Inventories, Inspections & Improvements
BIADOT BRIDGE PROGRAM
BIG SKY, MONTANA
2019 SEPTEMBER 18
BIADOT Bridge Inventory: ALL

COUNT = 1009
100%
Sufficiency ratings (SR) are used by the Federal Highway Administration to select candidate bridges for the Highway Bridge Program. Sufficiency ratings are determined during the biennial bridge inspection and are intended to indicate a measure of the ability of a bridge to remain in service.
BIADOT Bridge Inspections: SR

1. STRUCTURAL ADEQUACY AND SAFETY
   \[ S_1 = 55\% \text{ Max.} \]
   - 59 Superstructure
   - 60 Substructure
   - 62 Culverts
   - 66 Inventory Rating

2. SERVICEABILITY AND FUNCTIONAL OBSOLOSCENCE
   \[ S_2 = 30\% \text{ Max.} \]
   - 28 Lanes on Structure
   - 29 Average Daily Traffic
   - 32 Appr. Roadway Width
   - 43 Structure Type, Main
   - 51 Bridge Roadway Width
   - 53 VC Over Deck
   - 58 Deck Condition
   - 67 Structural Evaluation
   - 68 Deck Geometry
   - 69 Underclearances
   - 71 Waterway Adequacy
   - 72 Appr. Rdwy. Alignment
   - 100 STRAHNET Highway Designation

3. ESSENTIALITY FOR PUBLIC USE
   \[ S_3 = 15\% \text{ Max.} \]
   - 19 Detour Length
   - 29 Average Daily Traffic
   - 100 STRAHNET Highway Designation

4. SPECIAL REDUCTIONS
   \[ S_4 = 13\% \text{ Max.} \]
   - 19 Detour Length
   - 29 Average Daily Traffic
   - 100 STRAHNET Highway Designation

**SUFFICIENCY RATING = S_1 + S_2 + S_3 - S_4**

Sufficiency Rating shall not be less than 0% nor greater than 100%
BIADOT Bridge Inventory: SR < 50

COUNT = 77
7.63%
BIADOT Bridge Inventory: 50 < SR < 80

COUNT = 197
19.52%
# BIADOT Bridge Inventory: Status

<table>
<thead>
<tr>
<th>Region</th>
<th>ND</th>
<th>FO</th>
<th>SD</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>A - Great Plains</td>
<td>57</td>
<td>2</td>
<td>10</td>
<td>69</td>
</tr>
<tr>
<td>B - Southern Plains</td>
<td>60</td>
<td>0</td>
<td>1</td>
<td>61</td>
</tr>
<tr>
<td>C - Rocky Mountain</td>
<td>86</td>
<td>1</td>
<td>10</td>
<td>97</td>
</tr>
<tr>
<td>F - Midwest</td>
<td>54</td>
<td>0</td>
<td>2</td>
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<tr>
<td>H - Western</td>
<td>224</td>
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<td>J - Pacific</td>
<td>7</td>
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<td>M - Southwest</td>
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<td>70</td>
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<tr>
<td>N - Navajo</td>
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<td>23</td>
<td>14</td>
<td>177</td>
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<tr>
<td>P - Northwest</td>
<td>77</td>
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<td>11</td>
<td>105</td>
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<tr>
<td>S - Eastern</td>
<td>87</td>
<td>4</td>
<td>4</td>
<td>95</td>
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<tr>
<td><strong>Total</strong></td>
<td>849</td>
<td>66</td>
<td>94</td>
<td>1009</td>
</tr>
</tbody>
</table>

**Note:**

- **ND** = Not Deficient
- **FO** = Functionally Obsolete
- **SD** = Structurally Deficient
Structurally Deficient: Federal guidelines define a bridge as “structurally deficient” if certain key components—the superstructure, the substructure, or the deck—is rated at 4 out of a possible 10, i.e., “poor,” meaning engineers have identified one or more major defects in its support structure or deck.
Functionally obsolete bridges are those that do not have adequate lane widths, shoulder widths, or vertical clearances to serve current traffic demand, or those that may be occasionally flooded. A functionally obsolete bridge is similar to an older house.
In accordance with the **Pavement and Bridge Performance Measures** – FINAL Rule (published in January of 2017):

Bridge Condition is determined by the lowest rating of National Bridge Inventory (NBI) condition ratings for Item 58 (Deck), Item 59 (Superstructure), Item 60 (Substructure), or Item 62 (Culvert). If the lowest rating is **greater than or equal to 7**, the bridge is classified as **Good**; if it is **less than or equal to 4**, the classification is **Poor**. Bridges rated **5 or 6** are classified as **Fair**.
## BIADOT Bridge Inspections: Condition

<table>
<thead>
<tr>
<th>Region</th>
<th>Good</th>
<th>Fair</th>
<th>Poor</th>
<th>Total</th>
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<td>69</td>
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<tr>
<td>B - Southern Plains</td>
<td>36</td>
<td>14</td>
<td>11</td>
<td>61</td>
</tr>
<tr>
<td>C - Rocky Mountain</td>
<td>42</td>
<td>36</td>
<td>19</td>
<td>97</td>
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<tr>
<td>F - Midwest</td>
<td>34</td>
<td>22</td>
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<td>56</td>
</tr>
<tr>
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<td>102</td>
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<tr>
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<td>S - Eastern</td>
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<tr>
<td><strong>Total</strong></td>
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<td>288</td>
<td>281</td>
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BIADOT Bridge Program: Improvements

Segal’s Law states,

"A man with a watch knows what time it is. A man with two watches is never sure."
BIADOT Bridge Program: Improvements

https://www.fhwa.dot.gov/bridge/structures.cfm

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### Bridges & Structures

**Structures**

- Concrete
- Load Rating
- Security
- Seismic
- Sign Support
  - Guidelines for the Installation, Inspection, Maintenance and Repair of Structural Supports for Highway Signs, Luminaries, and Traffic Signals (pdf, 7 mb)
- Steel
- Tunnels

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### Events

- 2019 MWDPC Annual Meeting
  - Bismarck, ND
  - October 15-17, 2019

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### Contact

- Brian Kozy
  - Office of Bridges and Structures
  - 202-493-0341
  - E-mail Brian

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*Updated: 06/27/2017*
BIADOT Bridge Program: Improvements

https://www.fhwa.dot.gov/engineering/hydraulics/

Hydraulic Engineering

The purpose of hydraulic engineering is to design a structure with the proper capacity to direct or remove water from the roadway and pass collected water under the roadway. The design of a hydraulic structure requires knowing how much water is associated with the design storm (hydrology) and calculating the velocity, depth, and type of flow (hydraulics) that must be accounted for in the design.

One of the functions of the National Hydraulics Team (NHT) is to provide FHWA offices with technical expertise in matters of the hydraulic discipline. This involves providing technical assistance in interpretation of FHWA hydraulic policies, technical publications, software, and recommended guidelines in solving difficult and unusual drainage problems. We also are instrumental in the development of new technologies and research to the Chiricahua and state DOT partners.
BIADOT Bridge Program: Improvements

https://www.fhwa.dot.gov/engineering/geotech/
BIADOT Bridge Program: Improvements

https://www.fhwa.dot.gov/engineering/hydraulics/

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BIADOT Bridge Program: Improvements

https://www.fhwa.dot.gov/bridge/safety.cfm
BIADOT Bridge Program: Improvements

- Program Handbook
  - Inspection Types
    - Initial, Routine, FC, UW, Damage
  - Inspection Reports
    - Inspection, Inventory, Damage
  - Inspection Forms
    - Scour, Repair, Safety, Flood
BIADOT Bridge Program: Improvements

- Load Rating Software
  - BRASS
    - Bridge Rating & Analysis of Structural Systems
BIADOT Bridge Program: Improvements

- Asset Management Software
  - Replace BMS?
  - Fed-Ramp Compliant?
  - Costs?
  - Transfer of existing information?
Questions...
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Albuquerque, NM  87104
michael.vasquez@bia.gov

Michael Vasquez, PE
BIADOT Bridge Program Manager