Background Brief on …

Bridges

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Approximately 6,800 bridges connect Oregon's 59,000-mile road and highway system. The road system is vital to the movement of citizens, visitors, and freight. Bridges are points where the road system is especially susceptible to interruption. When officials must limit the weight of loads allowed on bridges, commerce can be seriously disrupted by requiring long detours for heavy trucks. Freight bottlenecks are also caused when bridges lack sufficient vertical or horizontal clearances.

The Oregon Department of Transportation **(ODOT)** owns and maintains 2,700 bridges on the state highway system. Most of the rest are under the control of local governments throughout the state.

ODOT inspects most state and local bridges every two years; those that are beginning to show signs of significant wear are inspected more frequently. Funding for bridge inspection, including inspection of local bridges is part of ODOT's Bridge Program. Maintenance and minor repairs for state highway bridges fall to ODOT maintenance crews and are covered in the maintenance portion of ODOT's budget. Bridge structural repair, rehabilitation, and replacement are part of the Bridge Program in the Statewide Transportation Improvement Program **(STIP)**. In order to stretch limited funding, the ODOT Bridge Program has been transitioning in recent STIP cycles from a predominantly bridge replacement program to an inventory-wide preservation program.

Aging Bridges

Most of Oregon's bridges are nearing the end of their "design life." Over time, in each successive construction era, bridge design life has increased: from 30 years in the 1930s to 50 years in the 1950s, to 75 years in the mid-1990s to 100 years or even 150 years with contemporary design and construction. The life of a bridge, though long, is not finite. No series of continued repairs, regardless of how well timed, can continue to extend the life of a bridge forever. Eventually, all bridges will need to be replaced.

As of 2014, the median age of state bridges is 48 years, with 56 years being the most frequently occurring bridge age. Approximately 12 percent of state bridges are currently 70 years or older. The passage of time, traffic, weather, and the structural weight of the bridges themselves have taken their toll on older bridges that were designed for lower vehicle weights, slower traffic speeds, and less traffic volume than are typical on Oregon's roads today. The service life of a bridge is an estimate of the number of years a bridge may remain in service. The expected service life can vary depending on the quality of construction materials and methods, the quality and timing of maintenance activities, environmental factors, and usage.

Based on current bridge conditions and increased maintenance, the average remaining service life of state bridges is 35-40 years, with the estimated total service life in the 80-85 year range. 1950s and 1960s bridges represent 40 percent of the state's bridge inventory. Many of these bridges were designed for loads weighing much less than allowed by state law since the mid-1980s.

It is not considered cost-effective to preserve bridges with weaker elements that cannot be corrected. However, because there is currently no identified funding to begin the process of replacing them, there is the potential for widespread freight restrictions in 20-30 years.

Modern trucks are heavier than those in use when many of the state's bridges were designed and built. The number of miles traveled annually by trucks exceeding 70,000 pounds has increased from roughly 100,000 in 1965 to more than 1.5 million today.

In some cases, trucks exceed what older bridges were designed to carry. Enforcement of an 80,000 pound weight limit (or less) on a large number of Oregon's bridges would impose a number of costs on motor carriers, including the need to purchase additional trucks, hire additional drivers, and pay higher weight-mile taxes. Those costs, when passed on to producers, would also have a negative effect on many business sectors, particularly manufacturing. The movement of large, non-divisible loads (single items such as transformers and construction equipment weighing 150,000 pounds or more) would be seriously impacted by bridges restricted to 80,000 pounds.

Transition to Bridge Preservation

The primary revenue sources for state highways, the motor fuel tax and weight-mile tax, are experiencing long-term decline as motorists change driving habits and more fuel-efficient vehicles enter the marketplace. As a result of these factors, ODOT has adopted new strategies to preserve the investment in roads and bridges. In selecting projects the agency has transitioned from a "worst first" approach to a focus on preservation. It is generally held that the investment needed to preserve the inventory in good condition is more cost-effective than paying for more extensive and expensive repairs and replacements needed once the asset conditions have declined to poor condition.

ODOT's strategy for bridge preservation activities includes:

- Protecting high-value coastal, historic, major river crossings, and border structures by acting before costs become prohibitive;
- Giving priority to maintaining the highest priority freight corridors;
- Developing a bridge preventive maintenance program to extend the service life of decks and other bridge components;
- Bringing structurally deficient bridges to fair condition using partial rehabilitation; and
- Continuing use of bridge inspection, health monitoring, and improved deterioration prediction methods.

Protection of High-Value Bridges

ODOT is attempting to maintain indefinitely a small number of Oregon bridges. Preservation of these major historic bridges is important for their cultural value and because the cost of replacement would far exceed revenues available to do so. It is anticipated that maintenance of these structures will require an increasing share of Bridge Program funding as the overall level of funding declines. Because

these are exceptional bridges, ODOT has chosen, as a matter of policy, functional obsolescence and high-maintenance costs as a fair trade-off for preserving these priceless assets. Priority activities include bridge painting and use of special anti-corrosion methods and systems.

Seismic Risk

Although there has not been a major seismic event during our state's recorded history, the geologic record shows that Oregon can expect such earthquakes in the future. Forty large damaging earthquakes – each larger than magnitude 8.0 – have occurred here during the last 10,000 years, and scientists currently estimate that there is a 37 percent conditional probability that a Cascadia subduction zone earthquake of similar magnitude will strike Oregon within the next 50 years.

A large earthquake along the Cascadia subduction zone will cause widespread disruption of the transportation system, making rescue operations difficult, if not impossible. The majority of bridges in western Oregon were built before modern seismic codes were in place and are thus susceptible to serious damage in a major seismic event.

Seismic retrofitting, or strengthening, is a well-developed and well-understood practice. It has been extensively accomplished in the neighboring states of California and Washington, which have had dedicated funding for this work. If no strengthening is done in preparation, the damage to the highway infrastructure during a major seismic event will result in sizable economic losses. It is estimated that with preemptive seismic strengthening, the economic losses would be reduced by 10 to 24 percent, depending on the level of investment.

The total investment cost to repair all seismically deficient bridges is in the billions of dollars. However, there are options for phased retrofitting that provide the maximum degree of mobility with reasonable investments. The manner and timing of funding will influence how and where Oregon is prepared for rescue and recovery. ODOT has been working in cooperation with a variety of stakeholders and decision makers to find solutions to the statewide problem. The most challenging decision is to determine when to begin these investments and how to generate the necessary revenue.

Oregon Transportation Investment Act (OTIA)

The 2003 Legislative Assembly enacted the third Oregon Transportation Investment Act (OTIA III) in recognition of the importance to the Oregon economy of unimpeded freight mobility in important transportation corridors. OTIA III authorized ODOT to issue additional revenue bonds for highway improvement projects, including bridge repair and modernization. The measure increased vehicle registration and title transaction fees to help repay the bonds. The amount dedicated to bridge projects was divided between state bridges ($1.3 billion) and city and county bridges ($300 million). Projects were selected by the Oregon Transportation Commission with input from technical rating committees, the Oregon Freight Advisory Committee, Area Commissions on Transportation, and stakeholders.

The OTIA III program is nearing completion. In June 2014, ODOT dedicated the last of 149 bridges replaced by the program, the Sandy River Bridge on Interstate 84. A marked improvement in bridge condition performance measures resulted largely due to the OTIA III Bridge Program. As this program ends, bridge conditions will be primarily influenced by the State Bridge Program and Major Bridge Maintenance Program funding levels, which are decreasing.

Local Bridges

ODOT is responsible for all bridges on state highways. However, state highways make up only 8,000 miles of Oregon's road system, compared to 33,000 miles of county roads and 10,800 miles of city streets. There are more than 4,000 bridges on county roads and city streets and those bridges must also be inspected, maintained, and periodically replaced. ODOT

administers contracts for the inspection of local agency bridges with funding from the local bridge program.

Federal funding for bridges is shared between state and local bridges. This process, and the selection process for local bridge projects, is outlined by formal agreement between ODOT and local agencies.

I-5 Bridge Replacement Project / Columbia River Crossing

The I-5 Bridge Replacement Project/Columbia River Crossing was a bridge, highway, and transit project meant to address transportation and economic challenges on the I-5 Bridge between Oregon and Washington and its approaches in Portland and Vancouver. The existing I-5 bridges across the Columbia were completed in 1917 and 1958 and are functionally obsolete; with three lanes in each direction, they are strained to capacity to carry the current 125,000 vehicles each day. With the population of the region expected to increase by more than one million people during the next 25 years, ODOT and the Washington State Department of Transportation worked with local governments and other stakeholders to develop solutions for congestion, safety, bicycle and pedestrian access, public transportation needs, seismic vulnerability, and marine navigation and mobility constraints.

The project was developed in conformance with the National Environmental Policy Act. The Federal Highway Administration and Federal Transit Administration, the federal oversight agencies for the project, issued a record of decision at the conclusion of the environmental planning phase of the project in 2011. The record of decision identified a replacement bridge with light rail as the alternative that best improved safety, travel reliability, freight mobility, and bridge structural stability, and relieved congestion on I-5 between Portland and Vancouver. The project also included improvements to interchanges used to access the bridge, including Hayden Island and Marine Drive in Oregon. The project was to be funded through tolling, a federal grant for light rail, and contributions from Oregon and Washington.

The 2013 Legislative Assembly enacted House Bill 2800, which made the Oregon "equity" commitment to the project by authorizing $450 million in bond proceeds. The measure also set out conditions that were to be met before the bonds could be issued, including a requirement that the State of Washington make its financial commitment before September 30, 2013.

When the State of Washington did not make its financial commitment by September 30, Governor Kitzhaber instructed the Oregon project team to evaluate options in the I-5 bridge project area that would achieve the objectives of reducing congestion, enhancing freight mobility and improving safety, all considered priorities for Oregon. Following completion of the analysis, ODOT offered an Oregon-led project. The Oregon-led project would have maintained the same project partners as the joint project, but modified responsibilities to reflect the state of Washington's postponed funding of the Washington interchanges. Implementing the Oregon-led project would have required modifications to the 2013 Oregon legislation to protect the State of Oregon and to clarify and strengthen ODOT's ability to collect tolls from Washington state drivers.

When the Legislative Assembly did not approve legislation during the 2014 Session to amend House Bill 2800, Governor Kitzhaber directed ODOT to close the project and archive its materials. The project was shut down by the end of May, 2014.

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