

State of Washington
Joint Legislative Audit & Review Committee (JLARC)



Total Highway Maintenance and Preservation Estimates Are Available

Phase 1 Briefing Report

January 7, 2014

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**Total Highway
Maintenance and
Preservation
Estimates Are
Available
Phase 1 Briefing Report**

January 7, 2014



STATE OF WASHINGTON

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REPORT SUMMARY

The Washington State Department of Transportation (WSDOT) has developed procedures for estimating total needs for highway maintenance and preservation. These estimates, however, are not required to be submitted as part of the biennial budget process. Unlike the budget procedures, which are well-documented, documentation of procedures for developing total need estimates is less complete.

Maintaining and Preserving Highways Is an Ongoing Responsibility

Washington's highway system is composed of numerous components, such as pavements, bridges, drainage systems, and electrical systems, all of which must be maintained on a regular basis and replaced or restored when they wear out.

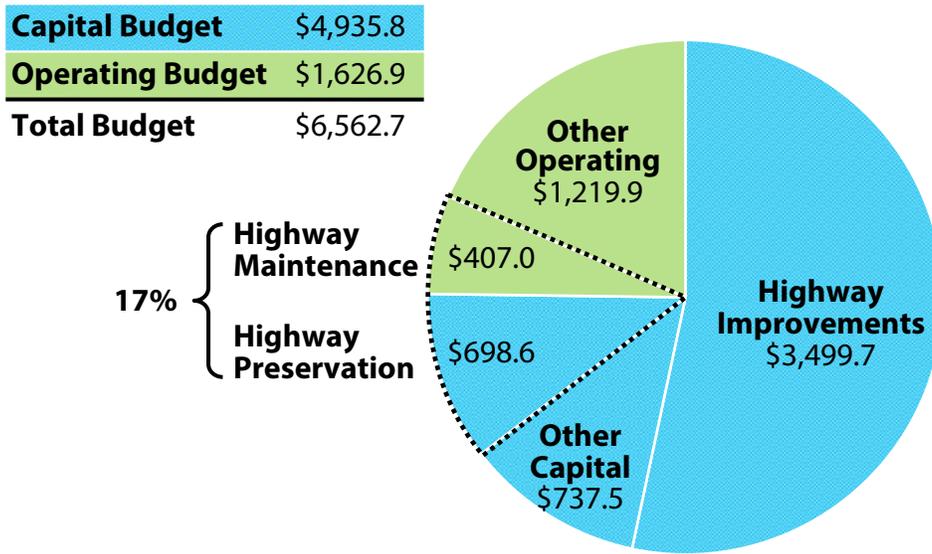
Together, highway maintenance and preservation account for 17 percent of the WSDOT 2013-15 Biennial Budget (Exhibit 1 on the following page). Highway maintenance is funded from the Department's operating budget and is budgeted at \$407 million in the 2013-15 Biennium. Highway preservation is a capital budget activity and is budgeted at \$699 million in the 2013-15 Biennium.

Legislature Directed JLARC to Review WSDOT Systems and Methods for Assessing Maintenance and Preservation Needs

The 2013-15 Transportation Budget (ESSB 5024) directed JLARC to conduct a review of the methods and systems used by WSDOT to develop estimates of asset condition, maintenance service level needs, and subsequent funding requests for highway preservation and maintenance programs. The full scope and objectives of the review are presented in Appendix 1. The directive establishes a two phase study:

- Phase 1 presents an **overview** of the methods and systems WSDOT uses to develop estimates of maintenance and preservation needs and the documentation for those methods and procedures.
- Phase 2 will **evaluate** whether WSDOT methods and systems for estimating maintenance and preservation needs are consistent with industry practices and other appropriate standards.

Exhibit 1 – Maintenance & Preservation Are 17 Percent of the WSDOT 2013-15 Biennial Budget (Dollars in Millions)



Source: JLARC staff analysis of 2013-15 WSDOT appropriations.

Total Maintenance and Preservation Need Estimates Are Available

WSDOT estimates both what is needed for continuing maintenance at the current level of service, as well as what would be necessary for a recommended level of service. The recommended level of service may be higher than the current level. The estimate to continue current maintenance activities is included in the biennial budgeting process and is consistent with instructions issued by the Office of Financial Management. Cost estimates for the total maintenance backlog, maintaining new additions to the highway system, or improving maintenance service levels are not required by the biennial budget process and may be provided to the Legislature separately.

Similarly, WSDOT estimates total preservation needs but, like maintenance, these needs are not a required part of the budget process which focuses on allocating available preservation revenues. WSDOT does not routinely provide estimates of all future preservation needs for the Legislature, but the agency has the information and systems to generate such an estimate when requested.

The estimates for both maintenance and preservation used in the biennial budgeting process are limited to the expected amount of available revenue. While this biennial budgeting process is well-established and well-documented, the procedures for estimating other needs (such as recommended maintenance and total future preservation) are not as thoroughly documented.

Phase 2 of Study Will Address Additional Questions

Phase 2 of this study will examine whether WSDOT methods and systems for assessing maintenance and preservation needs are consistent with industry standards, minimize life cycle cost, and quantify risk. JLARC staff will seek a technical consultant to assist in this phase of the study. The final report will be completed in December 2014.

BRIEFING REPORT

The Biennial Budget Request Process Does Not Identify All Maintenance Needs, But WSDOT Supplements This Process to Identify Those Needs

Maintenance provides routine activities each year to ensure that highway components will meet operational and service life expectations. Examples of maintenance activities include sealing pavement cracks and patching potholes, making minor bridge repairs, cleaning culverts and drainage ditches, repairing damage caused by motorists or natural events, and controlling snow and ice on highways during winter months.

WSDOT Budget Requests for Maintenance Needs Are Based on Expected Available Funding and Do Not Include Total Maintenance Needs

The biennial budgeting process for maintenance activities is well documented and uses an incremental approach. This means that the request for each biennium is based on the amounts requested for the previous biennium, with adjustments for inflation and other factors such as changes in the prices of goods and services. Rather than identifying all maintenance needs and the funding required to meet those needs, the biennial budget process limits the budget request to available revenue.

WSDOT has a well-established process for developing its biennial maintenance budget requests and prioritizing maintenance activities. Prior to preparing the maintenance budget request, Maintenance Operations staff in WSDOT's headquarters send the regional offices budget instructions. The regional offices use these instructions to prepare a list of their region's maintenance needs and the estimated funding required in order to meet those needs. In addition to the incremental budget request, the regional lists of needs sometimes identify maintenance backlogs, maintenance for highway system additions, or enhancements to the current levels of maintenance service for existing assets. As discussed in the following section, funding to address such needs may be requested using decision packages.

Regional offices use the Maintenance Accountability Process (MAP) to prioritize maintenance activities. MAP priorities are set by considering each maintenance activity's importance in achieving the following policy objectives:

- Ensuring the safety of traveling public and employees;
- Operating the highway system and keeping roads open;
- Meeting environmental responsibilities;
- Maintaining the infrastructure;
- Addressing legal mandates other than environmental (including torts); and
- Contributing to comfort, aesthetics, or convenience.

To assist in estimating maintenance costs, WSDOT Headquarters assigns each type of maintenance activity a level of service (LOS) target. These targeted service levels reflect a primary focus on task completion to achieve an asset condition that the Department strives to meet or exceed. LOS targets may range from an A (best asset condition) to an F (worst asset condition), although in practice WSDOT does not assign any maintenance activity below a D LOS target. For example, guardrails were expected to be maintained at a B+ service level in the 2011-13 Biennium. According to performance measures established by WSDOT, this requires that no more than 3 percent of the state’s guardrails can be damaged or missing at any point in time. At a C service level, up to 5 percent of the guardrails could be damaged or missing; for a D service level, 10 percent could need maintenance.

To achieve the asset condition associated with a specific LOS target, WSDOT must complete certain tasks. At each LOS target level, a different range of tasks is performed:

A	Focus is on preventive maintenance tasks in all areas
B	MAP activities dealing with a broad range of safety issues receive preventive maintenance, while other areas receive corrective and routine maintenance
C	Routine and corrective maintenance is performed except in safety-critical (i.e., life-threatening) areas, which receive preventive maintenance
D	Very little preventive maintenance is done. Maintenance work at this level focuses on correcting problems as they arise

Relying on MAP priorities and LOS targets for guidance, regional offices submit a list of needs and an accompanying budget request to WSDOT Headquarters. WSDOT considers this information in creating the Department’s overall maintenance budget request. As noted previously, this request is based on incremental changes to the prior biennium’s budget. This request is prepared using instructions from the state’s Office of Financial Management and submitted to the Legislature.

The LOS targets, which represent the level of service recommended by the Department, might not be achieved if appropriated funding is less than the Department’s request. In that event, maintenance managers focus resources on achieving targets for higher priority activities (pavement patching, snow and ice removal, for example) and de-emphasizing lower priority activities.

Estimates of Total Maintenance Needs Are Available

In response to a 2008 State Auditor’s recommendation, WSDOT began identifying the backlog of maintenance. WSDOT defines its maintenance backlog as “the amount of maintenance actions that could not be accomplished (or the associated dollar amounts) because of resource limitations.”

WSDOT followed a systematic and rigorous process to identify the backlog. WSDOT staff reviewed each maintenance activity, identifying the LOS actually achieved in 2007, as well as the associated costs and resources expended to meet that LOS. Staff then identified the recommended LOS target for each activity and determined what additional resources would be required to upgrade the actual LOS to the recommended level of service. Using this approach, WSDOT estimated that an additional \$85 million would be required to eliminate the maintenance backlog and continue to meet the recommended LOS targets in the future.

WSDOT issued a 2008 report detailing the maintenance backlog and explaining why the Department recommended additional funding to address the backlog. The report noted that WSDOT achieved only 53 percent of its statewide LOS targets in 2007. In contrast, the Department reported it had achieved 97 percent of statewide LOS targets in 2004. The 2009 Legislature approved an additional \$16.8 million to the biennial maintenance budget, which was intended to reduce part of this backlog.

In 2011, WSDOT updated the 2008 estimate to include funding required to maintain additions to the highway system that came on-line between 2008 and 2011. WSDOT staff reviewed the blueprints and contracts for each of these system additions and identified the maintenance activities and associated costs required to keep each addition in good condition at recommended service levels. The Department estimated that an additional \$12.9 million was necessary to maintain these new system additions at the recommended level of service. The 2011 Legislature added \$6.4 million to the maintenance budget for 2011-13. In 2012, the Legislature added \$3.5 million in a supplemental maintenance appropriation. These additions became part of the maintenance base budget that is incrementally adjusted in subsequent biennial budget requests.

This estimating process enabled WSDOT to develop tools it can use to update its estimates for meeting recommended service levels and maintaining new additions to the highways system. During the 2013 Legislative Session, the Department presented an updated estimate of \$414 million needed over ten years to eliminate the remaining backlog and provide recommended maintenance on new system additions through the 2021-23 Biennium.

Most of the documentation to show how WSDOT developed its initial maintenance backlog estimate and the initial system additions request was readily available. However, staff in one region had discarded the supporting documentation once the summary estimates were prepared and submitted to WSDOT Headquarters. Documentation to show how subsequent updates were estimated for both the maintenance backlog and maintenance of system additions was more limited. Working with WSDOT staff, JLARC staff obtained sufficient documentation to verify that the Department is using a logical process to identify its full maintenance needs. The definitions used for LOS targets have not been updated since they were established in 1996.

WSDOT Can Identify Total Preservation Needs, But Estimates of Total Needs Are Not a Required Part of the Biennial Budget Submission

Preservation is the periodic replacement or restoration of highway system components to renew service life. Examples of preservation work include repaving highways before surface wear and tear lead to subsurface deterioration, painting bridges, replacing bridge deck pavement, and replacing deteriorated culverts. Unlike maintenance, where work is performed on a frequent, recurring cycle, the preservation cycle for an individual asset may be as long as a decade or more.

Budget Requests for Preservation Needs Focus on Biennial Budget, Not Total Future Preservation Needs

WSDOT budgets for preservation projects through its priority programming process. The specific procedures used to identify projects and estimate associated costs can vary based on the type of asset that needs to be replaced or restored. In general, however, the priority programming process follows these steps:

- 1) **WSDOT information systems identify assets that are nearing the end of their expected service life.** For example, the Washington State Pavement Management System (WSPMS) managed by the WSDOT State Materials Laboratory identifies pavement segments that may need restoration or replacement. The Bridge Office maintains a Bridge Information System that summarizes the results of bridge inspections to identify bridges and bridge components requiring preservation. Pavement and bridge preservation account for approximately 88 percent of WSDOT preservation expenditures in the past ten years. Inventories and condition information for other assets are less extensive, although WSDOT has in recent years begun to develop similar information systems for signal systems, drainage structures, and unstable slopes.
- 2) **Staff from WSDOT regional offices visually inspect the identified assets and develop project proposals with assistance from technical specialists.** The agency reports that bridge preservation is more complex due to the multiple components of bridge structures, so bridge preservation projects are developed primarily by the technical specialists in the Bridge Office with assistance from regional office staff.
- 3) **The Capital Program Development and Management Division (CPDM) at Headquarters reviews the proposals for preservation projects.** CPDM staff categorize each project by asset type (pavement, bridge, etc.) and conduct various analyses to establish project priorities within each asset category. CPDM then proposes a preservation program budget that funds projects within the limits of projected preservation funding.

The primary purpose of this process is to establish a priority order for implementing projects. This means that the process focuses on estimating preservation needs for the upcoming biennium and does not require WSDOT to identify all future preservation needs. Although the biennial budget process also informs the ten-year preservation plan approved by the Legislature each biennium, only the first biennium of the ten-year plan is based on estimates of specific projects. The remaining four biennia of the plan often use formula-based estimates to illustrate how preservation funds will be used in those years.

Additionally, the ten-year preservation plan is based on estimates of revenue expected to be available for preservation during the ten-year planning period. The plan does not identify any preservation needs that may exceed available projected revenue. This means that not all preservation needs are identified by the biennial budget process.

The priority programming process is well-documented in flow charts and procedural descriptions provided by CPDM. In addition, CPDM communicates specific information in memos, instructions, emails, and periodic scoping conferences during the budget development process.

JLARC staff also reviewed selected project files to identify the specific information documented for individual projects during the scoping process.

The one element of the priority programming process that is not well-documented is how CPDM determines allocation of preservation funds among asset categories. Discussions with CPDM staff indicate that this decision balances value added to the highway system (e.g., additional service life, increased safety) against potential risk and liability. However, JLARC found no formal documentation for this decision-making process.

Estimates of Total Preservation Needs Are Available

WSDOT periodically estimates total preservation needs. The most recent attempt to estimate preservation needs beyond available revenue was presented to the 2013 Legislature in a report titled, “WSDOT Priorities for New Revenue—2013 Unfunded System Investments.” This report—also known as the “Orange List”—identified over \$2.5 billion of preservation needs in excess of projected revenue for the ten-year period beginning with the 2013-15 biennium:

Exhibit 2 –WSDOT Estimates Future Preservation Needs Exceed Projected Revenue Over the Next Decade (Dollars in Millions)

Asset Type	Estimated 10-Year Preservation Need	Projected Funding	Estimated 10-Year Unfunded Need
Pavement Preservation	\$ 2,934.5	\$ 1,115.5	\$ 1,819.0
Bridge Preservation	1,089.0	585.0	504.0
Other Facility Preservation	513.0	300.0	213.0
Total	\$ 4,536.5	\$ 2,000.5	\$ 2,536.0

Source: WSDOT Priorities for New Revenue – 2013 Unfunded System Investments.

Because estimating total preservation needs is not a formal process, procedures are less well-documented than for the biennial budget process. No specific procedures or flowchart of the process for estimating future needs were available, but JLARC staff were able to interview CPDM staff and review worksheets prepared to develop the estimates.

As described by CPDM staff, estimates of future preservation needs are not based on individual projects. Rather they are based on expected service life of system assets, strategies for using preservation funds cost-effectively, and historical costs. WSDOT has extensive information on condition and expected service life for pavement and bridge components. The pavement management system reports current pavement condition and provides historical data for research. The Bridge Office maintains an information system to assess preservation needs for replacing bridge decks, painting steel bridges, and replacing some bridges completely.

The process that served as the basis for developing the Orange List estimates appears logical. The Orange List pavement preservation estimate is consistent with both the procedures and results of a 2010 report prepared by the State Materials Laboratory to the Legislature. However, CPDM did not maintain a complete record of estimate modifications between the initial estimates prepared in July 2012 and those submitted to the Legislature in 2013. As a result, JLARC staff were unable to track changes in the estimates that occurred during the process.

Phase 2 of Study to Be Completed December 2014

This Phase 1 briefing report describes the methods and systems WSDOT uses to assess maintenance and preservation needs, the documentation supporting those assessments, and how those assessments influence funding requests for maintenance and preservation programs. Phase 2 of this study will examine the reliability and validity of WSDOT methods and systems for assessing these needs. It will address the remaining questions of the Legislative mandate:

- Are the methods and systems WSDOT uses consistent with industry practices and other appropriate standards?
- Are practices in place to minimize life-cycle preservation and maintenance costs?
- How does WSDOT quantify risks to its need and cost estimates?
- What steps are in place to ensure that requests are not unduly impacted by outside pressures?

The Phase 2 report will be presented at the December 2014 JLARC meeting.

APPENDIX 1 – SCOPE AND OBJECTIVES

REVIEW OF HOW WSDOT ASSESSES HIGHWAY PRESERVATION AND MAINTENANCE NEEDS

SCOPE AND OBJECTIVES

AUGUST 20, 2013

STATE OF WASHINGTON



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Why a JLARC Study of How WSDOT Assesses Highway Preservation and Maintenance Needs?

The Washington State Department of Transportation (WSDOT) is responsible for maintaining and preserving a statewide highway system of more than 20,000 lane miles of pavement, over 3,400 bridges and structures, and numerous other supporting assets such as signal systems and drainage ditches.

The 2013-15 Transportation Budget (ESSB 5024) directs the Joint Legislative Audit and Review Committee (JLARC) to conduct a review of the methods and systems used by WSDOT to develop asset condition and maintenance service level needs and subsequent funding requests for highway preservation and maintenance programs.

Maintaining and Preserving Highways Is an Ongoing Responsibility

“Maintenance” and “preservation” represent the activities needed to keep the highway system functioning. Maintenance begins when a highway asset such as a pavement surface, is placed in service and includes activities that keep the asset in service over its lifetime. For example, routine pavement maintenance includes filling potholes, sealing cracks, and restoring traffic markings. Crews from the six WSDOT regional offices perform these routine activities. The 2013-15 Transportation Budget appropriates \$407 million to WSDOT for highway maintenance.

In contrast, preservation occurs at the end of the asset’s service life when, even with the best routine maintenance, the asset must be replaced. For example, asphalt pavement typically has a service life of 15 years after which it can no longer provide a smooth and safe driving surface and prevent failure of the underlying substructure. A preservation project would replace the asphalt on a stretch of highway. Preservation work is performed by private contractors. The 2013-15 Transportation Budget appropriates \$699 million to WSDOT for highway preservation.

WSDOT is responsible for identifying highway maintenance and preservation needs. WSDOT also estimates the costs of meeting these needs.

Study Scope

The Legislature directed JLARC to conduct this review in two parts. Phase 1 will provide an overview of the methods and systems used by WSDOT to estimate highway maintenance and preservation needs and costs. Phase 2 will examine whether the methods and systems WSDOT uses for estimating highway preservation and maintenance needs and costs are consistent with industry practices and other appropriate standards.

Study Objectives

Phase 1 of this review will address the following questions:

- 1) What methods and systems does WSDOT use to develop estimates of highway maintenance and preservation needs and costs?
- 2) Is each stage in the estimating process fully documented?

Phase 2 will address the remaining questions of the mandate:

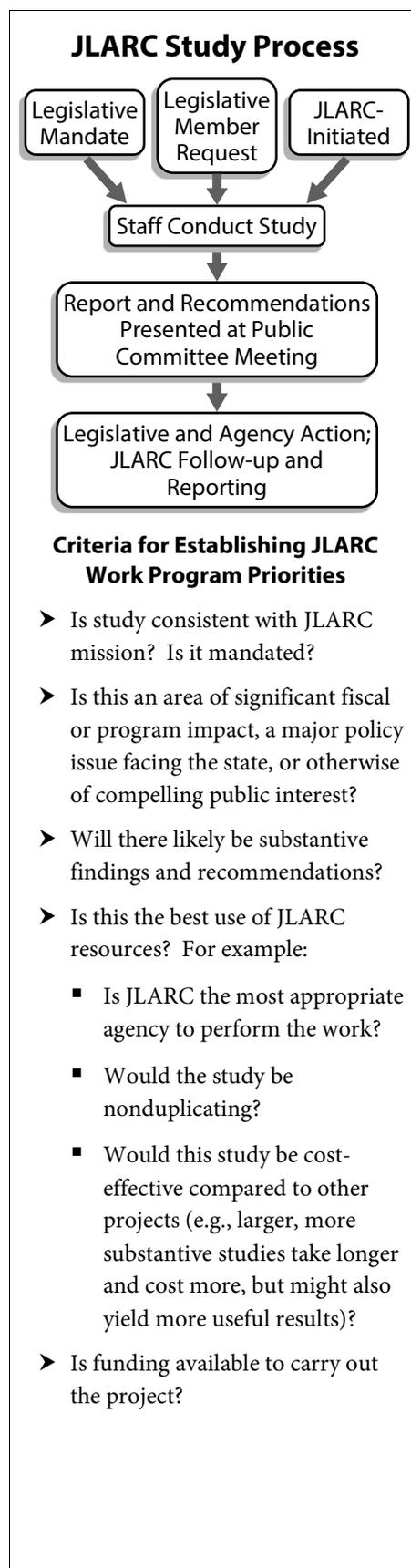
- 3) Are the methods and systems WSDOT uses consistent with industry practices and other appropriate standards?
- 4) Are practices in place to minimize life-cycle preservation and maintenance costs?
- 5) How does WSDOT quantify risks to its need and cost estimates?
- 6) What steps are in place to ensure that requests are not unduly impacted by outside pressures?

Timeframe for the Study

Staff will present the Phase 1 report at the January 2014 JLARC meeting. Staff will present the Phase 2 report at the December 2014 JLARC meeting.

JLARC Staff Contacts for the Study

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APPENDIX 2 – AGENCY RESPONSES

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December 26, 2013

Mr. Keenan Konopaski, Legislative Auditor
Joint Legislative Audit and Review Committee
1300 Quince St SE
Olympia, WA 98504-0910

Dear Mr. Konopaski:

Thank you for your December 19, 2013, briefing report on the performance audit of how WSDOT assesses highway maintenance and preservation needs.

WSDOT appreciates the briefing report's recognition that the Department has a well-established and documented process for developing its biennial maintenance and preservation program budgets, which are based on expected revenue and in accordance with budget instructions to agencies. We also appreciate the report's recognition that WSDOT has estimates available of total maintenance and preservation needs. As highlighted in the briefing report, the listing of maintenance and preservation needs includes both immediate and long-term program needs. Immediate needs become the basis of the biennial budget process, depending on the levels of revenue given, and long-range needs are an integral part of long-range planning for the programs.

The Department values the work the Joint Legislative Audit and Review Committee has done on assessing how the Department develops procedures for estimating total needs of its Highway Maintenance and Preservation programs and looks forward to Phase II of the audit, which will evaluate whether WSDOT's methods used to estimate program needs are consistent with industry practices and other appropriate standards.

Please call me at 360-705-7027, or Steve McKerney at 360-705-7004, if you have any questions or need more information.

Sincerely,

for Cam Gilmour
Deputy Secretary

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