Factors to Consider for Preserving Bearing Assemblies and Expansion Joint Systems

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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 blockout treatment:

- Add transverse rebar and/or WWF over modular joint support boxes to reduce possibility of deck cracking
- Continue longitudinal deck rebar into blockout
Installation of Expansion Joint Systems

• Ensure that seal is properly locked into steel channels at time of installation
3. Follow Maintenance Guidelines
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.........