Industry Perspective on Bridge Expansion Joints
• Proper preparation / installation practices of bridge expansion joints
  • Watson Bowman Acme – John Manning

• Proper sizing of bridge expansion joints
  • EMSEAL - Philip Benevides

• Preservation Methods of bridge expansion joints
  • RJ Watson - Matthew Keilson
The Expansion Joint didn’t fail you, you failed the Expansion Joint.
Maintenance and design requirements of expansion joints can not always be met

- Poor choices during design (standards)
- Lack of clarity in plans
- More responsibility on contractor and manufacturer to address field conditions
- Engineers working with as built vs actual field conditions
- Poor substrate and concrete condition
- Temperature / time of installation
- Compromising quality for time constraints
- Repair vs reconstruction/replacement

- Lack of understanding
- Lack of preparation knowledge
- Lack of seal knowledge
- Absence of proper supervision
- Inattentiveness to detail/s
- What dynamics are taking place
Preparation – Understanding Required Procedures

- Industry standard guidelines
- Educating oneself on these important standards
- Applying the procedures and standards
- Supervising less qualified workers as the work is being done

MAKE QUALITY A HABIT
Did You Know?
International Concrete Repair Institute (ICRI):
The *only association* in the concrete industry devoted solely to repair and restoration

- Concrete repair guidelines ACI (American Repair Institute)
- Cement and Concrete Terminology (reported by ACI committee 116)
- ICRI CSP (concrete surface profile) Chips 1 – 9 profile
- Epoxy injection 210.1-2016
- American Concrete Repair Institute – ACI 54614 Guide to concrete repair
- ACI -50605 – Guide to Shotcrete
- ACI-222 Protection of Metals in Concrete Against Corrosion (ACI)
- ACI-364107 – Guide for Evaluation of Concrete Structures before Rehab
- ICRI – 210-3R-13 Using In-Situ Tensile Pulloff Test to Evaluate Bond of Concrete Surface Materials
- ICRI – 210.4-2009 Nondestructive Evaluation Methods for Concrete Structures
- ICRI – 3102R13 Selecting and Specifying Concrete Surface Preparation
- SSPC SP1-SP15 Surface Preparation for Steel and Concrete Substrates
Proper preparation is everything in extending the life expectancy of an expansion joint!
Find out what is Going on or Needed!

Prep/Repair Matrix:
- Determine the problem/existing conditions
- Evaluate the cause/ issues
- Engineer the appropriate solution
- Complete the preparation (No Shortcuts)
- Complete long term repair or placement
The Profile is All-important for Mechanical Adhesion

- A properly prepared, roughened surface provides a far greater surface area to which a repair material can be adhered.
- A good, clean, profile allows the material to flow into the pore structure of the concrete and ensure a positive bond once it cures.

Illustration showing increase in surface area available for bonding after surface preparation:

Unprepared surface profile: 

Prepared surface profile: 

Prepared surface profile stretched flat to show comparative actual surface available for bonding:
Expansion Joint Seal Installation 101

Pre-Job Survey or Check list – every proper seal installation begins with a plan

- Is it new construction or retrofit?
- What type of substrate? ie: steel, epoxy, elastomeric, concrete etc.
- What condition are they in?
- Is it staged construction, day work or night work?
- Is weather going to be an issue?
- What size is the joint opening width?
- How many joints are there, do I have the material on hand?
Pre-Job Survey or Check list – every proper seal installation begins with a plan

- What tools and equipment do I need?
- Are there any time restrictions?
- Manpower requirements?
- Are there any special transitions or details?
- Do you have a copy of the manufacturer's installation procedure with you?

Two is One,
One is None
Expansion Joint Seal Installation 101

- Training and certifications programs
- Having a Technical Representative on site
Basic Installation Procedures

- Inspection joint locations where work is to be performed
- Investigate surrounding substrates and deck for:
  - Cracks, spalling, concrete condition, adjoining header, steel integrity, anchorage
- Apply correct fix and/or prep procedure prior to installing joint
- Clean joint opening and surrounding substrate
- Workmanship to protect surrounding areas and public organize and stage site to ensure easier installation
- Install expansion joint system and set to proper depth
- Work off the lower side of the deck when setting a joint
- Inspect installation, solvent wipe system if needed and remove any protected measures
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Sizing Considerations

- Sizing decisions take place in many ecosystems...
  - Design
  - Repair
  - Rehabilitation
Bridge Design Considerations

• Theoretical Movement

• Material Limitations
Theoretical vs. Actual Movement

- Calculated Thermal Movement
- Field Verification
  - Additional Measurements
  - Additional Tools
- Avoiding Extremes

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“SCRATCH PLATE”
Material Limitations

• Overall Movement

• Depth Requirements
Repair Considerations

• Existing conditions

• Scope of repairs
Existing Conditions

• Condition of Substrate
• Unique Joint Conditions
• Joint “Re-Sealing”
YOU GET A CHANGE ORDER!
EVERYONE GETS A CHANGE ORDER!!!
Scope of Repair

- Substrate quality
- Excessive Variation
- “No Go” Criteria
Rehabilitation Considerations

- Joint width
- Transitions
Rehab Remains

• Curbs
• Parapets
• Changes in Width
Sizing Considerations

- Design
- Repair
- Rehabilitation
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Preservation Methods of Bridge Joints
Repair vs Replace
Repair
Replace
**Recommendations**

- Training of Field engineers on various expansion joints and technologies
- Utilize industry standards for proper preparation of substrates
- Flexibility in actual field conditions vs “standards”
- Avoid Compromising quality for time constraints
- Follow Deck/Surface Preparation and Repair Matrix
- Be Proactive with Material Suppliers in the Design Stages
- Get preparation, installation, and sizing recommendations from suppliers
WE ARE ONLY A PHONE CALL AWAY

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