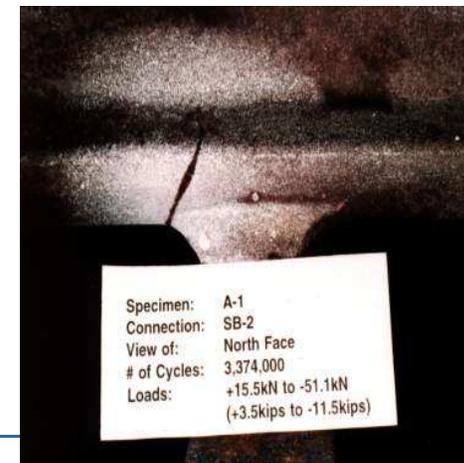
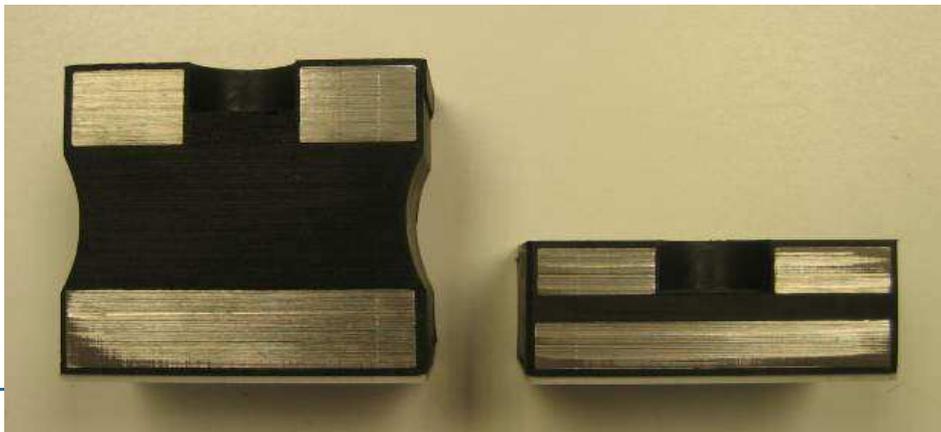
Selection of Bearing & Expansion Joint Systems

- Should be based on lowest life-cycle cost NOT lowest initial cost
 - Often not true for small movement expansion joints
 - Recent push towards use of “soft” joint systems
- Pick the most appropriate system given the load and/or movement requirements



Selection of Bearing & Expansion Joint Systems

- Incorporate durable materials in design and follow state-of-the-art specifications when available
 - Current AASHTO pot bearing design requirements
 - No aluminum expansion joints
 - Fatigue designed modular expansion joints with rubber slide springs and bearings



2. Install Properly

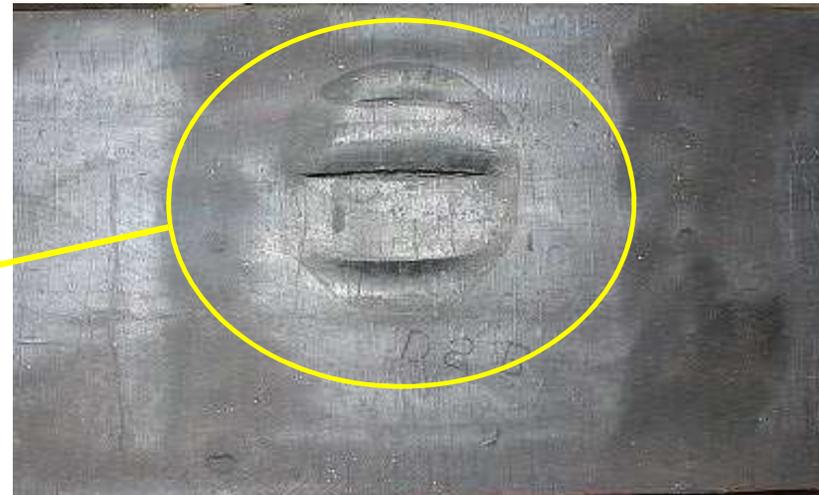
Installation of Bearing & Expansion Joint Systems

- Starts with proper shipping and handling



Installation of Bearing Systems

- Avoid use of sledge hammer to position elastomeric bearings



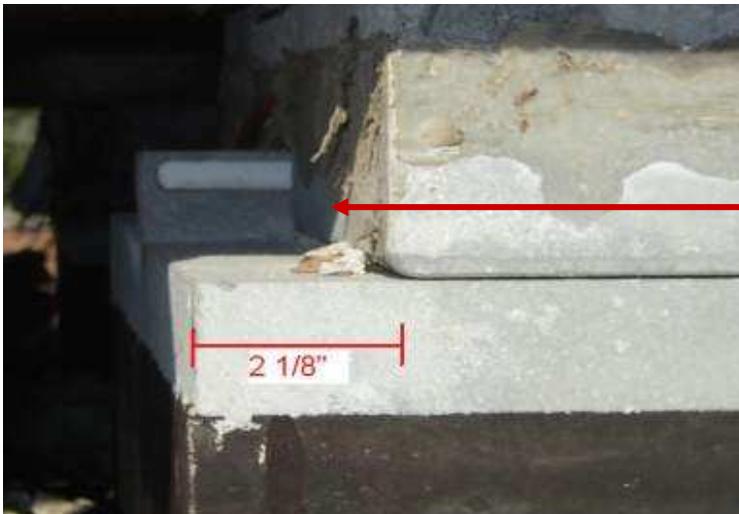
Installation of Bearing Systems

- Do not disassemble bearings and keep PTFE protected from UV light and dust/debris



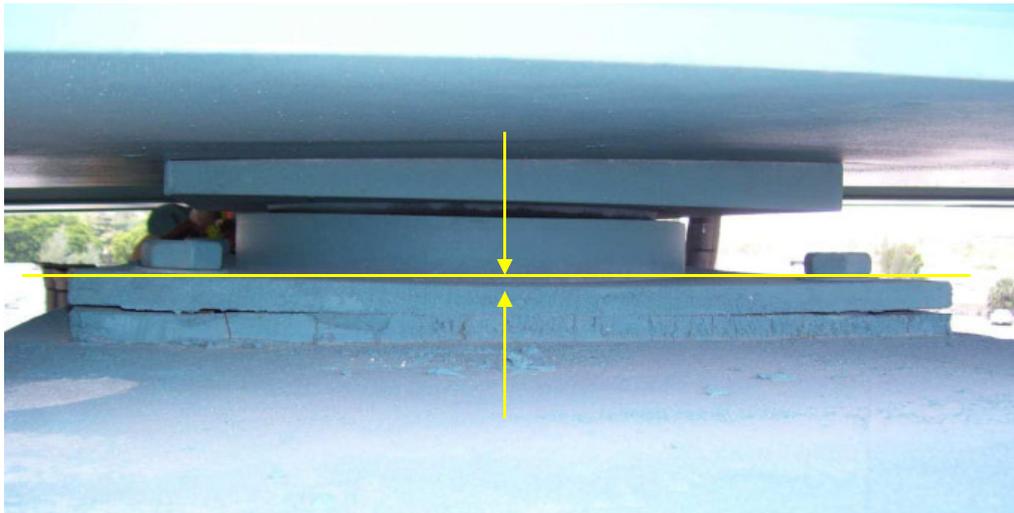
Installation of Bearing Systems

- Properly position expansion bearings based on temperature and/or expected shrinkage and creep



Installation of Bearing Systems

- Follow good construction practices



Installation of Expansion Joint Systems



- Typical problems:
 - Concrete in support boxes of modular joints
 - Poor concrete consolidation
 - Poor detailing
 - Wrong gap opening setting

Installation of Expansion Joint Systems

- Field splices required in staged construction or over-length joint assemblies
 - Strip seal max length of 40' for SSPA shape
 - Modular joint max length of +/- 53'



Installation of Expansion Joint Systems

Proper blackout treatment:



- Add transverse rebar and/or WWF over modular joint support boxes to reduce possibility of deck cracking
- Continue longitudinal deck rebar into blackout

Installation of Expansion Joint Systems

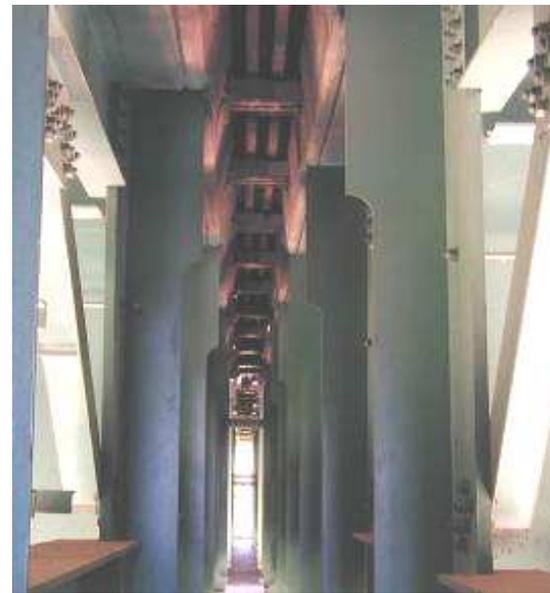
- Ensure that seal is properly locked into steel channels at time of installation



3. Follow Maintenance Guidelines

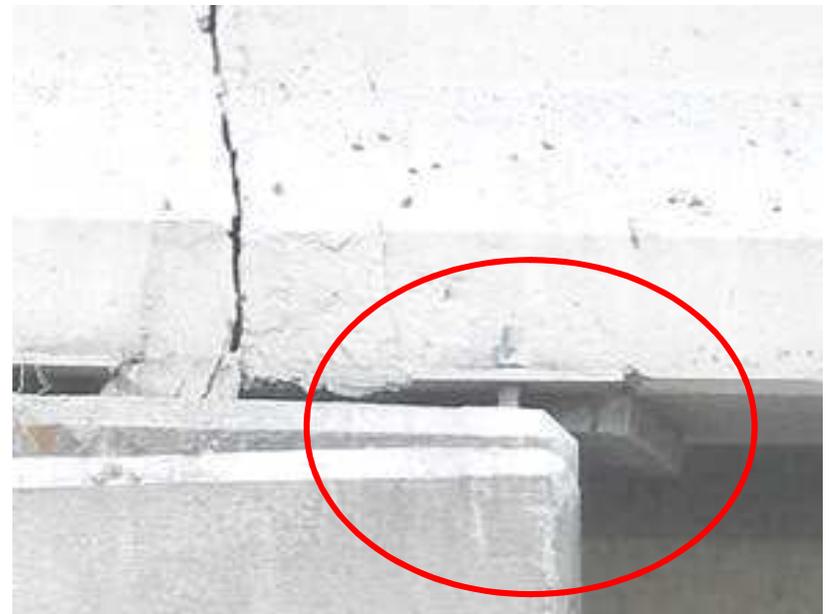
Maintenance of Bearing & Expansion Joint Systems

- A good maintenance program for expansion joints and bearings begins with a thorough inspection during the bi-annual bridge inspection
- Requires good access:



Maintenance/Inspection of Bearing Systems

- Loose/missing/bent anchor rods are common
- Rolled or walking elastomeric bearings should be reset



Maintenance/Inspection of Bearing Systems

- Severely worn or damaged PTFE/stainless steel sliding surfaces should be replaced



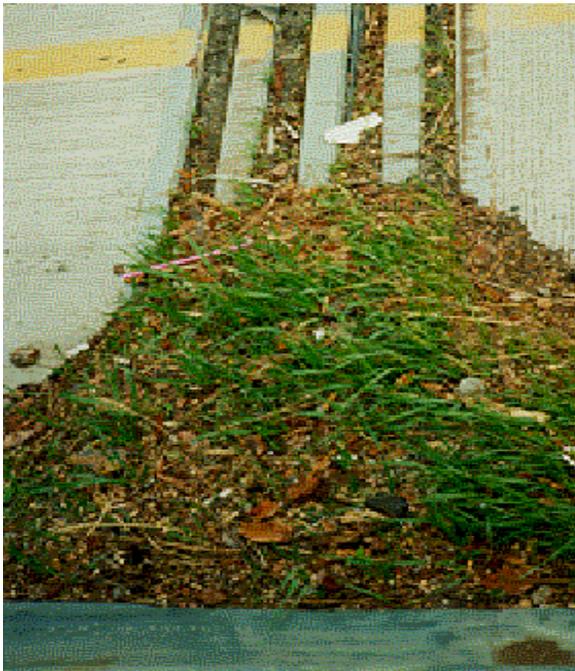
Maintenance/Inspection of Bearing Systems

- Some early (pre 1990's) pot bearings experience leakage of elastomer. Problem solved with improved AASHTO code design provisions.



Maintenance/Inspection of Expansion Joint Systems

- Number 1 issue is lack of funding to properly clean joint seals or finger joint troughs of debris on annual basis



Maintenance/Inspection of Expansion Joint Systems

- Spalling or delamination of concrete in joint header area is a common problem
 - Maintain cover and carefully consolidate concrete
 - Consider use of non-cementitious materials



Maintenance/Inspection of Expansion Joint Systems

- Problems seen in modular expansion joints prior to fatigue and durability requirement included in AASHTO code:



- Fatigue damage at welded connections
- Deterioration of elastomeric elements

Maintenance/Inspection of Expansion Joint Systems

- Typical problems seen on finger joint systems:



- Failure of anchorage system or header concrete
- Loosening of bolts on large finger joints
- Fatigue or impact damage of finger plates

Summary

Bearing assemblies and expansion joint systems can be expected to provide trouble free performance as long as they have been:

- *Properly Selected*
- *Installed Correctly*
- *Maintained*

Thanks for your interest! Questions.....