

Bridge Asset Management

ACEC Meeting – Nov 2020

DeWayne Wilson PE Bridge Asset Management Engineer





Agenda

- Bridge Inventory
- Risks of Failure
- Deterioration and Life Cycle
- Network Bridge Condition
- Prioritization of Limited Funds
- 10 year Bridge Preservation Needs
- I-90 Vantage Bridge

Washington State's Bridge System

Statewide 3,342 Bridges 56.5M SF Timber 1% Steel 23% Concrete 35% % based on bridge deck area **Prestress** Conc Nearly 90% of WSDOT bridges built in the past 10 years are precast prestressed/post-tensioned concrete 41%

Washington State's Bridge System



Border Bridges (Oregon DOT Managed)







Border Bridges (WSDOT Managed)



US12 Snake R Clarkston

🕏 WSDOT

WSDOT Floating Bridges



WSDOT Floating Bridges







WSDOT Suspension Bridges





WSDOT Cable Stayed Bridges



WSDOT Movable Bridges



15 Steel Movable bridges on state highways (Three are shared with a Border State)

WSDOT Concrete Bridges





WSDOT Steel Bridges





WSDOT Weathering Steel



US12 Cortright Cr Year Built - 1983

Five bridges painted with clear epoxy



WSDOT Bridge Deck – Non Integral





WSDOT Bridge Deck - Integral

Integral Concrete Bridge Decks





WSDOT Bridge Deck Overlays

3,039 Bridges with Concrete Decks 45.8 million SF deck area



WSDOT Timber Bridges





Agenda

- Bridge Inventory
- Risks of Failure
- Deterioration and Life Cycle
- Network Bridge Condition
- Prioritization of Limited Funds
- 10 year Bridge Preservation Needs
- I-90 Vantage Bridge

Bridge Closure / Failure Risks

#1 Risk



Since 1923 – State Owned Bridges:

- 70 Documented Bridge Failures
 - 43 due to Floods/Scour





Agenda

- Bridge Inventory
- Risks of Failure
- Deterioration and Life Cycle
- Network Bridge Condition
- Prioritization of Limited Funds
- 10 year Bridge Preservation Needs
- I-90 Vantage Bridge





SR 162 Spiketon Creek Bridge



Agenda

- Bridge Inventory
- Risks of Failure
- Deterioration and Life Cycle
- Network Bridge Condition
- Prioritization of Limited Funds
- 10 year Bridge Preservation Needs
- I-90 Vantage Bridge

WSDOT Bridges







Agenda

- Bridge Inventory
- Risks of Failure
- Deterioration and Life Cycle
- Network Bridge Condition
- Prioritization of Limited Funds
- 10 year Bridge Preservation Needs
- I-90 Vantage Bridge

Tough Trade Off Decisions

Prioritization of Bridge Needs

- Border bridge preservation
- Moveable Bridge Repairs
- Scour Repairs
- Floating Bridge Needs
- Preserve many bridges on T-1 Freight Routes (> 10 million tons/year moved)

Backlog of Unfunded Projects

- Some T-1 bridges (with current law funding, current T-1 bridge needs will take more than a decade to address)
- Bridges on all other routes (T-2 designation and lower T-2 routes have between 4 and 10 million tons/year moved))



Agenda

- Bridge Inventory
- Risks of Failure
- Deterioration and Life Cycle
- Network Bridge Condition
- Prioritization of Limited Funds
- 10 year Bridge Preservation Needs
- I-90 Vantage Bridge

Process to determine 10 year Preservation Needs



WSDOT





FIGURE 7 MDOT Project Level BMS flow diagram.

WSDOT 10 year Preservation Needs

Category	10yr Need (\$M)	Estimated Funding (\$M)	Gap (\$M)
Border Bridges	\$100	\$100	\$0
Bridge Scour	\$30	\$30	\$0
Bridge Element Repairs	\$150	\$50	\$100
Expansion Joints	\$400	\$100	\$300
Movable Bridges	\$50	\$50	\$0
Concrete Bridge Decks	\$1,200	\$230	\$970
Steel Painting	\$900	\$388	\$512
Replacement / Rehab	\$1,000	\$300	\$700
Totals	\$3.8B	\$1.2B	\$2.6B

"Pay me now or Pay me much more later"



Concrete Bridge Deck Preservation



Concrete Bridge Deck issues:

- Deterioration / Rebar Corrosion
- Rutting
- Rebar Cover
- Poor Quality Concrete



I-90 Over Homestead Valley Rd (90/91.5S) milepost 37.75



Prestress Girder Bridge – built in 1974 (46 years)

328 SF Patching (4.6%)





WSDOT Bridge Deck HMA – 2020



WSDOT Concrete Deck Rehab – 2021-23 2021 Planned New Construction 2022 Planned New Construction 2 bridges (402,513SF) 2 bridges (32,912SF) KETTLE FALL I-90 West Summit FORKS BREWSTER EVERETT 90/99 I-5 Ship Canal 4000D - 28,428SF 5/570 SB SPOKANE SEAT: E I-90 Wilson Creek I-5 NB Viaduct 90/162N 4000D-4,484SF 5/539W Polyester - 383,043SF OLYMPIA **I-90 RR OC** ABERDEEN ELLENSBURG 90/136S 4000D - 12,750SF YAKIMA WALLA WALLA **Concrete Deck Rehab** VANCOUVER Due (64) Past Due (27) Need to Rehab 60 Bridge Decks / Year (\$120M) February 2020



WSDOT Steel Bridge Painting



SR141 – White Salmon River (141/5)

Year Built – 1940 Yr Last Painted – 1988 Paint 26 yrs old (2014)

Trade-off Decisions

2014

Action	Year	Cost \$
Planned Paint Year –	2014	\$0.9 M
Do Nothing SD Year –	2018	
Do Nothing Rehab Year -	2025	\$3.0 M
Do Nothing Replace Year –	2035	\$7.7 M

SR141 – White Salmon River











SR141 – White Salmon River



SR141 – White Salmon River



Extended Service Life 25+ years



WSDOT Steel Bridge Paint Condition



WSDOT Steel Bridge Painting Plan - 10yr need



WSDOT has identified 200 bridges that need painting over next 10 years. (\$1 Billion)

There are Currently 99 Past Due and Due (\$422 Million)

WSDOT Steel Bridge Painting Plan 2019-23



WSDOT

Need to Paint 20 Bridges / Year (\$100M)

WSDOT Br Replacement / Rehab – 10 yr need



WSDOT has identified 115 bridges that should be replaced / rehab - next 10 years. (Total cost of \$1B)

Bridge Replacement



WSDOT Br Replacement / Rehab – 2020-21



Agenda

- Bridge Inventory
- Risks of Failure
- Deterioration and Life Cycle
- Network Bridge Condition
- Prioritization of Limited Funds
- 10 year Bridge Preservation Needs
- I-90 Vantage Bridge







Mod Conc Overlay 1982 (38 yrs)

Deck has 1,716 SF Patching (1.2%) 2019 – Full depth patching required five (5) times





Mod Conc Overlay 1982 (38 yrs)



There's Not Enough Money for Ongoing Maintenance & Preservation



Bridge Deck Repair by WSDOT Maintenance Forces

Questions?