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Bridge Inventory

WSDOT Structures	No. of Bridges	Square Feet
Bridges greater than 20 feet in length*	2,977	43,345,388
Structures Less than 20 Feet in Length	261	na
Border Bridges (maintained by Border State)	6	na
Culverts greater than 20 feet in length	88	na
Pedestrian Structures	57	249,730
Tunnels and Lids	38	739,381
Ferry Terminal Structures	45	248,443
Buildings (I-5 Convention Center)	1	na
Railroad Bridges	84	na
Totals of all Structures	3,555	44,582,942

* For comparison, cities and counties own 3,929 bridges greater than 20 feet

Vehicular Bridges greater than 20 feet in length
The number of vehicular bridges has increased from 2,967 to 2,977 since June 2004 as a net result of new bridges being built and added to the system.

Structures less than 20 feet in length
This number has increased from 257 to 261 since June 2004 due to additional structures that have been added to the State's inventory.

Culverts greater than 20 feet in length
This number has increased from 80 to 88 for the same reason.

Annual Bridge Condition Update

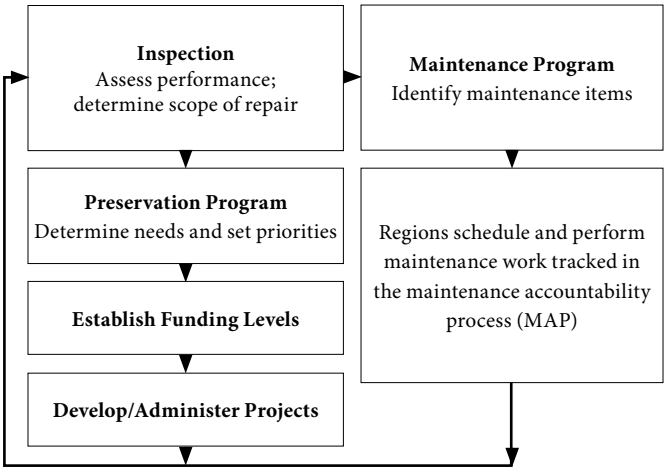
WSDOT reports the condition of WSDOT's bridges to the Office of Financial Management (OFM) in accordance with reporting standards set by the Governmental Accounting Standards Board (GASB). The rating system for bridges follows criteria set for the country as a whole by the Federal Highway Administration (FHWA). WSDOT's policy is to maintain 95% of its bridges at a structural condition of at least fair. The assessment in 2005 found that state-owned bridges were within these parameters: just two percent of bridges showed a condition rating of "poor." No bridge that is currently rated as "poor" is unsafe for public travel. Bridges determined to be unsafe are closed to traffic.

The condition rating data shown at right is based on the structural sufficiency standards established in the FHWA "Recording and Coding Guide for the Structural Inventory and Appraisal of the Nation's Bridges." This structural rating relates to the evaluation of bridge superstructure, deck, substructure, structural adequacy and waterway adequacy.

Category	Description	2000	2001	2002	2003	2004	2005
Good	A range from no problems to some minor deterioration of structural elements.	84%	85%	87%	86%	87%	89%
Fair	All primary structural elements are sound but may have deficiencies such as minor section loss, deterioration, cracking, spalling or scour.	11%	11%	10%	11%	10%	9%
Poor	Advanced deficiencies such as section loss, deterioration, cracking, spalling, scour or seriously affected primary structural components. Bridges rated in poor condition may be posted with truck weight restritions.	5%	4%	3%	3%	3%	2%

WSDOT Preservation Program

Bridge repair needs are identified through the inspection program. Once a needed repair has been identified, the urgency of the repair is determined and a list of bridge repairs is provided to each region's bridge maintenance office. Engineers review repair options and determine if the repair can be achieved within the scope of maintenance activity. The regional maintenance office tracks and manages these repairs through the Maintenance Accountability Process (MAP) system. Bridge repairs that are outside of the reach of maintenance activities are identified and prioritized in the bridge preservation program.



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Bridge Preservation Program

WSDOT's Bridge Preservation Program consists of the following four main program elements:

Inspection – Inspect one-half of all bridges every year.

Repair, Rehabilitation, and Replace – Repair bridges with deteriorated bridge elements such as concrete columns or floating bridge anchor cables. Rehabilitate mechanical and electrical operating systems on moveable bridges. Replace bridges as needed.

Preservation – Extend bridge service life by repainting steel structures; also repair and overlay of concrete bridge decks.

Risk reduction – Seismic retrofit of bridges and scour repair of bridge piers in rivers. This work provides a proactive approach to minimizing damage to bridges due to earthquake and higher water events.

Bridge Inspection

WSDOT inspects one-half of all traffic bridges every year. Bridge engineers also inspect floating bridge cables, tunnels, ferry terminal structures, sign bridges, and make a bridge inspection response if a bridge has been damaged by a vehicle or vessel.

Underwater Inspection Team

The Bridge Office Underwater Dive Team, formed in June 2004, enables WSDOT to perform underwater inspections and respond quickly to underwater emergencies. Over the past year the team has completed over 100 production dives in extreme conditions. The dive schedule has resulted in the completion of 32 State and 17 Local Agency bridge inspections.

Previously underwater inspections were contracted out . Initial estimates of annual savings of the dive team to WSDOT were $100,000. This figure is now being revised upwards to $150,000. This savings includes all labor and equipment purchases to date.

Darren Nebergall (left) and Shawn Plichta (right) at Port Washington Narrows, Bremerton, WA.

Bridge Replacements

The bridge preservation program includes funding for the replacement of selected bridges. Currently, there are three bridge replacement projects under construction:

SR 104 Hood Canal Bridge (near Port Gamble)

Replacement of the aging east half floating portion and widening of the west-half superstructure continues. See the story on page 49. More information is available at www.wsdot.wa.gov/projects/sr104hoodcanalbridgeeast/.

SR 240 Yakima River Bridge (near Richland)

Replacement of the old 1950 Yakima River Bridge with two new parallel bridges is nearly complete. Remaining work includes paving the new bike/pedestrian path and placing plants in the new wetland area under the south end of the new bridges. The project is scheduled for final completion by the end of October 2005. More information is available for this project at www.wsdot.wa.gov/Projects/SR240/Yakimariverbridge/.

U.S. 12 Coppei Creek Bridge (near Waitsburg)

The Coppei Creek Bridge was constructed in 1920. The waterway opening under the bridge is restrictive, causing water to flow over the approach roadway during peak flows.

The City of Waitsburg, WSDOT and the U.S. Army Corps of Engineers work together to help alleviate the flooding in the community. The U.S. Army Corps of Engineers is designing the dike system. WSDOT is replacing the bridge, reconstructing the U.S. 12 tie-in, and working with the U.S. Army Corps of Engineers to obtain additional funds to construct the dike. The construction project was awarded to A & R Construction of Lewiston Idaho on June 6, 2005. The estimated project cost is $2.3 million. The project is scheduled to be open to traffic by the end of November 2005. More information is available at www.wsdot.wa.gov/projects/US12/CoppeiCreekBridge/.

Additional bridges scheduled to go to contract for replacement during the 2005-07 biennium:

U.S. 97 Satus Creek Bridge (near Toppenish)

The existing bridge, constructed in 1942, is structurally deficient. The existing curve on U.S. 97 in this area is substandard. Several accidents have occured at this location. Over 1,000 trucks travel through this section of U.S. 97 every day.

The new wider bridge and straighter roadway will improve safety, as well as stream flow and habitat conditions in Satus Creek. This project will also reconfigure two main access points to Tribal Lands.

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WSDOT is scheduled to complete the design Fall 2006. Construction is scheduled to begin Spring 2007. The total project cost is estimated at $7 million. More information is available on the WSDOT web page for this project at www.wsdot.wa.gov/Projects/US97/SatusCreekBridge/.

Major Repairs

The major repair portion of the bridge preservation program includes projects for capital rehabilitation work beyond the scope of maintenance programs. This corrective work addresses a specific bridge element in need of repair and is not intended to upgrade all deficiencies. A prioritized list of major repair needs for bridges is developed each biennium. There are six major bridge repair projects scheduled to go to contract in the 2005-07 biennium. Emergency contracts are used when unexpected bridge problems occur, and when repair is needed right away.

Existing U.S. Satus Creek Bridge

I-5 East Fork Lewis River Bridge (near Woodland)
This bridge was constructed in 1936. Annual inspections have noted an increase in the number of connections that are cracking. Over the years, trucks have caused fatigue cracking in the steel stringers that support the concrete deck in the steel truss at many connection locations. The truck weight when the bridge was originally designed was much less compared to the current conditions and standards.

This project to repair the steel stringer cracking and replace the expansion joints is scheduled for contract in Spring 2006.

I-5 McCallister Creek Bridge Column Repair (near Lacey)
This bridge was constructed in 1968. The planned repair project will add steel jackets to three existing deteriorating columns and address the seismic retrofit needs located at Pier 2 in McCallister Creek. The repair project is scheduled for construction in Summer 2006.

I-5 East Fork Lewis River Bridge

Deteriorating column at Pier 2 in McCallister Creek

SR 153 Methow River Bridges Rail Replacement and Deck Repair (near Methow)
These bridges were constructed in 1939. The bridge deck surfaces, rails, and sidewalks show advanced signs of deterioration on Bridges 153/3, 153/4, 153/10, 153/14, and 153/15. The bridge rails will be removed and replaced, and the concrete deck surfaces will be repaired and overlaid with Hot Mix Asphalt. Sidewalks on two of the bridges (153/10 and 153/14) will be retrofitted with supports.

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SR 153 Methow River Bridge

This project is scheduled for advertisement in October 2006. Construction is to begin in Spring 2007 with completion by Fall 2008. More information is available at www.wsdot.wa.gov/Regions/NorthCentral/projects/SR153MethowRiverBridge/.

I-5 Southbound Viaduct Expansion Joint Replacement (near Seattle)
This bridge was constructed in 1969. Many of the bridges' steel expansion joints need to be replaced. Years of wear and rutting in the concrete adjacent to the expansion joints have caused excessive deterioration. Replacement of the expansion joints is scheduled for advertisement in Fall 2006, with construction to begin in Summer 2007.

Movable Bridge Repair

Movable bridge repairs include corrective work on electrical and mechanical systems that cannot be accomplished with routine maintenance. A prioritized list of movable bridge repair needs is developed each biennium. The following bridge repair projects are under contract or scheduled to begin construction in the 2005-07 biennium.

SR 529 Snohomish River Bridges (near Everett)
This project is under contract and has been awarded to Mowat Construction Company. The project will repair corroded steel elements in the draw span tower and add catwalks for maintenance employees to both the east and west bridges. Construction is expected to end in Fall 2006.

U.S. 12 Heron Street Bridge (near Aberdeen)
This repair project will modify the bridge to allow proper seating of the steel swing span during the closing of the bridge. The movable span sags when opened in hot weather making it difficult to close. Construction on this project is expected to begin in Spring 2006.

U.S. 101 Simpson Avenue Bridge (near Hoquiam)
This bridge was constructed in 1928. The repair project will modify deficient electrical and mechanical components. Construction on this project is expected to begin in the Spring 2006.

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Preservation and Risk Reduction

Steel Bridge Painting
Protective coatings painted on steel bridge elements are essential to prevent corrosion and eventual loss of use for traffic capacity. Steel bridges typically need to be repainted every 15 to 20 years. WSDOT schedules a bridge to be over coated with new paint when two to five percent of the existing paint has failed. Bridge painting can become a major project because of the size of the steel structures and the complexity of safety, environmental and containment system requirements.

Currently there is one project under contract, SR99 Duwamish River, and two projects scheduled for construction in the 2005-07 biennium.

SR 99 Duwamish River Bridge (near Seattle)
This project will paint the East bridge which is under contract for the second time in two years. The first contract was cancelled due to difficulties balancing the weight of the paint containment system during bridge openings for marine vessels.

The bridge is a moveable draw span and has the most openings of any state owned moveable bridge in Washington State. The bridge has an open steel grid deck that must be sealed prior to cleaning and painting. Because of environmental restrictions in the current contract regarding the Duwamish River, the cleaning process uses abrasive blasting material that must be fully contained. Vehicle traffic has to be restricted in order to prevent damage to the containment system. Therefore, cleaning and painting must be performed at night. Nearly half of the bridge is completed with the other half scheduled to be completed in Summer 2006.

Duwamish River Bridge

Lewis and Clark Bridge

SR4 33 Columbia River Lewis & Clark Bridge (near Longview)
This bridge crosses the Columbia River between Longview Washington and Rainier Oregon. The bridge was last painted in 1984. Repainting is scheduled for the Summer 2006. The cost of the project is estimated to be nearly $19 million and will be shared equally between Washington and Oregon.

I-90 East Channel Bridges (near Bellevue)
These bridges were constructed in 1981 with "weathering steel". Weathering steel is designed to rust but not corrode excessively. Over the years water has leaked through the concrete deck into the inside of the steel box units. The water has ponded in areas and caused the steel to corrode beyond acceptable limits. The project to overcoat the steel along the inside bottom surfaces with a clear rust penetrating epoxy is scheduled for contract in Spring 2006.

Bridge Deck Protection
Concrete bridge deck deterioration (from corrosion of the reinforcing steel) has been the largest single bridge-related problem throughout the country for years. Since the early 1980's, WSDOT has carried out a systematic program to prevent future concrete deck deterioration by using epoxy-coated rebar in new bridges, and repairing deterioration and traffic-related wear in existing bridges with new durable protective overlays. There are 15 bridges in eight projects that are scheduled for concrete deck repair and protection construction in the 2005-07 biennium.

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I-90 Spokane Viaduct (near Spokane)
The existing bridge decks were overlaid in 1985-86 with a 1.5-inch thick latex modified concrete. Heavy traffic with a high percentage of studded tire use has severely rutted the surface of I-90 in downtown Spokane. The project will remove and replace the existing concrete overlay on the mainline bridges.

The first phase of this project is scheduled for construction in Summer 2006 and will address the East side of the Viaduct Bridges. The second phase is scheduled for construction in Summer 2007 and will address the West side of the Viaduct Bridges. The total project cost is estimated to be nearly $15 million. More information is available at www.wsdot.wa.gov/Regions/Eastern/projects/I90/SpokaneViaductBridgeDeck/.

Risk Reduction

Seismic Retrofit
The purpose of the Seismic Retrofit program is to minimize and avoid catastrophic bridge failures by retrofitting bridges and structures. There are three projects currently under contract and four additional projects scheduled for construction in the 2005-07 biennium. Seismic bridge projects in progress:

I-5 North Seattle Bridges Seismic Retrofit
This project will retrofit seven bridges on I-5 in North Seattle area. Crews will retrofit the bridges by strengthening 22 concrete columns with steel jackets and adding restrainers on the end of the structures to decrease movement during an earthquake.

This project was originally awarded to PCT Construction, Inc. in May 2004 with completion scheduled for Spring 2005. The contact was canceled due to disagreements over scope and subsequent project costs. The project is currently being re-advertised for bids with a scheduled award date in November 2005. The contract cost estimate is $1.1 million. Updated project information is available at www.wsdot.wa.gov/projects/I5/NSeattleBridge_Retrofit.

SR 99 Spokane Street Overcrossing Seismic Retrofit Phase 3
This project is the last phase of seismic retrofit work on the Spokane Overcrossing Bridge. Wilder Construction Company will retrofit the bridge by strengthening the connections of the outrigger beams and the columns with steel jackets. Recently completed research by Washington State University provided WSDOT bridge engineers with information used to design the outrigger beam to column connection details. The contract was awarded in June 2005 and is scheduled to be completed in the spring of 2006. The contract cost is $708,000.

U.S. 2 Everett Vicinity Bridge Seismic Retrofit
This project will retrofit two sections of the westbound U.S. 2 Ebey Island Viaduct, two bridges on I-5, and a pedestrian bridge on SR 526. The contractor will retrofit the concrete bridge columns with steel jackets. The project was awarded to Wilder Construction of Everett in September 2005. The project is scheduled to be completed in Fall 2006. The contract cost is $4.6 million. Updated project information is available at www.wsdot.wa.gov/projects/us2/EverettSeismicRetrofit.

Scour
Historically, more bridges have collapsed from the scour of bridge foundations than from any other cause. Scouring is the action of rushing water on the rocky foundation holding up a column. Since 1923, there have been 70 bridge failures documented in Washington State. The astounding fact is that 43 of these failures were the direct result of foundation scour due to flooding. The most recent major bridge scour event happened in 1999 on SR 101 at the Nolan Creek Bridge.

Each biennium a list of bridges is developed requiring some type of scour mitigation action. Scour repair always involves working in water. WSDOT coordinates closely with, and usually receives stringent permit conditions from, the state Department of Fish and Wildlife. Most repairs consist of adding rock "rip-rap" around bridge pier foundations to replace streambed material that had been removed over time.

Two scour mitigation projects have been completed by contract, and two bridges were repaired by WSDOT maintenance crews. Eleven additional bridges are scheduled for repair in the 2005-07 biennium.

SR 8 Middle Fork Wildcat Creek Culvert Retaining Wall Replacement and Scour Repair (near McCleary)
This culvert at milepost 5.01 was built in 1962 and carries four lanes of SR 8 eastbound and westbound traffic above it. The culvert has four independent retaining walls at each corner. Previous inspections noted exposed footings in both the culvert and the retaining walls due to scour of the foundation material. In 2004 this project was given a high statewide priority.

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Middle Fork Wildcat Creek Culvert April 2005

Middle Fork Wildcat Creek Culvert September 2005

In April 2005, WSDOT engineers observed the southeast retaining wall rotated away from its original position. Scour of the retaining wall foundation was determined to be the cause of the movement in the wall. Engineers decided that an urgent repair was needed to prevent a total failure of the wall and the fill material under the eastbound lanes of SR 8. The repair project needed to be completed by October 2005 to meet water restrictions by the Department of Fish and Wildlife.

The design of a repair project included replacement of the southeast retaining wall and reconstruction of the fill material through the culvert with new rocks and streambed material. Woody debris was added to the stream to enhance the fish habitat. The water in the creek was temporarily diverted using pumps and pipes through the culvert.

The project was advertised in August 2005 and awarded to Roglins Construction. The in-water work on the project was completed on September 30, 2005. The contract cost was nearly $450,000.

I-5 Steamboat Slough Bridges Scour Repair (near Marysville)

Previous underwater inspections of these bridges found the riverbed had migrated and reduced the original channel bottom by as much as 10 feet in the vicinity of Pier 8 on both the east and west bridges. The timber piles that provide support for the foundations were exposed. A contract to repair the scour, including removing large woody debris and placing heavy loose rip rap around Pier 8, was prepared and awarded to American Construction Company, Inc. on June 6, 2005 for $122,084. The contract work was completed and verified by underwater divers in September 2005.