Bridge Cleaning Pocket Guide & State Survey

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Bridge Cleaning PG Task Group

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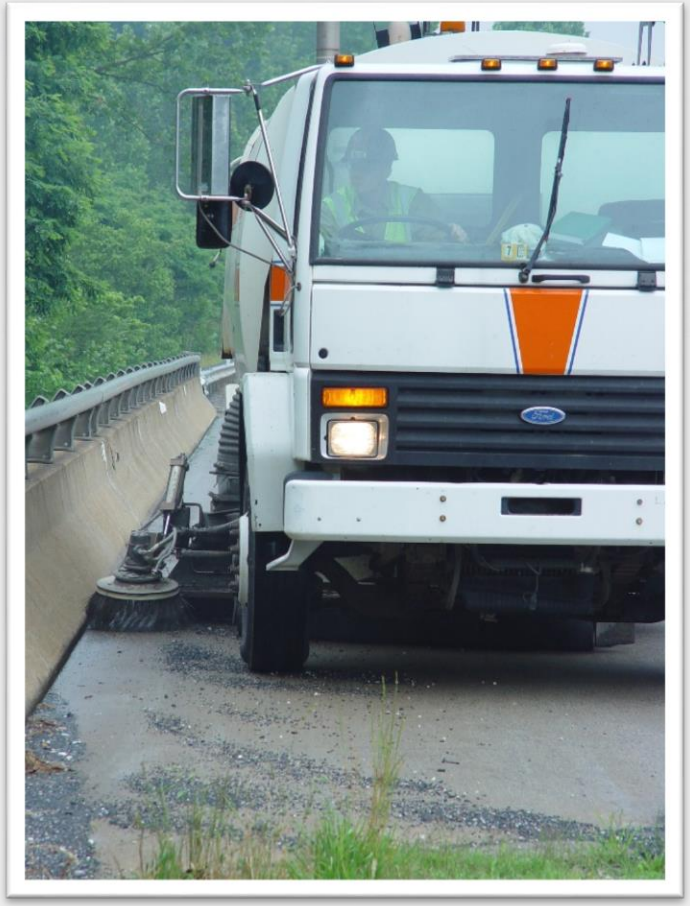


Challenges in Maintaining Highway Infrastructure

Cleaning, sweeping, rinsing, flushing, and power-washing

- Remove debris
- Clear scuppers and troughs
- Rinse away salts and abrasives
- Remove on-bridge vegetation

Bridge Deck Preservation - Bridge Cleaning Pocket Guide

Purpose and Scope

- Limits of topic: e.g., vegetation growth removal, not large debris from flooding

Background

- Overview of exposure; impact on functionality, durability, and safety

Accumulations of Debris and Contaminants

- Contaminant types (debris, salts, animal feces); effect on structural elements

Cleaning Methods

- Sweeping, shoveling, vacuuming, high-pressure and/or high-volume water

Complying with Environmental Regulations

- Run-off containment; protected species restrictions; state/federal regulations

Bridge Deck Preservation - Bridge Cleaning Pocket Guide

Disposition of Contaminants and Effluents

- Geography, water body types; methods, exclusions and limitations

Frequency of Cleaning/Washing

- By element type; geographic/meteorological influences; coordination w/ inspection

Access and Maintenance and Protection of Traffic

- Access to substructures; operations on decks; worker safety; MPT procedures

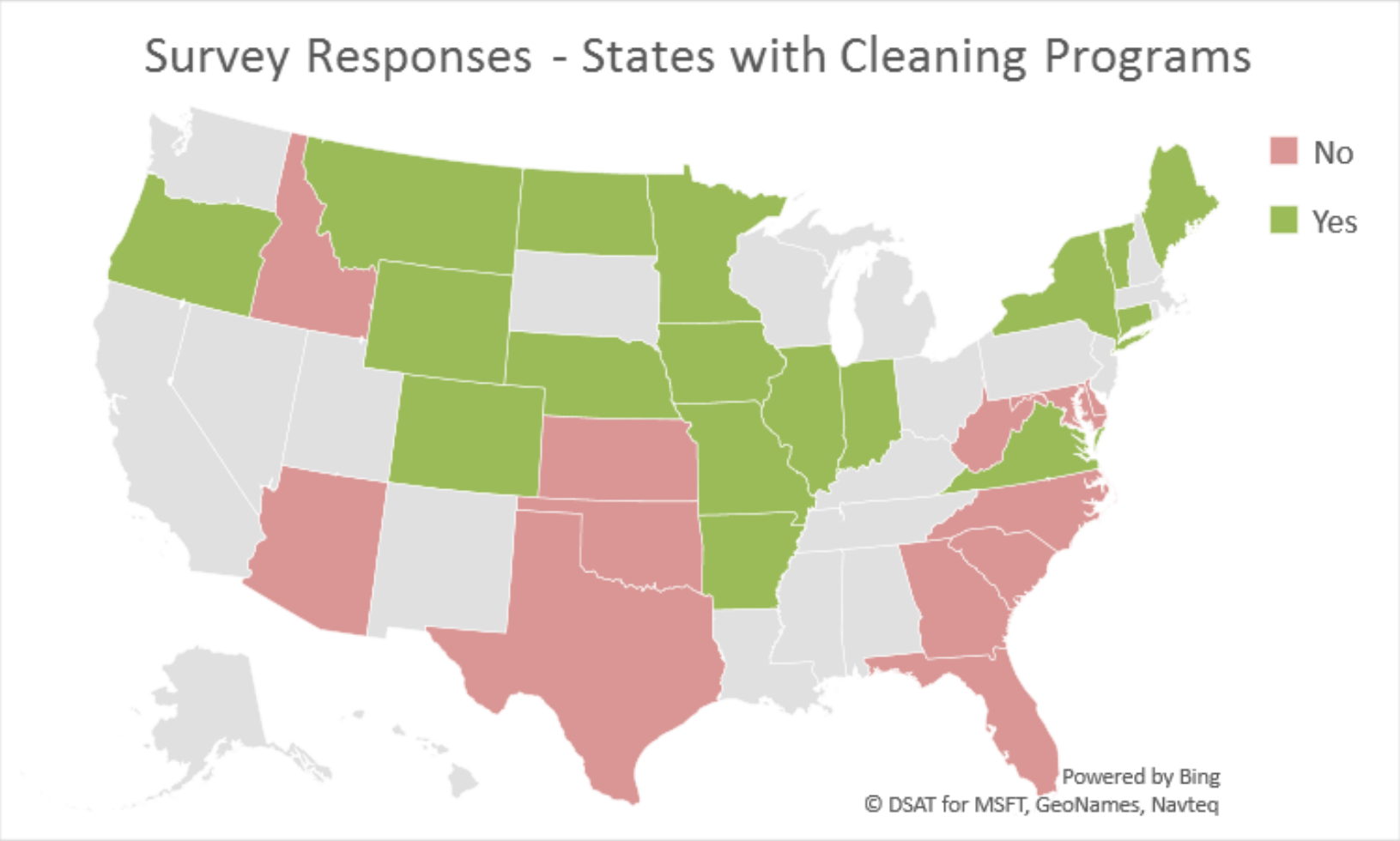
Benefits

- Benefits of cleaning on operations, service life, maintenance costs

References

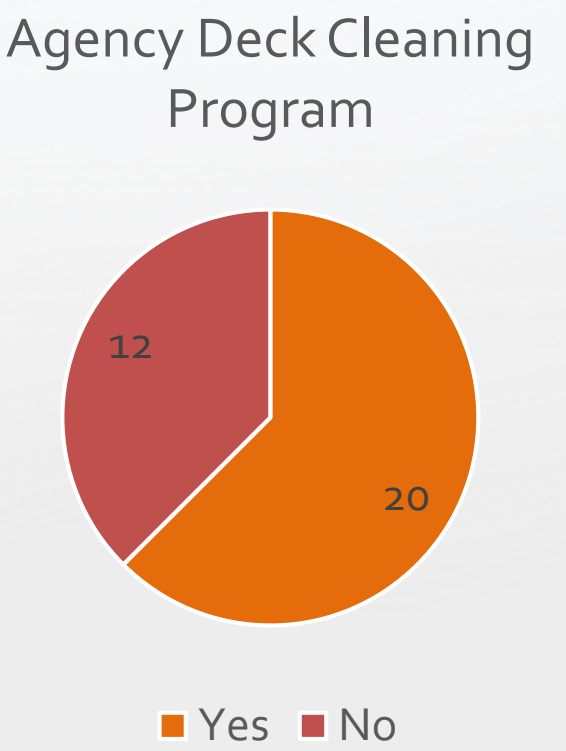
- Cited references with hyperlinks to resources and regulations

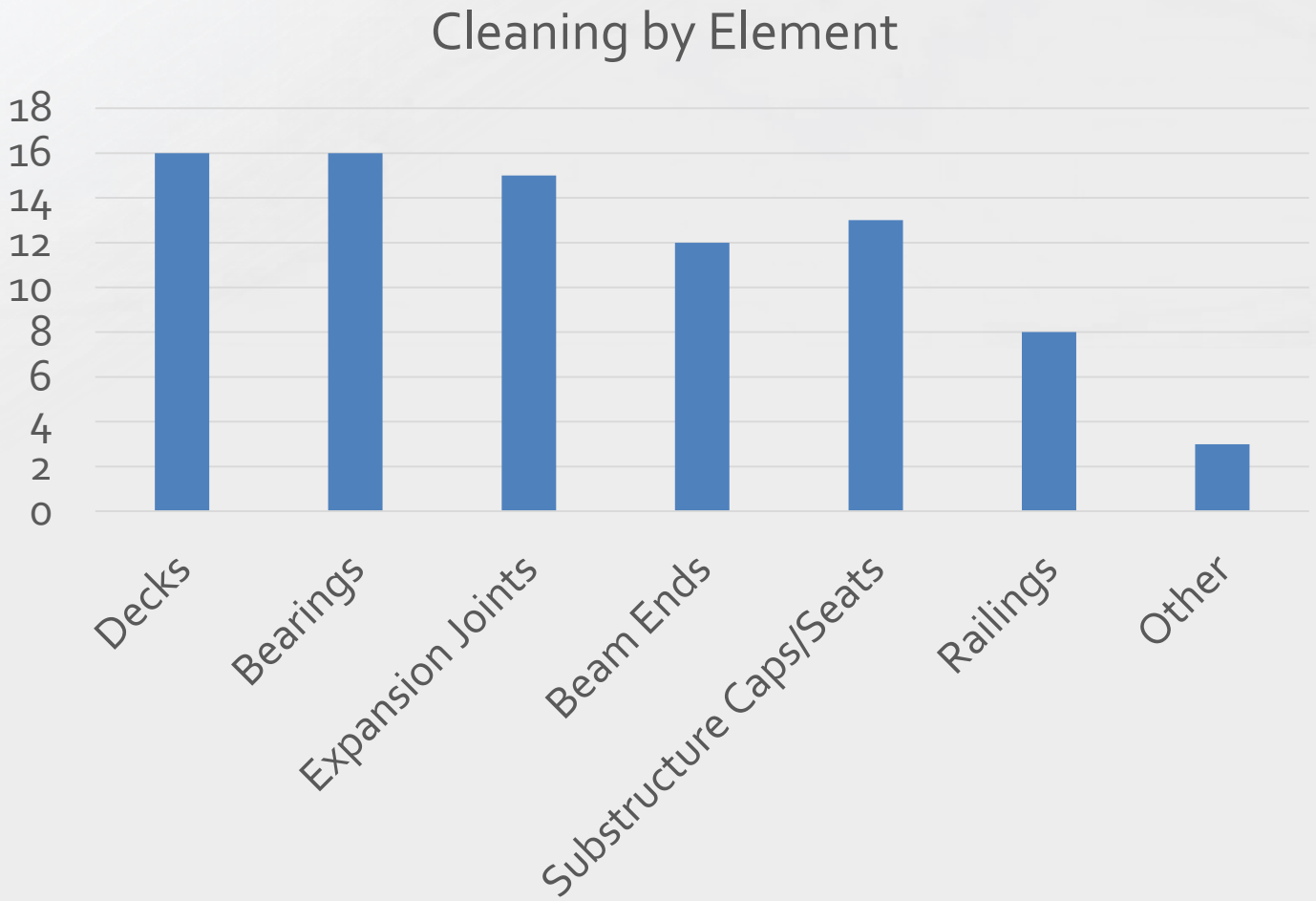
Survey Respondents



- Arizona
- Arkansas
- Colorado
- Connecticut
- Delaware
- Florida
- Georgia
- Idaho
- Illinois
- Indiana
- Iowa
- Kansas
- Maine
- Maryland
- Minnesota
- Missouri
- Montana
- Nebraska
- New York
- North Carolina
- North Dakota
- Oklahoma
- Oregon
- South Carolina
- Texas
- Vermont
- Virginia
- West Virginia
- Wyoming

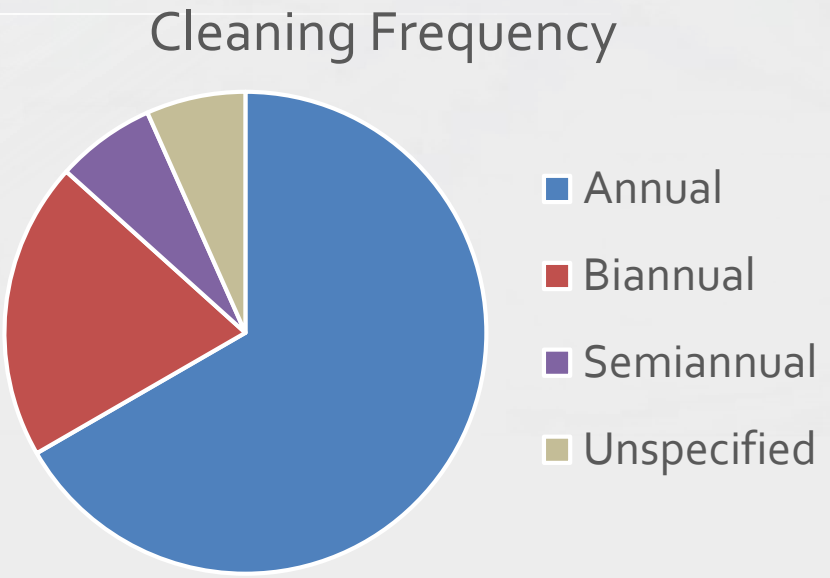
States with Bridge Cleaning Programs





Selection and Timing – Decks

- Bridges with railings
- Border bridges*
- All non-buried bridges
- All deck bridges
- Random as needed based on local field Maintenance personnel. Some areas are better at performing this than other.
- 50% of the region per year
- Deck Washing - All concrete decks and slabs that do not have an asphalt overlay. Deck Sweeping - All concrete decks and slabs with asphalt overlay, metal decks, timber decks and slabs.



"Always done in the spring"

Costs

$50,000 to $70,000 per bridge*

$2,000 to $10K

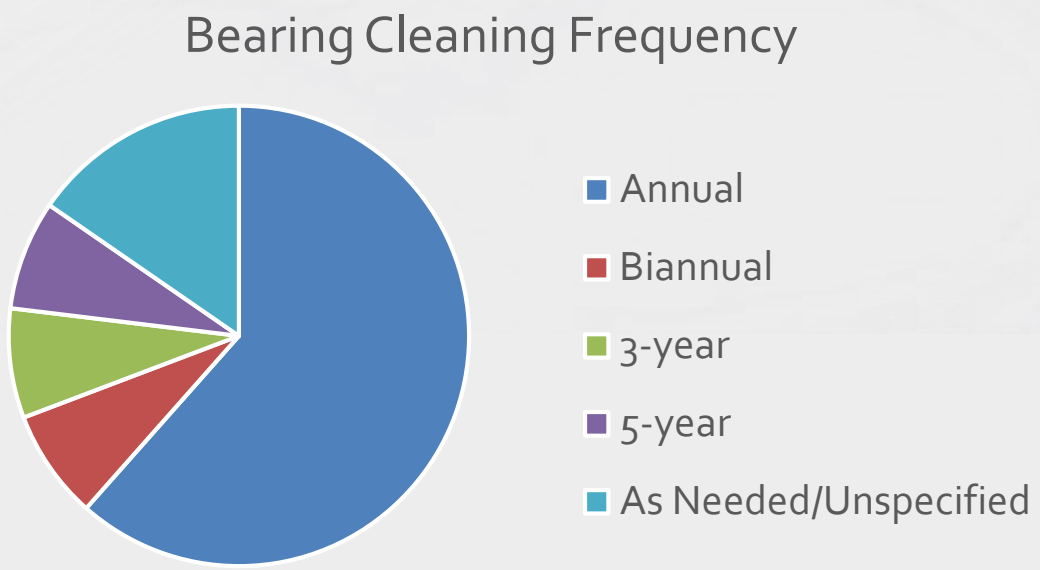
$0.04/SF

Washing - $0.24/SF

Sweeping - $0.18/SF

Selection and Timing – Bearings

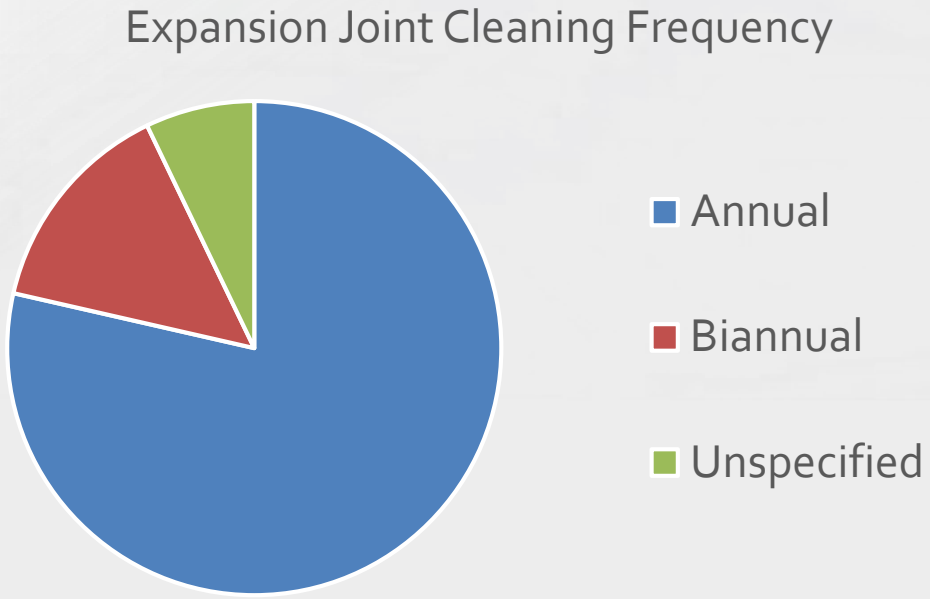
- Bridges with exposed bearings at end bents/abutments
- Bearings at open joints only
- All deck bridges
- As able to access
- 25% of the region per year
- Always done in the spring
- Included in Seat and Beam End Washing



"Always done in the spring"
"within 90 days of last winter storm event"

Selection and Timing – Expansion Joints

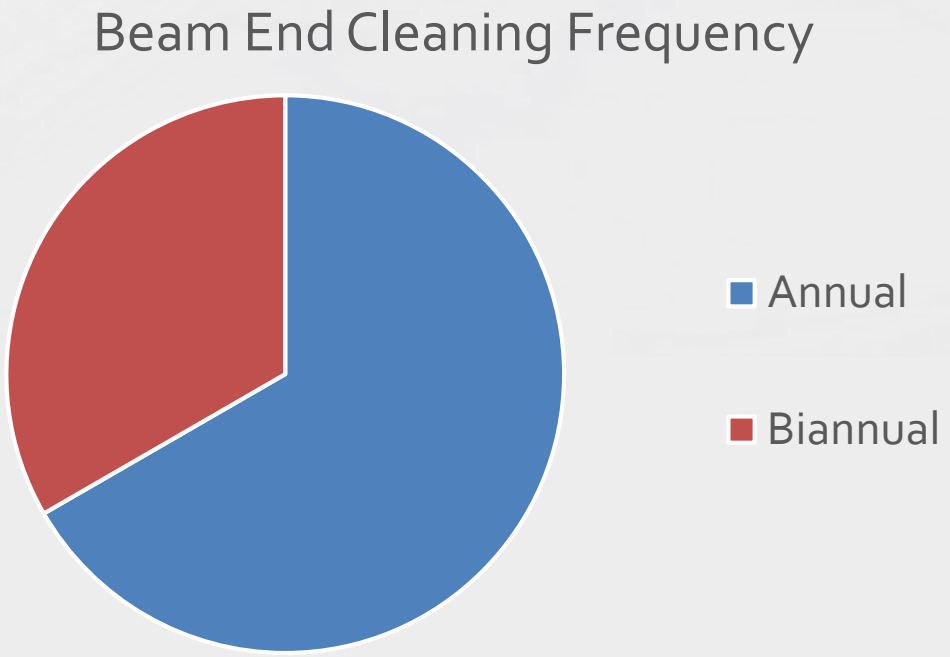
- Bridges with bridge deck expansion joints
- Border bridges
- All deck bridges
- All, as many as possible
- 50% of the region per year
- Included in deck cleaning



"Always done in the spring"
"within 90 days of last winter storm event"
"yearly in some areas. Some areas appear to be never."

Selection and Timing – Beam Ends

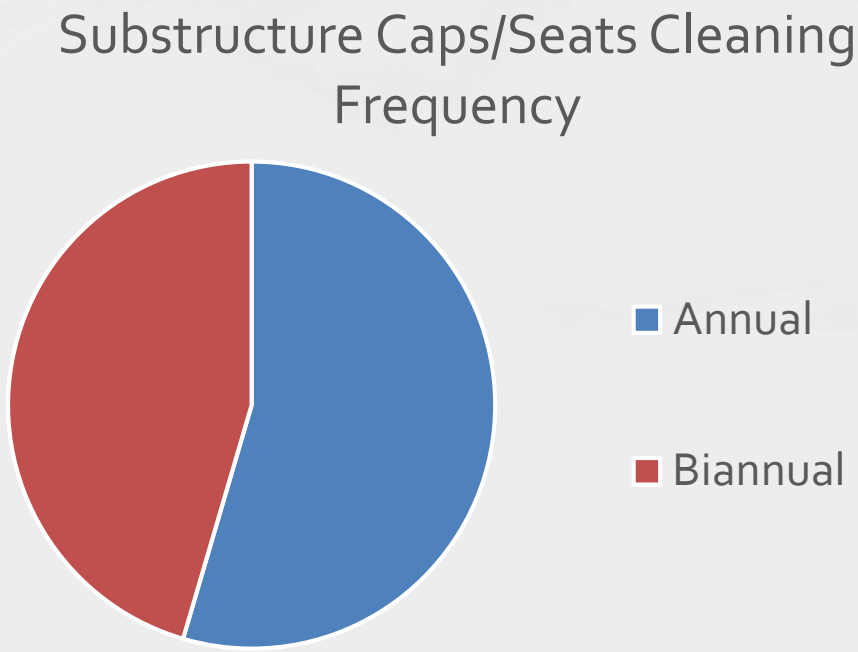
- Bridges with exposed beam ends at end bents/abutments
- Open joints
- All Deck Bridges
- All/as many as possible, based on access
- 50% of the region per year
- Included in Seat and Beam End Washing



"within 90 days of last winter storm event"

Selection & Timing – Substructure Caps/Seats

- Truss Structures
- Bridges with expansion joints over end bents/abutments
- Border bridges
- Open joints
- All Deck Bridges
- All/as many as possible, based on ability to access
- 50% of the region per year
- Seats and Beam End Washing - Clean all bridge seat and bearings, abutment seats, pier seats, bearing devices, end diaphragms and the last 5'of beams and girders.



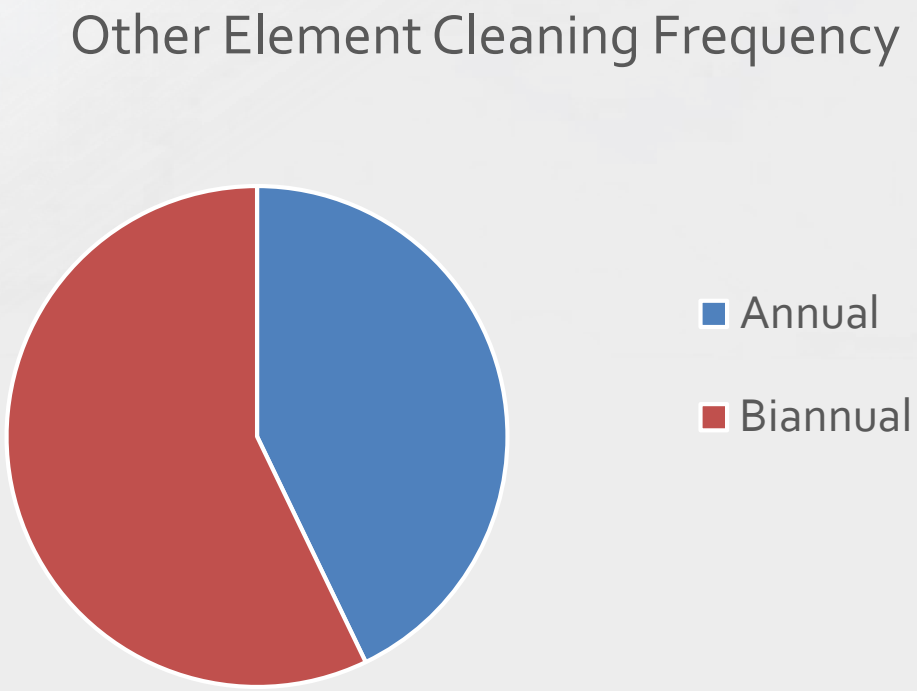
"within 90 days of last winter storm event"

Selection and Timing – Other Elements

- Railings/ Concrete railing
- Concrete barriers
- Columns

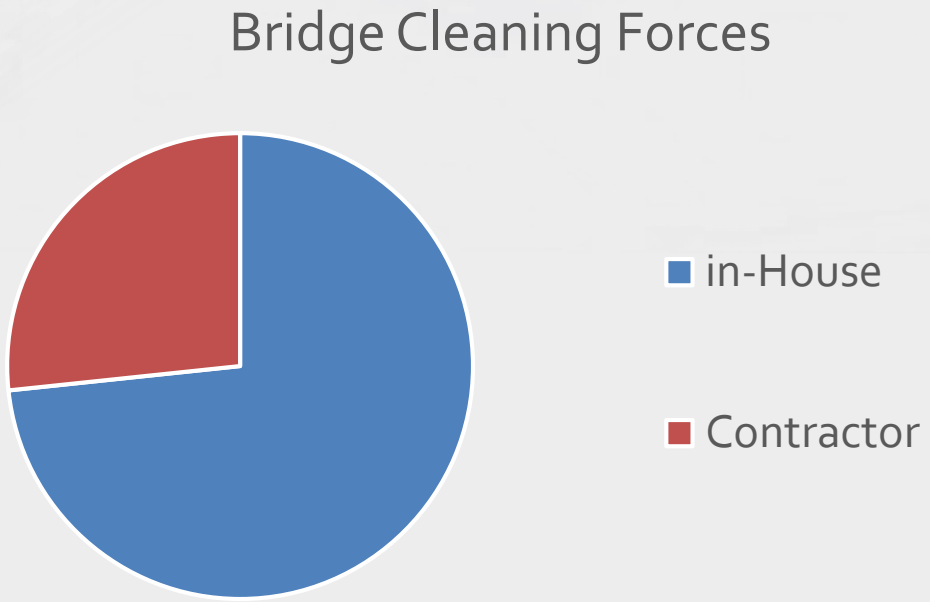
<u>Criteria</u>

- All Deck Bridges
- All
- 50% of the region per year



Staffing of Cleaning Activities

- Survey was structured as either/or
- Many states likely use a combination



Bridge Cleaning Provisions from Various DOTs

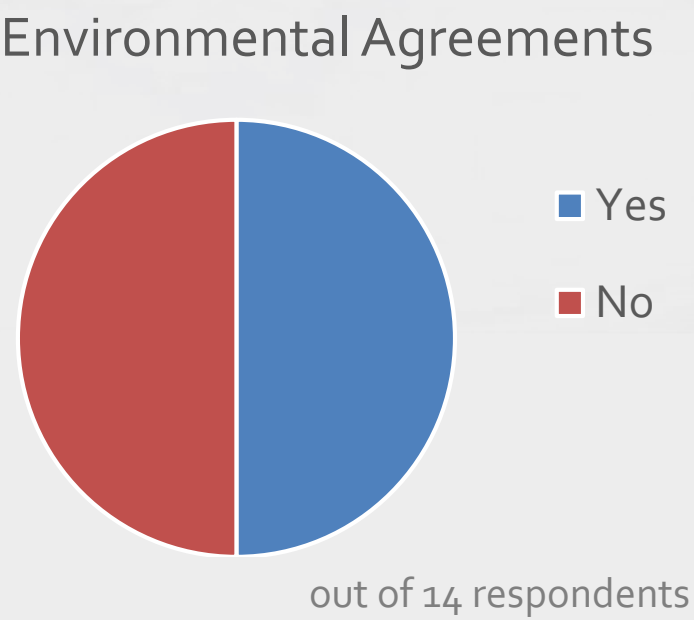
- No washing, just rinsing; collect all the run off
- Permit approved with environmental agency to conduct High flow - Low pressure Bridge Cleaning within 90 days of last winter storm event, expected during times of high water which would dilute and magnesium chloride deposits from cleaning
- Stay out of any water that is crossed and not leave any debris at site
- Contractor removes debris from bridge prior to washing. Water runs off the bridge
- Bridge first cleaned and debris picked up; bridge is washed during high stream flow
- All bridges are flushed using high water volume of water and low pressure
- Stormwater permit requires dry removal of bulk debris prior to washing. Required to use treated water source to avoid using in-stream local waters to prevent spread of invasive in-stream species. No additives or cleaners - only water for flushing

Bridge Cleaning Provisions from Various DOTs

- Remove majority of sand, dirt, and debris by bobcat bucket and wash the rest off
- Sweep or use hand tools to remove all dirt and debris from decks, pier tops, etc. Collect and dispose of debris in approved facility.
- VTrans has a bridge washing policy and best management practices
- Virginia - contract provisions for cleaning designated bridge superstructure and substructure surfaces, approaches and drains. Prescribes source and disposal of water for power washing. Special provision for bridges over a railroad or on railroad property. Containing and disposal of debris specified. Rinse, not power wash, the residues off of painted surfaces without damaging the protective coating.
  - Pay items for: Bridge Cleaning – Superstructure & Substructure; Bridge Cleaning and Washing – Superstructure, Substructure & Expansion Joint Drainage Trough

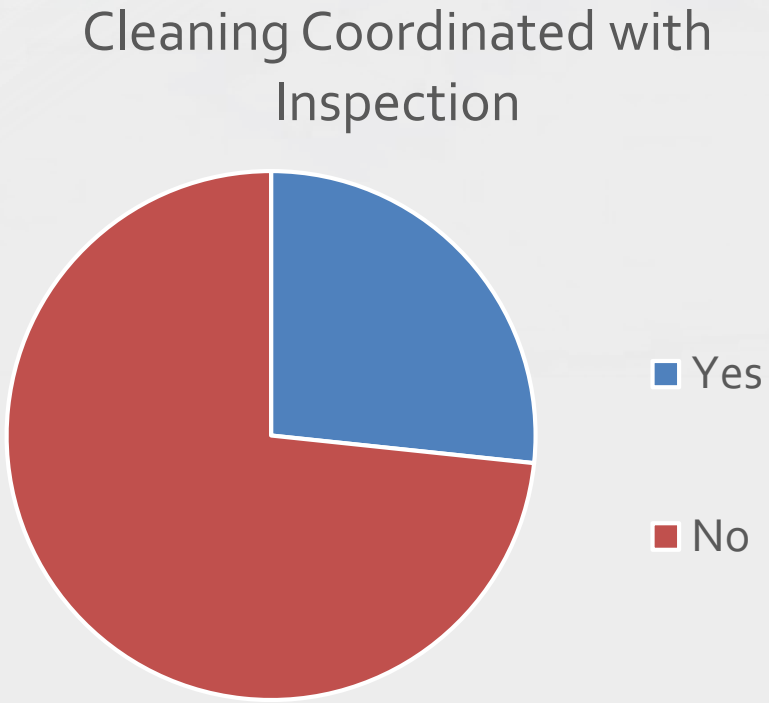
Agreements with Environmental Agencies

- MOU with USACE for removal of silt and vegetation work in a "Waters of the US". MOU is considered to cover our bridge cleaning efforts.
- Developed guidance document for street sweeping and flushing with MNDOT environmental stewardship office
- Stormwater permit, TS4 Permit Number MO-0137910, issued 10/28/2016



Activity Coordination

- The program is new and structures will be scheduled in the future to run consistently with inspection program
- Performed in early spring
- Coordination overall through spring bridge cleaning; however, we are working towards contract washing of major bridges in advance of construction due to extensive access requirements.



Documenting Benefits

<u>Studies, documentation of service life or economic benefits</u>

Only 1 or 2 responded Yes.

- Recently implemented, Spring 2017, therefore no long term results have been tracked or documented
- Other than information gathered by the previously delineated study, we have not
- Districts have realized the benefits of flushing through perceived delay of deterioration and opportunity to perform additional maintenance assessments
- Again, we firmly believe in washing for preventive maintenance; however, this has not been formally quantified

Questions?