King County Auditor's Office
Capital Projects Oversight Program
Kymber Waltmunson, King County Auditor
King County

Review of Road Services Division Pavement Preservation

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July 15, 2014

Executive Summary

It is vital that the Road Services Division (RSD) take strategic actions for using its greatly reduced pavement preservation resources cost effectively. RSD's recent road services plan introduces a number of new strategies to lessen impacts to road users and avoid costly road reconstruction; however, RSD's financial challenges will have unavoidable negative implications for the future condition of King County's road network. Other western Washington counties have applied innovative, cost-effective approaches to pavement preservation enabling them to keep their road networks in better condition while dealing with their own financial constraints. We make recommendations to leverage data and make decisions aimed at a more cost-effective preservation program with improved outcomes.

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Review of Road Services Division Pavement Preservation

Report Highlights

July 15, 2014

Purpose

This study reviews the Road Services Division (RSD) pavement preservation program, which is facing significant challenges related to a decline in road fund revenues. We assess RSD's adherence to its tiered maintenance strategy developed in mid-2011 to prioritize spending by road type and the long-term impacts of its pavement preservation approach. We discuss how RSD's Strategic Plan for Road Services 2014 Update guides the future use of resources for pavement preservation in the face of growing financial challenges. We evaluate the cost-effectiveness of RSD's pavement preservation program by comparing King County's performance to four other western Washington counties and identify strategies used by these counties for RSD to consider.

Key Study Findings

RSD's spending on pavement preservation has been in alignment with its tiered maintenance strategy since 2012. Funding constraints will have negative impacts to users and the condition of King County roads. RSD's Strategic Plan for Road Services 2014 Update identifies the need to change priorities as they manage risks of a declining road system due to current and forecast financial challenges. The plan update includes new strategies that could guide RSD's actions to more cost effectively use limited pavement preservation funds. Peer counties use a variety of tactics to achieve their pavement management goals despite road revenue constraints. We identify five strategies that contribute to peer success and may provide promising opportunities for King County as it makes changes to its pavement preservation program.

1. Strategic use of pavement seals
2. Continuous review and adjustment of treatment methods
3. Application of innovative technologies
4. Containing pavement management system spending
5. Establishing and monitoring of performance measures

What We Recommend

We make four recommendations to strengthen data-driven decision-making at RSD and to improve RSD's pavement preservation program cost-effectiveness and outcomes as the division adapts to continuing financial challenges.

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1. Alignment of Activities with Tiered Maintenance Strategy

Section Summary

Since 2012, the Road Services Division (RSD) has been spending its pavement preservation funds on the highest priority roads identified by its tiered maintenance strategy. A significant decline in road fund revenue led RSD to implement a tiered maintenance strategy to prioritize use of reduced resources. Roads with the highest traffic volume and those that serve transit and freight are prioritized to receive the highest levels of maintenance and other services. Prior to 2012, spending was spread more uniformly across all types of roads, including local access roads carrying only a small portion of the county's vehicular traffic.

RSD developed a tiered strategy to address revenue declines

Facing a significant decline in road fund revenue caused by annexations and a drop in property tax revenue after the 2008 recession, RSD developed a tiered maintenance strategy in mid-2011 to prioritize use of reduced resources. RSD uses the tiered strategy to focus resources and guide decisions about where and in what order work, such as pavement resurfacing, will be done. RSD categorized county roads into five tiers. Tier 1 roads, the highest priority, serve the most users and receive the highest level of service. Tier 5 roads, the lowest priority, serve the fewest users and receive the lowest level of maintenance. According to RSD, some of the criteria used to make tier assignments include traffic volume, projected lengths of detours, and whether the road provides sole access or is important for transit or freight.

Exhibit A: Road tiers have different levels of reliability and maintenance

	Tier 1	Tier 2	Tier 3	Tiers 4 and 5
Description	Heavily traveled Connect large communities and major services	Heavily traveled Serve smaller geographic areas and provide alternate routes to Tier 1 roads	Highly used local Serve local communities and large residential areas	Residential use Sole access (Tier 4) Alternate routes available (Tier 5)
Reliability of Access	Consistently reliable access	Generally reliable access	Somewhat reliable access	Less/least reliable access
Maintenance Level	Highest level of storm response; maintenance and preservation	Lower level of storm response; maintain in good condition, reactive preservation	Little or no storm response; maintain to slow deterioration	Virtually no storm response; maintain to preserve access and protect life
Percent of Network	50% of traffic 7% of lane miles[1]	20% of traffic 11% of lane miles	15% of traffic 13% of lane miles	15% of traffic 69% of lane miles

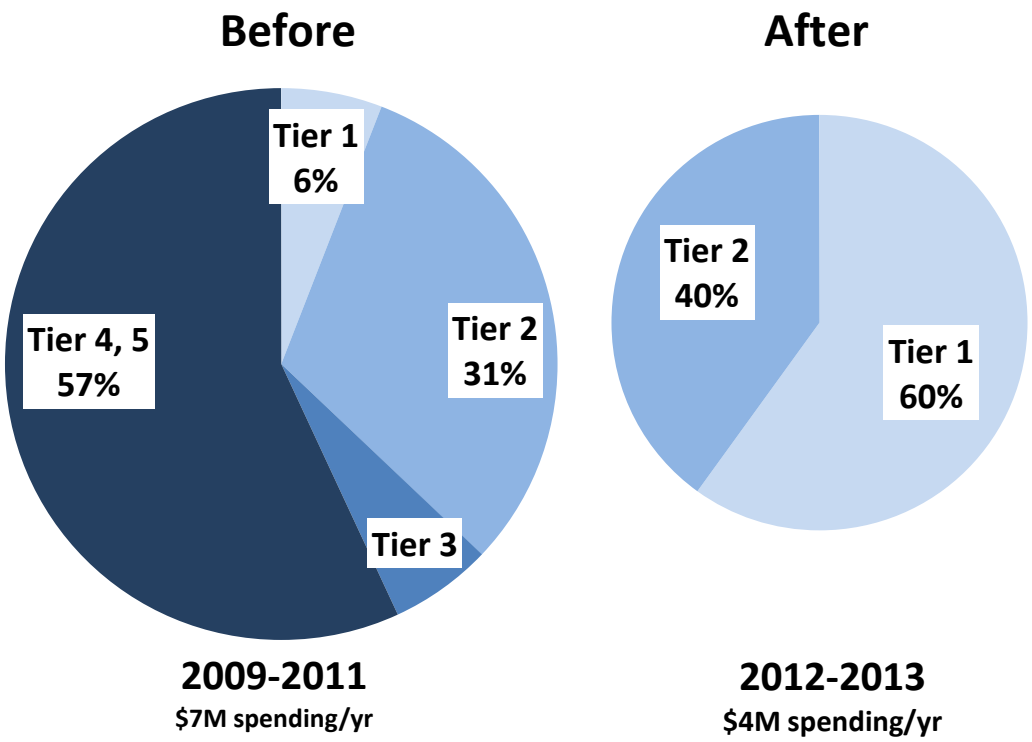
[1]A lane mile is measurement of surface area that is one lane (usually assumed to be 12-feet wide) by one mile long. If a one-mile length of a four-lane road is paved, it is recorded as four lane miles.

1. Alignment of Activities with Tiered Maintenance Strategy

RSD uses its tiered strategy for paving decisions

In accordance with its tiered maintenance strategy, RSD has paved only Tier 1 and 2 roads since 2012. These tiers include heavily traveled roads serving large communities, major services, or critical infrastructure. They carry 70 percent of the county's traffic and comprise 18 percent of the county's roads. In the three years before implementing its tiered strategy, RSD spent nearly 60 percent of its pavement preservation funds on Tier 4 and 5 roads, which carry just 15 percent of the county's traffic volume and are now identified as having the lowest priority. RSD explains that these three years were not representative of historical spending; rather they represented a concentrated effort to improve conditions on local access roads after years of focus on paving the more heavily traveled arterials roads.

Exhibit B: Spending has declined and shifted to most heavily traveled roads



Source: Auditor's Office analysis of King County's annual pavement preservation report to County Road Administration Board.

2. Future Implications

Section Summary

Given previous funding cuts, worse than expected financial forecasts, and non-discretionary expenses such as debt service, RSD will find it increasingly difficult to maintain pavement condition. RSD has identified promising new strategies that could improve pavement preservation outcomes. However, between 2009 and 2012, RSD significantly reduced the miles of pavement preserved, and plans further reductions. RSD's financial situation will have negative implications for the condition of pavement and impacts on users of the county's road network now and in the future. RSD has opportunities to implement changes to its pavement management approach that could lessen these negative impacts.

RSD's worsening financial situation point to new approach

RSD's Strategic Plan for Road Services 2014 Update[2] (SPRS Update) recognizes that the division's funding situation is worse than in 2010 and identifies even greater financial challenges ahead. RSD forecasts limited funds to maintain and preserve assets including pavement and plans to shift its approach to manage the risks of a declining road network. The SPRS Update provides policy guidance for future service and funding options and identifies many new strategies to improve cost-effectiveness. These include, for example, identifying efficiencies to streamline regulatory compliance and encouraging transfer of orphaned[3] county roads to adjacent jurisdictions.

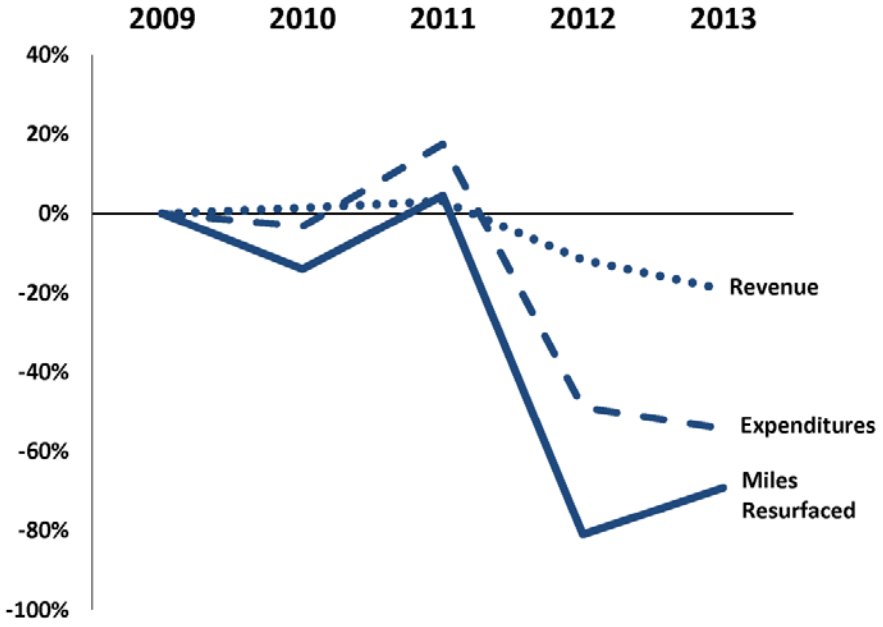
Rate of pavement preservation has declined more than revenue

Expenditure constraints, accounting changes, and strategic choices led RSD to reduce pavement preservation at a rate disproportionate to the decline in revenue. Between 2009 and 2013, road levy revenue, the major funding source for RSD declined by 19 percent, while annual capital spending on pavement preservation declined by approximately 50 percent. RSD officials explained that the magnitude of the decrease is due to non-discretionary expenses such as debt service, overhead, and core safety activities. In addition, changes in accounting methodology[4] caused some costs previously funded from the operations budget to be drawn from the pavement preservation program capital budget appropriation and further reduced what was available for spending on annual paving. RSD's new focus on paving only the most heavily traveled roads caused the division to abandon a pilot program of chip sealing, a lower cost pavement preservation treatment with a shorter life, which is suitable for some lower traffic volume roads. Together, these actions resulted in RSD preserving 69 percent fewer lane miles in 2013 than in 2009.

[2]Published in April 4, 2014, as an update to the adopted 2010 plan. It covers 2014 through 2024.
[3]Orphaned roads are isolated urban roads such as half-streets (i.e., one side owned by a city and the other by the county) completely surrounded by city territory, and roads located on the urban growth boundary where consistent urban services are most appropriate.
[4]RSD uses the Governmental Accounting Standards Board (GASB) Statement No. 34 modified approach to report the value of road infrastructure assets. This requires agencies to estimate and report the annual amount to maintain and preserve infrastructure, such as pavement, at a minimum condition level. In 2012, to better align cost accounting with GASB asset reporting, RSD began funding overlay preparation work done by county forces from its capital budget instead of its operating budget, as had been its past practice.

2. Future Implications

Exhibit C: Pavement preservation declined at a much greater rate than road levy revenue.



Note: Miles resurfaced include asphalt overlay and chip seals measured in lane miles.
Source: Auditor analysis of road levy data from the county Office of Economic and Financial Analysis, expenditure and mileage data reported to Washington State County Road Administration Board (CRAB), and expenditure data from RSD.

RSD plans to reduce pavement preservation spending by an additional 50%

RSD's SPRS Update quantifies a growing gap between available funding and the cost of addressing system needs, leading the division to plan a 50 percent reduction in pavement preservation spending. The updated plan projects a $20 million annual funding gap between RSD's budget and what the division needs to provide even the lowest level of road maintenance, which RSD refers to as "managing risk in declining system."[5] RSD's staff stated that the $20 million gap assumes pavement preservation capital spending would be $2 million per year, half the annual spending level in 2012 and 2013.

Without changes to the current approach, the planned cut in pavement preservation funding would mean that RSD could resurface Tier 1 roads approximately every 12 years. This is equivalent to the target life of RSD's overlays so it may be adequate to preserve Tier 1 road pavement, but would leave 93 percent of county roads with no resurfacing. According to RSD, users are likely to see impacts including deteriorating pavement and partial or full road closures depending on the road tier. The failure of the recent vote[6] for augmented local transportation funding means there will not be additional revenue in the near term.

[5]Strategic Plan for Road Services 2014 Update, p.5.
[6]Special election on April 22, 2014 for Proposition No. 1 Sales and Use Tax and Vehicle Fee for Transportation Improvements.

2. Future Implications

Recommendation 1

RSD should assess the proposed 2015-2016 funding levels for pavement preservation activities and ensure they are consistent with goals and priorities in its SPRS Update. RSD should communicate the proposed spending level and miles of resurfacing planned.

Current preservation funding is not sufficient to support best practices in pavement preservation

RSD's funding levels are insufficient to employ best practices in pavement preservation. The SPRS Update reports that funding constraints will force RSD to abandon best practice approaches, including applying timely pavement preservation activities to avoid costly road reconstruction work in the future. As a result, the pavement condition of county roads will deteriorate, and RSD may need to use suboptimal pavement surface treatments.

RSD has already departed from best practices due to recent lower levels of funding for pavement preservation. Because of aforementioned focus on Tier 1 and 2 roads, RSD has not done any pavement resurfacing on Tier 3, 4, and 5 roads since 2011. This leaves more than 80 percent of King County's road network at risk of deteriorating to a point where preservation activities such as asphalt overlays[7] and chip seals[8] can no longer be effective and more costly rehabilitation or reconstruction actions may be needed.

[7]Asphalt overlays are an additional layer of asphalt added to extend the life of existing pavement by covering imperfections, such as cracking, sunken areas, and mild deterioration. Thin overlays are usually defined as 2-inches or less in depth and provide limited structural benefit. Overlays greater than 2-inch depth may add to the structural integrity of the pavement.
[8]Chip seals involve the application of a liquid asphalt binder followed by a layer of aggregate that is rolled to embed in the binder. Chip seals provide a new skid resistant wearing surface and seal minor cracks.

3. Peer Comparisons

Section Summary

Based on comparison with peers, King County has opportunities to enhance pavement preservation program performance. We compared King County with selected western Washington peer counties in three key areas:

1. Resurfacing rate
2. Pavement preservation costs
3. Pavement management system spending

Selected peers include Clark, Kitsap, Pierce, and Snohomish counties. Officials from all counties described challenges to obtain adequate funding for pavement preservation work, but peers are not facing the revenue declines of the magnitude that King County reports in the SPRS Update. King County's road fund also has higher non-discretionary debt payments than the other counties. Because annexations in recent years have decreased the number of miles in King County's road network, Pierce and Snohomish counties currently have larger road networks than King County, while Clark and Kitsap counties have smaller ones.[9] Pierce County also has the highest traffic volume and most freight and goods system road miles.[10]

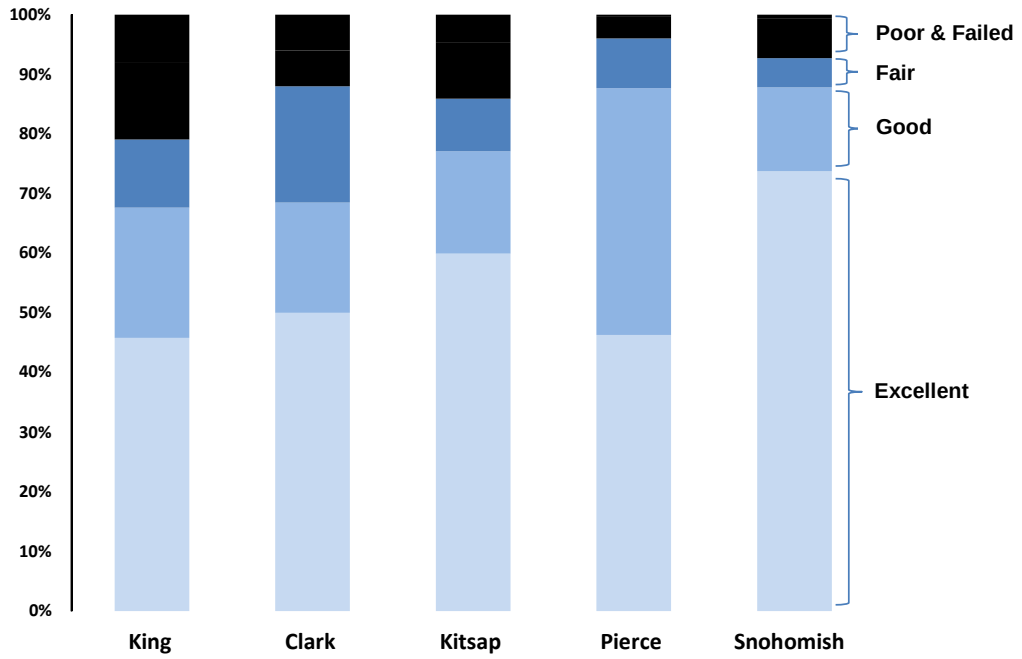
Peers have been able to maintain more roads in fair to excellent condition

Approximately ninety percent of peers' roads are in fair to excellent condition on average, compared to seventy-nine percent of King County's roads.[11] RSD officials reported that many of the county's roads are old, with pavement beyond its useful life based on structural testing on the subgrade of the arterial roads. According to RSD officials, degraded subgrade condition indicates that roads need work that is more extensive and costly than overlay to handle the traffic and volume. As a result, RSD has rated these roads in worse condition than if these roads were rated based on pavement surface condition alone. Unless additional funding becomes available, the SPRS Update forecasts a continuing decline in pavement condition. Peer counties anticipate maintaining or improving their pavement condition in coming years.

[9] Certified County Road Logs as of 01/01/2014 provided by CRAB.
[10] Table I, "County Freight and Goods System," 2013 Annual Report, CRAB.
[11] Puget Sound Regional Council analysis, January 23, 2013 and Auditor's Office interview with Clark County March 11, 2014.

3. Peer Comparisons

Exhibit D: Peers have a smaller percentage of their roads in poor or failed condition.



Source: Puget Sound Regional Council analysis of 2012 data and Auditor's Office interview with Clark County Public Works. Counties use different rating scales and data collection techniques. This analysis combines and normalizes data to show relative system pavement condition across jurisdictions to the extent possible.

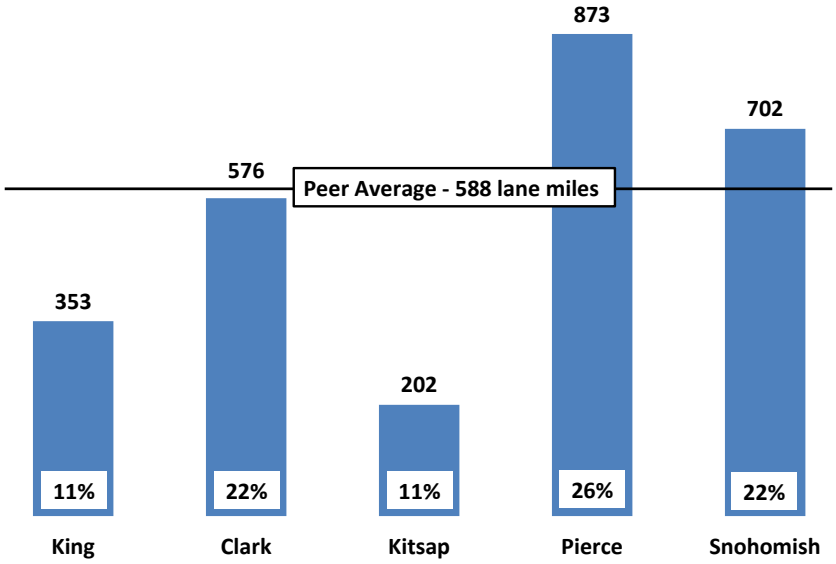
Peers resurface more roads

Peers resurface more of their road networks on average than King County, predominately because they use chip and other seals as a lower cost treatment to resurface roads.[12] From 2009 to 2012, peers resurfaced 21 percent of their road networks on average, compared to 11 percent for King County. At these accomplishment rates, it will take RSD approximately 36 years to resurface every road in King County's road network, while taking peers 19 years, on average, to resurface their road networks. Since resurfacing treatments typically last between 7 to 20 years, it is likely that King County's roads will deteriorate to a point where costly reconstruction work is needed.

[12]Resurfacing includes asphalt overlays and chip or other seal treatments to restore pavement surface condition deteriorated from cumulative impacts of traffic and weather.

3. Peer Comparisons

Exhibit E: In four years, most peers resurfaced more lane miles and a greater percentage of their road networks.



Source: Auditor's Office analysis of CRAB data 2009 to 2012.

Peer overlay costs are similar, seal costs are lower

Peer costs for asphalt overlays are comparable to King County's; however, peer costs for seal treatments are lower. Asphalt overlays and seal treatments are the resurfacing methods reported by counties to CRAB. CRAB reports also show the costs for the associated preparation work such as digging out soft spots, patching, and crack sealing. The following cost comparisons use the total costs per lane mile including preparation and surface treatment.

Overlay

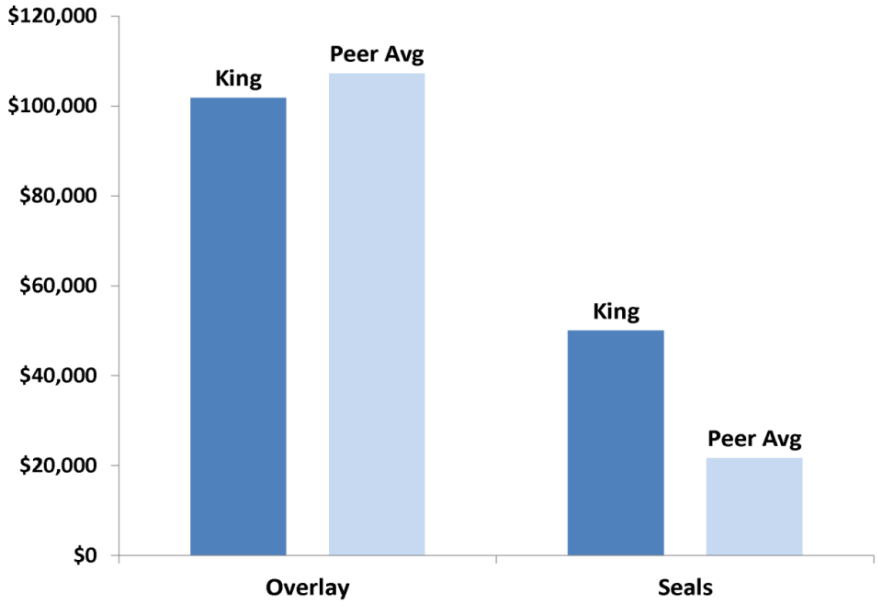
Between 2009 and 2012, King County's overlay costs averaged about $102,000 per lane mile, 5 percent lower than the peer average. Reports to CRAB do not include the thickness of overlays. When interviewed, most peers stated they typically apply 2.5 to 4 inch thick overlays. King County typically applies thinner overlays, which could contribute to some of the difference between costs.

Seal Treatments

King County's chip seal costs averaged about $50,000 per lane mile, more than two times the peer average for seal work. There are many factors that contribute to King County's higher chip seal cost. For example, these costs were from a pilot program conducted between 2009 and 2011 to chip seal a small number of road miles each year. Chip seals in 2009 were on Vashon Island, were done by contract, and involved higher transportation and material costs. In 2010 and 2011 King County maintenance crews did the chip seal work. Because it had been many years since King County had chip sealed roads, maintenance staff were learning new skills and were using borrowed equipment. Peers have larger and longstanding programs for chip

and other seals and use their own equipment contributing to production efficiency and lower labor costs. Peers purchase greater volumes of materials for their chip seal programs and may obtain materials at lower costs.

Exhibit F: Peers have similar overlay costs and lower seal costs. Overlays cost two to five times more than seals per lane mile.



Source: Auditor's Office analysis of pavement preservation data reported to CRAB for 2009 to 2012 and expenditure data from RSD.

Peers' pavement management system spending is lower than King County's

King and Clark counties spend on average $800,000 and $900,000 per year respectively to meet Washington's pavement management system (PMS) requirements.[13] In comparison, the other three counties estimate they spend less than $100,000 per year on their PMS efforts. Based on current road network sizes, King County spends $247 per lane mile on PMS, Clark County spends $338 per lane mile, and the other three counties spend approximately $25 per lane mile.[14]

King and Clark counties described conducting additional best practice activities as part of their PMS work programs. According to staff, these activities provide them with better data to analyze the condition of their pavement. Both counties conduct structural testing of roads and manage pavement-related grants as part of their PMS program. Clark County also collects traffic data as part of its PMS program and currently has heavy workload due to switching to a new software system and supporting increased spending to address a backlog of pavement resurfacing.

[13]Washington counties are required to have a PMS in order to be eligible for certain state transportation funds. PMS work includes the collection, analysis, and reporting of pavement condition and other data used to assist decision-makers develop preservation strategies.
[14] King County's labor costs are fully burdened with department and county overhead such as rent.

4. Factors Contributing to Peers' Favorable Results

Section Summary

Five tactics have helped peer counties improve the cost-effectiveness of their pavement preservation programs:

1. Strategic use of seal treatments
2. Continuous review and adjustment of treatment methods
3. Application of innovative technologies
4. Containment of pavement management spending
5. Setting and monitoring of performance measures

The tactics used by peers are discussed below. They may be useful to help mitigate the effects of the financial challenges faced by RSD. All peers indicated a willingness to share their experience with King County.

Peers use seal treatments to make their funding go further

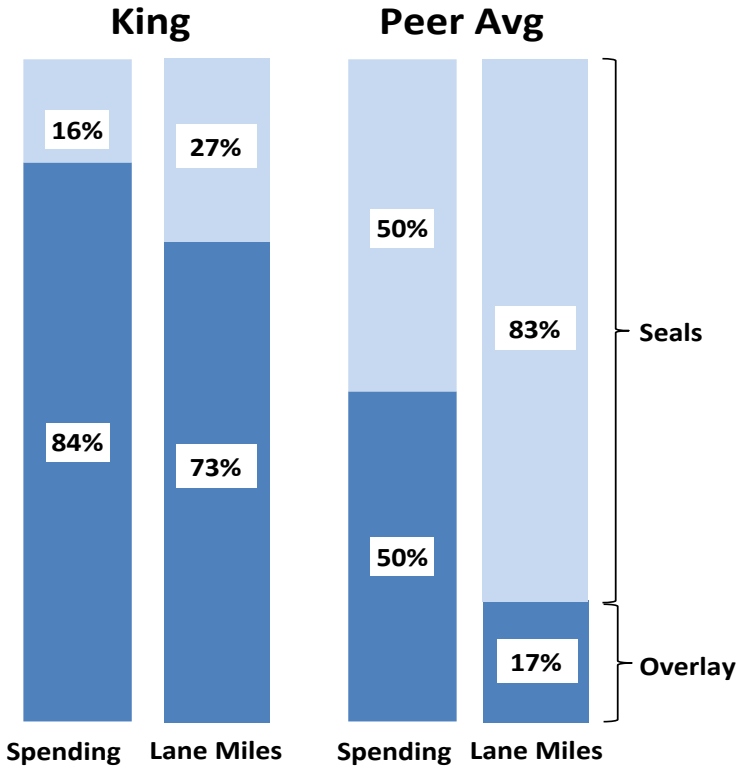
Most peers use chip seals and other seal treatments as a major part of their pavement preservation program. The lower cost for seals compared to overlays allows peers to resurface more lane miles with their available funding. Seals have a shorter life than overlays and are typically applied more frequently. Between 2009 and 2012, peers spent approximately 50 percent of their pavement preservation funds on chip and other seals and accomplished 83 percent of their resurfacing. During the same period, King County spent 16 percent of its pavement preservation funding on its pilot chip seal effort and accomplished 27 percent of the lane miles of its resurfacing.

Because overlays cost approximately two to five times more than seal treatments, King County's greater use of asphalt overlay resulted in an average cost per lane mile of resurfacing nearly two times that of peers, $87,700 for King County compared to approximately $36,000 on average for peers.[15]

[15]Based on pavement preservation accomplishments and costs reported to CRAB 2009 through 2012 and expenditure data from RSD.

4. Factors Contributing to Peers' Favorable Results

Exhibit G: Peer counties emphasize seals. Spending on seals yields more road miles.



Source: Auditor's Office analysis of data reported to CRAB for 2009 through 2012 and expenditure data from RSD.

Peers report success using seals on roads with traffic volumes up to 10,000 average daily trips (ADT), the threshold recommended by current Washington State Department of Transportation guidelines. While seals are not likely a viable preservation strategy for King County's Tier 1 priority roads because of traffic volume, they could be a viable strategy for some Tier 2 and all Tier 3, 4, and 5 roads, more than 80 percent of the county's roads. As future annexations occur, the miles of roads exceeding 10,000 ADT will decline, but King County will retain some roads with traffic volumes too high for chip sealing.

In addition, the current condition of some of King County's roads may be too far deteriorated for seals to be an effective strategy. In order for seals to be successful, roads must be structurally sound and have been maintained or prepared well enough to use seals. Lastly, the life expectancy of seals is shorter than overlays. Industry standards and peer interviews describe the typical life of a chip seal as six to seven years.

4. Factors Contributing to Peers' Favorable Results

Peers continuously assess their treatment methods

Peer counties report monitoring the performance of the various resurfacing treatments they use, and adjusting their strategies if targets are not met. Clark, Pierce, and Snohomish counties make extensive use of a variety of seal treatments, and in interviews described that they apply seals at 7- to 10-year intervals to maintain good pavement condition and to extend asphalt overlay life to 20 years and longer. In addition, these counties use asphalt overlays predominately on their arterial roads and apply thicker overlays than King County, ranging from 2.5 to 4 inches. Peers stated both their overlays and seals have performed as expected, meeting or exceeding their targeted life.

RSD has acknowledged that its overlays are not achieving their targeted useful life. RSD's typical method is to apply a 1.75 to 2-inch overlay. The division reported targeting, but not achieving, a 12-year useful overlay life on its arterial roads. This approach was chosen based on a life cycle cost analysis that may no longer be applicable, since the treatment is not achieving the expected life. For this reason, RSD conducted structural testing to better understand the condition of arterial road subgrade and its impact on the diminished life of overlays.

King County discontinued chip sealing in 2012 when declining revenues led RSD to prioritize spending on Tier 1 and Tier 2 roads only. RSD indicated it is willing to revisit using seals if future opportunities develop. Peers would be a valuable resource to King County because of their extensive experience with seal treatments.

Recommendation 2

As RSD defines its new pavement management strategies, it should document how it will identify and apply the most cost-effective approaches by:

a) Updating its life cycle cost analysis at regular intervals using the best available cost and performance data from King County and peers.
b) Using its life cycle cost analysis to identify the most cost-effective resurfacing options for different types of roads.
c) Developing and applying criteria for when and where to use each resurfacing option effectively.
d) Documenting and applying a formal process for considering developments in overlay and seal technologies.

4. Factors Contributing to Peers' Favorable Results

Peers are using innovative ideas and technologies to increase cost-effectiveness

Peer counties have taken advantage of innovative pavement preservation approaches and advancements in seal technologies to reduce pavement preservation costs and extend pavement life. Innovative approaches used include:

- Using overlays at intersections to add structural strength where pavement wear is the worst, and seals on the road stretches between intersections
- Using lower cost seal technologies such as fog and slurry seals on residential roads to achieve additional years of useful life while keeping complaints from residents to a minimum
- Using rubberized asphalt and coated chip seals to achieve longer life on higher volume roads and reduce complaints from drivers
- Adding high strength Kevlar fibers to asphalt overlays on high traffic volume roads to reduce the overlay depth and extend the useful life

Peer counties report investing in research, participation in regional technical groups, and working closely with vendors to select and pilot new treatments. They report some failures, but for the most part report these innovations have contributed to their success at preserving their pavement in an era of flat or reduced funding for pavement preservation.

Some peers keep regulatory costs at a minimum

Kitsap, Pierce, and Snohomish counties have implemented staffing approaches that allow staff to meet PMS regulatory requirements at a lower cost than King County. These counties report using between .5 and 1.5 full-time equivalents while King and Clark use approximately 5 full-time equivalents working predominantly on PMS regulatory activities.

Conducting visual surveys of pavement condition on all roads is the single largest expense for PMS work for counties.[16] King County accomplishes this work using three staff for nine months, costing approximately $400,000 per year. Two peer counties use consultants to conduct their visual condition ratings, at a cost of approximately $60,000 for a similar number of road miles. A third peer uses county staff to rate a similar number of road miles in approximately 65 percent fewer staff hours than King County.

RSD indicated it is considering ways to cut the cost of its pavement management activities, including reducing frequency of condition rating and

[16]The state requires counties to survey for visual pavement distress and rate the condition of all arterial roads at least every other year. King County and all peer counties also survey and rate their non-arterial roads, although some rate non-arterials less frequently.

finding more efficient ways to collect data, including sampling, where possible. If successful, RSD's effort could identify savings that could be used for resurfacing more miles each year. It could also create capacity for engineering staff to pursue adaptive management and innovation to maximize the value of its work to improve pavement preservation program outcomes.

Recommendation 3

As RSD moves to implement the SPRS Update scenario described as "manage risk in a declining system," it should make strategic adjustments to its staffing approach to more cost effectively satisfy pavement management system regulatory requirements and maximize value to pavement preservation program outcomes.

Peers establish and monitor performance goals for pavement preservation

All peer counties had established performance measures for their pavement preservation programs. These ranged from broad outcome measures reported to the public to detailed measures to inform management decisions. For example:

- Monitoring the average time to failure for different treatments by road type to update their analysis and optimize their life cycle costs.
- Setting road crew production targets, which are shared weekly to encourage performance.
- Measuring the percentage of completion of regulatory requirements for pavement condition rating to ensure compliance by deadline.
- Establishing target dates for bidding out annual contracts for asphalt overlay to obtain most favorable bidding climate.

RSD has an opportunity to establish and monitor performance measures and targets to improve the outcomes of its pavement preservation program.

Recommendation 4

As RSD implements new pavement preservation strategies, it should establish performance measures, set targets, and monitor and act on the results to guide decision-making, motivate staff, and improve cost-effectiveness.

Conclusion

King County's pavement preservation program faces serious challenges in the foreseeable future due to revenue shortages and an aging road network. While a decline in the pavement condition of the road network is inevitable without additional revenue, it is vital that RSD take every opportunity to use its limited pavement preservation resources effectively. As RSD begins to implement its Strategic Plan for Road Services 2014 Update, we recommend immediate attention to King County's pavement preservation program, evaluating past practices and seeking ways to increase the benefits achieved from spending even as available funding continues to decline. RSD should explore the applicability of and consider adopting strategies used by peer counties to more cost effectively manage its pavement preservation efforts and improve outcomes.

Executive Response

King County

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July 9, 2014

Kymber Waltmunson
King County Auditor
Room 1033
COURTHOUSE

Dear Ms. Waltmunson:

Thank you for the opportunity to provide a response to the Pavement Preservation report. I appreciate the Auditor's Office role in promoting and improving performance, accountability and transparency through independent studies of County operations. The Road Services Division is looking closely at ways to shape its business practices given resource limitations, and we appreciate how this analysis can validate potential future strategies.

King County maintains the roads outside of cities that provide connections and routes for the two million people who live in the County. This includes access to schools and work places, allowing goods to move from farm to market, and routes for freight, businesses, utilities, and other critical services. About half the trips on the high-volume roads originate in cities and other counties that pay no taxes to support the road system.

Given significant financial constraints, the County is facing a "sea change" for the 2015-16 biennium in the area of pavement preservation. In light of inadequate revenues and adopted priorities for the management of County roads and bridges, the program focus is changing to a highly reactive effort focused on safety first, instead of a prevention and preservation approach. Unfortunately, since little funding is expected to be available for overlay, work will be focused on spot repairs and reactive work in efforts to keep higher tiered roadways open.

Keeping up a cycle of overlay, chip seal, surface defect repair work, and base repair are industry best practices to cost-effectively extend the life of roads. Depending upon usage and environment, a new asphalt road may last about 20 years before an overlay or new surface is required. A second overlay would be required after about 12 years, and a third overlay needed in about 8 to 10 additional years. Road condition is monitored throughout its life

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cycle, but typically, after 40 to 50 years, overlay is no longer cost efficient or effective and major rehabilitation or reconstruction is needed to avoid restrictions or closures.

The County estimates that 70 percent of its arterial roads require major rehabilitation or reconstruction. The County's Transportation Needs Report identifies unfunded projects that include 72 miles at particular risk of failure. The number of annual miles of overlay completed has dropped from 44 miles in 2009 to seven miles in 2013, and pothole filling and patching was 65 percent less than in 2012 on County-maintained roadways.

Current estimates are that it would cost $350 million annually to fully address the backlog of system needs and operate the roads at the lowest lifecycle cost. About $200 million annually would be needed to just moderate the decline of the roadways. Based upon recent forecasts, the average annual revenue for the next six years will only be about $90 million. Until structural funding issues for transportation are addressed by the State Legislature, King County expects that the overall condition of the system will decline precipitously over the next few years.

I am committed to continuous improvement in County services. The Roads Services Division (RSD) has undertaken a focused effort to be more efficient and respond to revenue declines. RSD will have reduced staff by about 50 percent from peak levels by the end of the year. They have also participated in freezing salary increases, are installing Automatic Vehicle Location (AVL) systems in all vehicles for more efficient dispatch, have consolidated from nine to six facilities, and have implemented innovative approaches to managing with constrained resources. In the event adequate funding returns for preservation work, the department will evaluate and implement that program consistent with the Auditor's report and our detailed responses attached. We agree with many of the efficiencies you have identified and some will likely be addressed in my budget proposal this fall.

Sincerely,

Dow Constantine
King County Executive

Enclosure

cc: King County Councilmembers
ATTN: Carolyn Busch, Interim Chief of Staff
Harold Taniguchi, Director, Department of Transportation (DOT)
Brenda Bauer, Director, Road Services Division, DOT

Executive Response to Pavement Preservation Report

The Road Services Division (RSD) has consistently and proactively managed its approach to pavement management with the goal of maximizing the life and stabilizing the condition of the County's road system at the lowest possible cost. To achieve that goal, the program's approach varied over time to respond to shifting priorities and fluctuations in funding. For example, as outlined on page 2 of the Auditor's report, in 2009-11 the division spent a majority of pavement preservation funds (63%) on Tier 3, 4 and 5 roads before shifting in 2012 to primarily Tier 1 and 2 roads in accordance with the policies adopted in the Strategic Plan for Road Services (SPRS) and a declining revenue environment.

However, this analysis only represents half of RSD's strategic approach to pavement management over the last 10 years. As stated briefly in the report, the strategy of spending the majority of pavement preservation funds on Tier 3, 4 and 5 roads over the course of 2009-11 was predicated by 5 years of spending the majority of funds on Tier 1 and 2 roads (referred to in that time frame simply as "arterials" because it pre-dated the - the tier framework). As identified in the chart below, over the course of 2004-08, the division spent 63% of funding on arterials:

Year	$ Arterials	$ Local
2004	$4,050,000	$680,000
2005	$4,958,000	$590,000
2006	$3,835,000	$3,367,000
2007	$5,209,000	$3,171,000
2008	$3,611,000	$4,546,000
Total	**$21,663,000**	**$12,354,000**
	63.68%	**36.32%**

The division's strategy of balancing investments on higher travelled roads and lower travelled roads over the period between 2004-11 was developed to ensure compliance with the County's Governmental Accounting Standards Board (GASB) statement 34, requiring that 80% of the *arterial and local* county road system retain a Pavement Condition Score (PCS) of 40 or greater. Unfortunately, declining revenues mean that the County will need to modify its GASB statement.

Response to Recommendations

Recommendation:	Agency Position:	Schedule for Implementation:
Recommendation #1	Concur	2015-16 Biennium

Recommendation 1
RSD should assess the proposed 2015-2016 funding levels for pavement preservation activities and ensure they are consistent with goals and priorities in its SPRS Update. RSD should communicate the proposed spending level and miles of resurfacing planned.

Comments:
Overall, we agree that open communication and consistency with the goals and priorities of SPRS should be a focus for the 2015-16 biennium. In the spirit of open communication, it is important to understand that given the financial challenges that Roads is experiencing. The look and feel of the pavement preservation program will be very different in the next two years – and likely very different than any other roads agency in the country. With less than $2 million average per year of dedicated funding, a majority of the program will consist of wide-spread spot repairs on Tier 1 and 2 roads performed by County forces, and the potential for a small surface preservation contract partially subsidized with grant funds every 2 years. This contracted work will vary in scale significantly from years past when RSD executed $40-50 million annual preservation contracts. The program will be in alignment with the top priority in SPRS--critical safety--and will focus on ensuring that the key safety issues are addressed, while attempting to also ensure that the County's most heavily travelled roads are not subjected to restrictions.

Recommendation:	Agency Position:	Schedule for Implementation:
Recommendation #2	Partially Concur	2015-16 Biennium

Recommendation 2
As RSD defines its new pavement management strategies, it should document how it will identify and apply the most cost-effective approaches by:

a) Updating its life cycle cost analysis at regular intervals using the best available cost and performance data from King County and peers.
b) Using its life cycle cost analysis to identify the most cost-effective resurfacing options for different types of roads.
c) Developing and applying criteria for when and where to use each resurfacing option effectively.
d) Documenting and applying a formal process for considering developments in overlay and seal technologies.

Comments:
As outlined on page 12 of the Auditor's report, peer counties appear to have applied thicker overlays (2.5–4 inches) than King County (1.75-2 inches). We understand that this data point was not derived from the County Road Administration Board (CRAB) documentation - which only identifies overlays less than or greater than 1 inch - but rather from informal discussions with peer county representatives. Without an understanding of how this range of depth was determined for the peer counties it is difficult to validate this comparison. We would note that the extensive preparation work that preceded any pavement resurfacing on County roads resulted in overlay depths that should be considered greater than the 2 inches that is considered standard best practice and therefore more in line with the work potentially performed by the peer counties.

We agree that updating life-cycle costs and identifying cost-effective resurfacing options, applying appropriate decision criteria, and considering new technologies are all prudent activities. As mentioned in the comments for Recommendation #1, RSD's pavement preservation program for 2015-16 will be significantly different than the approach of the past.

RSD performed deflection testing that identified defects and failures in significant miles of road bed. When the roadbed requires rebuilding, it is not cost-effective to apply surface treatments that are likely to fail quickly. Rather, funding will be targeted on performing critical safety repairs, reconstructing limited portions of the roadway, and applying surface treatments only as funding allows and only in targeted locations where the new pavement is likely to have a reasonable lifecycle.

Recommendation:	Agency Position:	Schedule for Implementation:
Recommendation #3	Concur	2015-16 Biennium

Recommendation 3
As RSD moves to implement the SPRS Update scenario described as "manage risk in a declining system," it should make strategic adjustments to its staffing approach to more cost effectively satisfy pavement management system regulatory requirements and maximize value to pavement preservation program outcomes.

Comments:
We agree that making strategic adjustments to the pavement management system is prudent. In the year preceding the receipt of this report, the division was transitioning the pavement management program to meet the base requirements for CRAB reporting, and to best match the future funding levels and the new approach to pavement preservation. That transition involved documenting current processes, evaluating alternatives, and choosing to implement the CRAB proprietary software for pavement data management. The software package enables the visual inspection of roadways using vehicle mounted cameras, which will reduce costs, while maintaining a pavement condition database that is suitable for both reporting and

program management. In addition, the division is implementing the recommendations from a LEAN process that will consolidate and improve data collection processes. The data collection process will inform a new maintenance and asset management software program, *Roadworks*, that will retain condition information on all of the County road assets This will lead to a more informed and comprehensive decision-making process for roadway asset investment.

Recommendation:	Agency Position:	Schedule for Implementation:
Recommendation #4	Partially Concur	2015-16 Biennium

Recommendation 4
As RSD implements new pavement management strategies, it should establish performance measures, set targets, and monitor and act on the results to guide decision-making, motivate staff, and improve cost effectiveness.

Comments:
We agree that establishing performance measures for pavement preservation is prudent. However, given the state of RSD's program for 2015-16, the performance measures that are most reasonable and informative are likely to be high-level variables like response times for responding to critical safety failures, and the percentage of Tier 1 and 2 roads that continue to operate at their intended design speeds. In addition to monitoring these measures, RSD is in the process of implementing Automatic Vehicle Location (AVL) systems in all vehicles and equipment, which will allow real-time oversight of equipment locations and usage. The AVL technology will be particularly useful to the pavement preservation program in combination with RSD's forthcoming maintenance and asset management software system, *Roadworks*. Through *Roadworks*, preservation locations and activities will be tracked, monitored and prioritized to ensure that investments in pavement management are maximized for efficiency and accountability.

List of Recommendations & Implementation Schedule

Recommendation 1: RSD should assess the proposed 2015-2016 funding levels for pavement preservation activities and ensure they are consistent with goals and priorities in its SPRS Update. RSD should communicate the proposed spending level and miles of resurfacing planned.

Implementation Date: 2015-16 Biennium
Estimate of Impact: Communication of miles of resurfacing planned will help policy-makers quantify the impact of funding decisions. Consistency of pavement preservation funding levels with the SPRS Update could mean that RSD may consider augmenting preservation funding if opportunities, such as savings in other functions or additional revenue, occur.

Recommendation 2: As RSD defines its new pavement management strategies, it should document how it will identify and apply the most cost-effective approaches by:

a) Updating its life cycle cost analysis at regular intervals using the best available cost and performance data from King County and peers.
b) Using its life cycle cost analysis to identify the most cost-effective resurfacing options for different types of roads.
c) Developing and applying criteria for when and where to use each resurfacing option effectively.
d) Documenting and applying a formal process for considering developments in overlay and seal technologies.

Implementation Date: 2015-16 Biennium
Estimate of Impact: Documenting how RSD will use new pavement management strategies to arrive at the most cost-effective approaches will provide a framework for data driven decision-making and help RSD clearly communicate that it is using limited resources wisely.

Recommendation 3: As RSD moves to implement the SPRS Update scenario described as "manage risk in a declining system," it should make strategic adjustments to its staffing approach to more cost effectively satisfy pavement management system regulatory requirements and maximize value to pavement preservation program outcomes.

Implementation Date: 2015-16 Biennium
Estimate of Impact: Making strategic adjustments in staffing to lower the cost of compliance with pavement management system requirements could allow technical staff to spend time on more complex and higher priority work. It could also result in cost savings with potential for augmenting pavement preservation funding. If RSD could

lower costs for pavement management system compliance to the levels observed at Pierce, Snohomish, and Kitsap counties potential savings would be approximately $425,000 annually. This amount does not include burden associated with saved labor costs. It is assumed that RSD would need to spread the burden costs elsewhere.

Recommendation 4: As RSD implements new pavement preservation strategies, it should establish performance measures, set targets, and monitor and act on the results to guide decision-making, motivate staff, and improve cost-effectiveness.

Implementation Date: 2015-16 Biennium
Estimate of Impact: Using performance measurement on new pavement preservation approaches could give staff and managers early feedback on how results of changes align with their expectations. This would facilitate making timely adjustments for better use of limited resources.