



Oregon

John A. Kitzhaber, M.D., Governor

Department of Transportation
ODOT Bridge Engineering Section MS#4
4040 Fairview Industrial Drive SE
Salem, OR 97302
Phone: (503) 986-4200
Fax: (503) 986-3407

Date: October 1, 2014

FILE CODE:

To: Matt Ransom, Executive Director
SW Washington Regional Transportation Council

From: 
Bruce Johnson, State Bridge Engineer
Oregon Department of Transportation

Subject: I-5 Interstate Bridges Maintenance and Rehabilitation Needs

As requested by the RTC Board of Directors, I have prepared a summary of the projected needs for the I-5 Interstate Bridges. Those bridges over the Columbia River have been in service for decades. Both require extensive maintenance and rehabilitation to keep them operational and serviceable for their extreme traffic and environmental demands.

This memo describes the needs for both the northbound and southbound bridges that have been identified and remain unaddressed as of July 2014.

Here is some background and the basic needs of each bridge:

Northbound – Status

- Built in 1917.
- Major rehabilitation in 1958.
- Deck replacement 1988.
- North trunnions replaced in 1999.
- Repainted in 2002.
- Federal deficiency rating: Functionally obsolete. (Not structurally deficient.)
- Federal sufficiency rating: 18.5 out of 100, due to narrow width, low vertical clearance and low original design load.

Northbound – Needs

- The steel truss has some section loss, corroded rivets, and pack rust, but not in critical locations. The truss will need re-painting within 15-20 years.
- The deck has some cracks and spalls that will need sealing and patching within the next 5 to 10 years.
- The trunnion shafts on the south tower will need replacement within 5 years.
- The lift tower rollers will need replacement within 5 years.
- Bearings have debris, pack rust, severely corroded anchor bolts that will require repair or replacement of the bearings within 5 years.

Southbound – Status

- Built in 1958.
- Deck replaced in 1988.
- Repainted in 2002.

- Federal deficiency rating: Functionally obsolete. (Not structurally deficient.)
- Federal Sufficiency rating: 51.0 out of 100, due to narrow width, low vertical clearance.

Southbound – Needs

- The steel truss has some corrosion, pack rust and fatigue cracking, and will need re-painting in 10-15 years.
- Fatigue cracks are being repaired and may need further repair in the future.
- The deck has some cracks and spalls that will need sealing and patching within 5-10 years.
- Those guide rollers wear and slip off the guide bar periodically. A couple of years ago (in 2012) we discovered the rollers were wearing out prematurely (about every 5 years). This was thought to be caused by the towers being out of plumb (or leaning in one direction). We did some very precise measurements and found out that in fact some of the towers were very slightly leaning out of plumb. The amount is within normal construction tolerances and does not cause any concern with the stability or safety of the bridges. However, it does probably contribute slightly to the wear of the guide rollers.

Seismic Summary

- Neither bridge is considered seismically adequate by ODOT.
- Neither was designed for current seismic forces.
- Both are very vulnerable to moderate or high seismic events.
- ODOT Bridge Section considers that both spans are likely to sustain major damage or collapse and will not be usable after a major seismic event.
- Both bridge structures were built with wooden pilings supporting piers that extend 60 to 70 feet into the liquefiable soils of the river bed, but do not reach into the rock of the Troutdale Formation, approximately 200 feet deep on the Oregon side of the River.

Operational Summary

These bridges are tended to by a full-time staff of nine ODOT employees who carry out regular maintenance at a cost of approximately \$1.0 million per year. In 2012, the southbound span, the northbound span or both were closed 155 times for maintenance work. This totaled 97 hours, 48 minutes of closures during 2012.

"Program Level" Cost Estimate of Needs

- Deck Replacement: Estimated \$150M for deck replacement costs, total, for the two structures. This was based on data from two contracts, Biggs and Lewis & Clark, and scaled to represent the I-5 bridges.
- Paint contract for both bridges: \$75M based on full containment and data from major paint projects in urban area.
- Seismic Retrofit including essentially new substructure, strengthening of trusses and reconstructed lift spans with risk and contingencies (similar to WSDOT CEVP reviewed cost): \$600M
- Trunnion Repair: \$12M for shaft and \$0.5M for guide replacement.
- "Routine" maintenance such as spot painting, fatigue crack repair of the floor system, cable greasing, lift span balancing, etc. is estimated to cost approximately \$1.0 million over 10 years or \$100,000 per year on average.

As you can see, the needs are substantial. Since both states share in the cost of the rehabilitation needs, ODOT coordinates with the WSDOT SW Region to program these needs to allocate funds for future projects to address the needs. The costs shown here have been coordinated between the ODOT Bridge Section and the SW Region within the last year. The costs and timeframe listed are estimates for programming purposes and do not represent detailed engineering estimates, which are normally prepared as part of the design and bidding process.