# BRIDGE PRESERVATION

North Dakota Association of County Engineers

January 21, 2016

Nancy Huether, P.E. & Gary Doerr, P.E.

NDDOT Bridge Division

# What is Bridge Preservation?

*AASHTO defines* **Bridge Preservation [as] "actions or strategies that prevent, delay or reduce deterioration of bridges or bridge elements, restore the function of existing bridges, keep bridges in good condition and extend their life."**

***Source: AASHTO Board of Directors, Policy Resolution PR-3-11, October 17, 2011.***

# What is Bridge Preservation?



Source: FHWA Bridge Preservation Guide, August 2011

# Bridge Preservation at all phases of the life of a bridge

- Design
- Construction
- Scheduled Preventative Maintenance
- As-Needed Preventative Maintenance
- Major Maintenance/Rehabilitation

# Design

- Design for 75 to 100-year life
- Analyze hydraulics carefully
- Use quality, long-lasting materials
  - Epoxy coated reinforcement
  - Quality paint/coating
- Follow proven methods
  - Use integral abutments when possible to eliminate joints
  - Provide adequate cover over reinforcement
  - Provide proper deck drainage
- Learn from past – successes and failures

# Construction


- Quality Contractor
- Properly trained Construction Observer
- Contractor and Observer
  understand Plans and Specifications
- Proper materials used during construction
  - Compliance with plans, specs, and shop drawings
- Sound construction methods used
  - Document conditions, tests, results, etc.

# Preventative Maintenance - Scheduled

- Perform Scheduled Preventative Maintenance (SPM)
  - Sweep Decks
  - Clean decks, joints, drainage systems
  - Seal concrete surfaces
    - Deck, splash zone, pier tops
  - Seal deck cracks
  - Clean & Lubricate Bearings
- Follow Best Practices
- Use proven materials


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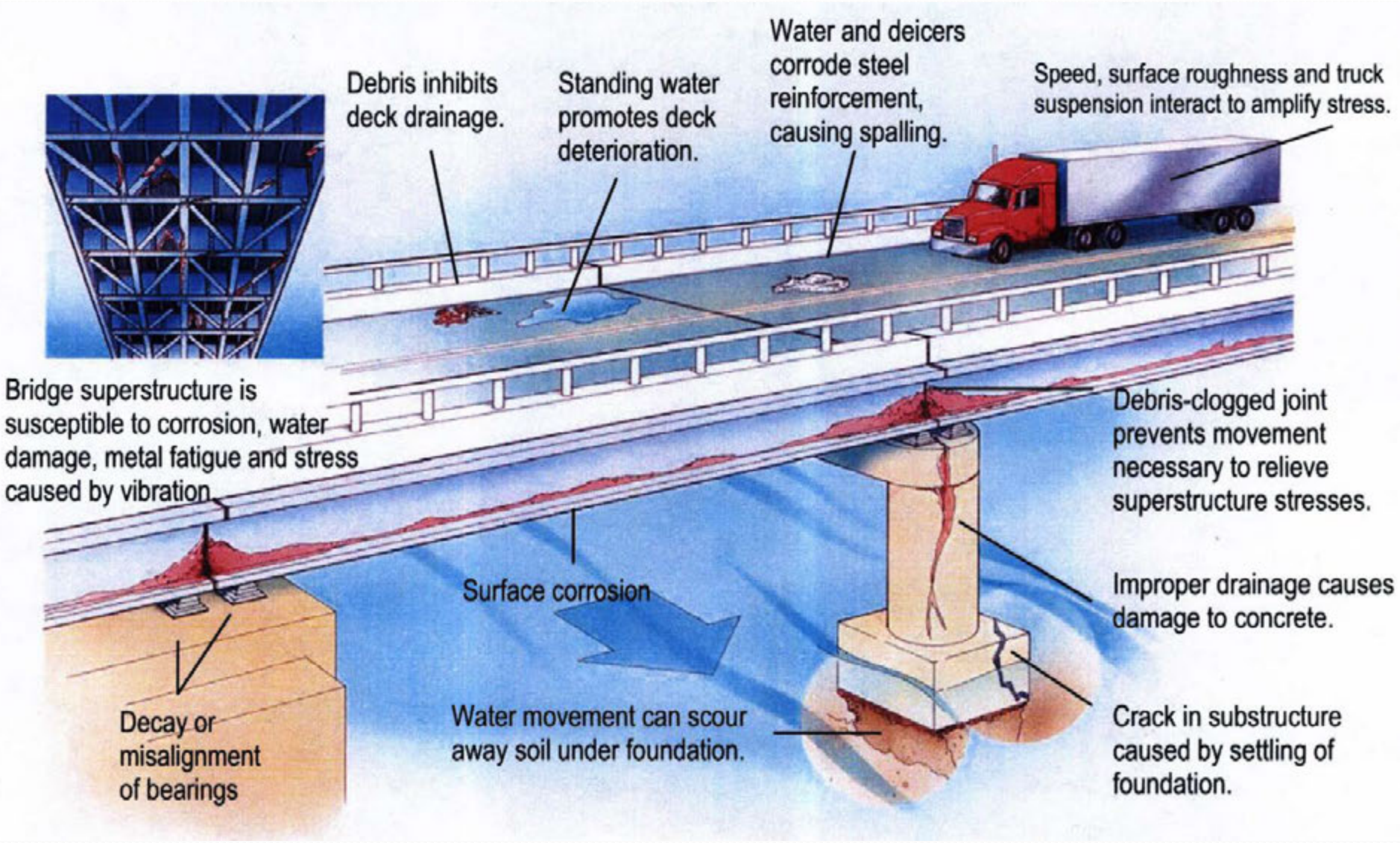
# Preventative Maintenance - As-Needed

- Fix minor problems when found
  - Minor erosion
  - Spalled concrete
  - Debris on & around bridge
  - Joints & Drains
- Use inspection SI&A sheets
  - Review and address Comments
  - Address Alert Codes 1 & 2
  - Don't wait till issue becomes Alert Code 3
- Know or learn what to look for
- Address the **cause** of the problem



Debris inhibits deck drainage.
Standing water promotes deck deterioration.
Water and deicers corrode steel reinforcement, causing spalling.
Speed, surface roughness and truck suspension interact to amplify stress.
Bridge superstructure is susceptible to corrosion, water damage, metal fatigue and stress caused by vibration.
Debris-clogged joint prevents movement necessary to relieve superstructure stresses.
Surface corrosion
Improper drainage causes damage to concrete.
Decay or misalignment of bearings
Water movement can scour away soil under foundation.
Crack in substructure caused by settling of foundation.

# Erosion Issues

# Major Maintenance/Rehabilitation

- Includes:
  - Deck replacement
  - Joint replacement
  - Painting/Coating


- Schedule major bridge projects wisely
  - Before problem adversely affects other elements of bridge
  - Combine with corridor projects
  - Combine similar projects to make more economical

# Sorlie Bridge – Grand Forks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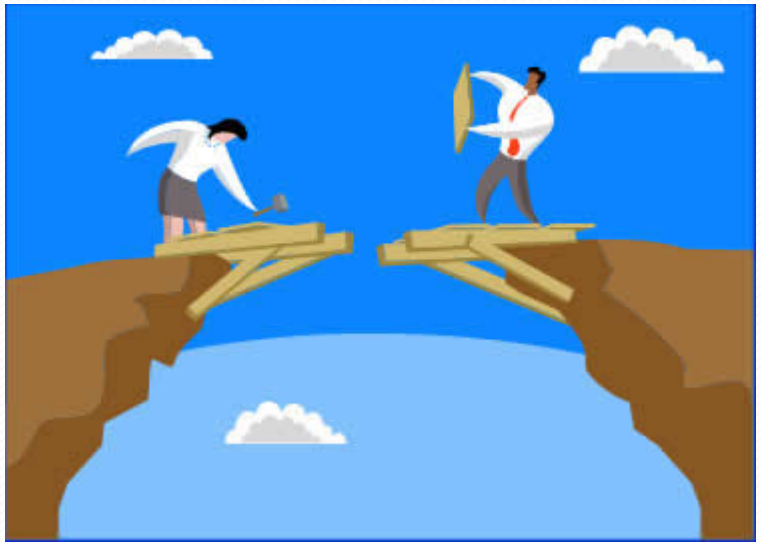
# Bridges are . . .

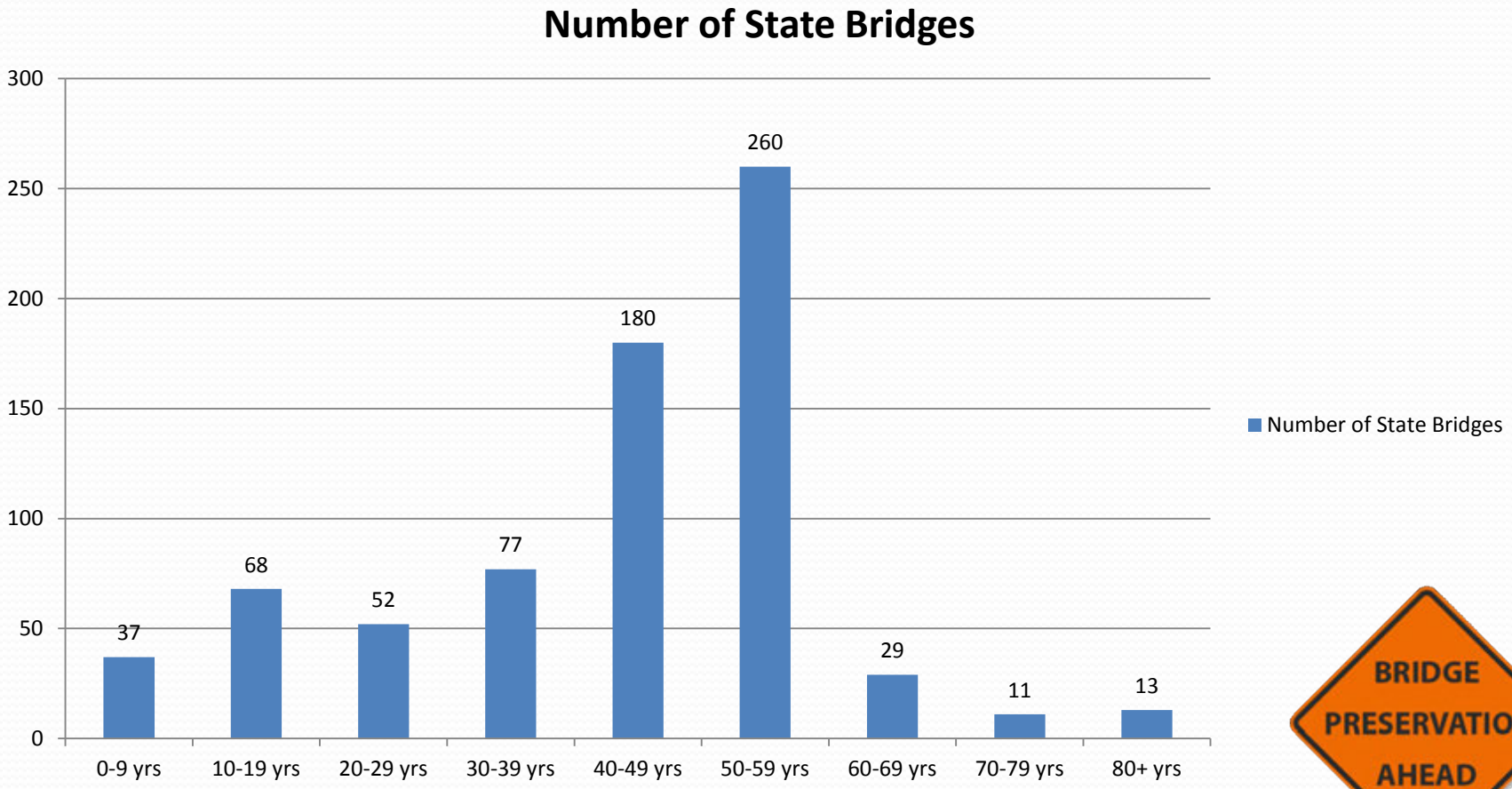
- A Valuable and Critical Asset
  - Major Rehabilitation or Replacement is Costly
  - Detour Routes are often Long
- The Link that Connects the Roadways in our Transportation System



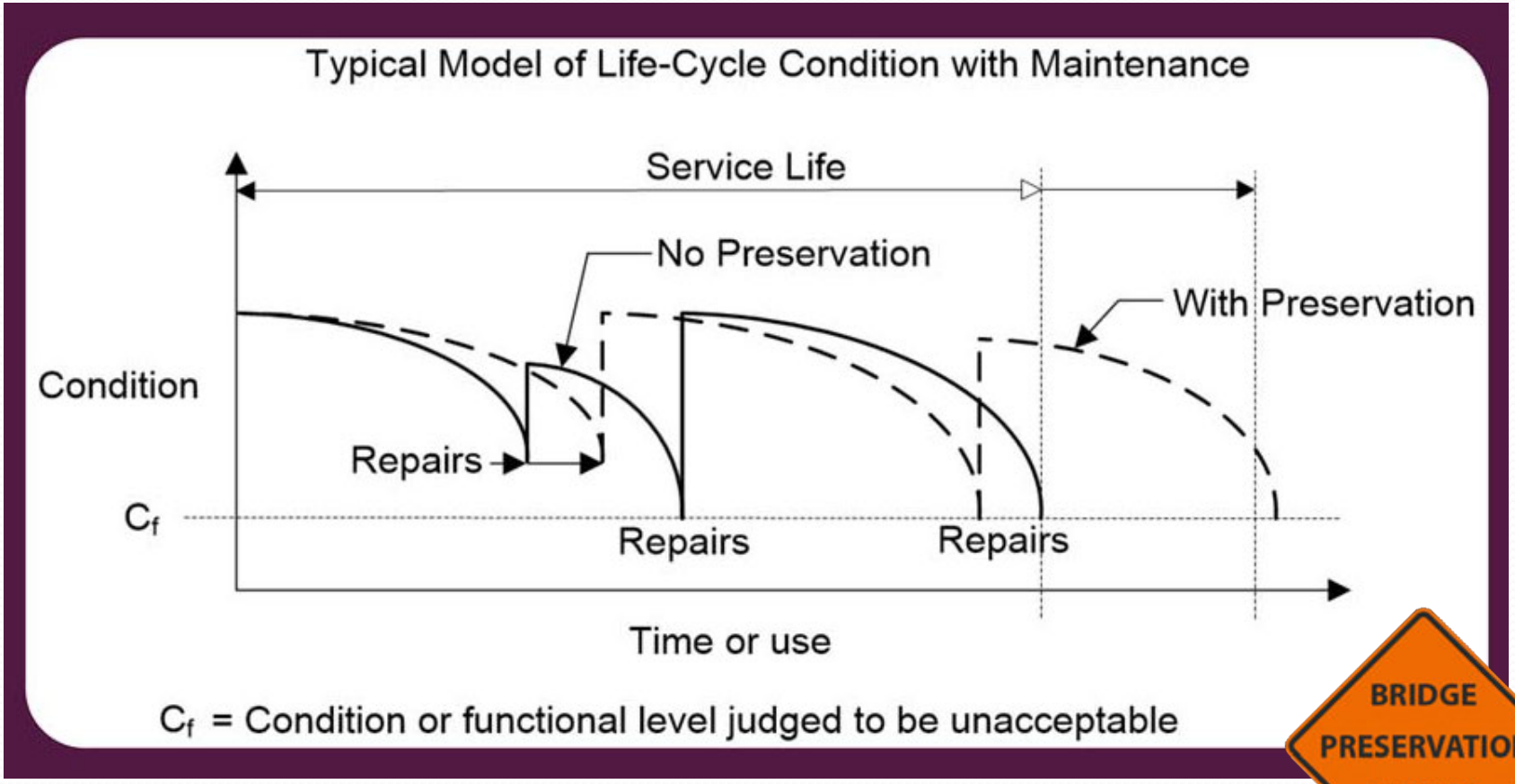
# Bridge Preservation at NDDOT

- We needed a better *plan* for efficient and effective care of our bridges
  - Our bridges are aging
  - We are using more deicing materials on our bridges
  - We want to make the best use of limited funding
  - **Performing preventative maintenance & fixing minor problems is more cost effective than major repairs & replacement**
- Take the **right action** on the **right bridge** at the **right time** for the **right cost**

# State Bridge Age




# Example of Life Cycle Cost Chart




# Bridge Preservation Program

## Goals & Measures

- Goals
  - Long-term results desired by organization
- Measures
  - Specific steps that can be monitored for completeness


# Goals & Measures*

- Overall Goal
  - Employ cost effective strategies and actions to keep bridges in good condition and maximize their useful life
- Measures
  - Bridge Health Index
    - Current Value compared to New Condition Value
  - Percent of Structurally Deficient Bridges
  - Percent of Deck Area in Good Condition
  - Percent of Preventative Maintenance Completed

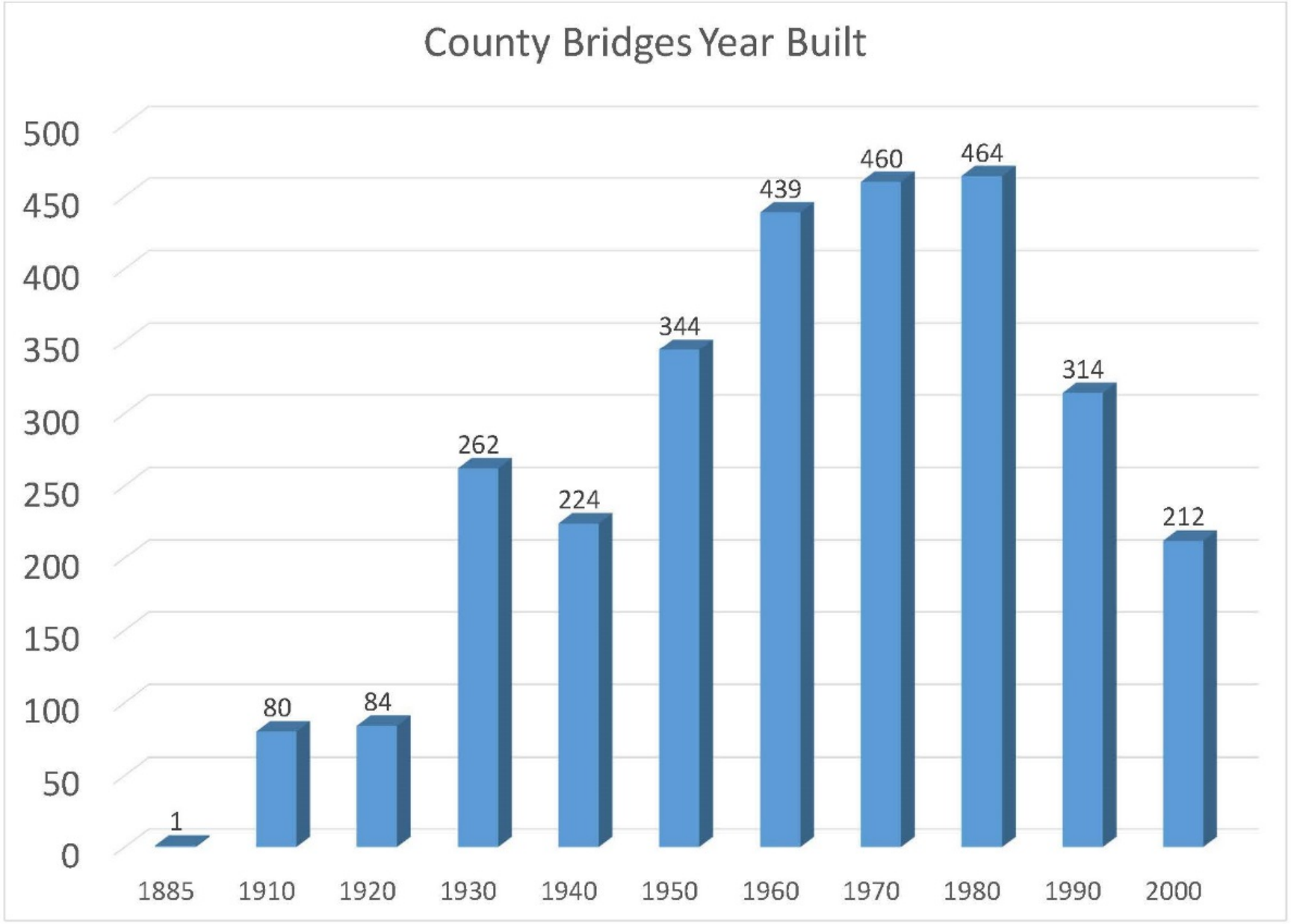

* Examples only

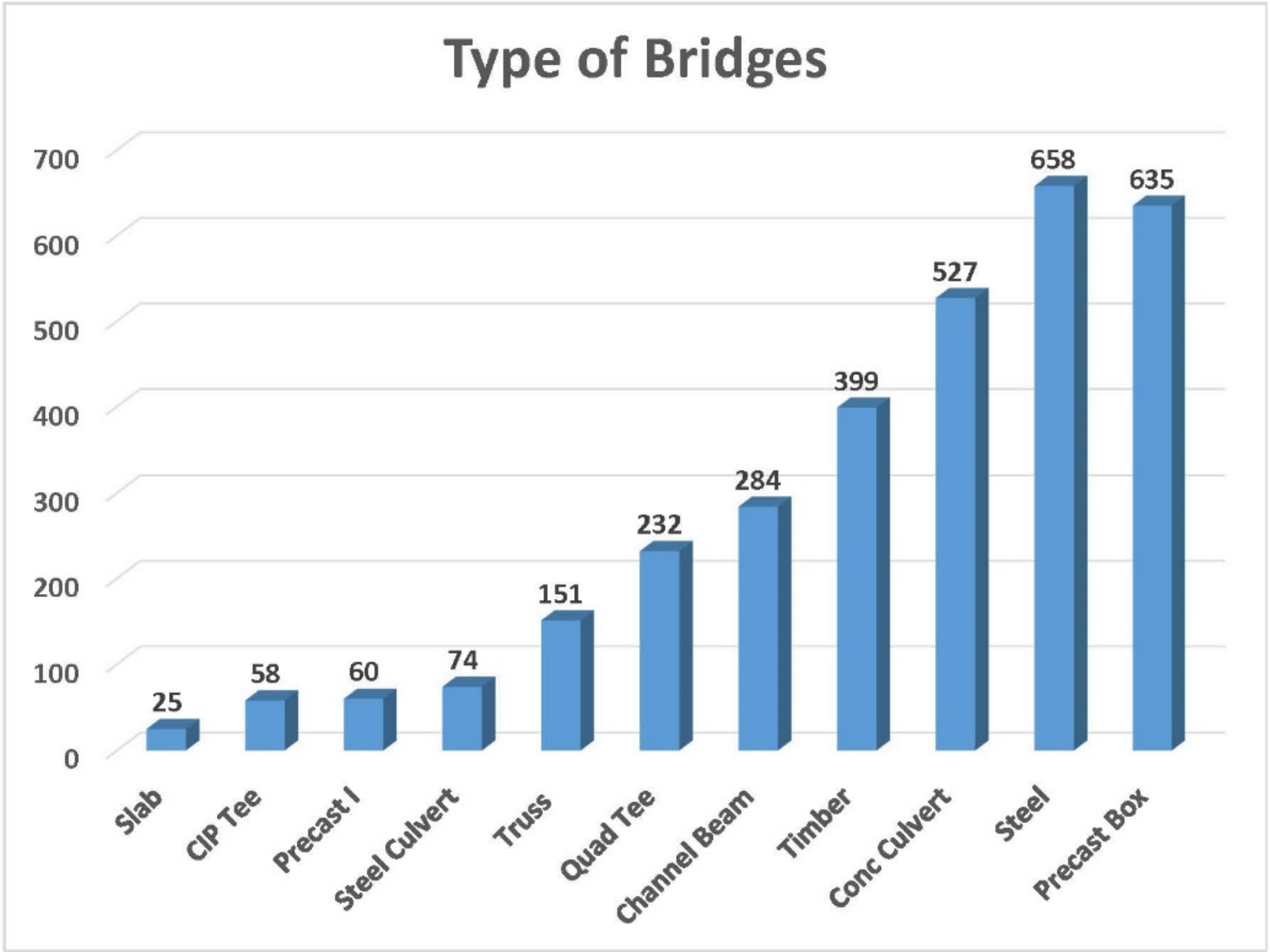
# NDDOT Bridge Preservation Program

- Update Bridge Maintenance Manual
  - Best Practices
  - Materials
  - Recommended Intervals

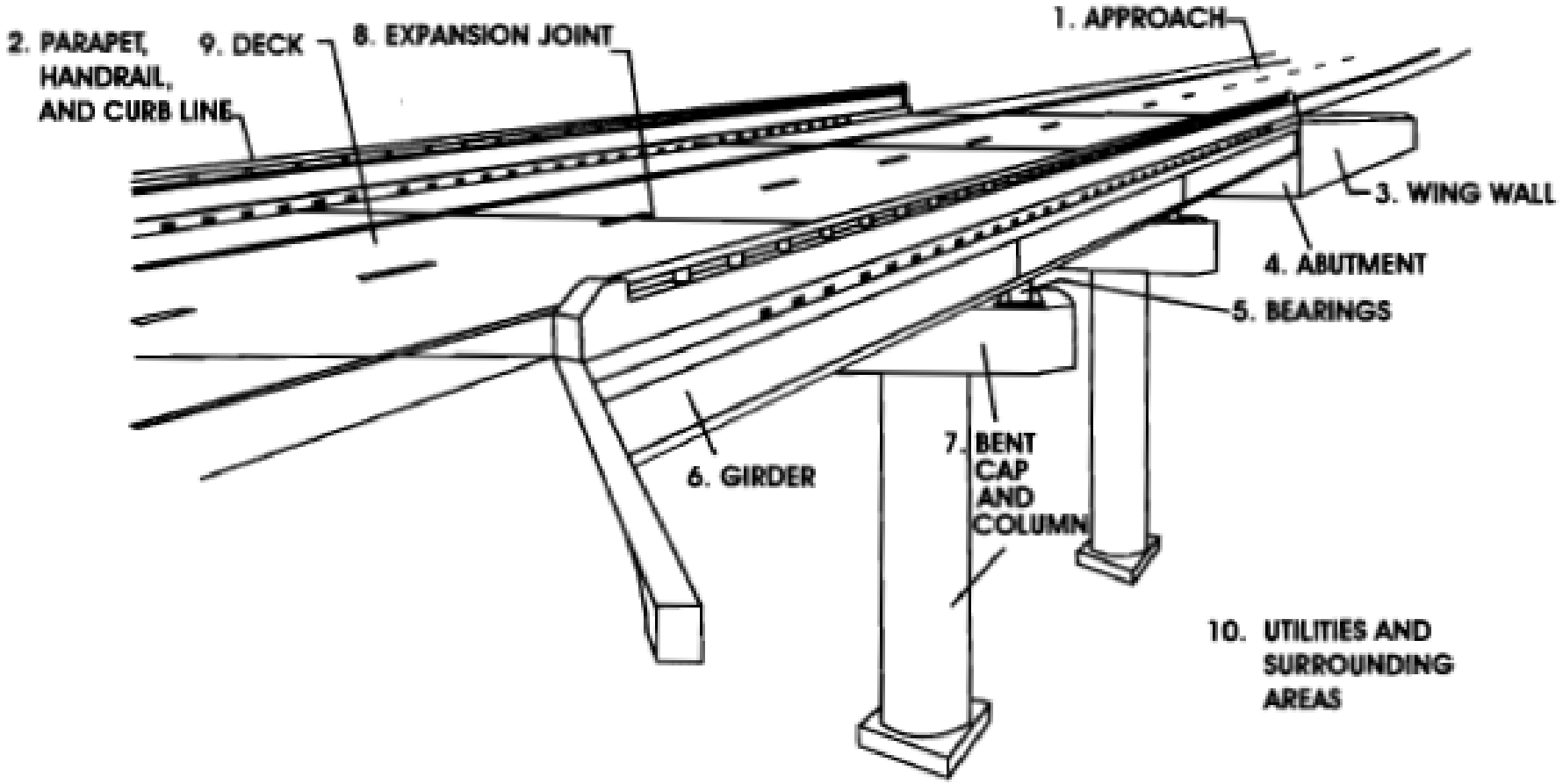

- Use updated Bridge Management System (BrM)
  - Track and Monitor Measures
  - Prioritize and Plan Actions/Strategies/Projects
    - Maximize effectiveness
    - Minimize cost
- Keep our bridges in good condition and extend their useful life!

# How do you know what to preserve?


County Bridges Year Built
500
450
400
350
300
250
200
150
100
50
0
1
80
84
262
224
344
439
460
464
314
212
1885
1910
1920
1930
1940
1950
1960
1970
1980
1990
2000


Type of Bridges
700
600
500
400
300
200
100
0
25
58
60
74
151
232
284
399
527
658
635
Slab
CIP Tee
Precast I
Steel Culvert
Truss
Quad Tee
Channel Beam
Timber
Conc Culvert
Steel
Precast Box

# Post Incident 10-Point Inspection Cheat Sheet



January 13, 2016

# North Dakota Department of Transportation

## Bridge Inventory - Structure Inventory And Appraisal Sheet

SEC 409

**Structure Number:** 18-113-28.1 chaindate

| | | | |
|---|---|---|---|
| 200 System Designation | | 3 – County Off | |
| 201 Status | | Not Deficient | |
| 202 Sufficiency Rating | | 62.00 | |
| **Identification** | | | |
| 02 Highway District | | Grand Forks District | |
| 03 County | | Gr. Forks | |
| 04 City | | GRACE TOWNSHIP | |
| 05 Inventory Route | | Route On Structure | |
| 4 County Hwy | 1 Mainline 00000 | 0 N/A (NBI) | |
| 06 Feats Intersect | | CREEK | |
| 09 Location | | 2 SOUTH 1 WEST KEMPTON | |
| 11 Milepoint | | 0.000 | |
| 13 LRS Inv Route, Subroute | | -1 | -1 |
| 16 Latitude | | 47d 47' 16.00" | |
| 17 Longitude | | 97d 38' 36.00" | |
| GPS Coordinates XY | 601621.7 | 5293591.9 | |
| 98 Border Bridge | Unknown (P) | 0.00 % | |
| 99 Border Bridge Struct No. | | _ | |
| **Structure Type and Material** | | | |
| 43 Main Struct Type | | Steel | |
| Stringer | | | |
| 44 Approach Struct Type | | Unknown (NBI) | |
| | | Unknown (P) | |
| 45 No. Spans in Main Unit | | 1 | |
| 46 No. Approach Spans | | 0 | |
| 107 Deck Struct Type | | 8 Wood or Timber | |
| 108 Wearing Surface | | 7 Wood or Timber | |
| Membrane | | 0 None | |
| Dk Protect | | None | |
| 208 Dk Overburden | 205 | Gravel/Dirt | |
| **Age and Service** | | | |
| 27 Yr Built | 1949 106 Yr Reconstructed | -1 | |
| 42 Type of Service | | 1 Highway - On | |
| | | 5 Waterway - Under | |
| 28 Lanes on Structure | | 2 | |
| 29 ADT | 30 30 Year of ADT | 2013 | |
| 109 Average Daily Truck Traffic | | -1.00 | |
| 19 Bypass, Detour Length | | 2 Miles | |
| **Geometric Data** | | | |
| 10 Min Vert Clearance | | 328 Ft. 1 In. | |
| 32 Approach Roadway Width | | 20 Feet | |
| 33 Bridge Median | | 0 No median | |
| 34 Skew | | 0.00 | |
| 35 Structure Flared | | 0 No flare | |
| 47 Total Horizontal Clearance | | 25.3 Feet | |
| 48 Length of Max Span | | 26 Feet | |
| 49 Structure Length | | 29.86 Feet | |
| 50 Curb/Sidewalk Widths | | 0.3 Ft Rt-Side | |
| | | 0.3 Ft Lt-Side | |
| 51 Bridge Rdwy Width - Curb to Curb | | 25.3 Feet | |
| 52 Deck Width | | 26.2 Feet | |
| 53 Min Vert Clear. Over Bridge | | 328 Ft. 1 In. | |
| 54 Min Vert Underclearance | | 0 Ft. 0 In. | |

| | | | |
|---|---|---|---|
| **Classification** | | | |
| 12 Base Highway Network | | Not on Base Network | |
| 20 Toll | | 3 On free road | |
| 21 Maint Responsibility | | 02 County Hwy Agency | |
| 22 Owner | | 02 County Hwy Agency | |
| 26 Functional | | Rural, Local | |
| 37 Historical Significance | | 5 Not eligible for NRHP | |
| 100 Defense Highway Designation | | 0 Not a STRAHNET hwy | |
| 101 Parallel Structure Designation | | No \|\| bridge exists | |
| 102 Direction of Traffic | | 2 2-way traffic | |
| 103 Temporary Structure Designation | | Not Applicable (P) | |
| 104 Highway System of Inventory Rte | | 0 Not on NHS | |
| 105 Federal Lands Highways | | Not applicable | |
| 110 Designated National Network | | 0 Not part of natl netwo | |
| 112 NBIS Bridge Length | | | |
| 226 Functional Under | | | |
| **Condition** | | | |
| 58 Deck | | 7 Good | |
| 59 Superstructure | | 6 Satisfactory | |
| 60 Substructure | | 5 Fair | |
| 61 Chan. & Chan. Protection | | 7 Minor Damage | |
| 62 Culvert and Retaining Walls | | N N/A (NBI) | |
| **Load Rating and Posting** | | | |
| 31 Design Load | | M 18 (H 20) (live load for which structure was designated) | |
| 41 Structure Open, Closed or Posted | | P Posted for load | |
| 63 Operating Rating Method | | 2 AS Allowable Stress | |
| 64 Oper. Rating | HS 14 | 26 Tons | |
| 65 Inventory Rating Method | | 2 AS Allowable Stress | |
| 66 Inv. Rating | HS 9 | 17 Tons | |
| 70 Bridge Posting | | 2 20.0-29.9%below | |
| 209 Posted in "Tons" | | 27 Tons | |
| **Appraisal** | | | |
| 67 Structural Condition | | 4 Minimum Tolerable | |
| 68 Deck Geometry | | 6 Equal Min Criteria | |
| 69 Underclear. Vert & Horiz | | N Not applicable (NBI) | |
| 71 Waterway Adequacy | | 8 Equal Desirable | |
| 72 App. Rdwy. Alignment | | 6 Equal Min Criteria | |
| 36 Traffic Safety Features | | 0 0 0 0 | |
| 113 Scour Critical | | U Unknown Scour | |
| **Inspections** | | | |
| 90 Date of Last Inspection | | September 02, 2015 | |
| 91 Designated Inspection Frequency | | 24 Months | |
| 92 Critical Feature Inspected / 93 Critical Feature Last Inpsection Dt | | | |
| Fracture Critical | N | | |
| Underwater | N | | |
| Other Special | N | | |
| 218 Channel Profile | Y 48 | 09/19/2013 | |
| Chaining Date | | None | |
| 207 Transporter Erector Routes and Sites | | -1 | |
| 212 Structure Load Rated | | 01/01/1901 | |
| 213 Federal Aid Project Number | | | |
| 214 Delayed Inspection | | Not Applicable | |
| 216 Inspector | | Fischer | |

# SI&A Sheet

# North Dakota Department of Transportation

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| Membrane | 0 None | |
| Dk Protect | None | |
| 208 Dk Overburden 205 | Gravel/Dirt | |
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|---|---|
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| 41 Structure Open, Closed or Posted | P Posted for load |
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| 64 Oper. Rating HS 14 | 26 Tons |
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| 66 Inv. Rating HS 9 | 17 Tons |
| 70 Bridge Posting | 2 20.0-29.9%below |
| 209 Posted in "Tons" | 27 Tons |

| | | | |
|---|---|---|---|
| 108 Wearing Surface | | | 7 Wood or Timber |
| Membrane | | | 0 None |
| Dk Protect | | | None |
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**Age and Service**

| | | | |
|---|---|---|---|
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| 29 ADT | 30 | 30 Year of ADT | 2013 |
| 109 Average Daily Truck Traffic | | | -1.00 |
| 19 Bypass, Detour Length | | | 2 Miles |

**Geometric Data**

| | | |
|---|---|---|
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| 32 Approach Roadway Width | | 20 Feet |
| 33 Bridge Median | | 0 No median |
| 34 Skew | | 0.00 |
| 35 Structure Flared | | 0 No flare |
| 47 Total Horizontal Clearance | | 25.3 Feet |
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| 49 Structure Length | | 29.86 Feet |
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| | 0.3 | Ft Lt-Side |
| 51 Bridge Rdwy Width - Curb to Curb | | 25.3 Feet |
| 52 Deck Width | | 26.2 Feet |
| 53 Min Vert Clear. Over Bridge | | 328 Ft. 1 In. |
| 54 Min Vert Underclearance | | 0 Ft. 0 In. |
| | | N Feature not hwy or RR |
| 55 Min Lateral UnderClear. - Rt | | 327.8 Feet |
| | | N Feature not hwy or RR |
| 56 Min Lateral UnderClear. - Lt | | 0.0 Feet |
| 210 Culvert / 211 Description | | |

| | | | |
|---|---|---|---|
| 63 Operating Rating Method | | | 2 AS Allowable Stress |
| 64 Oper. Rating | HS | 14 | 26 Tons |
| 65 Inventory Rating Method | | | 2 AS Allowable Stress |
| 66 Inv. Rating | HS | 9 | 17 Tons |
| 70 Bridge Posting | | | 2 20.0-29.9%below |
| 209 Posted in "Tons" | | | 27 Tons |

**Appraisal**

| | |
|---|---|
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| 72 App. Rdwy. Alignment | 6 Equal Min Criteria |
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**Inspections**

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| Fracture Critical | N | | |
| Underwater | N | | |
| Other Special | N | | |
| 218 Channel Profile | Y | 48 | 09/19/2013 |
| Chaining Date | | | None |
| 207 Transporter Erector Routes and Sites | | | -1 |
| 212 Structure Load Rated | | | 01/01/1901 |
| 213 Federal Aid Project Number | | | |
| 214 Delayed Inspection | | | Not Applicable |
| 216 Inspector | | | Fischer |

**Navigation Data**

| | |
|---|---|
| 38 Navigation Control | Permit Not Required |
| 39 Navigation Vertical Clearance | 0 Feet |
| 40 Navigation Horizontal Clearance | 0 Feet |
| 111 Pier or Abutment Protection | Unknown (NBI) |
| 116 Minimum Navigation Vertical Clearance | -1 Feet |

# North Dakota Department of Transportation

## Bridge Inventory - Structure Inventory And Appraisal Sheet



**Structure Number:** 18-113-28.1

chaindate

| Element / Env. / Description | Units | Total Qty | 1 % | 1-Qty St | 2 % | 2-Qty St | 3 % | 3-Qty St | 4 % | 4-Qty St |
|---|---|---|---|---|---|---|---|---|---|---|
| 107/2:Steel Opn Girder/Beam | ft | 331 | 100 | 331 | 0 | 0 | 0 | 0 | 0 | 0 |
| 515/2:Steel Protective Coating | sq.ft | 100 | 100 | 100 | 0 | 0 | 0 | 0 | 0 | 0 |
| 111/2:Timber Open Girder | ft | 180 | 77 | 138 | 17 | 30 | 7 | 12 | 0 | 0 |
| 1160/2:Crack (Timber) | each | 4 | 0 | 0 | 0 | 0 | 100 | 4 | 0 | 0 |
| 215/2:Re Conc Abutment | ft | 52 | 4 | 2 | 65 | 34 | 31 | 16 | 0 | 0 |
| 1080/2:Delamination/Spall/Patched Area | each | 3 | 0 | 0 | 0 | 0 | 100 | 3 | 0 | 0 |
| 1090/2:Exposed Rebar | each | 2 | 0 | 0 | 0 | 0 | 100 | 2 | 0 | 0 |
| 235/2:Timber Pier Cap | ft | 52 | 100 | 52 | 0 | 0 | 0 | 0 | 0 | 0 |
| 31/1:Timber Deck | sq.ft | 764 | 100 | 764 | 0 | 0 | 0 | 0 | 0 | 0 |
| 330/1:Metal Bridge Railing | ft | 59 | 100 | 59 | 0 | 0 | 0 | 0 | 0 | 0 |
| 515/1:Steel Protective Coating | sq.ft | 100 | 100 | 100 | 0 | 0 | 0 | 0 | 0 | 0 |
| 332/1:Timb Bridge Railing | ft | 59 | 100 | 59 | 0 | 0 | 0 | 0 | 0 | 0 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 215/2:Re Conc Abutment | ft | 52 | 4 | 2 | 65 | 34 | 31 | 16 | 0 | 0 |
| 1080/2:Delamination/Spall/Patched Area | each | 3 | 0 | 0 | 0 | 0 | 100 | 3 | 0 | 0 |
| 1090/2:Exposed Rebar | each | 2 | 0 | 0 | 0 | 0 | 100 | 2 | 0 | 0 |
| 235/2:Timber Pier Cap | ft | 52 | 100 | 52 | 0 | 0 | 0 | 0 | 0 | 0 |
| 31/1:Timber Deck | sq.ft | 764 | 100 | 764 | 0 | 0 | 0 | 0 | 0 | 0 |
| 330/1:Metal Bridge Railing | ft | 59 | 100 | 59 | 0 | 0 | 0 | 0 | 0 | 0 |
| 515/1:Steel Protective Coating | sq.ft | 100 | 100 | 100 | 0 | 0 | 0 | 0 | 0 | 0 |
| 332/1:Timb Bridge Railing | ft | 59 | 100 | 59 | 0 | 0 | 0 | 0 | 0 | 0 |
| 8398/3:Slope Protection | each | 1 | 100 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| 8401/2:Wings | each | 4 | 100 | 4 | 0 | 0 | 0 | 0 | 0 | 0 |

**Remarks:** 12/28/2005 - Facia timber beam north side and 6th from the east cracked. NBI Remarks: Poor horizontal roadway alignment. Roadway embankment erosion, southwest abutment corner. Vertical crack in east abutment. Riprap added to both banks under structure and thru channel.

**Alert Code 1:** Two cracked timber girders-north outside girder and sixth in from the south. Concrete in abutment backwalls deteriorating with exposed reinforcing steel @ west abutment corner with up to 2" of spalling and section loss.

# CFR 23 Part 650 subpart C

- Requires bridges 20’ and longer be inspected
  - Every 24 months
  - Underwater 60 months
  - NDDOT inspects critical bridges at 12 months
- Outlines requirements for qualification and training

# CFR 23 Part 650 subpart C

- Visual inspection
- Feel free to join our inspectors
- Contact District to coordinate

# Bearings

# Elastomeric bearing

# Neoprene Bearing Creeping out from under bearing plates

# Overburden

- Gravel
- Asphalt
- Combination


Facing Northeast
22" gravel overburden
12/27/05

# Overburden

- 22” of gravel over a typical 30’x20’ bridge is
- 66 Tons


Bridge #18-125-28.0
Facing Northwest
Estimate 12" asphalt
overburden
12/28/05

# Overburden

- 12” of asphalt over a typical 30’x20’ bridge is
- 43 Tons

# Overburden in Gutter

# Joints

# Non Functioning Expansion Joint


Grant Marsh
Looking West
Eastbound

# Due to Leaky Expansion Joint

# Staining from Leakage thru Joint in Deck

# Leakage thru joints

# Truss Remarks

- Pack Rust
- Low vertical clearance
- Narrow roadway

# Pack Rust


7
6
5
4
3
2
1
8
9
10
11
12

# Vehicle Impact Damage

# Scour

- Caused by increased speed of water due to Constriction of Channel

# Scour at Abutment

# Exposed Timber Piling

# Abutment Scour

# Sink Hole in Approach

# Counter Measures

# Erosion Due To High Water

# Channel Profiles

# COUNTY SCOUR & CHANNEL PROFILE

North Dakota Department of Transportation, Bridge Division

SFN 50344 (Rev. 09-2008)

| Structure Number | Date | Inspector (name) |
|---|---|---|
| | | |

## STREAM CROSS SECTIONS

**NOTE:** Stream profile is to be taken on both sides of the bridge. Check appropriate directions.

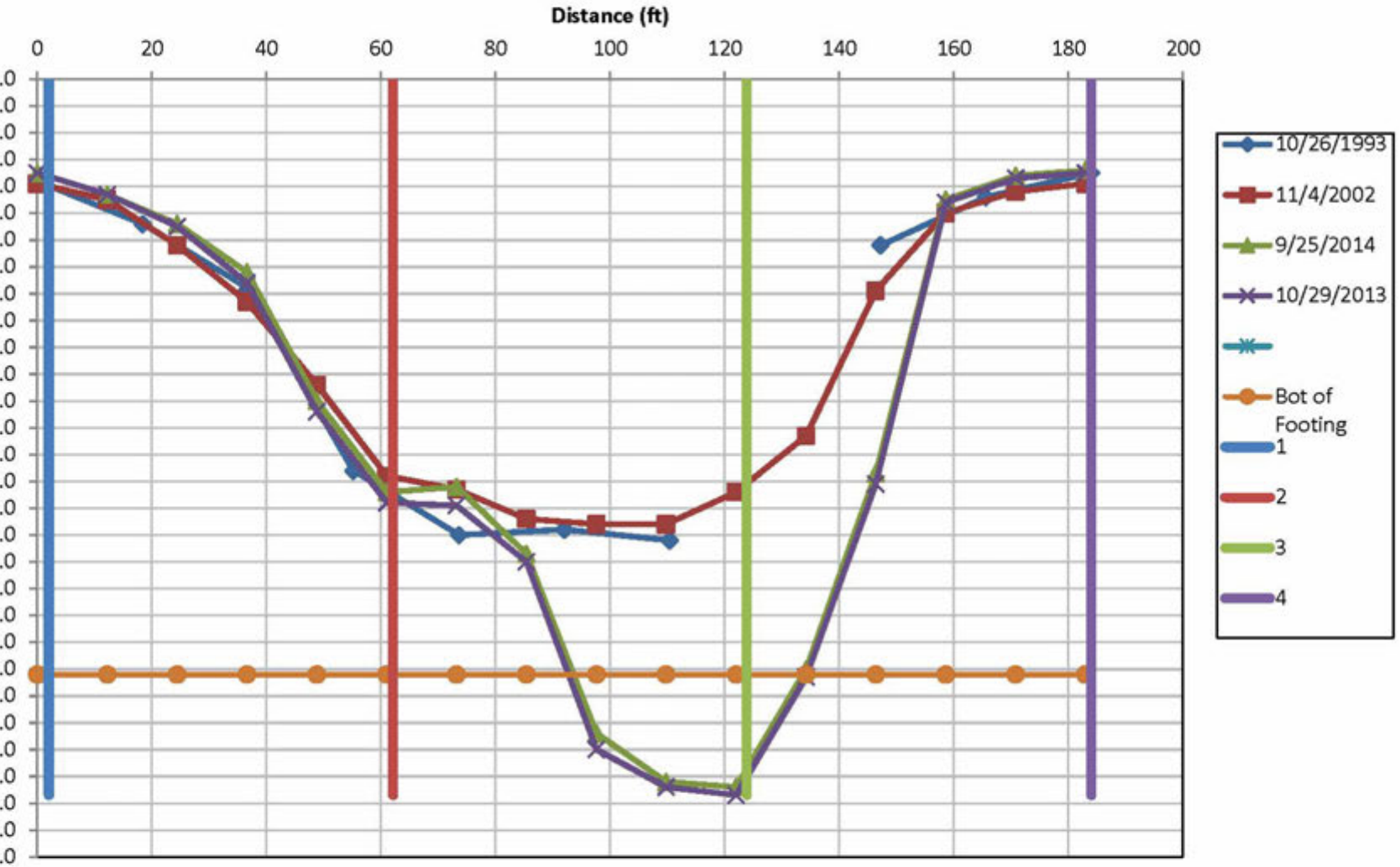
| |
|---|
| **Profile 1** taken on ☐ N ☐ S ☐ E ☐ W side of bridge, from ☐ N to S ☐ W to E |
| Measurements taken from top of ☐ Curb ☐ Rail ☐ Deck |
| Measurements taken at intervals. (ft.) |
| Measurements are as follows: |
| **Profile 2** taken on ☐ N ☐ S ☐ E ☐ W side of bridge, from ☐ N to S ☐ W to E |
| Measurements taken from top of ☐ Curb ☐ Rail ☐ Deck |
| Measurements taken at intervals. (ft.) |
| Measurements are as follows: |

| EVIDENCE OF SCOUR AT BRIDGE | Yes | No | NA | EXISTING CHANNEL CONDITION | Yes | No | NA |
|---|---|---|---|---|---|---|---|
| Channel slopes washing or sloughing | ☐ | ☐ | ☐ | Are channel banks up and downstream of bridge stable? | ☐ | ☐ | ☐ |
| Scour holes near abutments | ☐ | ☐ | ☐ | | | | |
| Scour holes near piers | ☐ | ☐ | ☐ | Is the channel degrading/aggrading up or downstream? | ☐ | ☐ | ☐ |
| Bed deposits downstream | ☐ | ☐ | ☐ | | | | |
| Exposure of footings | ☐ | ☐ | ☐ | Is the structure on a channel change? | ☐ | ☐ | ☐ |
| Debris collection | ☐ | ☐ | ☐ | Are there lakes, reservoirs, dams, etc., near the crossing? | ☐ | ☐ | ☐ |
| Riprap (if any) displaced | ☐ | ☐ | ☐ | | | | |

# Scour and Channel Profile

## 2-187.740 R

## North SIDE



# Ice Damage

# Debris

# Debris Buildup


08/31/2007

# Impact Damage

# Typical County Bridge Traffic

# Damaged Equipment

# Damage to Bridge

# View along Structure

# Damaged Rail

# Rust and Corrosion


Bridge # 46-115-05.0
Direction: SW
Section Loss to H-pile at Water
Line, Est. 1/16"


2007.10.10 14:15


Rusted pile in pi


9-106-19.
11-22-200

# Why we did POA

- Plan of Action (POA)
  - Flood event occurred
  - Who gets notified
  - What action is taken

# SCOUR CRITICAL BRIDGE - PLAN OF ACTION

## 1. GENERAL INFORMATION

| | | |
|---|---|---|
| **Structure number:** 01-139-16.0 | **City, County, State:** Adams County, ND | **Waterway:** Cedar Creek |
| **Structure name:** _____ | **State highway or facility carried:** County Highway 139 | **Owner:** Adams County |

| | | |
|---|---|---|
| **Year built:** 1964 | **Year rebuilt:** ____ | **Bridge replacement plans (if scheduled):** _____ **Anticipated opening date:** _____ |

**Structure type:** ☒ Bridge ☐ Culvert

**Structure size and description:** **PRES CONC SNGLE/SPRD BOX BEAM/GIRD, 3 SPAN, 48'**

**Foundations:** ☒ Known, type: Spread Footings Depth: _____ ☐ Unknown

**Subsurface soil information (*check all that apply*):** ☒ Non-cohesive ☒ Cohesive ☒ Rock

| | | |
|---|---|---|
| **Bridge ADT:** 140 | **Year/ADT:** 2008 | **% Trucks:** N/A |

**Does the bridge provide service to emergency facilities and/or an evacuation route (Y/N)?** N
**If so, describe:** _____

## 2. RESPONSIBILITY FOR POA

**Author(s) of POA (name, title, agency/organization, telephone, pager, email):** Chuck Olsen, KLJ, (701)483-1284, chuck.olsen@kljeng.com **Date:** 2/20/2009 **Date of last update:** N/A

**Subsurface soil information (*check all that apply*):** ☒Non-cohesive ☒Cohesive ☒Rock

| **Bridge ADT:** 140 | **Year/ADT:** 2008 | **% Trucks: N/A** |
|---|---|---|

**Does the bridge provide service to emergency facilities and/or an evacuation route (Y/N)? N**
**If so, describe:** _____

## 2. RESPONSIBILITY FOR POA

**Author(s) of POA (name, title, agency/organization, telephone, pager, email):** Chuck Olsen, KLJ, (701)483-1284, chuck.olsen@kljeng.com Date: 2/20/2009 Date of last update: N/A

**Concurrences on POA (name, title, agency/organization, telephone, pager, email):** Theo Schalesky, Highway Superintendent, Adams County, 701-567-2235, adamscounty@pop.etctel.com

**POA to be updated every 24 months** Date of next update: 2/20/2011

## 3. SCOUR VULNERABILITY

**a. Current Item 113 Rating:** ☒ 3 ☐ 2 ☐ 1 Other: _____

**b. Source of Scour Critical Rating:** ☐ Observed ☐ Assessment ☒ Calculated Other: _____

**c. Scour Evaluation Summary:** This structure, based on scour calculations was found to be scour

**Scour monitoring criteria for consideration of bridge closure:**

- ☐ Water surface elevation reaches ___ at _____
- ☒ Overtopping road or structure
- ☐ Scour measurement results / Monitoring device (See Section 6)
- ☐ Observed structure movement / Settlement
- ☐ Discharge: _____ cfs/cms
- ☐ Flood forecast: _____
- ☒ Other: ☒ Debris accumulation ☐ Movement of riprap/other armor protection
  ☒ Loss of road embankment

**Emergency repair plans (*include source(s), contact(s), cost, installation directions*):** _____

**Agency and department responsible for closure:** Adams County

**Contact persons (name, title, agency/organization, telephone, pager, email):** Theo Schalesky, Highway Superintendent, Adams County, 701-567-2235, adamscounty@pop.ctctel.com

**Criteria for re-opening the bridge:** Inspection after floodwater recedes

**Agency and person responsible for re-[illegible]ning the bridge after inspection:** Adams County

## 9. DETOUR ROUTE

**Detour route description** (route number, from/to, distance from bridge, etc.) - Include map in Section 10, Attachment E. 0.5 miles North on CMC 0139, 4 miles East to CMC 0143, 12 miles South and West to Lemmon, 9.5 miles North and West to Bridge (26 miles)

**Bridges on Detour Route:**

| Bridge Number | Waterway | Sufficiency Rating/ Load Limitations | Item 113 Code |
|---|---|---|---|

# Resources

- *NDDOT Bridge Maintenance Manual*

  *Currently in the process of being updated and expanded*
- *NDLTAP*
- *AASHTO Transportation System Preservation Technical Services Program (TSP·2)* https://www.tsp2.org/


EMERGENCY BRIDGE REPAIR TEAM

# Questions?

Thank you!!