CITY OF SEATTLE
PAVEMENT CONDITION REPORT

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PREPARED BY

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ABSTRACT

SDOT assessed the condition of its arterial street pavements in 2003. Seattle's arterial pavements are, on average, in good condition, but many street surfaces are at or beyond their expected performance life. This is a strong indicator of future maintenance need. Moreover, the amount of pavement resurfacing, rehabilitation and reconstruction that Seattle accomplishes each year is less than the amount that it needs to complete in order to keep up with the maintenance need. The current amount of deferred maintenance is estimated to be about $310 million and is projected to increase to $560 million within ten years at the present level of investment.

The 245 12'-wide lane-miles of arterial pavements in the worst condition need, or will soon need to be reconstructed. Because maintenance continues to be deferred, this amount will increase each year at present levels of investment. There is not currently any program in place to address this need. Moreover, the funds that are available for resurfacing and rehabilitation are too limited to permit making investments at the lowest life-cycle cost, adding to the maintenance burden and future investment needs. Streets in the worst condition cause inconvenience to drivers, increase maintenance demand on City forces and generate legal liabilities and claims for damages.

Nearly two-thirds of Seattle's streets are the least-traveled, non-arterial streets. Funds have not been available to assess the condition of these streets since the mid '90's.

EXECUTIVE SUMMARY

Seattle's streets are in good condition, but there is a large and growing amount of deferred maintenance. Decades of under-investment in street resurfacing and rehabilitation mean that a day of reckoning is coming when Seattle will have to increase its annual investment in maintaining the condition of its streets or its economy and quality of life will suffer.

Seattle needs to invest:

- $14 million/yr on resurfacing and rehabilitating its busiest arterial streets if the condition of the arterials is to remain in the good range and the amount of deferred maintenance is to be kept in check.

- An additional $10 million/yr to eliminate the deferred maintenance backlog over twenty years. Smaller amounts will still allow the City to make progress against the deferred maintenance backlog, but will take longer to eliminate it.

The annual amounts needed represent more than a three-fold increase over the approximately $7 million/yr investment in arterial street maintenance that Seattle has made in the last several years. The needed level of arterial funding would each year allow, on average, about 30 lane-miles of streets to be resurfaced or rehabilitated and 5 to 11 lane-miles of streets in the poorest condition to be reconstructed.

Seattle needs to invest perhaps $15 million/yr if it is to maintain and rehabilitate its non-arterial streets. This figure is so high because two-thirds of Seattle's streets are non-arterial and sixty percent of those were constructed of Portland cement concrete in the first half of the twentieth century and those streets are approaching the end of their design life. Since Seattle currently spends only about $1 million/yr on programmed non-arterial street maintenance, the needed level of annual investment represents about a fifteen-fold increase in funding for non-arterial street maintenance. The highest priorities for non-arterial street maintenance are: to assess the condition of the non-arterial streets as a basis for priority setting (this has not been done for many years); to shorten the interval between maintenance treatments for the 25% of non-arterial streets that are surfaced with a low-cost maintenance treatment called chip seal; and, to replace isolated broken and cracked concrete street panels. When the rest of the street remains in good condition, a small, spot repair can restore the serviceability of the pavement for many years, at very modest cost.

SDOT is using the information in this report, and the database that supports it, to help cost effectively manage its network of street pavements.

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SEATTLE'S PAVEMENT NETWORK

Seattle has 3,946 12-foot wide lane miles of streets. The busiest streets, the arterials, account for approximately 1,534 of the total network 12-ft-wide lane miles. The street network replacement cost is estimated at $4.1 Billion.*

Seattle's streets are grouped according to the traffic they carry and the function they serve (see Table 1).

Table 1. Pavement Area by Functional Classification

Functional Classification	Pavement Area (12-foot Lane-miles)	Fraction of Network
Principal Arterial	620	15.7%
Minor Arterial	566	14.3%
Collector Arterial	348	8.8%
All arterial streets	**1,534**	**39%**
Other	23	0.6%
Non-arterial	2,389	60.5%
All non-arterial/other streets	**2,412**	**61%**
All Pavements	***3,946***	***100.0%***

Principal arterial streets are the most important, busiest through streets, such as Rainier Ave S or 15th Ave NW. Minor arterial streets link together the neighborhoods; examples are California Ave SW or N 80th St. Collector arterials tie the least traveled streets, the non-arterial streets, into the arterial street system. Non-arterial streets serve a variety of users. The majority are neighborhood residential streets, but some also support industry in areas such as south of downtown (SODO) and the Ballard/Interbay Manufacturing Industrial (BINMIC) areas.

Seattle has four primary street surface types: Portland cement concrete (PCC), asphalt concrete over Portland cement concrete base (AC/PCC), asphalt concrete over flexible base (AC), and bituminous surface treatment (BST, commonly called Chip Seal). Other surface types, such as brick or stone or gravel represent only a small fraction of the street network.

* This estimate does not include the cost of the right-of-way (about 22 square miles of urban real estate), nor the cost of drainage and other improvements that might be required or desired if streets were reconstructed. The replacement value of the street network is $5.9 billion or more when these factors are included in the calculation.

Each pavement surface type has a unique set of design considerations, including initial cost and design life between major maintenance activities. The City's street network, categorized by surface type and typical design life, is shown in Table 2.

Table 2. Pavement Area by Surface Type

Pavement Type	Pavement Area (12-foot Lane-miles)	Typical Design Life (Years)	Fraction of Network
PCC	1,797	40	45.5%
AC / PCC	897	12-14	22.7%
AC	684	20	17.3%
BST	560	7	14.2%
Other	8	varies	0.2%
All Pavements	**3,946**	**---**	***100.0%***

Arterial Street Construction History

Nearly 60 percent of Seattle's arterial streets were constructed as Portland cement concrete streets but were resurfaced with asphalt concrete at some time in the past in an effort to improve mobility and preserve the pavement. The asphalt surfacing improves ride, but it adds minimal structure and deteriorates quickly because of cracking associated with the movement of the underlying concrete slabs. This maintenance approach has held up well over many years, but the thin wearing course of asphalt should regularly (every 12-14 years) be renewed.

Non-arterial Street Construction History

More than half of Seattle's non-arterial streets were constructed of Portland cement concrete during the first half of the twentieth century. These streets, most of them lightly traveled, have not required much maintenance, but whole neighborhoods are approaching "block obsolescence" with Portland cement concrete at the end of its service life.

About 25 percent of Seattle's non-arterial streets were converted in the 1960's and 1970's from gravel roads to a low-cost surface treatment called chip seal. Chip seal streets need to be resealed on a regular basis, or else they begin to deteriorate rapidly. That is because the chip seal does not provide significant pavement structure to support traffic. The surface coat simply seals the surface.

SEATTLE'S PAVEMENT CONDITION

SDOT manages its pavements by regularly assessing condition, analyzing budget needs, performing routine maintenance and undertaking major paving projects. The cornerstone for managing pavements is the pavement management database system. Seattle's streets are categorized and tracked in nearly 14,000 segments in this system. For each segment, the system includes descriptive information, assessments of pavement condition, and information about the segment's construction and maintenance history.*

Rating Methodology

Seattle currently utilizes the Metropolitan Transportation Commission (MTC) method for pavement condition rating. The MTC method measures the occurrence of several pavement distress types and assigns a pavement condition index (PCI) based upon the density (area affected) and severity of the observed distress. The PCI is a number between 100 and 0. A PCI of 100 represents a pavement completely free of distress; a PCI of 0 corresponds to a pavement that has failed completely and can no longer be driven safely at the designed speed.

Pavement Condition Ratings (PCRs) are associated with ranges of PCI. Table 3 shows the range of PCI values to which each rating corresponds. The scale used in the table is widely accepted by pavement engineers in the United States as well as internationally.

Table 3. Pavement Condition Ratings and Pavement Condition Index Ranges

Pavement Condition Rating (PCR)	Pavement Condition Index (PCI)
Excellent	86-100
Very Good	71-85
Good	56-70
Fair	41-55
Poor	26-40
Very Poor	11-25
Failed	0-10

Examples of asphalt and concrete pavements in Excellent, Fair and Very Poor condition are shown in Figures 1 and 2.

* The Transportation Efficiency Act of 2003 (RCW 46.68) requires that cities report the condition of their pavements to Washington State Department of Transportation. When Sec. 305 of this Act is fully implemented, comparative information on street surface condition will be available across Washington.

Figure 1. Asphalt Pavement Condition and Description of Typical Distresses

Excellent

The pavement is smooth and generally free of distress.

Fair

Cracking is extensive and the pavement surface is weathered. The pavement shows signs of structural damage.

Very Poor

The pavement surface is cracked and disintegrated. Structural damage is widespread. The ride has deteriorated to the point where traffic operations are affected.

Figure 2. Concrete Pavement Condition and Description of Typical Distresses

Excellent

The pavement is smooth and generally free of distress.

Fair

Cracking is common with areas of patching, faulting and joint breakup. Ride is affected in areas of more severe distress.

Very Poor

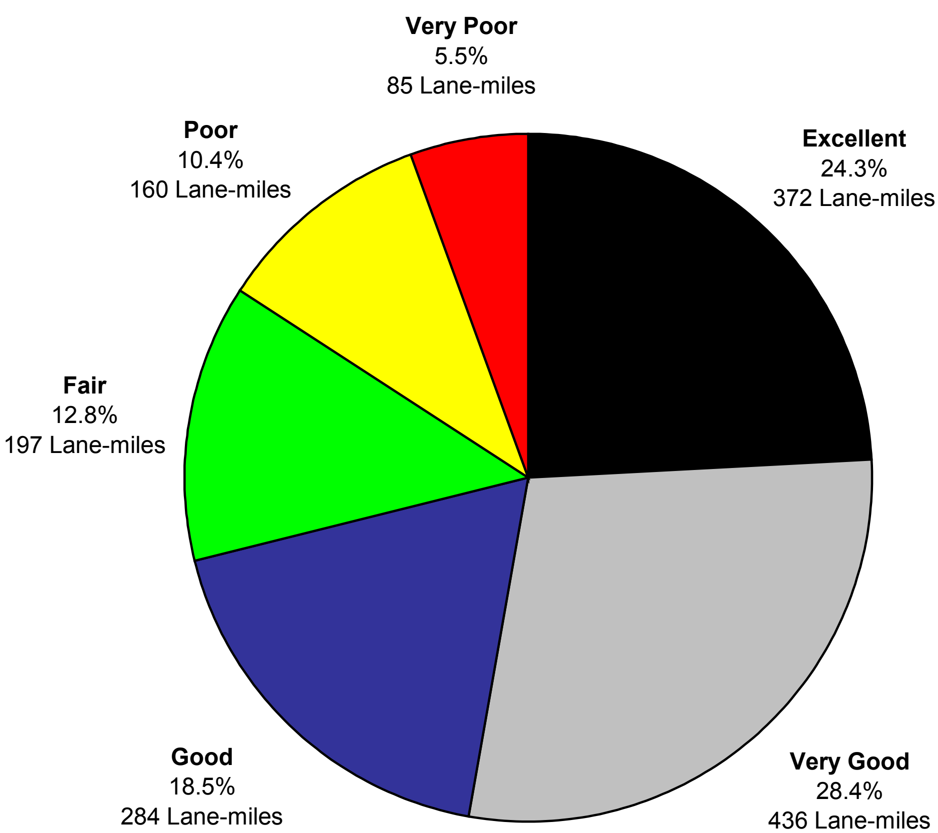
Concrete panel breakup and faulting is extensive. The ride has deteriorated to the point where traffic operations are affected.

Pavement condition rating data is used to assess overall pavement condition, to identify pavements requiring maintenance and rehabilitation, to identify feasible maintenance and rehabilitation strategies, and to prioritize paving projects. Additionally, the results are used to forecast the funds required to maintain the City's pavement network in serviceable condition. Regular pavement condition surveys ensure the City of Seattle complies with State law that cities have a pavement maintenance-management program in place to be eligible for State funds (RCW46.68.113).

Arterial Street Surface Condition

A pavement condition survey of the City of Seattle's arterial street network was conducted in the summer of 2003. The survey was conducted using an automated system that used an array of cameras and sensors to record pavement distress. In addition to pavement distress information, digital photo logs were collected. The results of the 2003 arterial survey are shown in Figure 3.

Figure 3. Seattle Arterial Street Condition (Summer, 2003)



Age, contrasted with pavement design life, provides another measure of pavement condition. Average arterial street age and design life (by surface type) is shown in Table 4.

Table 4. Arterial Pavement Area, Design Life and Age

Pavement Type	Pavement Area (12-foot Lane-miles)	Typical Design Life (Years)	Average Age (Years)	Fraction Older than Design Life in 2004
PCC	517	40	44.2	57.5%
AC/PCC	889	12-14	22.7	74.8%
AC	121	20	18.3	45.8%
Other	7	varies	n/a	n/a
All Pavements	***1,534***	***---***	***29.6***	***66.8%***

The environment can greatly affect pavement performance, particularly in regions where the ground freezes during the winter months. Mild climate coupled with light traffic contributes to certain Seattle pavements performing better than expected. However, age beyond design life is an indicator of an imminent maintenance need.

Non-arterial Street Condition

No funds have been available for years to assess the condition of non-arterial streets; therefore no current condition information is available. Since comprehensive, up-to-date street condition information is not available for analysis, pavement preservation needs for non-arterial streets have been estimated using maintenance cycles. (This information is discussed later in the report.) A first step towards developing a maintenance program for non-arterial streets is to complete a comprehensive condition survey similar to that conducted on the arterial streets in Summer 2003.

MAINTENANCE NEEDS

Using inputs developed by SDOT engineers, the City's pavement management system can model pavement deterioration and estimate maintenance budget needs. The forecasts rely on condition data, street construction history, and the estimated cost of maintenance procedures. Good information is available on the arterial streets. Non-arterial street condition and construction history are largely unknown, so estimating maintenance needs is done using an alternate approach.

Arterial Maintenance Needs

For each street surface type, SDOT has identified the level of maintenance appropriate to a given pavement's condition. These maintenance activities are deemed appropriate to local conditions and conform to widely accepted pavement maintenance practices. Table 5 shows a general outline of maintenance activities, the approximate pavement condition level at which they are triggered and associated unit costs. The costs were developed from an SDOT study of arterial paving projects built 1994-2002. The values include an added allowance for new Americans with Disabilities Act (ADA) curb ramp requirements, drainage regulations, inflation and other factors affecting more recent (2002-2004) projects.

Table 5. Pavement Condition Ratings with Typical Maintenance Activity and Cost[*]

Pavement Condition Rating (PCR)	*Asphalt Surface (AC or AC/PCC)*		*Concrete Surface (PCC)*	
	Maintenance Activity	**Cost ($ / 12' lane-mile)**	**Maintenance Activity**	**Cost ($ / 12' lane-mile)**
Excellent	Routine or Preventive Maintenance (crack seal and spot repair)	Operations Budget	Routine or Preventive Maintenance (crack seal and spot repair)	Operations Budget
Very Good				
Good				
Fair	Mill-and-overlay AC	$215,000	Select Panel Replacement PCC	$387,000
Poor	Partial Reconstruction	$415,000	Complete Reconstruction	$1.55MM (PCC) $598,000 (AC)
Very Poor	Complete Reconstruction	$1.55MM (PCC) $598,000 (AC)		
Failed				

Based on current policy, reconstruction in concrete was assumed for streets with a concrete surface or base; however, as shown in Table 5, reconstructing some concrete streets as asphalt streets would result in large initial construction savings, with a shorter design life. In Seattle, asphalt and concrete have exhibited similar life-cycle costs. However, if asphalt were to be used on a street that carried heavy loads more suitable for

[*] Table 5 shows the approximate condition where maintenance activity is triggered. The specific pavement condition index (PCI) breakpoints (the condition value at which maintenance is triggered) used for budget analysis are shown in Table 6. *Actual project level decisions on appropriate maintenance activities are based on field evaluation of pavement condition.*

a concrete street, the asphalt life-cycle costs would increase. SDOT carefully considers such factors when selecting surface types.

As condition deteriorates, the cost of pavement rehabilitation increases. Reconstructing a street in concrete is greater than seven times the cost of an asphalt mill-and-overlay project. Where pavement structure is sound, asphalt mill-and-overlay projects or concrete panel replacement projects can cost effectively extend the life of a pavement. The current arterial network maintenance needs, determined by pavement condition, are summarized in Table 6.

Table 6. Current Arterial Street Maintenance Requirements

Maintenance Action	Pavement Area (12-foot Lane-miles)	Cost ($Millions)
Mill-and-overlay with asphalt concrete *PCI between 41 and 60 on AC and AC/PCC*	243	$52
Reconstruct in Portland cement concrete *PCI 40 or less on PCC and 30 or less on AC/PCC*	129	$200
Partially reconstruct asphalt concrete *PCI between 31 and 40 on AC and AC/PCC*	101	$42
Replace select Portland cement concrete panels *PCI between 41 and 55 on PCC*	24	$9
Reconstruct in asphalt concrete *PCI 30 or less on AC*	23	$13
Required Arterial Major Maintenance	***520***	***$316***
No Major Maintenance Required	*1,014*	---

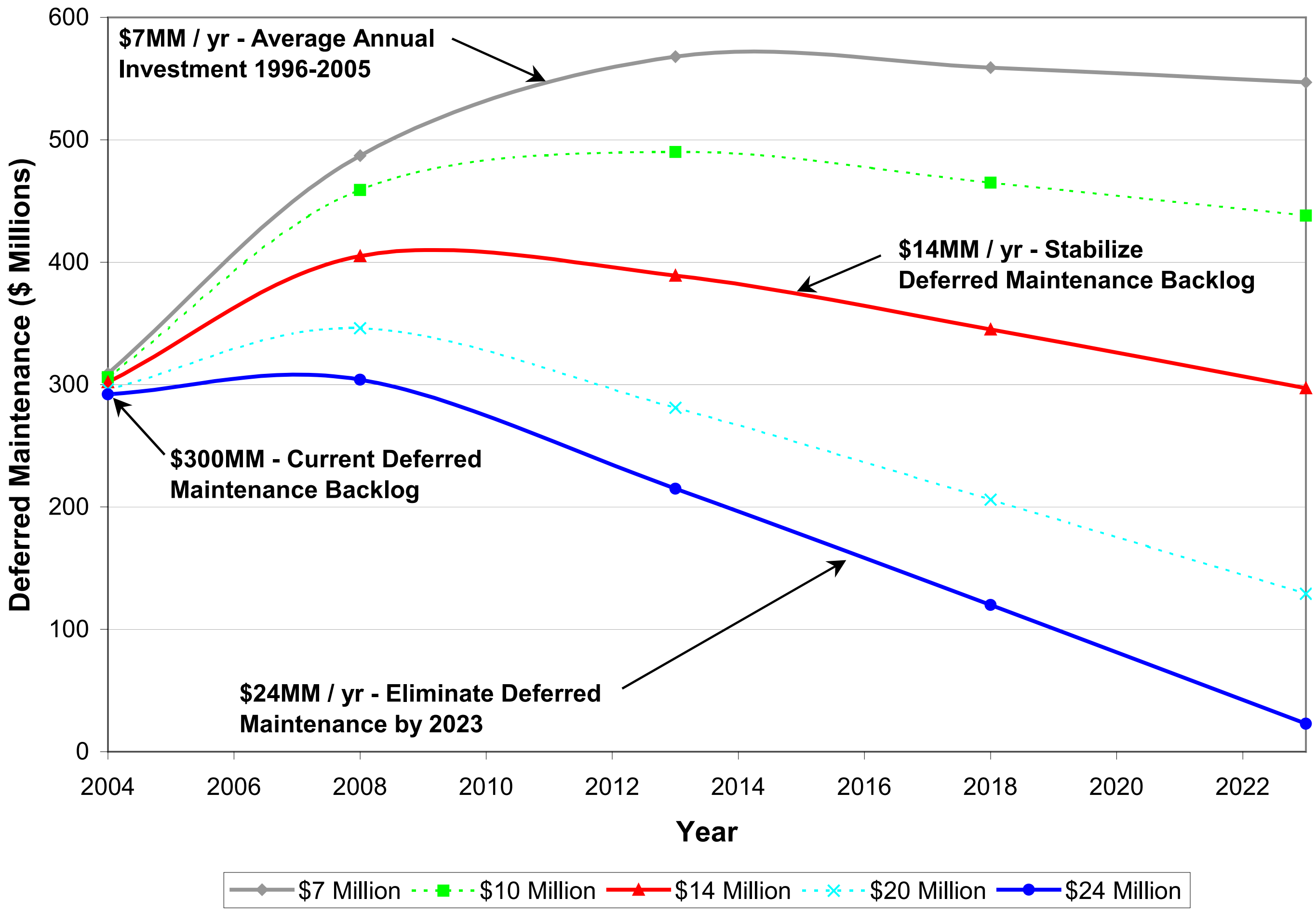
Delaying repairs on streets where pavement condition indicates a need creates deferred maintenance. Deferred maintenance is work that is postponed to a future budget cycle, or until funds are available. When maintenance is deferred, streets deteriorate to the point where eventually they need to be completely reconstructed. Since the current annual maintenance expenditure is around $7 million, at current budget levels Seattle's deferred maintenance backlog is about $310 Million.

Seattle's pavement management database system can model pavement performance over time. Using the critical condition points and costs described, the software can predict the effect of different funding levels on the deferred maintenance backlog. A summary of the different investment scenarios is provided in Table 7 and Figure 4. A $14 million annual investment in arterial paving is required in order to stabilize the deferred maintenance backlog at current levels. At this funding level, Seattle would maintain its arterial streets efficiently, at a reduced life-cycle cost. However, $14 million would not address the deferred maintenance backlog. An additional annual investment of $10 million is required to eliminate deferred maintenance by the year 2023. A smaller additional amount would still allow progress to be made against the backlog, but would take longer to eliminate it.

Table 7. Investment Scenarios and Outcomes

Annual Investment Level	20-yr Annual Average Paving Accomplishment (12' lane-miles)		Deferred Maintenance		Description of Program
	Asphalt	Concrete	2004	2023	
$7 Million	26	1	$309 Million	$547 Million	At the $7M investment level, Seattle will continue at the current level of paving accomplishment. Most paving will be asphalt resurfacing on streets where condition allows. The amount of deferred maintenance will increase nearly 60% over the next twenty years.
$14 Million	30	5	$302 Million	$297 Million	At the $14M investment level, some funds are available for reconstruction efforts, but the net effect will be to maintain the street network at a deferred maintenance level comparable to the present. Initially, Seattle would not have adequate funds to prevent many streets from deteriorating to a level where major rehabilitation is required, so the deferred maintenance backlog would grow. However, asphalt resurfacing and other rehabilitation would stabilize the network condition and 5 additional lane-miles could be reconstructed each year, negating the initial increase in the deferred maintenance backlog. At the end of 20 years, the deferred maintenance level would be approximately where it started.
$24 Million	33	11	$292 Million	Negligible	At the $24M investment level, funds are available to reconstruct streets in the worst condition and keep pace with other major maintenance needs. The deferred maintenance backlog is eliminated over the next twenty years.

Figure 4. Annual Arterial Paving Investment and Projected Deferred Maintenance Backlog by Year



Non-Arterial Maintenance Needs

Seattle is challenged to estimate maintenance needs for non-arterial streets because condition information is not available. Without up-to-date condition information, SDOT cannot assess maintenance need on the basis of condition, as on the arterial streets. An alternative is to estimate non-arterial maintenance needs based on maintenance cycles. Table 8 shows non-arterial maintenance practices and estimates a yearly budget based on these. The rehabilitation periods that have been selected for this analysis reflect professional judgment based on observed non-arterial street pavement life in the field and an effort to balance what is desirable from an engineering standpoint with what is achievable and practicable from a budget standpoint.

Table 8. Non-arterial Maintenance Practices

Pavement Type	Pavement Area (12-foot Lane-miles)	Typical Design Life (Years)	Maintenance Cycle (Years)	Current Seattle Maintenance Cycle (Years)	Annualized Maintenance Cost ($Millions)
PCC	1,280	40	160	None	$9.6
AC	564	20	25	200	$4.4
BST	553	7	10	13	$1.0
AC / PCC	7	12-14	25	200	$0.4
Other	8	varies	10	Varies	$0.1
				Total	***$15.5***

The non-arterial major maintenance program shown in Table 8 is based on overlays of asphalt streets on a 25-year cycle, replacement of half the concrete street network over the next eighty years and continued chip seal efforts. It does not take into account asphalt surfaced pavements that have already failed or will because of deferred or inadequate maintenance. Those streets will require reconstruction, at an additional cost beyond the yearly budget estimate. Moreover, the 160-year concrete replacement cycle used in this analysis is extremely optimistic. Without up-to-date condition information it is impossible to identify streets requiring reconstruction, time major maintenance or prioritize projects. For these reasons, the $15.5 million estimate of annual maintenance investment is at present little more than an educated guess.

Routine and Preventive Maintenance

Routine maintenance is intended to maintain pavement in adequate operating condition. This work is normally anticipated within a budget cycle, but its location and timing may not be known in advance. Seattle has a robust routine maintenance program for its asphalt-surfaced streets. Potholes are normally repaired within 48 hours of a report and spot asphalt paving is performed as needed. However, significant gaps exist in the current routine maintenance program. No significant budget is allocated for concrete pavement-specific repairs. Damaged concrete receives only stopgap repairs, usually an asphalt shim in the area of defective pavement. Asphalt shims tend to settle or be displaced as the surrounding concrete shifts. The shims are often not enough to correct the ride irregularities caused by broken or shifting concrete panels. A concrete pavement specific repair program, involving patching and replacement of failed concrete panels, would increase the effectiveness of repairs performed on concrete streets.

Preventive maintenance is performed on streets in good condition, intended to extend pavement life by protecting the existing layer structure. Seattle currently has a limited preventive maintenance program, spending approximately $60-100,000 each year on sealing cracks. Crack sealing reduces water infiltration into the pavement layers. Water penetration can reduce the strength of the supporting layers under the surface pavement, resulting in increased structural damage seen in the form of cracking, faulting, depressions and potholes. In the past, Seattle has spent as much as $300,000 a year on crack sealing. An expanded crack-seal program could cost effectively extend the life of the majority of Seattle pavements that are still in good condition.

PAVING PRIORITIES, PLANS AND ACCOMPLISHMENTS

SDOT evaluates the condition of Seattle's streets and uses that and other information to establish priorities for street surface maintenance and rehabilitation. Other factors that are considered when establishing paving priorities are safety, mobility and community concerns; the volume and type of traffic; other planned construction work; and the availability of funds. By City Council Ordinance (SMC 15.32.160), paving priorities are established with a three-year planning horizon. Arterial and non-arterial street resurfacing projects are selected from separate paving priority lists. Small paving projects are implemented in a timely way with City forces. Corridor-scale resurfacing projects are implemented through resurfacing contracts. Still other paving priorities, including street reconstruction are addressed through large capital projects that may have several objectives, including but not limited to street surface rehabilitation. The resurfacing contracts and the other capital projects that include paving may be funded through state or federal grants as well as with local funds.

Paving Priorities

The 2004 paving priorities list appears in Appendix A. The list is updated each December, taking into account the paving accomplishments of the previous (summer) construction season, and the city budget for the coming year (adopted each November). The list states the highest-priority paving needs in the city. The list includes budgeted projects planned to be implemented in the coming year and project priorities for future years that do not yet have funds budgeted for them. For the projects near the top of the list, design work may be undertaken, as well as planning and development tasks (such as grant-writing) necessary to secure project funds.

Each year, funds available for street resurfacing or rehabilitation are directed towards the highest priorities. One or more projects near the top of the list may however be skipped over if there is a compelling reason to reach further down the list; an example might be a project that has attracted grant funding that requires that federal or state funds be matched with local dollars. The matched funding would produce a leveraged return to the taxpayer versus a project that must be funded with strictly local dollars.

The paving priorities list currently contains primarily streets that require asphalt resurfacing. Many concrete streets in the city would benefit from rehabilitation but funds are so limited at present that, with the exception of large, multi-objective capital projects that receive separate state or federal grants, the limited resources available are being directed to asphalt street resurfacing where they can deliver the most lane-miles of new street surface. Nor are funds currently available for city forces to replace selected concrete street panels, other than a few panels each year that present imminent safety or mobility concerns. As funds become available, the priorities list will be expanded to include Portland cement concrete street rehabilitation priorities.

2004 Paving Plans

Table 10 lists the paving projects that SDOT plans to complete in 2004. The table shows the name and location of the project, the amount of planned paving accomplishment, the approximate cost of the paving (and the year or years in which the paving was funded), and the program under which the paving is being accomplished.

Arterial Paving Accomplishments

Table 9 summarizes the arterial street resurfacing and rehabilitation accomplishments from 1996-2005. During this time period, Seattle averages 26 lane-miles of asphalt and 1 lane-mile of concrete paving a year.

Table 9. Arterial Street Resurfacing and Rehabilitation 1996-2005

12' lane-miles	1996	1997	1998	1999	2000	2001	2002	2003	2004 (est)	2005 (est) [1]
Concrete	0.76	2.98	0.77	0.54	0.00	0.00	1.04	3.30	0.30	1.83
Asphalt	29.00	24.61	41.08	17.03	25.07	13.26	15.53	26.46	27.07	38.10
Total	***29.76***	***27.59***	***41.85***	***17.57***	***25.07***	***13.26***	***16.57***	***29.76***	***27.37***	***39.93***

[1] Unapproved budget

The accompanying map (Figure 5) shows the streets that were resurfaced or rehabilitated in 2002 and 2003, and also the paving planned for 2004. Over three years, there is a reasonable geographic balance in the street resurfacing and rehabilitation program.

Non-arterial Paving Accomplishments

In addition to the arterial work, 40 or more lane-miles of non-arterial chip seal streets were maintained each year and up to 2 lane-miles of non-arterial asphalt streets were resurfaced. The chip seal streets are resurfaced on a grid system. A widely accepted return-cycle for chip seal treatment is about a seven-year interval between chip seal maintenance treatments. Seattle's interval between maintenance treatments has been increasing in recent years; the streets being resurfaced in 2004 were last maintained in 1990, 1993 and 1994. The consequence of the longer-than-desirable interval between chip seal maintenance treatments is that about 60 percent of the chip seal program dollars go to base repairs that are necessary to repair roadway damage before the chip seal treatment can be reapplied. If more funding for chip seal were available, the interval

Table 10. 2004 Planned paving projects

Project	Area (12' Lane-Miles)	Estimated Value of Paving ($)[1]	Comments
Transportation CIP[2]			
12th Ave Corridor Improvements *E Yesler Way to E Union St*	3.44	740,000	
Leary Way NW and NW 46th Street Improvements *15th Ave NW to NW 36th St*	4.08	1,200,000	
SUBTOTAL	7.52	1,940,000	
Arterial Major Maintenance			
Rainier Ave S AMM 2003 Contract 2 *S Austin St to S Alaska St*	8.96	1,940,000	Contract awarded Fall 2003; Resurfacing to be completed 2Q 2004
Northgate AMM 2003 Contract 3 *5th Ave NE, NE Northgate Way to NE 130th St* *15th Ave NE, NE 117th St to NE 125th St*	5.50	1,170,000	Contract awarded Fall 2003; resurfacing to be completed 2Q 2004
Corson Ave S AMM *S Michigan St to S Orcas St*	0.63	126,000	Local share of WSDOT project

[1] Estimated portion of budget for paving elements; based on engineer's estimates, bid tabs and typical unit costs

[2] Several major 2004 Transportation CIP projects, including 35th Ave NE Arterial Improvements, S Jackson St. Arterial Improvements, Phinney Ave N Arterial Improvements, SR 519 Surface Street Improvements and Lake City Way NE Multi-modal, have been deferred to 2005 or later as part of an effort to restructure funding. The delayed CIP projects represent approximately 26.4 lane-miles valued at $8,400,000. Those projects, plus the Arterial Major Maintenance budget , project the 2005 paving accomplishment to 39.9 lane-miles valued at $11,300,000.

Table 10. 2004 Planned paving projects (continued)

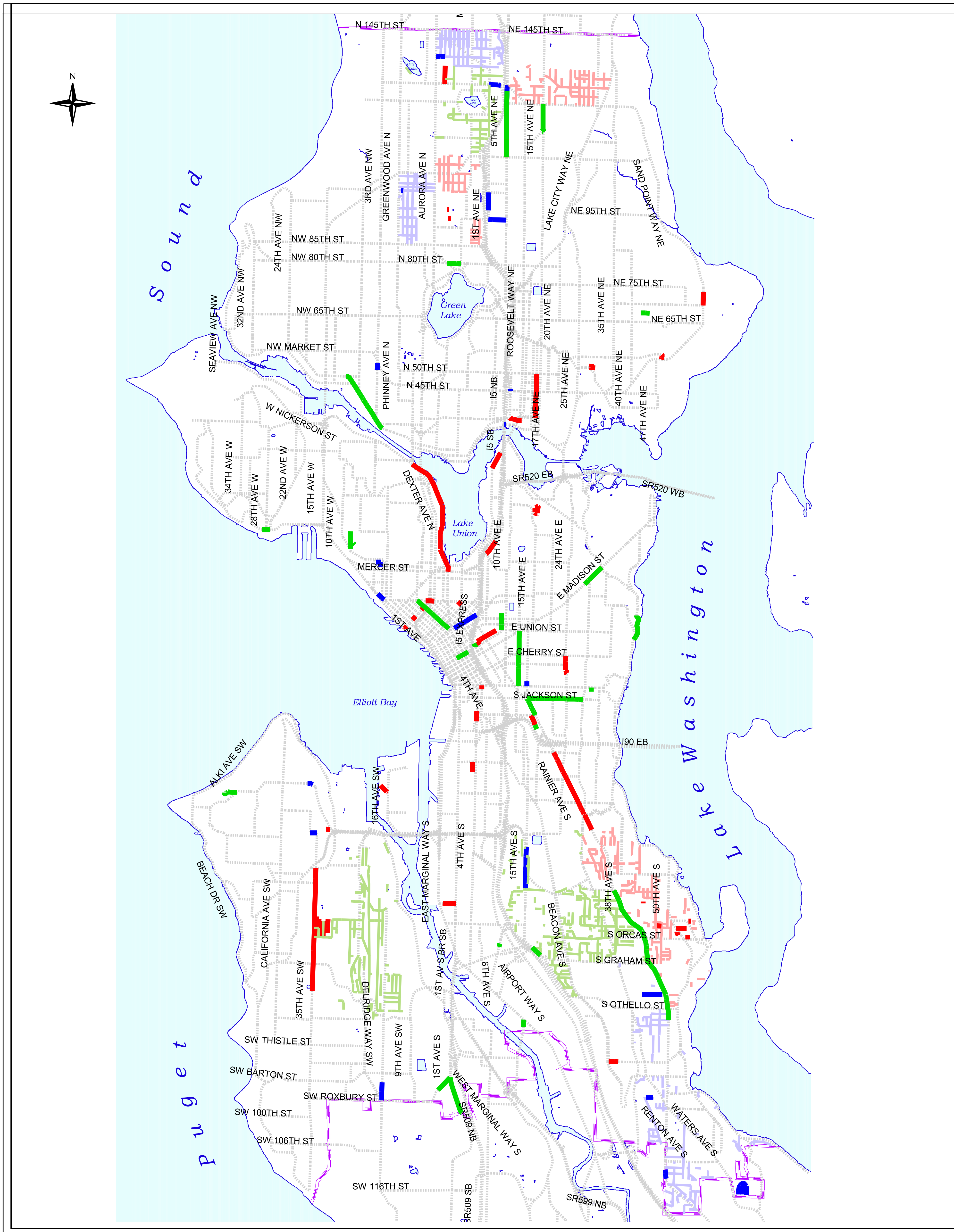
Project	Area (12' Lane-Miles)	Estimated Value of Paving ($)[1]	Comments
Arterial Major Maintenance (continued)			
SDOT Crew Paving *N 80th St, Interlake Ave N to Wallingford Ave N* *E Madison St, 27th Ave E to Lake Washington Blvd* *Seneca St, 3rd Ave to 6th Ave* *Olson Pl SW, Park & Ride to Myers Way SW Intersection* *W Galer St, Thorndyke Ave W to 29th Ave W* *Swift Ave S, 19th Ave S to S Albro St* *5th Ave, Denny Way to Stewart St (Spot Repair)* *16 Ave S, E Marginal Way S to City Line*	4.76	761,000	
SUBTOTAL	*19.85*	*3,997,000*	
Non-arterial Major Maintenance			
SDOT Crew Paving *NE 68th St, 43rd Ave NE to 45th Ave NE* *Poplar Pl S, S Charles St to S Norman St* *SW Lander St, SW Admiral Way to SW Tieg Pl* *29th Ave S, E Yesler Way to S Washington St* *Harvard Ave, E Union St to E Olive St*	1.43	223,000	
SUBTOTAL	*1.43*	*223,000*	
Chip Seal			
Grid 9W *Chip seal streets in area bounded on the West by I-5; on the north by S Spokane St; on the east by MLK Jr. Way from S Spokane St. to S Alaska St., then S Alaska St., and then Rainier from S Alaska St to S Graham St; on the south by S Graham St from Rainier Ave S to Beacon Ave. S, then on Beacon from S Graham St to Swift Ave S.*	---	---	Street to receive spot repairs only. Chip seal surface treatment will be applied in 2005.

[1] estimated portion of budget for paving elements; based on engineer's estimates, bid tabs and typical unit costs

Table 10. 2004 Planned paving projects (continued)

Project	Area (12' Lane-Miles)	Estimated Value of Paving ($)[1]	Comments
Chip Seal (continued)			
Grid 15A *Chip seal streets in area bounded on the north and east by Elliott Bay and the Duwamish Waterway; on the south by SW Michigan and SW Holden; on the west by 35 Ave SW, then SW Genessee, then 30th Ave SW and then Harbor Ave SW.*	---	---	
Grid 16 *Chip seal streets in are bounded on the north by N 135th St., east by I-5, south by N 110th St, and west by Aurora Ave.*	---	---	
SUBTOTAL	*30.00*	*671,000*	See comment above about Grid 9W. Grid 9W will be prepped and ready to go, reducing the unit cost and increasing the accomplishment in 2005.
Oher Paving			
8th Pl W *W Galer St to 7th Ave W*	0.40	64,000	Department of Neighborhoods funds
Right-of-Way Permit Paving *Various Locations*	4.00[3]	2,200,000[3]	Paving by other entities, public and private, under SDOT right-of way permit.
SUBTOTAL	4.40	2,264,000	
2004 ARTERIAL PAVING ACCOMPLISHMENT	27.37	5,937,000	
2004 TOTAL PAVING ACCOMPLISHMENT	63.20	9,095,000	

[1] estimated portion of budget for paving elements; based on engineer's estimates, bid tabs and typical unit costs
[3] estimate based on 2003 accomplishment; 1 lane-mile PCC and 3 lane-miles AC resurfacing assumed



SDOT

The City of Seattle

Produced by the City of Seattle,
PEMS Dept
Patricia Carroll

May 18, 2004

Figure 5

2004 Planned Projects 2002 and 2003 Paving Accomplishments

Legend

- 2004 planned projects
- 2004 proposed chip seal.shp
- 2003 paving accomplishments
- 2003 chip seal accomplishments
- 2002 paving accomplishments
- 2002 chip seal accomplishements
- Arterials
- City Limits
- *Text* Waterbody Names
- Water Body Outlines
- Land/Water Base
- Waterbodies

between treatments would be closer to the widely accepted seven-year norm, and the unit cost of chip seal maintenance would be much less (the taxpayer's dollar would stretch much further with perhaps as many as sixty lane-miles being accomplished each year).

The small amounts spent on the three-fourths of non-arterial streets that are asphalt concrete or Portland cement concrete and not chip seal are more in the line of spot repair; the amount invested each year is not substantial enough to be called a maintenance program. The right-of way-permit paving is not necessarily done on streets in need of maintenance; rather it is a consequence of private development or utility work. Nearly two-thirds of the non-arterial streets are Portland cement concrete. In general, these pavements were constructed in the first half of the twentieth century. Portland cement concrete pavements have longer lives than other pavements and have required a minimum of maintenance over many years, but they are very costly to rehabilitate, not only in terms of construction money but also in resident and business inconvenience from traffic restrictions when pavement work is performed. Rehabilitating or replacing these pavements will involve a large cost and significant local disruptions. Seattle faces a reckoning with its large inventory of concrete streets that are approaching the end of their life and will need rehabilitation.

Accomplishments vs. Needs

Is Seattle investing enough in its streets? As shown in Figure 4, there are three alternative life-cycle paths for Seattle's streets.

- If the annual investment does not meet the need, then the amount of deferred maintenance will continue to grow. Paving accomplishments will not keep pace with pavement deterioration. Streets that cannot be resurfaced will deteriorate to a level where reconstruction is required. The number of streets in the worst condition will grow. This trajectory is shown by the $7 million annual investment curve in Figure 4.

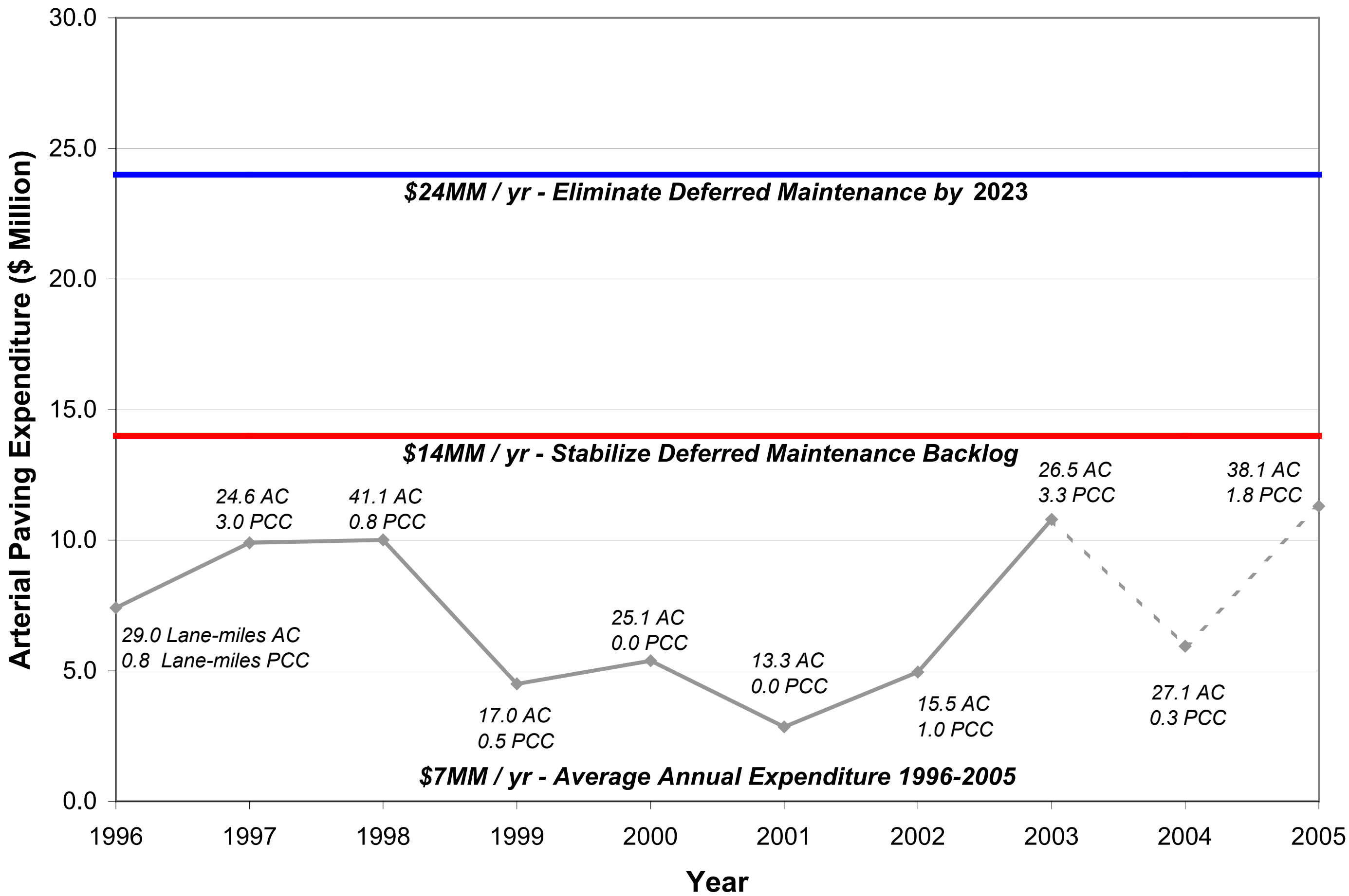
- The investment can be pegged at a level that holds the condition of the network constant in the good range and stabilizes the deferred maintenance over the next 20 years, but does not decrease it. This is the $14 million annual investment curve in Figure 4.

- A program of rehabilitation can be undertaken that seeks to improve the average condition of the street network and to eliminate the deferred maintenance over a long period of time. An annual investment of $24 million over 20 years (that is, an annual investment over and above the $14 million required to hold the network condition constant) eliminates the deferred maintenance on the arterial streets and therefore returns Seattle to an optimal pavement condition in which the street network is in very good condition and there is little or no deferred maintenance.

Seattle’s estimated yearly arterial paving investment for the years 1996-2005 is shown in Figure 6. The value of each year’s paving accomplishment is given in 2004 dollars, calculated with current unit costs.

While the annual totals vary, Seattle appears to be under-investing by a factor of 2X-4X in its arterial streets. As a rough measure, if the objective is to maintain the condition of the arterial street network and not to add to the amount of deferred maintenance, Seattle should complete a 20-yr annual average of approximately 30 lane-miles of asphalt resurfacing and rehabilitation, plus 5 lane-miles of street reconstruction. Seattle has not approached that level of accomplishment in the eight years for which data are available. This means that the amount of maintenance that has to be deferred grows each year.

Figure 6. Arterial paving expenditure (1996-2005)



As for the non-arterial streets, the programmed annual level of investment has hovered around $1 million/yr. While the need is not completely characterized because of the absence of up-to-date pavement condition information, the annual need is estimated at $15 million, so Seattle is currently under-investing by perhaps a factor of 15X in its non-arterial streets.

CONCLUSIONS

A $14 million annual paving investment is required to maintain Seattle's arterial street network in its current (good) condition, holding deferred maintenance steady in the $300 million range. An annual investment of $24 million is required to eliminate deferred maintenance by the year 2023. The investment in arterial paving should be directed to resurfacing streets that are in fair or good condition, and also rehabilitating or reconstructing streets that are in poor condition or worse.

Effective non-arterial street maintenance begins with regular condition assessments and a stable (and adequate) major maintenance budget. A $15 million annual expenditure is the order of magnitude of annual need for maintaining the two-thirds of Seattle streets that are classified as non-arterial. Long-term maintenance of chip seal (BST) streets is one of the signal successes of Seattle's non-arterial street maintenance program. The chip seal program demonstrates the cost effectiveness of timely, regular maintenance. A modest ($500K) increase in chip-seal annual funding would shorten the time interval between maintenance treatments and improve the cost-effectiveness of the program. The other urgent need for the non-arterial streets is to replace isolated concrete panels that have cracked and broken because they have exceeded their design life; a very modest investment, on the order of $500K/yr would improve the safety and driving condition of Seattle's large inventory of Portland cement concrete streets.

APPENDIX A
2004 PAVING PRIORITIES

2004 Paving Priorities – CONTRACT (1/4)

Street	From	To	Pavement Type	Length (ft)	Width (ft)	Lane-Miles	Estimated Cost	Comments	PCI	Functional Class
Corson Ave. S	S. Michigan St.	S. Orcas St. (S Doris St)	AC/PCC	841	54	0.63	$125,000		57	Major
						0.63	**$125,000**	**Subtotal (2004 tier 1)**		
S. Jackson St	14th Ave. S	M. L. King Jr. Way S	AC/PCC	2,857	50	3.15	$672,068		27	Minor
Rainier Ave. S.	S. Jackson St.	S. Dearborn. St.	AC/PCC	689	77	1.12	$228,110		48	Major
12 Av S	S Lane St	S Jackson St	AC/PCC	Varies	see note	0.85	$140,578	dropped from CIP, bus route	55	Minor
						5.12	**$1,040,755**	**Subtotal (2005 tier 1)**		
Roosevelt Way NE	NE 92 St	Pinehurst Wy NE	AC/PCC	Varies	see note	3.17	$679,815	Loop detector list	43	Major
Pinehurst Way NE	ES of Roosevelt Way NE	WS of 15th Ave NE	AC/PCC	1,977	44	1.36	$291,062		47	Major
15 Ave NE	NS of NE 125 St	SS NE 145 St	AC/PCC	Varies	see note	3.01	$646,722	Complaints	43	Major
						7.54	**$1,617,598**	**Subtotal (2005 tier 2)**		
1st Ave. N	Denny Way	Roy St	AC/PCC	Varies	see note	1.67	$358,558		27	Major
Queen Anne Ave. N	W. Harrison St.	W. Roy St.	AC/PCC	Varies	see note	0.94	$201,819	1 claim- bike, other	21	Major
Roy St.	Queen Anne Ave. N	5th Ave. N	AC/PCC	Varies	see note	1.73	$371,460		42	Major
3rd. Ave	Virginia St.	Broad St.	AC/PCC	2,556	54	2.65	$568,947	Field check shows addl deterioration	74	Minor
						6.99	**$1,500,783**	**Subtotal (2006 tier 1)**		
10th Ave. W	Olympic Way W	W. Crockett St	AC/PCC	segments	unmatched	1.76	$377,895	Bus complaint	38	Minor
W. McGraw St.	Queen Anne Ave. N	3rd Ave. W	AC/PCC	926	42	0.68	$146,004	Bus, bicycle complaints	21	Minor
Olympic Way W	St sign W Olympic Pl	10th Ave. W	AC/PCC	Varies	See note	0.83	$178,395	Bus	29	Minor
W Olympic Pl	WS of 1 Av W	St sign W Olympic Wy	AC/PCC	Varies	see note	1.53	$327,845	Bus	29	Minor
						4.80	**$1,030,138**	**Subtotal (2006 tier 2)**		

2004 Paving Priorities – CONTRACT (2/4)

Street	From	To	Pavement Type	Length (ft)	Width (ft)	Lane-Miles	Estimated Cost	Comments	PCI	Functional Class
N 45th St	ES of Stone Way	Es of 5th Ave NE	AC/PCC	4,710	48	3.92	$766,160	Important link b/t Ballard and UW	41	Minor
NE 45th.	WS of 7th Av NE	WS of Roosevelt Wy NE	AC/PCC	896	varies	0.69	$149,115	Complaints	41	Major
NE 45 St	ES of Roosevelt Wy NE	Pvt Chg at 21 Av NE	AC/PCC	2,852	48	2.16	$463,925		53	Major
15 Av NE	Pvt Chng N of NE Pacific St	SS of NE 45 St	AC/PCC	2,814	varies	2.37	$509,381		28	Major
						9.15	**$1,888,580**	**Subtotal**		
4 Av S	Royal Brougham	S Holgate	AC/PCC	Varies	see note	2.94	$631,045		36	Major
S Holgate	Airport Wy	1st Av S	AC/PCC	Varies	see note	2.61	$559,675	From 6th to bridge flex base, complaints R&Rxing	38	Minor
16 Av S	E Marginal Wy	14 Av S	AC/PCC	1,108	50	0.87	$187,758	Crew possible? KC & Tukwila	19	Major
						6.42	**$1,378,478**	**Subtotal**		
N Northgate Wy	ES of Aurora Av	ES of Meridian Av	AC/PCC	Varies	see note	2.13	$456,372		37	Major
NW 85th	14 Av NW	1st Av NW	AC/PCC	4,290	41	2.96	$635,559		31	Major
N 85th	1st Av NW	Greenwood Av N	AC/PCC	---	---	0.43	$92,812		50	Major
Greenwood Av N	NS of N 77 St	SS of N 85 St	AC/PCC	2,082	54	1.77	$381,006		51	Minor
						7.29	**$1,565,748**	**Subtotal**		
22nd Ave W	W. Dravus St.	Gilman Ave. W./ W. Emerson	AC/PCC	1,894	25	0.74	$160,461	Need pcc bus stops & localized PCC base replacement.	43	Minor
21st Av W	W Emerson Pl	W Commodore Wy	AC/PCC	Varies	see note	0.64	$137,067	Access to BINMIC industries	33	Minor
						1.38	**$297,528**	**Subtotal**		
23 Av	E Denny Way	E Yesler Way	AC/PCC	Varies	see note	4.04	$868,396		32	Major
						4.04	**$868,396**	**Subtotal**		

2004 Paving Priorities – CONTRACT (3/4)

Street	From	To	Pavement Type	Length (ft)	Width (ft)	Lane-Miles	Estimated Cost	Comments	PCI	Functional Class
Boren Av	NS of Broadway	SS of Denny Wy	AC/PCC	5,381	varies	7.51	$843,325	Shoving, rutting, reflection cracking,delaminations Sub-base appears ok	28	Major
Seneca St	ES of Boren	SS of E Union St(E Harvard St)	AC/PCC	1,250	33	0.65	$139,792		21	Minor
Madison St	WS of Terry Av	ES of Broadway	AC/PCC	1,624	48	1.23	$264,171		19	Major
E Madison St	ES of Broadway	ES of E Pine St	AC/PCC	2,886	varies	1.80	$385,581		45	Major
						11.19	**$1,632,868**	**Subtotal**		
10 Av E	E Roy	Bridge at SR520	AC/PCC	5,630	varies	3.92	$841,709		23	Minor
E Boston St	ES of 10th Av E	WS of 12 Av E	AC/PCC	1,684	varies	0.82	$176,443		29	Minor
15th Ave E	NS of E Galor St	St sgn E Boston St	AC/PCC	1,923	varies	0.83	$178,415		30	Minor
						5.57	**$1,196,566**	**Subtotal**		
N & NE Northlake Way	W of Densmore Av N	6th Av NE	AC/PCC	7,237	varies	2.25	$483,486		36	Minor
Stone Wy N	NS of N 34 St	SS of N 45 St	AC/PCC	4,587	54	3.91	$839,421	Citizen complaints	45	Minor
N 34 St	ES of Fremont Av N	ES of Wallingford Av N	AC/PCC	3,341	42	2.21	$475,536	Solid Waste trucks	41	Major
						8.37	**$1,798,443**	**Subtotal**		
California Av SW	SS of SW Myrtle St	NS of SW Dakota St	AC/PCC	9,689	48	7.34	$1,576,077	Some base repairs needed	33	Minor
California Av SW	NS of SW Dakota St	SS of SW Donald St	AC/PCC	9,109	48	6.90	$1,481,731	Some sections still in good cond	60	Minor
Fauntleroy Wy SW	NS of Holly Pl SW	Pvt Chg at SW Alaska St	AC/PCC	8,423	varies	5.08	$1,091,290	Bike and AC shoving complaints	30	Major
						19.32	**$4,149,098**	**Subtotal**		
SW Orchard St	St Sgn Sylvan WY SW	NS of SW Myrtle ST	AC/PCC	1,579	varies	0.83	$179,157	Mill and Overlay	23	Major
Dumar Wy SW	St Sgn SW Orchard St	St Sgn SW Austin St	AC	1,362	24	0.52	$308,720	Reconstruct AC	43	Major
SW Austin St	St Sgn Dumar Wy SW	Pvmt Chg	AC	248	31	0.12	$72,609	Reconstruct AC	20	Major
Sylvan Wy SW	SS of SW Holly St	St Sgn SW Orchard St	AC	3,103	39	1.91	$1,142,938	Reconstruct AC, X-walk poor	19	Major
						3.38	**$1,703,424**	**Subtotal**		

2004 Paving Priorities – CONTRACT (4/4)

Street	From	To	Pavement Type	Length (ft)	Width (ft)	Lane-Miles	Estimated Cost	Comments	PCI	Functional Class
14th. Ave. S.	S Sullivan St/Dallas Av S-CL	S Director/CL	AC/PCC	Varies	see note	1.19	$257,237		56	Major
5th. Ave.	Stewart St.	Denny Way.	AC/PCC	Varies	see note	2.52	$540,033	Monorail? Failed rubberized AC	60	Minor
						3.71	**$797,270**	**Subtotal**		

2004 Paving Priorities – CREW / ARTERIAL (1/2)

Street	From	To	Pavement Type	Length (ft)	Width (ft)	Lane-Miles	Estimated Cost	Comments	PCI	Functional Class
N 80 St	Interlake Av N	Wallingford Av N	AC/PCC	820	32	0.41	$72,889	Complaints	31	Minor
5 Ave	Stewart	Denny	AC/Brick				$83,332			Major
E Madison St	27 Av E	Lk Washington Blvd E	AC/PCC	1,500	15	0.36	$62,500	completes project started in 2003	24	Minor
L Washington Blvd E	intersection w Madrona		AC			0.22	$48,000	Bus turnaround reconstruct w Full-depth AC		Minor
W Galer St	Thorndyke Av W	29 Av W	AC/PCC	559	35	0.31	$54,347		37	Minor
Seneca St	3rd Av	6th Av	AC/PCC	850	42	0.56	$99,167	I-5 access rte	44	Major
Olson Pl SW	Park & Ride	1st Av SW	AC/PCC	480	55	0.42	$73,333		16	Major
Myers Wy SW	intersection Olson Pl SW		AC/PCC	500	80	0.63	$111,111		51	Major
Swift Av S	19 Av S	S Albro	AC/PCC	900	42	0.60	$105,000	Base repair on E side	38	Major
						3.51	**$709,679**	**2004 Subtotal**		
NE 71 St	E Greenlake Dr N	6 Av NE	AC/PCC	870	40	0.55	$96,667	Complaints Needs base repair	53	Minor
Thackery Ave NE	NE 42nd St	NE 45th St	AC/PCC			0.52	$70,000		38	Collector
E John/E Thomas St	19 Av E	E Madison St	AC/PCC	Varies	See note	0.73	$127,775		28	Minor
8 Av	Olive Wy	Stewart St	AC/Brick	810	42	0.54	$96,667	Stewart-Va paved under permit in 04	38	Minor
8 Av	Virginia St	Westlake Av	AC/Brick						38	Minor
Olive Way	4 Av	6 Av N	AC/Brick	575	43	0.39	$68,681		51	
SW Alaska St	35 Av SW	Fauntleroy Wy SW	AC/PCC	915	15	0.22	$38,125	bicycle complaints	45	Minor
Corson Av S	S Warsaw St	S Michigan St	AC/PCC	1,080	33	0.56	$99,000	extends WSDOT project	41	Major
Corson Av S	S Doris St	Airport Wy S	AC/PCC	1,620	varies	0.49	$85,550	extends WSDOT project	32	Minor
						3.99	**$682,464**	**2005 Subtotal**		

2004 Paving Priorities – CREW / ARTERIAL (2/2)

Street	From	To	Pavement Type	Length (ft)	Width (ft)	Lane-Miles	Estimated Cost	Comments	PCI	Functional Class
S Bailey St	12 Av S	13 Av S	AC/PCC	348	40	0.22	$38,667		37	Major
Stanley Av S	13 Av S	S Albro Pl	AC/PCC	451	25	0.18	$31,319		55	Minor
13 Av S	Airport Wy S	S Bailey St	AC/PCC	214	26	0.09	$15,456		76	Major
Magnolia Blvd	29 Av W	W Howe St	AC/PCC	1,773	35	0.98	$172,375		49	Minor
3rd Av W	NS of MCGraw St	W Raye St	AC/PCC	1,311	30	0.62	$109,250	Bus route	29	Minor
3rd Av W	W Raye St	NS of W Fulton St	AC/PCC	947	30	0.45	$78,917		35	Minor
Madison St	7 Av	9 Av	AC/PCC	630	50	0.50	$87,500	repair X-walks	27	Major
S Albro Pl	S Corgiat intersection	I-5 ramp (Stanley)	AC/PCC	742	42	0.49	$86,567	ramp closure required	46	Major
SW Admiral Wy	39 Av SW	SW Belvidere	AC/PCC	700	48	0.53	$93,333		43	Major
SW Admiral Wy	SW Belvidere	SW Olga St	AC/PCC	610	48	0.46	$81,333		43	Major
16 Av S	Bridge	E Marginal Wy S	AC/PCC	1,100	50	0.87	$152,778	Partner w KC-Tukwila	19	Major
7 Av NE	NS of NE 42 ST	RP	AC/PCC	1,060	32	0.54	$94,222	bus route	45	Minor
N 34 St	Wallingford Av N	Burke Av N	AC	270	37	0.16	$27,750	needs base repair	30	Major
W Greenlake Dr N	Winona Av N	Densmore Av N	AC	370	40	0.23	$41,111	Complaints	32	Minor
25 Av NE	NE 75th St	NE 77th St	AC/PCC	424	28	0.19	$32,978	Severe settlement	34	Major
						6.50	**$1,143,556**	**2006+ Subtotal**		

2004 Paving Priorities – CREW / NON-ARTERIAL (1/2)

Street	From	To	Pavement Type	Length (ft)	Width (ft)	Lane-Miles	Estimated Cost	Comments	Old PCI Data
NE 68 St	43 Ave NE	44 Av NE	ACP	278	24	0.11	$17,051		10
NE 68 St	44 Ave NE	45 Av NE	ACP	304	24	0.12	$18,645		10
Poplar Place S	S Charles St	S Norman St	BST	347	24	0.13	$21,283		
SW Lander St	SW Admiral/53rd	SW Lander Pl	APC	414	24	0.16	$25,392		15
SW Lander Pl	SW Lander St	SW Teig Pl	APC	355	24	0.13	$21,773		15
29 Av S	E Yesler Wy	S Washington St	APC	288	24	0.11	$17,664		43
E Harrison St	18 Av E	19 Av E	Block	340	25	0.13	$21,722		40
Harvard Av	E Union St	E Pike St	APC	336	40	0.21	$34,347		24
Harvard Av	E Pike St	E Pine St	APC	357	40	0.23	$36,493		24
Harvard Av	E Pine St	E Olive St	APC	365	40	0.23	$37,311		15
						1.55	**$251,681**	**2004 Subtotal**	
E Olive St	Summit Av	Belmont Av	APC	268	24	0.10	$16,437		10
S Charles St	Poplar Pl S	Rainier Av S	BST	342	20	0.11	$17,480		
20 Av	E Fir St	E Spruce St	APC	306	24	0.12	$18,768		35
Harvard Av E	Lakeview Blvd E	E Boston St	APC	885	24	0.34	$54,280		9
NE 68 St	42 Av NE	43 Av NE	ACP	328	28	0.14	$23,470		10
Bell St	2 Av	3Av	APC	331	45	0.24	$38,065		35
Nagle Pl	E Pine St	E Howell	APC	823	20	0.26	$42,064		13
Nagle Pl	E Howell St	E Denny Wy	APC	421	20	0.13	$21,518		10
10 Av S	S Cambridge (CL)	DE North	ACP	1,480	21	0.49	$79,427		15
						1.92	**$311,509**	**2005 Subtotal**	
NW 58 St	1 Av NW	DE	ACP	470	20	0.15	$24,022		9
20 Av S	S Stevens St	S Hanford St	APC	704	24	0.27	$43,179		9
Harrison St	Terry Av N	Boren Av N	APC	321	40	0.20	$32,813		10
43 Av NE	NE 68 St	NE 70 St	ACP	628	30	0.30	$48,147		15
43 Av NE	Ne 70 St	NE 72nd (cul de sac)	ACP	631	24	0.24	$38,701		11
Dorffel dr E	E John St	37 Av E (2 legs)	APC	911	24	0.35	$55,875		9
						1.50	**$242,737**	**2006 Subtotal**	

2004 Paving Priorities – CREW / NON-ARTERIAL (2/2)

Street	From	To	Pavement Type	Length (ft)	Width (ft)	Lane-Miles	ESTM COST	COMMENTS	Old PCI Data
Marion St	Terry Av	Boren Av	APC	292	28	0.13	$20,894		10
25 Av SW	SW Edmunds St	SW Hudson St	ACP	660	23	0.24	$38,793		33
Terry Av	Marion St	Madison St	APC	289	28	0.13	$20,680		12
Minor Av	Marion St	Madison St	APC	282	40	0.18	$28,827		10
42 Av NE	NE 70 St	NE 72 St	ACP	468	24	0.18	$28,704		13
Belmont Av E	E Olive Wy	E Thomas St	APC	425	24	0.16	$26,067		10
Belmont Av E	E Thomas St	E Harrison St	APC	415	24	0.16	$25,453		17
Belmont Av E	E Republican St	E Mercer St	APC	432	24	0.16	$26,496		10
Harrison St	Minor Av N	Pontius Av N	APC	323	36	0.18	$29,716		30
						1.52	**$245,630**	**2007 Subtotal**	
Boren Av N	Mercer St	Valley St	APC	440	40	0.28	$44,978		9
Belmont Av	E Pike St	E Pine St	APC	417	40	0.26	$42,627		22
Melrose Av	E Olive Pl	E Denny Wy	APC	514	34	0.28	$44,661		24
E Olive St	11 Av	12 Av	APC	269	30	0.13	$20,623	brick base	10
E Olive St	12 Av	13 Av	APC	269	30	0.13	$20,623	brick base	10
S Norman St	Poplar Pl S	Rainier Av S	BST	343	24	0.13	$21,037		
36 Av E	Lk Washington Blvd E	E Ford Pl	APC	683	20	0.22	$34,909		15
E Ford Pl	Lk Washington Blvd E	36 Av E	APC	681	20	0.21	$34,807		9
11 Av NW	NS of NW Ballard Wy	SS of Nw Leary Wy	ACP	204	30	0.10	$15,640		
11 Av NW	NS of NW 46 St	SS of NW Ballard Wt	ACP	208	30	0.10	$15,947		55
						1.83	**$295,852**	**2008 Subtotal**	
15 Av NW	NW 100 St	NW 103 St	ACP	645	22	0.22	$36,263	brick base	9
15 Av NW	NW 103 St	NW 105 St	ACP	672	22	0.23	$37,781	brick base	9
Boylston Av E	E Mercer St	E Roy St	APC	324	24	0.12	$19,872	brick base	9
Boylston Av E	E Olive St	E Thomas St	APC	440	24	0.17	$26,987	brick base	20
Cascadia Av S	S Hinds St	S Court St	APC	661	24	0.25	$40,541	brick base	25
Cascadia Av S	S Horton St	S Hinds St	APC	488	24	0.18	$29,931	brick base	25
						1.18	**$191,375**	**2009 Subtotal**	

GLOSSARY

Asphalt Concrete	A controlled mixture of asphalt binder and aggregate, compacted into a uniform layer.
Chip Seal/BST	A surface treatment in which the pavement is sprayed with asphalt and then immediately covered with aggregate and rolled. Within the City of Seattle, chip seals are typically used as a surfacing course on non-arterial streets.
Crack Seal	A maintenance procedure where pavement cracks are sealed to prevent damage related to water infiltration into the underlying pavement layers.
Deferred Maintenance	Maintenance activity which, in accordance with stated maintenance strategy, should be carried out in the current year, but is not funded.
Lane-Mile	The standard area measurement unit used for reporting paving accomplishments within the City of Seattle. The standard lane width is 12 feet. *1 lane-mile = 7,040 square yards = 63,360 square feet*
Mill and Overlay	An asphalt concrete resurfacing activity that involves removing (milling) and replacing (overlaying) the uppermost part of the pavement structure.
Portland Cement Concrete	Portland cement is the proper name for the most common type of cement used in virtually all concrete. It consists of a controlled mixture of aggregate, cement and water. The cement and water harden, binding the aggregate into a rocklike mass, concrete.
Preventive Maintenance	Planned maintenance on streets in good condition intended to extend pavement life through protection of the existing layer structure. Preventive maintenance does not typically improve functional condition, but it can minimize future damage. It does not increase structural capacity beyond the original pavement design.
Reconstruct	Replacement of an existing pavement structure by the placement of a new pavement structure. Reconstruction usually involves complete removal and replacement of the existing pavement structure.
Rehabilitate	Major construction intended to improve the structural condition of a pavement, extending pavement service life beyond the original design.
Resurface	Replacement of the uppermost layer of pavement. Resurfacing improves ride and preserves underlying layers by minimizing the entry of water. It does not increase structural capacity beyond the original pavement design.

Routine Maintenance	Regular maintenance intended to maintain pavement in adequate operating condition. This work is normally anticipated within a budget cycle, but its location and timing may not be known in advance.
Select Panel Replacement	Replacement of failed concrete slabs on a Portland cement concrete street. Ride is improved through replacement of areas with the worst cracking and faulting. Large portions of the old pavement are retained, so no structural capacity is added beyond the original pavement design.