Bridge Asset Management or IT’S THE MONEY DUMMY

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Bridge Maintenance Engineer
Region Operations Engineer

Secretary of Transportation
Roger Millar

WBPP, Denver CO
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Asset Management

Asset management is a strategic, risk-based approach to cost effectively and efficiently manage the physical assets of your transportation system.
Asset Management

Creation of a sustainable asset management program Requires:

Data: (collected, stored, analyzed)
  Inventory, condition of inventory

Performance measures: Simple, easy to understand, lead to a state of “good repair”

Money
The Money

- Where is it?
- Who controls it?
- How do you get it?
- How do you keep it?
- How do you get more?
DATA IS DOLLARS
$1,000,000 per year for Bridge Washing?
Floor beam 6 after cleaning
How did we get the money

- Pilot program washing bridges ongoing.
- Permitting agencies willing to allow washing because of data.
- Skagit river showed effects of not cleaning steel truss bridges.
- Pilot program provided cost data. Already had data on state steel truss bridges.
- FHWA sent letter to bridge saying trusses not clean enough for fracture critical insp.
## Where Does the State Fuel Tax Go?

**49.4¢ PER-GALLON STATE FUEL TAX:**

<table>
<thead>
<tr>
<th>261 Transportation Partnership projects*</th>
<th>160 Nickel projects</th>
</tr>
</thead>
<tbody>
<tr>
<td>9.5¢</td>
<td>5¢</td>
</tr>
<tr>
<td>421 PROJECTS</td>
<td></td>
</tr>
<tr>
<td><strong>11.9¢</strong> Connecting Washington**</td>
<td><strong>8¢</strong> Maintenance and Operations Preservation Safety Improvements</td>
</tr>
<tr>
<td><strong>11¢</strong> Cities and counties local roads</td>
<td><strong>4¢</strong> Pay off bonds funded by pre-2003 fuel tax</td>
</tr>
</tbody>
</table>

* Of the 9.5 cents, 8.5 cents is used by the state for highway projects, 1 cent goes to cities and counties for street and road improvements.

** The 11.9-cent gas tax increase will be phased in over the next two years. The first 7.0-cent increase occurred on August 1, 2015, followed by a 4.9-cent gas tax increase on July 1, 2016.
Connecting Washington

• $16.2B total revenues over 16 years
  – $4.762B bond proceeds
• 11.9¢ gas tax increase
  – 7¢ August 2015
  – 4.9¢ July 2016
  – 6th highest in the nation to 4th highest
• $8.759B state and local
• $1.225B highway preservation*
• $100M highway maintenance*
• $300M fish passage
• $52M facilities
• $50M traffic operations
* 

- Connecting Washington recognizes the importance of preserving our aging transportation infrastructure and helps make a dent in our preservation backlog.
- $1.2 Billion on state highway preservation. The new revenue investment reduces the rate at which the preservation backlog will grow, improves bridges and contributes funds to maintenance and traffic operations.
Practical Solutions

• The legislature recognized and incorporated anticipated savings from practical design into a fund for preservation projects and additional capital projects in the outer years of the package.
Bridge Asset Performance

- Percent of bridges in fair or better. Goal 90% or better, current 91.2%
- # of bridges load posted 126
- Steel bridge painting backlog – 414 million
- 10 year forecast paint backlog- $707 mil
- Decks due or past due – $115.6 mil
- Projected 10yr deck backlog - $727 mil
- SD NHS state bridges goal under 10%, current 9.3%
The intelligent ask.

• Have the data ready.
• Know what the data says.
• Know what you need.
• Know what you can do.
• Ask for the money.
• Keep asking.
Stretching the Money

Practical solutions

• Preservation funding to maintenance
• 17 – 19 Biennium $6 million of P funds to M + one time $1M of M $s for equip for crews
• 2 new bridge crews,
• Focus initially on catching up on repairs, move to a PM plan
Strategic Preservation

• Pavement
• Bridges
Pavements

• HMA
  – P-1 or M-2: Life extension, crack seal, dig outs, rut fills. (Region maintenance crews work with materials engineer to extend pavement life)
  – Overlays, chip seal, slurry seal

• Concrete
  – P-1, M-2, Crack seal, patch, rut fill, panel replacement
  – P-1, dowel bar retrofit and grind, panel replacement, precast or pour in place.
Bridges

• PM: (M-2 or P-2) Clean, seal concrete, seal joints, treat timber, waterproof, remove LWD, scour protection, spot and area paint, EQ retrofits, etc.
• Funding to maintenance 17-19 Eastside and NW bridge crews added. 1/2 M ea. OR & SW regions.
• Repairs: (M-2 or P-2)
• P-2 Rehab/Replace
## Bridge Maintenance Funding

<table>
<thead>
<tr>
<th>Region</th>
<th>Bridge 15-17 Funding</th>
<th>Br Funding percent</th>
<th>Bridge 15-17 fixed only</th>
<th>fund percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>NW</td>
<td>$15,668,296</td>
<td>55%</td>
<td>$6,170,641</td>
<td>40%</td>
</tr>
<tr>
<td>NC</td>
<td>$679,028</td>
<td>2%</td>
<td>$679,082</td>
<td>4%</td>
</tr>
<tr>
<td>OL</td>
<td>$7,578,570</td>
<td>27%</td>
<td>$3,903,425</td>
<td>26%</td>
</tr>
<tr>
<td>SW</td>
<td>$1,412,810</td>
<td>5%</td>
<td>$1,412,810</td>
<td>9%</td>
</tr>
<tr>
<td>SC</td>
<td>$1,952,343</td>
<td>7%</td>
<td>$1,857,378</td>
<td>12%</td>
</tr>
<tr>
<td>EA</td>
<td>$1,233,940</td>
<td>4%</td>
<td>$1,233,940</td>
<td>8%</td>
</tr>
<tr>
<td>Total</td>
<td>$28,524,987</td>
<td>100%</td>
<td>$15,257,276</td>
<td>100%</td>
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</table>
## Priority-1 Structural Repair Backlog Increase

### Structural Repairs from Bridge Repair List

<table>
<thead>
<tr>
<th>Region</th>
<th>P-1 Structural repairs</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th>Increase 2010 to 2016 of region repairs</th>
<th>Percent increase 2010 to 2016 of P-1 Repairs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year date</td>
<td>Jul-10</td>
<td>%</td>
<td>Jul-11</td>
<td>%</td>
<td>Jul-15</td>
<td>%</td>
<td>Jul-16</td>
</tr>
<tr>
<td>NW</td>
<td>60</td>
<td>29%</td>
<td>70</td>
<td>37%</td>
<td>434</td>
<td>57%</td>
<td>393</td>
</tr>
<tr>
<td>NC</td>
<td>10</td>
<td>5%</td>
<td>7</td>
<td>4%</td>
<td>50</td>
<td>7%</td>
<td>14</td>
</tr>
<tr>
<td>OL</td>
<td>59</td>
<td>28%</td>
<td>39</td>
<td>21%</td>
<td>45</td>
<td>6%</td>
<td>77</td>
</tr>
<tr>
<td>SW</td>
<td>20</td>
<td>10%</td>
<td>13</td>
<td>7%</td>
<td>31</td>
<td>4%</td>
<td>123</td>
</tr>
<tr>
<td>SC</td>
<td>41</td>
<td>20%</td>
<td>34</td>
<td>18%</td>
<td>142</td>
<td>19%</td>
<td>196</td>
</tr>
<tr>
<td>EA</td>
<td>19</td>
<td>9%</td>
<td>25</td>
<td>13%</td>
<td>58</td>
<td>8%</td>
<td>97</td>
</tr>
<tr>
<td>Total</td>
<td>209</td>
<td>100%</td>
<td>188</td>
<td>100%</td>
<td>760</td>
<td>100%</td>
<td>900</td>
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</table>
## Bridge Maintenance Repairs Remaining

<table>
<thead>
<tr>
<th></th>
<th>Northwest</th>
<th>North Central</th>
<th>Olympic</th>
<th>Southwest</th>
<th>South Central</th>
<th>Eastern</th>
<th>State Totals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Structural repairs from bridge repair list left 6/30/16</td>
<td>393</td>
<td>14</td>
<td>77</td>
<td>123</td>
<td>196</td>
<td>97</td>
<td>900</td>
</tr>
<tr>
<td>Structural Repair estimate remaining repairs</td>
<td>$4,131,000</td>
<td>$195,000</td>
<td>$1,863,200</td>
<td>$1,075,000</td>
<td>$2,490,000</td>
<td>$1,230,500</td>
<td>$10,984,700</td>
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<tr>
<td>Deck Repairs Left 6/30/16 from repair list</td>
<td>102</td>
<td>13</td>
<td>17</td>
<td>26</td>
<td>69</td>
<td>16</td>
<td>243</td>
</tr>
<tr>
<td>Deck Repair estimate from repair list thru 6/30/16</td>
<td>$630,000</td>
<td>$135,000</td>
<td>$271,000</td>
<td>$325,100</td>
<td>$587,000</td>
<td>$104,000</td>
<td>$2,052,100</td>
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<tr>
<td>PM repairs left from br repair list as of 6/30/16</td>
<td>87</td>
<td>2</td>
<td>8</td>
<td>21</td>
<td>11</td>
<td>8</td>
<td>137</td>
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<tr>
<td>PM estimate from Br repair list as of 6/30/16</td>
<td>$622,000</td>
<td>$10,000</td>
<td>$53,000</td>
<td>$117,300</td>
<td>$195,000</td>
<td>$63,500</td>
<td>$1,060,800</td>
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<tr>
<td>Number of clearance sign postings needed</td>
<td>86</td>
<td>9</td>
<td>8</td>
<td>0</td>
<td>0</td>
<td>12</td>
<td>115</td>
</tr>
<tr>
<td>Vertical Clearance sign needed posting cost</td>
<td>$355,000</td>
<td>$39,000</td>
<td>$24,000</td>
<td></td>
<td></td>
<td></td>
<td>$110,000</td>
</tr>
<tr>
<td>Total Actual P-1 Repairs left 6/30/16</td>
<td>668</td>
<td>38</td>
<td>110</td>
<td>170</td>
<td>276</td>
<td>133</td>
<td>1395</td>
</tr>
<tr>
<td>P-1 Repair estimates All P-1s</td>
<td>$5,738,000</td>
<td>$379,000</td>
<td>$2,211,200</td>
<td>$1,517,400</td>
<td>$3,272,000</td>
<td>$1,508,000</td>
<td>$14,625,600</td>
</tr>
<tr>
<td>Below are estimated repairs based on averages</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emergent repairs/bien/ estimated number</td>
<td>131</td>
<td>49</td>
<td>78</td>
<td>38</td>
<td>24</td>
<td>64</td>
<td>384</td>
</tr>
<tr>
<td>Emergent repairs/bien estimated cost</td>
<td>$1,377,000</td>
<td>$682,500</td>
<td>$1,887,397</td>
<td>$332,114</td>
<td>$304,898</td>
<td>$811,876</td>
<td>$5,395,785</td>
</tr>
<tr>
<td>New Repairs to end of bien(Average new annually)</td>
<td>100</td>
<td>10</td>
<td>60</td>
<td>52</td>
<td>70</td>
<td>40</td>
<td>332</td>
</tr>
<tr>
<td>New repairs cost (Average estimated cost per repair)</td>
<td>$1,051,145</td>
<td>$139,286</td>
<td>$1,451,844</td>
<td>$454,472</td>
<td>$889,286</td>
<td>$507,423</td>
<td>$2,965,869</td>
</tr>
<tr>
<td>Region Repair # total = actual plus est new thru June-2017</td>
<td>899</td>
<td>97</td>
<td>248</td>
<td>260</td>
<td>370</td>
<td>237</td>
<td>2111</td>
</tr>
<tr>
<td>Total Accumulated Maint Repair cost estimate 15-17</td>
<td>$8,166,145</td>
<td>$1,200,786</td>
<td>$5,550,441</td>
<td>$2,303,986</td>
<td>$4,466,184</td>
<td>$2,827,299</td>
<td>$22,987,254</td>
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<tr>
<td>Bridge Maintenance funding remaining 6/30/16- less movables and tunnels.</td>
<td>$2,052,675</td>
<td>$282,319</td>
<td>$1,128,734</td>
<td>$969,679</td>
<td>$635,501</td>
<td>$716,359</td>
<td>$5,785,267</td>
</tr>
</tbody>
</table>

Repairs beyond Maintenance that need to go to contract as of 6/30/2016. *
Preservation Cycle

Bridge Condition Diagram

Cyclic Maintenance Needs (CM)  NBI 7 - 9
a  Unchanged

Preventative Maintenance Needs (PM)  NBI 5 - 6
b  Unchanged

Replacement or Major Rehabilitation Needs (RR)  NBI 0 - 4
c  Unchanged

General Targets:
\[ v \geq y \quad u \geq x \]
\[ u + v + w \geq x + y + z \]
Strategic Bridge Preservation Pilots

• 167/32 E, Joint Replacement
• TNB Travelers - Practical solution
• 113/5 Beaver Creek Deck
167/32 E, Steel Plate Joints

• Project scheduled for 2021, est $907,000
• Steel plates were loose and fracturing now. (Liability Issue)
• NW region similar joint on I-5 made headlines (I-5 shutdown).
• Requested $250,000 in Preservation funds to do in summer 2016.
• Completed work for $226,000.
167/32E Joint replacement P2 funds
TNB Lower Travelers

- Project estimate to build 3 - $12.5 M
- Needed, a paint platform.
- Travelers are expensive to build and maintain, and have a limited load capacity.
- Cost to purchase removable platform $400,000. Save $12.1 M.
Beaver Creek 113/5
Asset Management

Pilot the asset management elements
Identify champions in each area
Communicate: maps showing needs, condition based, by legislative district
Show savings of actions
Request funding to meet goals
Practical Design Is For the Long Term

- Bridges constructed of easy to maintain materials.
  - Elastomeric bearings
  - Concrete
- Bridges designed with easy to maintain details.
  - Drainage off the bridge
  - No or limited joints
  - Use simple joints that can be maintained
  - Eliminate piers in the water
  - Urban design to discourage homeless condos
  - Rails that are not valuable when metal prices rise.
  - Details that discourage bird nesting
  - Eliminate large flat surfaces attractive to urban artists
  - Standard components that do not require keeping a large inventory of parts
  - Bridges with sufficient clearance to prevent over height load hits
- Eliminate or at least minimize skew angles in bridges
- Design with protective measures where corrosive salts and/or studs are used during the winter
Treat concrete w/ waterproofing agents
Construction

• Built as designed
• Discuss changes with designer of record
• Notify design of construction problems with the design
• Materials meet specifications
• Work is complete
• Site is cleaned
• Contractor damages repaired
• As built plans are completed
Asset Management

There is never enough money to do it all. Set Priorities, ADT, critical routes, Orphans Small dollar contracts
Soldier pile wall with timber lagging

Estimated life of lagging 20 years. Wall is 19 years old.
sign bridges?
QUESTIONS?