Seattle Department of Transportation

Status and Condition Report – In Brief
2007

Version 1.0

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Executive Summary

Purpose of This Document:

This report is a concise version of the 2007 Status and Condition Report prepared by the Seattle Department of Transportation (SDOT) through its Asset Management Program.

The report provides a description of the transportation infrastructure assets owned by SDOT; their value and condition; and the funding needed to maintain and preserve them. It provides a baseline to use in determining asset investment strategies and making decisions about the SDOT 2009/2010 Operations Budgets and Transportation Capital Improvement Program (TCIP).

The statistics provided in this report reflect the state of the assets as of August 1, 2007.

The *Status and Condition Report*, the full report, is available from SDOT Asset Management Program staff.

West Seattle Low-Level Bridge Serving a Major Industrial Area

Bridging the Gap Funding Package:

2007 marked the first year of the 9-year Bridging the Gap (BTG) funding package, a combination of a voter–approved transportation levy and a mayor/council-approved parking tax and employee hour tax. BTG funding supports transportation infrastructure maintenance and preservation, and has contributed nearly $40 million in 2007, and will contribute approximately $51 million in 2008.

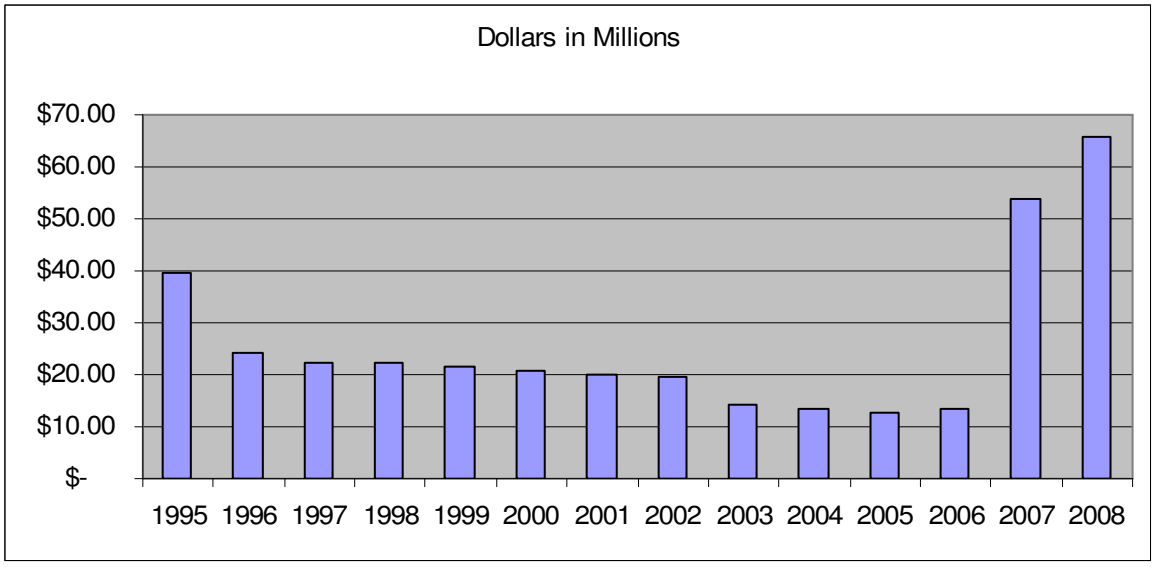
BTG was conceived as a 20-year levy program in response to 35 years of deferred maintenance that had been aggravated by years where the Department's dedicated transportation revenues had been shrinking. Between 1995 and 2006, the Department experienced a 66% loss in dedicated transportation funding, as the chart on the following page illustrates (funds stated in 2007 dollars). This decrease in funding is attributable to certain statewide tax-revenue-limiting initiatives and a mild recession in the early years of this decade.

A Variety of Assets Receiving BTG Funding

The mayor and council supplemented SDOT's budget using other funding sources, including the general fund. However, because of competing citywide priorities, this was not a sustainable solution. Ultimately, the 20-year levy was abandoned and a 9-year program was set before the voters.

BTG has restored dedicated transportation revenues, and this funding is enabling SDOT to establish better maintenance and replacement programs.

Dedicated Transportation Revenues 1995 - 2008



Assets/Transportation Infrastructure:

The hundreds of infrastructure assets owned by SDOT have been ordered into an asset hierarchy (see Appendix B) that contains 44 main types of assets, called "level 1" assets. This is the level at which SDOT will manage its assets. The level 1 assets have been grouped based on common functions into asset classes, a convenient grouping for reporting purposes. (See the accompanying table on page 9.)

SDOT-owned assets include a range, from substantial and long-lived structures such as bridges and pavement, to smaller, more frequently maintained assets, such as signs and marked crosswalks. SDOT also owns assets that are not traditional for a transportation department, such as the air raid siren tower which was constructed by SDOT's predecessor, the Seattle Engineering Department, in 1957.

SDOT's newest asset is the 2.6-mile streetcar line linking the Downtown with the South Lake Union neighborhood. Another new asset that is planned for Seattle is a roundabout that is currently in the design stages.

The inventory of most of the 44 level 1 assets is increasing annually, each of which will need to be preserved and maintained.

SDOT also has a regulatory, rather than ownership, interest in certain fixtures or installations that are in the public right-of-way (ROW), such as trees, landscaped areas, and areaways (vaults beneath the sidewalks). SDOT regulates and issues permits for these assets.

SDOT has an ownership interest in the fundamental asset underlying all of the infrastructure improvements: the ROW itself. Nearly 24.8% of the city's geographic area is held in trust by the city of Seattle, under the jurisdiction of SDOT, as public ROW. ROW has not been assigned a value or discussed within this report but is recognized as the essential base for all of the rest of the infrastructure that is SDOT responsibility.

Asset Condition:

A standard condition rating has been established for all SDOT level 1 assets.

Asset Condition Ratings

Condition Rating	Definition
Good	Asset is "as new" or requires only routine maintenance to keep it in service
Fair	Asset requires major rehabilitation to keep it in service
Poor	Asset should be replaced

The accompanying table on page 9 presents the condition ratings, where known, for SDOT assets.

The condition of a significant portion of the infrastructure is reliably rated as good. For bridges and arterial pavement, the Department routinely assesses condition on a prescribed basis, and the majority of these assets are in good or fair condition.

The Department also has some significant infrastructure assets that are relatively new:

- ✓ The Department has migrated from single-space parking meters to pay stations that control multiple spaces. All of the pay stations are still within the initial warranty period and are considered "as new" or in good condition.
- ✓ The Department's newest asset, the Streetcar line in the South Lake Union neighborhood, opening in December, 2007, is also rated "as new" or in good condition.

Overall, the Department has verifiable condition ratings on assets that represent more than half of the overall current replacement value of the infrastructure. In 2008, SDOT will conduct a condition assessment on its sidewalk assets, crash cushions and guardrails, and traffic signals, and will complete an update on the condition of its trees. Other condition assessments will be conducted as resources allow.

SDOT, like other urban transportation systems, faces the problem of deterioration of its assets which has primarily been driven by the historic lack of funding to sustain them in good condition. The annual increase in the inventory of each asset also adds to the costs of future maintenance which, without corresponding increases in funding, means less money available to maintain existing assets and a decline in asset condition.

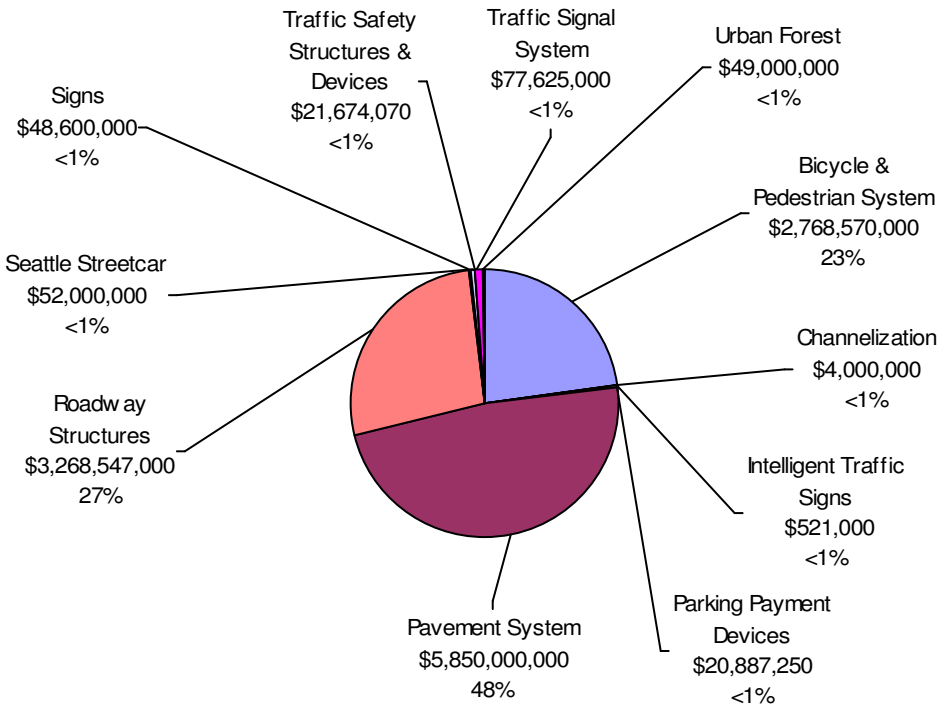
Replacement Value:

"Replacement value" quantifies the total value of Seattle's transportation infrastructure. It represents what it would cost in 2007 dollars to replace all of SDOT assets, and does not imply that the entire infrastructure needs replacement. Knowing an asset's replacement value helps direct decision-making about investment strategies for repair or replacement. Postponing asset maintenance could result in earlier replacement rather than extending an asset's useful life if maintenance were performed.

The estimated replacement value of SDOT infrastructure assets is in excess of $12.1 billion. Pavement and roadway structures assets represent 75% of this total. The third largest asset class is the Bicycle and Pedestrian System, which includes the sidewalk system, and represents 23% of the total. The assets in the other nine (9) asset classes make up the remaining 2%.

The value of the ROW is not included in this total.

2007 Infrastructure Replacement Value
By Asset Class
Total Value: $12,161,424,320



Unmet Funding Need:

"Unmet funding need" is the cost to raise all existing assets to good condition and sustain them at that level. When new assets are installed to address an infrastructure need or to replace existing assets, the requirements to fund the installation/replacement and sustain it in good condition are also included in determining unmet funding need.

BTG has provided funding to reduce the unmet funding need for many SDOT assets. However, funding gaps persist. Factors which contribute to the unmet funding need are consistent across assets:

- ✓ When new assets are installed, corresponding maintenance budgets are not always increased to allow SDOT to sustain the new assets in good condition.
- ✓ Funding has not traditionally been available to establish replacement programs for assets so that they can be replaced when they reach the end of their useful lives.
- ✓ Many assets are maintained based on customer request rather than through programmed maintenance. Condition of these assets is generally unknown until they reach the point where the asset must be replaced, which is generally more expensive than the cost of performing timely, routine maintenance.
- ✓ Funding to maintain expensive assets does not compete well in the budget process.

The top four (4) asset classes for unmet funding need are:

- ✓ Roadway Structures for annual bridge maintenance, rehabilitation or replacement of bridges and retaining walls, including the Alaskan Way seawall, and fill or restoration of areaways;

- ✓ Bicycle and Pedestrian System to perform permanent repairs on sidewalks, complete the sidewalk network, construct additional trails, and rehabilitate or replace stairways;
- ✓ Pavement System for rehabilitation of non-arterial pavement; and
- ✓ Urban Forest to preserve the condition of these assets and raise them to good condition.

Funding is sufficient for most of the assets in the Traffic Safety Devices and Structures asset class.

Arterial pavement's funding needs to be reassessed based on current construction costs.

Funding needs for several of SDOT assets have not been clearly assessed as of the date of this report:

- ✓ Seattle Streetcar – A major maintenance program will be established in the next two (2) years
- ✓ Assets in the Intelligent Traffic Signs and the Traffic Signal System asset classes
- ✓ Pavement markings - Legends, bicycle lane lines, stop bars, and non-arterial pavement markings

Replacement programs have not been established for most assets. Where new replacement programs have been established in 2007, the programs need an additional $277,400 annually.

SDOT Transportation Infrastructure Assets
Status, Condition, Value
August 2007

Asset Class/Asset	Inventory Status	Replacement Value	Condition			
			Good	Fair	Poor	TBD
Bike/Ped System						
Bicycle Racks	3,000 (e)	$1,995,000				x
Marked Crosswalks	6,000 (e)	$3,000,000				x
Pedestrian Crossing Underpass/Tunnel	1	TBD				x
Pedestrian Viewing Platform	4	TBD				x
Sidewalks	33,778 block faces	$2,650,000,000				x
Stairways	482	$34,775,000	48% *	30% *	22% *	
Trails	39.4 lane miles	$78,800,000				x
Transit Loading Platforms	TBD	TBD				x
Channelization						
Pavement Markings	TBD	$4,000,000				x
Roundabout	0	---				---
Intelligent Traffic Signs						
Dynamic Message Signs	5	$500,000				x
Radar Speed Signs	3	$21,000	100% *			
Parking Payment Devices						
Pay Stations	1,845	$40,387,250	100%			
Parking Meters	1,000 (e)	$500,000		100% *		
Pavement						
Arterial	1,531 lane miles	$2,600,000,000	70%	15.7%	14.3%	
Non-arterial	2,412 lane miles	$3,250,000,000				x
Real Property						
Parcels	106	TBD				---
Buildings	8	TBD				---
Regulated Assets						
Shoreline Street Ends	149 (e)	N/A				---
Roadway Structures						
Areaway Street Walls	205	$144,620,000	3%	57%	19%	21%
Bridges	92	$1,422,800,000	51%	10%	39%	
Bridge Hydrant Vaults	13	TBD				x
Retaining Walls	582	$1,701,127,000	43%	37%	20%	
Seattle Streetcar						
Streetcar System	1	$52,000,000	100%			
Signs						
Sign Assemblies	TBD	$48,600,000				x
Structures other than Roadway						
Air Raid Siren Tower	1	TBD				N/A
Piers	1	TBD				x
Traffic Safety Devices & Structures						
Chicanes	19	$285,000				x
Crash Cushions	34	$595,000				x
Curb Bulbs	92	$2,300,000				x
Guardrails	66,913 linear feet	$8,085,320				x
Median Islands	TBD	TBD				x
Speed Cushions	19	$209,000				x
Speed Dots	1	TBD				x
Speed Humps	47	$199,750				x
Traffic Circles	1,000 (e)	$10,000,000				x
Traffic Signal System						
Beacons	380 (e)	$2,280,000				x
CCTV Camera Assemblies	46	$345,000				x
Detection Systems	TBD	TBD				x
Traffic Management Center	1	TBD				x
Traffic Signal Assemblies	1,001	$75,000,000				x
Traffic Signal Communication System	TBD	TBD				x
Urban Forest						
Landscaped Areas	5,371,000 square feet (e)	$31,250,000	30% *	30% *	30% *	10% *
Trees	35,000 (e)	$17,750,000	28% *	66% *	5% *	

(e) = estimated count
* = estimated condition

Introduction

Purpose and Scope of this Report:

This report is a concise version of the initial Status and Condition Report prepared by the Seattle Department of Transportation (SDOT) through its Asset Management Program.

The report provides a description of the transportation infrastructure assets owned by SDOT: their value and condition; and the funding needed to maintain and preserve them. It provides a baseline to use in determining asset investment strategies and making decisions about the SDOT 2009/2010 Operations Budgets and Transportation Capital Improvement Program (TCIP).

A Variety of SDOT Assets

The statistics provided in this report reflect the known state of the assets as of August 1, 2007.

This report focuses on the physical infrastructure assets in the transportation right-of-way (ROW) that are owned and operated by SDOT and that directly affect the delivery of transportation services to the public. It does not include real property owned by SDOT or maintenance facilities used to support maintenance activities.

SDOT also has jurisdiction over physical assets in the ROW that are owned by other parties. These assets, termed Regulated Assets, are not included in this 2007 report and will be addressed in subsequent documents.

The *Status and Condition Report*, the full report, is available from SDOT Asset Management Program staff.

Organization of this Document:

The main section of this report provides more detailed information about each of the assets and is organized by asset class.

The detailed information about each asset, where available, includes:

- ✓ Current inventory and anticipated annual growth
- ✓ Condition ratings
- ✓ Funding requirements
- ✓ Unmet funding needs

The appendices provide additional information, a glossary of terms used in this document, and more detailed supporting data.

How this Document was Prepared:

This document was prepared from data provided by SDOT asset owners. For the most part, this data was gathered from information currently available and was not the result of field inventories or inspections.

Relationship to Other Planning Documents:

This report is a snapshot of the state of SDOT transportation infrastructure. Over time, this report will be refreshed to depict historical trends in the state, value, condition and performance of SDOT assets. It is a companion document to other SDOT guiding, planning and reporting documents, including:

Portion of the Sidewalk System

- ✓ SDOT Transportation Strategic Plan (TSP) – The 20-year plan, describing the actions SDOT will take to accomplish the goals and policies in the city of Seattle's Comprehensive Plan and the Puget Sound Regional Council's Destination 2030 plans, and in support of Mayor Nickels' four (4) priorities for Seattle.
- ✓ 6-Year Transportation Capital Improvement Program (TCIP) – A six-year plan for improvement and preservation projects for SDOT assets.
- ✓ SDOT Financial Forecast – An assessment of resources and expenditure demands for the period 2008-2013.
- ✓ SDOT Biennial Budget – A two-year projection of the revenues and resources required to support SDOT annual operations and maintenance activities, including the planning and administration of the SDOT organization.

Future Expectations for this Report:

As the Asset Management Program matures, SDOT will develop Asset Management Plans for each asset or asset class. These plans will contain detailed asset management strategies that will be the source of information used in subsequent Status and Condition Reports. The Asset Management Plans will advance TSP goals with specific actionable projects associated with each asset.

Some of the many Regulated Assets in the Street ROW

Transportation System Environment

Transportation System Overview:

The city of Seattle covers 142.5 square miles - 83.87 square miles consisting of land and 58.67 square miles of water. The Seattle Metropolitan Area covers 8,186 square miles. There are approximately 3,946 12-foot wide lane miles of streets within the city of Seattle. The street ROW occupies 24.8% of the city surface area.

Seattle's urban transportation system consists of a street system with paved roads, a sidewalk system, a bicycle network, bridges and other roadway structures, a traffic control network, paths and trails, street signs, traffic safety structures and devices, and an urban forest. All of these infrastructure assets exist within the public ROW.

Value of the Transportation System:

The estimated replacement value of the transportation infrastructure assets is estimated at more than $12.1 billion in 2007 dollars.

Total Dollars Invested in Transportation Assets:

The city has invested in transportation infrastructure since its founding in 1851. The records of the cost of building these infrastructure assets existed in old paper ledgers that are no longer available, or, if they are, the cost figures are expressed in real dollars as of the date the monies were originally expended and would be meaningless in today's context.

Since 1980, an explicit record of the cost to build and perform major rehabilitation on infrastructure assets has been maintained and has been recently used for Governmental Accounting Standards Board, Statement 34, (GASB-34) reporting (see Appendix C). While this is only a partial representation of the total dollars invested in SDOT assets, it demonstrates that the Department has made an investment of $979 million in transportation infrastructure since 1980.

Seattle Growth and Development:

In 2000, Seattle had a population of 563,374 with a density of 6,901 people per square mile. Puget Sound Regional Council planners expect this population to grow by 200,000 by 2040.

Employment growth is expected to increase by 19% over 2002 levels to a total of 569,000 jobs by 2020. More than 75% of all trips within the city of Seattle are not work-related, but are taken for shopping, errands, and entertainment.

Traffic on the Alaskan Way Viaduct

This growth will significantly increase demand and stress on the city's transportation infrastructure.

The city will strive to accommodate growth through greater population densities and more transportation choices. The anticipated growth will impact the maintenance and operation of infrastructure assets and may require accelerated maintenance, replacement, and construction of new assets, and/or implementation of non-asset solutions.

Seattle Department of Transportation:

SDOT manages short- and long-term investments in streets, bridges, pavement, and trees to better connect the city with the region.

SDOT's annual budget was $193 million in 2007 and is approximately $205 million in 2008. The Bridging the Gap (BTG) initiative supplied approximately 21% of the funding in 2007 and 25% of the funding for 2008. Approximately 28% of the total budget in 2007 is provided by the city of Seattle's General Fund and Cumulative Reserve Fund. Another 7% is supported by a traditional transportation revenue source: the gasoline tax. These revenue sources are programmed to support the department's general maintenance and operations budget, as well as to provide partial support of the Transportation Capital Improvement Program (TCIP). Of the $193 million budget, approximately 45%, or $87.8 million, is devoted to maintenance and operation of the existing transportation infrastructure. Of that $87.8 million, a minimum of 61% of the budget, or $53.6 million, is spent on routine maintenance and operation. This represents an annual investment of 0.75% of the total replacement value in maintaining the assets and keeping them in service.

The traditional responsibility of SDOT has been to build, operate and maintain the transportation system. In more recent years the Department's mission and vision have been revised to include mobility, environmental stewardship, and economic vitality. The Asset Management Program will allow SDOT to operate and maintain infrastructure more strategically than ever before.

Landscaped Trail in an Industrial Area

SDOT Asset Management Program:

SDOT has adopted Asset Management to enable it to meet the challenges of preserving Seattle's transportation infrastructure. SDOT has elected to implement the asset management business model through a multi-year program of continuous, compounded improvement in infrastructure asset management policies and practices. More information about SDOT Asset Management principles is available in Appendix A.

Status and Condition of SDOT Infrastructure Assets

Overview:

The transportation infrastructure owned by SDOT is made up of hundreds of distinct physical components. SDOT has organized them into an Asset Hierarchy (see Appendix B) and has identified 44 different "level 1" assets that are the management basis. Asset ownership has been assigned for each level 1 asset. SDOT staff members who serve as asset owners are recognized as the primary sources of information and knowledge about capital investment needs, preservation, maintenance and operation of the asset.

Level 1 assets that share a common purpose or function have been grouped into asset classes. The Status and Condition of the level 1 assets is presented in alphabetical order by asset class.

A condition rating has been specified for each of the level 1 assets where known. This condition rating is a consistent measure used for all SDOT assets.

Asset Condition Ratings

Condition Rating	Definition
Good	Asset is "as new" or requires only routine maintenance to keep it in service
Fair	Asset requires major rehabilitation to keep it in service
Poor	Asset should be replaced

The asset condition rating may also be noted as "to-be-determined" (TBD) if the condition of the asset is unknown. Assets are generally rated as TBD if the time period between periodic inspections is long, or the asset is managed on a customer-request basis and no requests have been received for the asset that necessitated an on-site inspection of the asset.

Statements made about maintenance approaches will include references to safety repair or work that is done to address a safety concern. The term "safety" is used as a means of prioritizing maintenance work against limited funding and is not an assessment of defects that would result in an asset being judged as unsafe.

Assets that have received BTG funding are identified in the document by the BTG logo and have associated BTG performance measures.

Financial figures used in this document are generally expressed in 2007 dollars. Where the time-value of dollars is important, a 3% inflation factor has been used, and these are noted.

The funding requirements discussed in this section are estimates based on available financial information about each asset. A rigorous reconciliation to budget and financial information was not conducted primarily because current financial systems, with few exceptions, do not track budgets or costs by asset.

Unmet funding needs discussed in this document are presented for informational purposes and are not intended as a recommendation.

SDOT uses a variety of methods to record its asset inventory, the most predominant system being the Inventory system provided by the software vendor Hansen and commonly referred to as the Hansen system. Other inventory repositories include:

- ✓ Division-level database systems, such as Structures (used by the Capital Projects and Roadway Structures Division) and the Pavement Management System (used by the Street Maintenance Division)
- ✓ Microsoft Office products: Excel and Word
- ✓ Manual files and binders
- ✓ GIS layers associated with the Street Network Database (SND)

Asset Classes:

What follows is a class-by-class discussion of the transportation infrastructure assets within each asset class:

- ✓ Bicycle and Pedestrian System
- ✓ Channelization
- ✓ Intelligent Traffic Signs
- ✓ Parking Payment Devices
- ✓ Pavement System
- ✓ Real Property
- ✓ Regulated Assets
- ✓ Roadway Structures
- ✓ Seattle Streetcars
- ✓ Signs
- ✓ Structures other than Roadway
- ✓ Traffic Safety Structures & Devices
- ✓ Traffic Signal System
- ✓ Urban Forest

Asset Class – Bicycle and Pedestrian System:

The Bicycle and Pedestrian System asset class is the set of SDOT assets that serve pedestrians and bicyclists and encourage walking and bicycling as modes of transportation. It includes the following assets:

- ✓ Bicycle Racks
- ✓ Marked Crosswalks
- ✓ Pedestrian Crossing Underpass/Tunnel
- ✓ Pedestrian Viewing Platforms
- ✓ Sidewalks
- ✓ Stairways
- ✓ Trails
- ✓ Transit Loading Platforms

These assets have ownership responsibilities distributed across multiple divisions. For some of these assets, budgeting is performed and tracked through a general maintenance budget that may include assets from other classes. [1]

[1] A one-time appropriate of $500,000 for pedestrian safety and mobility was added to the 2008 budget by Council action. As of the date of this report, the budget dollars were not allocated to specific level 1 assets.

Bicycle Racks:

A bicycle rack allows the public to use bicycles as an alternative transportation mode by establishing a place to keep bicycles safe and secure when arriving at their destinations. Providing sufficient availability and convenience of bicycle racks is essential to increasing the number of people who choose bicycles as a mode of transportation.

Bicycle Rack Converted from a Meter Pole

Bicycle racks are installed and maintained by Traffic Maintenance crews at the direction of the Traffic Operations group in the Traffic Management Division.

Current Inventory, Condition Ratings, and Anticipated Annual Growth:

Traffic Operations engineers estimate that there are approximately 3,000 bicycle racks installed throughout the city of Seattle. All bicycle racks that have been installed since May 2007 have been recorded in an Excel spreadsheet.

A physical inventory of bicycle racks has not been conducted nor have the bicycle racks been inspected to assess their condition.

Approximately 300 new bicycle racks will be installed each year as called for in the Bicycle Master Plan. Many of the newly installed bicycle racks re-use parking meter poles which were left in the sidewalk when the parking meters were replaced by a pay station. A special bracket is attached to the meter pole, thereby converting its use for bicycle attachment.

The estimated replacement value for bicycle racks is $1,140,000-$2,850,000 in 2007 dollars. Where expressed elsewhere in this document for summary purposes, a replacement value of $1,995,000 has been used.

Funding Requirements and Unmet Funding Needs:

Approximately $40,000-$60,000 is spent on maintenance, replacement, and installation of new bicycle racks out of a general maintenance budget for Bike Spot Improvements of $340,000. This funding has been adequate for maintenance based on the current level of customer request and the previous rate of installation of new/replacement bicycle racks.

Traffic Operations has allocated $110,000 within the $340,000 Bike Spot Improvements budget for the installation of 300 new bicycle racks each year. Addressing this funding requirement within this budget may mean reallocation of existing resources.

Marked Crosswalks:

Marked crosswalks are marked portions of the roadway that are designated locations for pedestrians to cross the street. Marked crosswalks establish a visible demarcation that alerts motor vehicle operators to expect pedestrians at a given location in the road.

There are four (4) types of marked crosswalks:

- ✓ Raised – which includes a concrete platform in addition to the striping
- ✓ Painted
- ✓ Torch-down – a type of crosswalk where the material is integrated into the pavement through the application of intense heat provided by a torch

✓ Thermoplastic – a type of crosswalk where a plastic amalgam is applied to the pavement

Marked crosswalks are maintained by Traffic Maintenance crews at the direction of the Traffic Operations group in the Traffic Management Division. The Street Maintenance Division maintains the pavement component of the raised crosswalks at the direction of the Traffic Operations group.

Thermoplastic "Textured" Crosswalk

Current Inventory and Anticipated Annual Growth:

The number of marked crosswalks is estimated at 6,000 and is based on a manual file of marked crosswalks that has been maintained in the Traffic Operations engineering files for many years. This inventory is being transcribed to an Excel spreadsheet to provide better access to the marked crosswalk inventory. A field check of marked crosswalks has not been undertaken to verify the accuracy of the inventory.

The estimated replacement value for marked crosswalks is $3,000,000 in 2007 dollars.

Condition Ratings:

Condition assessments, which focus on the visibility of the markings, have not been conducted on marked crosswalks. In 2008, SDOT will conduct a condition assessment for this asset.

Raised Crosswalk

Funding Requirements and Unmet Funding Needs:

Prior to 2007, Traffic Operations had base funding of approximately $261,000 for remarking of crosswalks to address customer requests. BTG has provided an additional $230,000 for a total of $491,000 which is considered adequate to meet BTG targets and ensure replacement of each marked crosswalk by the end of its useful life.

Funding requirements for maintenance of the concrete platform for raised crosswalks are included in a general maintenance budget and are not separable at the asset level.

Pedestrian Crossing Underpass/Tunnel:

A pedestrian crossing underpass/tunnel provides an underground means for pedestrians and bicycles to cross a busy arterial. There is only one (1) pedestrian crossing underpass/tunnel in the city of Seattle, and it is located under Aurora Avenue at N 79th and Aurora. The tunnel was built in 1929.

The tunnel is under temporary closure for public safety reasons.

The pedestrian crossing underpass/tunnel is maintained by the Roadway Structures group in the Capital Projects and Roadway Structures Division.

Additional information about the tunnel was not pursued for this reporting period.

Pedestrian Viewing Platforms:

A pedestrian viewing platform is a structural deck that provides a safe space for pedestrians to view the city and its surroundings away from vehicular traffic.

There are four (4) pedestrian viewing platforms in Seattle:

- ✓ 9300 block of California Place SW
- ✓ 700 block of Galer St
- ✓ 2500 block of Westlake Ave N
- ✓ NE 130th St and Riviera Place NE

The inventory and location of these platforms is maintained in the Structures database.

The pedestrian viewing platforms are maintained by the Roadway Structures group in the Capital Projects and Roadway Structures Division.

Additional information about the pedestrian viewing platforms was not pursued for this reporting period.

Sidewalk System:

The sidewalk system consists of paved walkways (concrete, asphalt, and pavers) and a few soft-surface pathways, curbs, filler areas, and curb ramps. Curbs, if present, separate the pedestrian area from the street and also provide a drainage function. The filler area is adjacent to the sidewalk, may be improved or unimproved, and is the zone occupied by the street shoulder, planting strip, trees, light poles, parking meters or pay stations, and other street furniture. Curb ramps provide access to the sidewalk system at street crossings and are usually located at intersections, but are also found mid-block. There are some sidewalks in the existing sidewalk system that do not have curb ramps, and without a curb ramp, the sidewalk is not considered fully accessible.

Sidewalk in a Commercial District

SDOT seeks to provide an interconnected network of sidewalks and walkways that allow pedestrians to safely access their destinations, including transit stops, places of employment, recreation facilities, shopping, schools and residences.

Adjacent property owners are responsible for keeping sidewalks safe which includes shoveling snow, raking leaves, and repairing sidewalk damage when it is privately caused, e.g., by uplift from trees on private property, failed side sewer connection, construction, or parking damage.

SDOT is responsible for repairing damaged sidewalk at intersections and also damage caused by trees or other conditions in the ROW. Curb repairs are the responsibility of the city except in those instances where the curb is constructed monolithically with the sidewalk and the damaged sidewalk is a private responsibility.

Responsibility for the sidewalk system is shared between the Traffic Operations group in the Traffic Management Division, which plans, engineers and designs new sidewalks, and the Street Maintenance Division, which is responsible for maintenance of the sidewalk system.

Current Inventory, Condition Ratings, and Anticipated Annual Growth:

SDOT completed a physical inventory of the sidewalk system in October 2007. Of the 46,040 block faces (the area on either side of the street) in the city of Seattle, 33,778 have improved, or paved, sidewalks, approximately 73%. The length of Seattle's sidewalk system is 2,256 miles, or 67.5 million square feet of sidewalk. The sidewalk system also includes:

- ✓ 2,274 miles of cast concrete and stone curbs. Extruded curbs and thickened edges are excluded in this figure.
- ✓ 2,033 miles, or 74.8 million square feet of filler. Of this total, 351 miles, or 8.93 million square feet, is partially or completely paved.
- ✓ 27,712 curb ramps at the end of blocks. 5,725 of these, or 21.4%, meet current Americans with Disability Act (ADA) standards.

Sidewalk Curb Ramp

The physical inventory of the sidewalk system is maintained in the Hansen system. In 2008, the inventory will be expanded to include information on sidewalk condition.

BTG has provided the funding to build 12-20 new block faces of sidewalk per year over the next nine (9) years. Each year additional sidewalks are also built under Street Use permits or as part of SDOT capital projects. While a precise count of the new sidewalks built annually through these projects is not available, a rough estimate is fifty (50) additional block faces.

Approximately 200 new curbs ramps are expected to be installed annually.

The estimated replacement value of the existing sidewalk system is $2.65 billion in 2007 dollars.

Funding Requirements:

Maintenance and Operations:

In 2008, Street Maintenance will have a recurring annual budget of $1.86 million for maintenance of the sidewalk system and an additional $1.2 million for operations, such as sidewalk cleaning. BTG has provided $1.5 million of the maintenance funding of which approximately $400,000 has been allocated each year in 2007 and 2008 to complete the sidewalk inventory and assess its condition. A supplemental appropriation in 2008 will provide an additional $500,000 for sidewalk maintenance and $1 million for new sidewalk development. These are both one-time appropriations.

Approximately $100,000 of this total maintenance funding is for spot repair which will likely be a recurring annual cost. The remaining $1.36 million will be used for permanent repair which will fund repair of less than 0.1% of the total sidewalk system. Funding requirements are affected by street trees, the root systems of which contribute to buckling of the sidewalk and reduce the life expectancy of the sidewalk. Urban Forestry and Street Maintenance work together to ensure the trees that the city plants are compatible with existing conditions.

While condition information will not be available until late 2008, based on the 50-year life cycle of sidewalks, an estimated 2% of the sidewalk system, including curbs, filler, and curb ramps, should be permanently repaired or replaced annually. This will require $53 million each year.

New Construction of Sidewalks:

BTG has also provided approximately $1.07 million for construction of new sidewalks. This amount should be adequate to meet the BTG performance measure of new sidewalk construction.

New sidewalks constructed by SDOT, developers and capital projects will require additional costs for maintenance and operations which is estimated at $5,700 per year. While initially a modest amount, it is a compounded cost for each and every year and must be factored into the cost of routine maintenance and operations.

Newly Constructed Sidewalk on The Ave

Results from the sidewalk inventory project show that 12,262 block equivalents within the city lack sidewalks. Ensuring that a sidewalk exists on each of those blocks will require an investment of more than $996 million in 2007 dollars.[2] At the current funding levels, this would require 930 years to complete. More aggressive funding could complete this construction in fifty (50) years given a total of $19.9 million per year. If private development and CIP projects continue to contribute an additional fifty (50) block equivalents per year, the sidewalk network could be completed in 200 years at current funding levels. Completion of the entire sidewalk network would add an additional $1.1 million (2007 dollars) to the cost of maintenance and operations annually.

Unmet Funding Needs:

The unmet funding needs (2007 dollars) of the sidewalk system are:

Action	Duration (Years)	Annual Cost
Permanent repair of up to an additional 1.9% of the sidewalk system [3]		$51,900,000
Increased costs of maintenance and operations for newly constructed sidewalks (62 block equivalents/yr)		$5,700 (compounded each year)
Completion of sidewalk network in addition to current BTG funded amount	50	$19,900,000
Increased costs of maintenance and operations for additional newly constructed sidewalks (183.25 block equivalents/yr)		$16,860 (compounded each year)
Total		$71,800,000 each year + $22,560 (compounded each year)

Stairways:

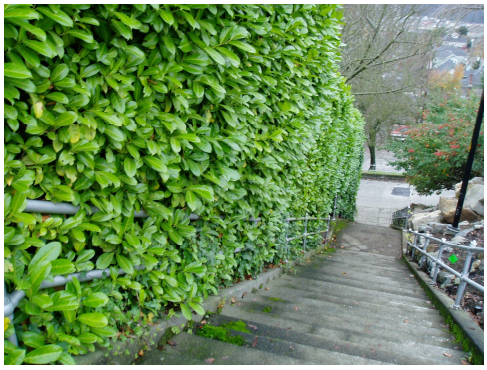
Due to the many hills throughout Seattle, there are numerous locations where it becomes too steep for a street or sidewalk. Stairways were built to maintain the connection between adjacent neighborhoods

[2] Not all locations without sidewalks would necessarily be candidates for new sidewalks. For example, it would not be practical to build sidewalks on the Alaskan Way Viaduct or on freeway ramp segments.
[3] A better estimate will be available as more information about sidewalks, such as condition, is developed.

and to provide an interconnected network of sidewalks. Stairways encourage walking and provide access to public transportation.

Stairways are maintained by the Roadway Structures group in the Capital Projects and Roadway Structures Division.

Current Inventory and Anticipated Annual Growth:



One of the Many Stairways in Seattle

The inventory of stairways has been maintained in the Structures database since 1994. The last physical inventory effort took place in the 1980s.

SDOT owns and maintains 482 stairways in the City of Seattle, or approximately 34,775 linear feet.

Over the last four (4) years, an average of 1-2 new stairways has been built each year. Stairways are often built by developers, and ownership and maintenance responsibility is turned over to SDOT.

The estimated replacement value of stairways is $34,775,000 in 2007 dollars.

Condition Ratings:

SDOT conducts periodic inspections of stairways including emergency response to an incident or customer request. Additional funding is needed to establish a regular, 7-year cycle of inspections.

Stairway Condition Rating
July 2007 (Estimated)

% in Good Condition	% in Fair Condition	% in Poor Condition
48	30	22

This condition rating is based on an assessment conducted ten (10) years ago and has been updated by field inspection of specific stairways. Condition information is recorded in the Structures system.

Funding Requirements and Unmet Funding Needs:

In 2007, Roadway Structures will have a budget for stairway maintenance of approximately $1 million. Within this budget, approximately $593,000 is allocated for maintenance crews to repair stairways. This maintenance budget is fairly static and has not been adjusted for annual growth in new stairways. [4]

The remaining $428,000 in the budget is from BTG and is allocated to the rehabilitation or replacement of stairways identified in poor condition and prioritized for rehabilitation. (See Appendix C for a list of the prioritized stairways.) Assuming an average stairway of 72.15 linear feet and an estimated cost of $1,000 per linear foot to rehabilitate the stairway, this funding will allow for the rehabilitation of six (6) stairways of average length each year.

Because the rate of deterioration of aging stairways exceeds the rate of rehabilitation (six stairways of average length per year), the backlog of stairways rated in poor condition will persist. Roadway

[4] A one-time appropriation of $100,000 was added by Council action to the 2008 budget for stairway vegetation management which is the responsibility of the Street Maintenance Division.

Structures engineers estimate that 5% of the stairways rated as fair condition will deteriorate to poor condition each year, and that 3% will deteriorate from good to fair condition in that same time period.

If a program were established to raise to good condition all of the stairways rated in fair or poor condition, a one-time cost of $19.0 million (2007 dollars) would be required.

Trails:

Trails are generally off-road paths, the majority of which are paved. All of the city trails are multi-use. Multi-use trails encourage walking and biking, as well as other forms of recreational transportation, such as rollerblading. These trails provide important connections to the sidewalk network.

Portion of the Urban Trails

Trails are maintained primarily by the Street Maintenance Division at the direction of the Traffic Operations group in the Traffic Management Division. Traffic Maintenance crews also perform minor trail maintenance.

Current Inventory and Anticipated Annual Growth:

There are 39.4 lane miles of 12-foot-wide trails in the city of Seattle.

The majority of the trail inventory (32.31 land miles) is recorded in the Hansen system and consists of 136 separate trail segments.

BTG has provided the opportunity to construct new trails in 2007 and to construct additional trail segments as defined in the Bicycle Master Plan completed in 2007.

The estimated replacement value of trails is $78,800,000 in 2007 dollars.

Condition Ratings:

BTG has provided the opportunity to assess condition rating of trails. This is planned as part of the condition assessment of the sidewalk system.

Funding Requirements and Unmet Funding Needs:

Maintenance and Operations:

Prior to BTG, trail maintenance was not funded separately, and spot repair was completed as part of the overall budget to maintain pavement. BTG has provided $489,000 annually to perform routine maintenance and major rehabilitation of the trail network.

Since funding has not previously been available specific to this asset, routine maintenance costs could not be determined. Traffic Operations will be better able to derive costs of maintenance in 2008.

New Trail Construction:

Traffic Operations has allocated BTG funds for construction of new trails as illustrated in the following table.

Urban Trail with Bollard

New Trail Construction
2007-2016

Year	New Trails Constructed (Lane Miles)	Funding Allocated	Funding Required
2007		$1,200,000	
2008		$1,470,000	
2009		$1,000,000	
	Total 2007-2009: 2.5	$3,670,000	$5,000,000
2010-2016	16.3	$7,000,000	$32,600,000

For the period ending in 2009, new trail construction will require funding of an additional $1.33 million dollars and budget to leverage grant funding or partnerships with other government agencies to provide the full funding needed for construction of new trails. Funding for new trail construction may also be allocated on a case-by-case basis through the city's CIP process.

Additional funding needs for the costs of maintenance and operation of these new trail segments will be developed once Traffic Operations has more experience in performing trail maintenance.

Transit Loading Platforms:

Transit loading platforms are paved areas between the sidewalk and the curb that are designated for transit passenger loading. There are two (2) categories of transit loading platforms:

- ✓ Bus Islands
- ✓ Streetcar Platforms

Bus Islands:

A bus island is a paved area between the sidewalk and the curb that is designated for bus passenger loading and was built to accommodate the "kneeling" buses. At locations without sidewalks, the bus island is a free-standing paved area usually with asphalt entrance ramps. A bus island encourages the use of public transit and increases safety by providing a designated area for bus passenger loading and unloading.

Bus islands are relatively new assets for SDOT, resulting from agreement between SDOT and King County Metro Transit, the primary transit service provider in the city.

Bus islands are the maintenance responsibility of the Street Maintenance Division at the direction of the Traffic Operations group in the Traffic Management Division.

Current Inventory, Condition Ratings, and Anticipated Annual Growth:

Since bus islands are new assets, very little maintenance has been required, and, hence, limited information has been recorded and tracked. An inventory of the bus islands has not been recorded, nor have bus islands been inspected to assess condition. However, as new assets, the condition of the bus islands is considered as good.

The estimated replacement value of bus islands has not been determined.

Funding Requirements and Unmet Funding Needs:

Funding requirements have not yet been established for bus islands.

Streetcar Platform:

A streetcar platform is a designated raised area of the sidewalk that houses a streetcar shelter. These are new assets that are associated with the Seattle Streetcar asset. SDOT has maintenance responsibility for streetcar platforms.

Additional information was not pursued about this asset for this reporting period.

Asset Class - Channelization:

The Channelization asset class consists of those assets that define usage of the city streets and direct the flow of traffic. It includes:

- ✓ Pavement Markings
- ✓ Roundabouts

Pavement Markings:

Pavement markings are markings on the roadway that communicate essential information to road users about the use of the roadway and how to negotiate city streets safely and most efficiently.

Bike Sharrow

There are several categories of pavement markings:

- ✓ Pavement delineators (lane lines)
- ✓ Legends, such as bike sharrows
- ✓ Hatchings
- ✓ Stop lines
- ✓ Parking space
- ✓ Curb markings

Pavement delineators are maintained more actively for arterial streets than for non-arterial streets due to higher traffic volumes on the arterials.

Pavement markings are maintained by Traffic Maintenance crews at the direction of the Traffic Operations group in the Traffic Management Division.

Current Inventory and Anticipated Annual Growth:

A manual file of pavement markings has been maintained in the Traffic Operations engineering files for many years. A field check of pavement markings has not been undertaken to verify the accuracy of the inventory that exists in the manual file. Pavement delineators on arterials in the city of Seattle are estimated at approximately 1,300 lane-line miles.

BTG has provided the opportunity to preserve the engineering drawings of pavement markings at approximately 1,600 of the most complex intersections in the city of Seattle out of a total of approximately 12,000 intersections. The inventory of paper sketches and AutoCAD drawings will be digitized and added as a GIS channelization layer to the SND so that the drawings will not only be preserved, but will be made more widely accessible to SDOT staff. This effort has been funded for two (2) years.

The pavement marking inventory will change over time as adjustments are made to lane usage.

The replacement value of pavement markings is in excess of $4 million in 2007 dollars.

Condition Ratings:

The condition of pavement markings is judged by the visibility of the marking. BTG has provided the opportunity to re-stripe all of the arterial pavement delineators every year, so the condition of pavement delineators on the arterials is considered in good condition.

Bike sharrows were first introduced in the summer of 2007, and, therefore, are considered in good condition.

Pavement markings are not assessed on a regular basis, so the condition of many of these markings has not been determined.

Funding Requirements and Unmet Funding Needs:

Prior to 2007, Traffic Operations had base funding of approximately $444,000 for re-striping of a sub-set of the arterials and remarking of pavement to address customer requests. The re-striping includes pavement delineators, stop bars, and channelization legends. BTG has provided an additional $231,000.

Funding is considered adequate to meet the BTG targets for arterials and to address the current level of customer request.

Transit Lane Legend

Roundabouts:

A roundabout is a type of road junction at which traffic enters a stream around a central island after first yielding to the circulating traffic. Although SDOT does not currently own established roundabouts, a roundabout is in the development stages and is expected to be operational within a few years.

Asset Class – Intelligent Traffic Signs:

The Intelligent Traffic Signs asset class consists of message boards with intelligent electronic components that can display variable rather than static messages. It includes:

- ✓ Dynamic Message Signs
- ✓ Radar Speed Signs

Budgets for the assets in this asset class are included in a combined general maintenance budget of $7,458,000 which also includes the assets in the Traffic Signal System asset class.

Intelligent traffic signs are maintained by Traffic Maintenance crews at the direction of the Traffic Signal Operations group in the Traffic Management Division.

Dynamic Message Signs:

A dynamic message sign is a variable message board that provides motorists with valuable information about traffic conditions or activities that may impact their trip. It can be pre-programmed, as well as accessed remotely to update messages with current up-to-the-minute information.

Dynamic Message Sign at the Low-Level Spokane Street Bridge

Dynamic message signs were installed starting in 2000.

Current Inventory and Anticipated Annual Growth:

There are five (5) dynamic message signs in the city of Seattle. Three (3) of these are used primarily for special events. The other two (2) are used to advise traffic that the low-level Spokane Street bridge is open for maritime traffic.

Approximately one (1) new dynamic message sign is installed each year.

The estimated replacement value of dynamic message signs is $500,000 in 2007 dollars.

Condition Ratings:

The condition rating of all dynamic message signs is to-be-determined (TBD).

Funding Requirements and Unmet Funding Needs:

A lower maintenance priority, coupled with the limited maintenance that has been performed, has not provided the information that would allow an accurate assessment of funding requirements for these devices.

Radar Speed Signs:

A radar speed sign is a device that provides motorists with feedback as to the speed they are traveling as they approach the sign. This feedback helps motorists comply with speed limits and lowers the frequency of speeding vehicles and the attendant safety risks associated with speeding vehicles. The devices can be powered either by electricity or by solar power.

Current Inventory, Condition Ratings, and Anticipated Annual Growth:

There are three (3) radar speed signs in the city of Seattle. These devices were installed starting in 2006.

Since these are new devices, a condition assessment has not been performed, and these assets are considered in good condition. Regular condition assessment is planned during preventive maintenance checks.

Anticipated annual growth has not been determined.

The estimated replacement value of radar speed signs is $21,000 in 2007 dollars.

Radar Speed Sign

Funding Requirements and Unmet Funding Needs:

Funding requirements for the maintenance of these devices have not yet been established. After a maintenance program has been established, funding requirements will be available.

Asset Class – Parking Payment Devices:

The Parking Payment Devices asset class includes:

- ✓ Pay Stations
- ✓ Parking Meters

The parking payment devices collect fees for on-street parking and other parking areas on public property or ROW. The city of Seattle uses on-street payment devices to:

- ✓ Promote parking turnover
- ✓ Act as a means of distributing a limited amount of on-street spaces primarily in commercial areas where supply exceeds demand
- ✓ Provide short-term parking spaces for shopping or personal errands
- ✓ Improve traffic circulation and economic viability of commercial areas by maximizing the number of patron visits by car

In 2007, payment parking devices will contribute $17 million in annual revenues to the City at an operating cost of approximately $4 million.

Parking payment devices are managed by the Parking Operations group in the Traffic Management Division.

Pay Stations:

Pay stations are electronic payment devices installed on sidewalks adjacent to on-street paid parking. A pay station controls more than one parking space. Pay stations accept payment by both credit card (Visa and MasterCard) and coin. Features of this newer parking payment device include a credit card reader, a receipt printer, and a solar panel.

The pay stations are connected to an electronic network owned by the vendor Parkeon and is connected to the Meter/Pay Station Maintenance Shop which monitors performance of the pay stations on a real-time basis. Help is provided to customers via telephone during normal business hours (8AM – 6PM, Monday through Saturday), and, in the event a credit card gets lodged in one of the pay stations, a technician in the field will respond immediately during normal business hours.

Pay Station

SDOT began installing pay stations in 2004 to replace single-space parking meters.

Current Inventory and Anticipated Annual Growth:

The inventory of pay stations is maintained in the Hansen system.

There are 1,495 pay stations as of July 1, 2007, and an additional 350 are planned by year end 2007.

SDOT has a work plan to examine on-street parking conditions in various neighborhoods and business districts over the next seven (7) years, which may or may not result in paid parking in each area. SDOT currently estimates installation of approximately 802 new pay stations during that time for an estimated full deployment of 2,647 pay stations by 2013.

As of the end of 2007, the estimated replacement value of the pay station inventory is $20,387,250 in 2007 dollars.

Condition Ratings:

The pay station comes with a 5-year warranty period. Since these are all relatively new assets and are within the warranty period, they are all considered to be in good condition.

Funding Requirements:

Maintenance and Operations:

In 2007, the actual costs for maintenance are projected to be $640,182 and actual costs for operations are $1,840,384 for all 1,845 devices based on financial performance through the first half of 2007.

For the remaining four (4) years, with the inclusion of the anticipated growth of new pay stations installed, funding requirements to meet projected actual costs are displayed in the following table.

Pay Station Funding Requirements
Maintenance & Operation
2008-2011

Year	Number of New Pay Stations	Cost of Maintenance	Cost of Operations	Total Cost of Maintenance & Operations
2008	190	$769,469	$2,212,058	$2,981,527
2009	140	$941,098	$2,439,858	$3,380,956
2010	105	$1,163,677	$2,607,710	$3,771,387
2011	141	$1,270,655	$2,733,600	$4,004,255
4-year Total	576	$4,144,899	$9,993,226	$14,138,125

The cost of maintenance has been adjusted starting in 2009 to include the cost of replacement parts for the pay stations that have passed the 5-year warranty period. These costs have been adjusted for inflation.

Acquisition of New Pay Stations:

The cost of purchase and installation of new pay stations is not included in the cost of maintenance and operations shown in the table above. In 2007, the cost of purchase and installation is approximately $11,050 per pay station. Projecting this unit cost forward into 2013, the estimated cost of the planned new growth results in a funding requirement as shown in the following table.

Pay Station Funding Requirements
New Pay Station Acquisition and Installation
2008-2013

Year	Number of New Pay Stations	Unit Cost	Acquisition Cost
2008	190	$11,381	$2,162,390
2009	140	$11,723	$1,641,220
2010	105	$12,075	$1,267,875
2011	141	$12,437	$1,753,617
2012	68	$13,194	$ 897,192
2013	156	$13,590	$2,120,040
Total	800		$9,842,334

The unit costs have been adjusted for inflation.

By practice, the purchase costs for new pay stations are included in a separate capital budget, and the installation costs are included in the maintenance budget.

Replacement of Pay Stations:

Replacement of the pay stations is expected to take place starting in 2014 and extend over a ten (10) year period to replace all 2,647 of the pay stations.

Unmet Funding Needs:

Parking Operations does not anticipate any unmet funding needs assuming that the Neighborhood Parking Work Plan is included in successive-year budgets to continue the acquisition of new pay stations.

The maintenance budget up to and including 2007 has not included the cost of replacement parts, and these costs will need to be added to the budget for maintenance starting in 2009.

Replacement of pay stations starting in 2014 has not yet been funded. Given the unknowns about the cost of newer technology, an estimate of replacement funding for planning purposes is approximately $40.5 million over the ten (10) year replacement period.

Replacement Funding Plan for Pay Stations
Starting 2014

Year	Number of Replacement Pay Stations	Unit Cost	Acquisition Cost
2014	386	$13,999	$5,403,643
2015	686	$14,419	$9,891,467
2016	264	$14,852	$3,920,828
2017	511	$15,297	$7,816,853
2018	190	$15,756	$2,993,656
2019	140	$16,229	$2,272,027
2020	105	$16,716	$1,755,141
2021	141	$17,217	$2,427,611
2022	68	$17,734	$1,205,886
2023	156	$18,266	$2,849,437
Total	2,647		$40,536,549

These numbers have been adjusted for inflation.

Parking Meters:

A parking meter is older technology that consists of a meter head housing containing an electronic parking meter mounted atop a pole. Each meter controls a single parking space adjacent to it. Parking meters accept only coinage. These electronic parking meters replaced the older mechanical meters in 1999/2000.

Current Inventory and Anticipated Annual Growth:

The inventory of parking meters is maintained in the Hansen system.

There are approximately 1,000 parking meters in service. Most of these are located Central Business District, the Denny Triangle, in scattered downtown locations in commercial loading zones, and in some more outlying districts, such as First Hill.

SDOT intends to replace all parking meters with new pay stations over time.

The replacement value of the parking meter inventory in 2007 dollars is $500,000.

Parking Meters

Condition Ratings:

All of the parking meters are considered to be in fair condition. This condition rating is based on the useful life of the electronic component of the device which, at seven (7) years,

is considered as being in fair condition. All of the parking meters are at least 7.5 years old.

Funding Requirements:

Funding requirements for parking meters include the costs of maintenance and operation until all units are replaced. In 2007, actual costs for maintenance are projected to be $152,216 and actual costs for operations are $73,637 for all devices.

For the remaining years until all parking meters are replaced, funding requirements to meet projected actual costs are:

Parking Meter Funding Requirements
2008-2011

Cost Element	Yearly Cost (2007 Dollars)
Maintenance	$116,445
Operations	$56,332

The decrease in annual cost for maintenance and operations reflects the decreasing number of these assets.

By practice, the costs of maintenance and operations for parking meters have been included in the same budget as maintenance and operations for the pay stations.

Unmet Funding Needs:

Parking Operations does not anticipate any unmet funding needs.

Asset Class – Pavement System:

The Pavement System asset class consists of the street surfaces of Seattle's street network and includes:

- ✓ Pavement

The most recent cost estimates for paving were derived in 2003 using existing pavement condition data, construction and maintenance costs effective in 2003, and project requirements effective in 2003. Since that time, paving costs have increased significantly due to market forces in the construction industry, oil price hikes, and new mandates:

- ✓ Guidelines in the Americans with Disability Act (ADA), which took effect in 2003, require that paving projects replace or retrofit curb ramps to meet new accessibility standards.
- ✓ Beginning in 2006, Seattle Public Utilities (SPU) began requiring drainage improvements on all SDOT paving contracts that involved full-depth pavement repairs. Paving projects must now install storm water detention and treatment facilities in accordance with the City's National Pollutant Discharge Elimination System (NPDES) permit to meet SPU requirements.
- ✓ A third requirement is the "Complete Streets" ordinance and resolution that requires that the ROW be improved for all modes of transportation under certain conditions whenever major maintenance is undertaken.

A re-estimate of pavement construction and maintenance costs is planned in 2008 when more up-to-date projections can be made.

The Street Maintenance Division has maintenance responsibility for the pavement system.

Pavement:

Pavement is divided into four (4) major categories:

- ✓ Arterial
- ✓ Non-Arterial
- ✓ Alley ways
- ✓ Excess ROW in use for access and parking

Pavement must have adequate structure to support the traffic it carries at the roadway's design speed and must also withstand environmental degradation. Pavement also serves a secondary function as drainage structures, channeling runoff to collection facilities.

The total arterial and non-arterial pavement network in Seattle is 3,943 12-foot-wide lane miles. This figure is based on a pavement management assessment conducted in 2005-2006.

Since the majority of the pavement infrastructure is represented by the arterials and non-arterials, these two pavement categories were emphasized in this report.

Arterial Pavement:

Arterials are Seattle's busiest streets. They are classified according to the traffic they carry:

- ✓ Principal arterial – the most important, busiest through-streets, such as Rainier Ave S or 15th Ave NW
- ✓ Minor arterial – streets that link neighborhoods together, such as California Ave SW or N 80th ST
- ✓ Collector arterial – streets that tie the least traveled streets, the non-arterials, into the arterial street system

Current Inventory and Anticipated Annual Growth:

Arterials account for 39% of the pavement network of Seattle, or 1,531 12-foot-wide lane miles. The break-down of arterials according to the functional classification is:

Functional Classification	Pavement Area (12-ft Lane Miles)	Fraction of Network
Principal Arterial	617	40%
Minor Arterial	567	37%
Collector Arterial	347	23%

The arterial pavement inventory is maintained in the Pavement Management database system where condition and maintenance information is also recorded. New pavement is entered into the database annually, and condition ratings are updated every two (2) years. A condition and inventory update is currently underway and is expected to complete in fourth quarter 2007.

The city adds very little to the street network annually. Additions that occur are usually in connection with redevelopment or annexation.

The arterial pavement network replacement cost is estimated at $2.6 billion in 2007 dollars, not including the cost of the right-of-way, and the cost of drainage and other improvements that might be required or desired if streets were reconstructed.

Condition Ratings:

A pavement condition survey of Seattle's arterial pavement was conducted in the summer of 2005. This 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.

Pavement condition is assessed using an industry-standard rating methodology to derive a Pavement Condition Index (PCI).

Arterial Pavement Condition Ratings
2005

Condition Rating	PCI Index	Lane Miles	Percent of Arterials
Good	56-100	1,071	70
Fair	41-55	239	15.7
Poor	0-40	220	14.3

Funding Requirements:

In 2008, Street Maintenance will have a recurring annual budget of $23.6 million for major maintenance (re-surfacing) of arterial pavement and an additional $8.1 million for operations, such as street sweeping and pothole filling. BTG has provided $20.1 million of the maintenance funding.

Prior to BTG, the maintenance budget for arterial pavement provided the ability to complete spot safety repair and a small amount of arterial re-surfacing. The result of this lower level of funding has been a deferred maintenance backlog of $310 million.

The additional BTG funds have provided:

- ✓ $14 million to maintain the current condition of arterial pavement and stabilize the deferred maintenance backlog at the $310 million level. This requires resurfacing approximately 30-60 lane-miles/year and reconstructing 1-5 lane-miles/year.
- ✓ $9.4 million to begin elimination of the deferred maintenance backlog.

Any funding amount less than $14 million/year will result in further deterioration of the arterial pavement network and a corresponding increase in the deferred maintenance backlog.

Based on the 2003 data, Street Maintenance estimates that reduction of the deferred maintenance backlog would require a 20-year program of $24 million per year which translates into resurfacing of an additional 30-60 lane-miles/year and reconstruction of an additional 7-11 lane-miles/year.

Arterial Pavement
Mercer Street

Unmet Funding Needs:

The funding requirements are based on 2003 figures. The intervening impacts of market forces, oil price hikes, and new mandates need to be accounted for in assessing out-year funding requirements. In 2008, SDOT will re-estimate construction costs and anticipates disproportionate increases in the price of construction materials, based on recent market experience. This will likely result in higher cost estimates and additional funding needs.

Non-Arterial Pavement:

Non-arterials are Seattle's least trafficked streets. Non-arterial streets serve a variety of users. The majority of non-arterials are neighborhood residential streets, but some also support industry in areas such as south of downtown (SODO), South Park, and the Ballard/Interbay Manufacturing Industrial (BINMIC) areas. Because of their limited use, non-arterials are typically of lighter construction than arterials, however, they still must have adequate structure to support the heavy vehicles they carry and resist environmental degradation, as well as drain properly.

Current Inventory, Condition Ratings, and Anticipated Annual Growth:

Non-Arterial Pavement

Non-arterials account for 61% of the pavement network of Seattle, or 2412 12-foot-wide lane miles. Unlike arterials, non-arterials are not classified by functional use.

The non-arterial pavement inventory is maintained in the Pavement Management database system. Unlike arterial pavement, limited funds have been available to provide information to effectively manage these assets. Inventory data has been updated on an incident basis, and basic information on surface type and construction history is available, but current condition information is not.

Some general information is known about non-arterial pavement.

- ✓ 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 which are lightly traveled, have not required much maintenance. However, the age of the pavement suggests many are past their design life.
- ✓ About 25% of Seattle's non-arterial streets were converted in the 1960s and 1970s from gravel roads to a low-cost surface treatment called BST or chip seal. Chip seal streets need to be resealed on a regular basis or else they begin to deteriorate rapidly because the chip seal does not provide significant pavement structure to support traffic. The surface coat simply seals the surface.

Non-Arterial Pavement in a Seattle Neighborhood

If condition assessments were conducted on non-arterial pavement, the same method used on arterial pavement would likely be used. A statistical or sampling approach could be used to control costs and still maintain a reasonable level of accuracy.

The non-arterial pavement network replacement cost is estimated at $3-3.5 billion in 2007 dollars, not including the cost of the right-of-way, and the cost of drainage and other improvements that might be required or desired if streets were reconstructed. Where expressed elsewhere in this document for summary purposes, a replacement value of $3,250,000,000 has been used.

Funding Requirements:

In 2008, Street Maintenance will have a recurring annual budget of $2 million for maintenance of non-arterial pavement and an additional $3.1 million for operations, such as pothole filling. No BTG funding has been provided for non-arterial pavement. This maintenance budget primarily provides spot safety repair and a small amount of asphalt and concrete rehabilitation, including the Chip Seal Program.

Estimation of maintenance needs for non-arterials is challenging because condition information is not available. Without up-to-date condition information, the maintenance need cannot be assessed on the basis of condition as it was for arterial pavement. As is evident, SDOT is not replacing non-arterial pavement in contradiction of industry standards.

In the 2004 Pavement Condition Report, a maintenance program was proposed as a compromise to an aggressive reconstruction program, as has been outlined above. This program outlined funding requirements for each surface type.

Non-Arterial Pavement

Non-Arterial Maintenance Cycles

Surface Type	Proposed Maintenance Cycle (Years)	Annual Cost (Millions)
PCC	160	$9.6
AC/PCC	25	$0.4
AC	25	$4.4
BST (Chip Seal)	10	$1.0
Other	10	$0.1
Total		$15.5

The maintenance approach outlined above does not take into account the asphalt surfaced pavements that have already failed or will fail because of deferred or inadequate maintenance. Those streets will require reconstruction at an additional cost beyond the annual cost estimate provided above.

These costs were estimated based on 2003 dollars.

Unmet Funding Needs:

An annual rehabilitation program funded at $15.5 million (2003 dollars) is needed to maintain non-arterial pavement.

Asset Class – Real Property:

The Real Property asset class encompasses real estate owned by SDOT and includes:

- ✓ Parcels
- ✓ Buildings
- ✓ Excess/Unopened ROW in public use

As these assets do not directly affect the delivery of transportation services to the public, only a limited amount of information was pursued for this reporting period.

All real property assets are managed in cooperation with the Fleets and Facilities Department (FFD) by the Property & Environmental Services group in the Capital Projects and Roadway Structures Division.

Buildings:

Buildings are usually acquired indirectly through the ROW acquisition process. When acquiring parcels for street and multi-purpose ROW usage, a parcel may already have a building on it, and the building is purchased as part of the transaction.

SDOT owns eight (8) buildings.

SDOT-owned buildings are maintained by FFD, and the inventory is recorded in the Real Property Asset Management System (RPAMIS) operated by FFD.

Parcels:

A parcel is physical land that is owned by SDOT. Some parcels are remnants of former railroad ROW purchased for the Burke Gilman Trail. Other parcels are large pieces or remnants that were purchased for various reasons, such as to widen streets and sidewalks, and for constructing bicycle and pedestrian trails.

Some of these parcels are integral to the operation of SDOT:

- ✓ Materials Storage and Transfer Yard at Sixth Ave N and Harrison St
- ✓ West Seattle Maintenance Facility at 8th Ave SW and SW Barton St

The number of parcels owned by SDOT by category is:

Category of Parcel	Number
Former Railroad ROW	18
Other Real Estate (Remnants)	88
Excess/Unopened ROW in Public Use	TBD

SDOT-owned parcels are maintained by FFD, and the inventory is recorded in RPAMIS.

Asset Class – Regulated Assets:

The Regulated Assets asset class encompasses those assets/improvements that exist in the street ROW that are not owned by SDOT, but over which SDOT has a jurisdictional interest. SDOT has an ownership interest in the ROW itself, but in many cases does not make the improvements that exist in the ROW, for example, trees or other landscaping. The assets that comprise this asset class were not studied to any degree in preparation of this report, and a partial list of the assets within this asset class includes:

- ✓ Areaways
- ✓ Landscaped areas, not owned by SDOT
- ✓ Shoreline Street Ends
- ✓ Trees, not owned by SDOT
- ✓ Unimproved Filler
- ✓ Unopened ROW

For this reporting period, the only asset for which asset information was solicited is the shoreline street end.

Shoreline Street Ends:

A shoreline street end is a platted street end of the ROW that runs into the water and provides access or views to Lake Washington, Lake Union, the Duwamish River, or Elliott Bay.

A Shoreline Street End Program has been established, and, by Director's Rule 00-1, the Program is guided by an overall policy that the highest and best use of the street ends is public access. The Program is currently funded by shoreline-street-end permit fees of approximately $100,000 annually, and all fees cover the cost of the Program.

Shoreline Street End

A consultant is working on a master plan for the Shoreline Street Ends Program estimated to be completed 1st Quarter 2008.

Shoreline Street Ends are administered by the Street Use group in the Street Use and Urban Forestry Division.

In the fall of 2006, a site inventory was conducted of all shoreline street ends captured in Ordinance 119673, the ordinance that established the Program, including documentation of existing encroachments and photographs of each site. The inventory is stored as Word files. The consultant creating the Shoreline Street End Master Plan will expand the details of the inventory and convert the data into GIS files.

There are 149 shoreline street ends enumerated in Ordinance 119763, Exhibit A. There are several shoreline street ends that were not included in the Ordinance that need to be added by an amended ordinance. Three (3) such street ends were identified in 2006, and Street Use administrators believe that an effort should be made to identify additional street ends to incorporate into the program.

Additional information about shoreline street ends was not pursued for this report.

Asset Class – Roadway Structures:

The Roadway Structures asset class consists of the transportation structures that are associated with the street network and includes:

- ✓ Areaway Street Walls
- ✓ Bridges
- ✓ Bridge Hydrant Vaults
- ✓ Retaining Walls

All roadway structures are maintained by the Roadway Structures group in the Capital projects and Roadway Structures Division.

Areaway Street Walls:

Areaways are spaces that exist under sidewalks and are situated between the street and the adjacent building. Although there are a variety of reasons why areaways exist around Seattle, the most common case is the reconstruction and raising of street grades in the Pioneer Square area following the Great Seattle Fire of 1889. Street walls were built, and the street area was filled. These are older structures and were built from the 1890s through the 1940s. SDOT owns and maintains most of the areaway street walls in the city of Seattle, as well as a few of the sidewalks that are adjacent to the areaway street wall and are supported by the street wall. In most cases, the areaway itself is considered private, as it is used by the adjacent property owner under a street use permit.

The areaway street wall provides a necessary and important support to the street fill and utilities.

Current Inventory and Anticipated Annual Growth:

The inventory of areaway street walls has been maintained in the Structures database since 1994. The last physical inventory effort took place in the 1980s.

There are 205 known areaway street walls in Seattle, or approximately 144,620 square feet. Records of the original construction of street walls are often missing, and the location of a previously unknown street wall will occasionally be discovered in the process of new development or renovation of buildings in the downtown area. No new street walls are planned.

The estimated replacement value of areaway street walls is $144,620,000 in 2007 dollars.

Areaway and Areaway Street Wall

Condition Ratings:

SDOT conducts inspections of both areaways and areaway street walls (a regulated asset), and, although a regular inspection cycle has not been established, Roadway Structures believes a 3-5 year inspection cycle of areaway street walls is desirable to maintain these street walls in good condition. If critical defects are noted on the areaways during an inspection, the inspectors contact Street Use who then contacts the adjacent property owner and requests that repairs be made.

Sidewalks are an integral structural component of the areaway, and, although maintenance responsibility is decided on a case-by-case basis between SDOT and the adjacent property owner, the condition rating of the areaway street wall includes consideration of the condition of the sidewalk as well as the areaway street wall.

Areaway Street Wall Condition Rating
July 2007 (Estimated)

% in Good Condition	% in Fair Condition	% in Poor Condition	% Condition TBD
3	57	19	21

The areaway street walls that are rated in good condition are the six (6) that have been restored. All remaining areaway street walls require rehabilitation or replacement.

The areaway street wall inventory and condition rating are updated after any periodic inspection is completed.

Funding Requirements:

Roadway Structures has a modest budget of $200,000 for routine maintenance of areaway street walls. If allocated equally across the inventory of areaway street walls, this funding averages approximately $975 per year per areaway street wall.

In recent years, working with adjacent property owners, a program was undertaken to address some of the areaways in the most severe condition. Under this program, 23 areaways were filled, some by the adjacent property owners. Filling is the desired solution because it can be done at a low (relative)

cost, and it will provide structural support to the street wall and to the sidewalk. Most areaways and areaway street walls are in the Pioneer Square area, a designated historic district, so filling is not always an option. SDOT has restored six (6) historically significant areaways. Areaway filling or restoration both have the result of protecting the street wall.

Funding for areaway work, either fill or restoration, is allocated on a case-by-case basis through the city's CIP process.

Unmet Funding Needs:

The street walls are of varying construction ranging from brick to reinforced concrete. None of the street walls meet current design standards. Less than 5% of the areaway street walls have been rebuilt/replaced. Current funding does not allow rehabilitation/replacement within the 75-year useful life.

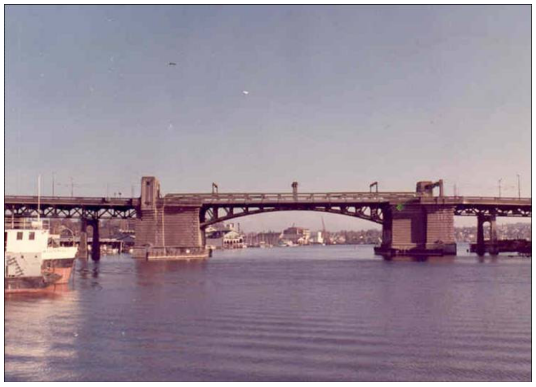
Roadway Structures estimates that there are 35 areaways/areaway street walls in poor condition that could either be filled or restored. Approximately $5.1 million (2007 dollars) is required to fill seventeen (17) of the areaways, and an additional $21.6 million (2007 dollars) is necessary to restore/rehabilitate the other eighteen (18) areaways.

Bridges:

Bridges are elevated structures that facilitate efficient and direct travel routes between points in Seattle's street network that are disrupted by physical features or topography. Absent a bridge at such locations, travel routes would be inefficient and circuitous, if possible at all.

There are multiple categories of bridges:

- ✓ Movable Vehicular Bridges
- ✓ Non-movable Vehicular Bridges
- ✓ Pedestrian Bridges



University Bridge

Non-movable vehicular bridges are further classified for maintenance purposes based on the structural materials used in the bridge:

- ✓ Steel
- ✓ Reinforced Concrete
- ✓ Timber
- ✓ Composite

SDOT has sole ownership and maintenance responsibility for 92 bridges and shares partial ownership and maintenance responsibilities for others. For bridges that are partially owned by SDOT, SDOT is responsible for maintenance which is funded through the General Fund; full replacement is funded by the partner. SDOT also performs reimbursable maintenance work on bridges belonging to other city and state departments, and performs inspections on SDOT bridges as well as privately owned bridges within the ROW. Occasionally, SDOT inspects and maintains other city department bridges on an as needed basis.

Current Inventory and Anticipated Annual Growth:

The inventory of bridges has been maintained in the Structures database since 1980. The inventory of bridges includes all bridges where SDOT performs maintenance work: SDOT sole/partial ownership, as well as privately owned bridges in the ROW and bridges where SDOT crews perform reimbursable work.

The number of bridges in sole and partial SDOT ownership is:

Category of Bridge	Number in Sole Ownership	Number in Partial Ownership
Movable Vehicular Bridge	4	
Non-movable Vehicular Bridge	76	33
Pedestrian Bridge	12	

The total square footage of bridge deck is 2,845,600.

The bridge inventory is updated after the routine annual bridge inspection program is completed.

SDOT builds an additional 6,408 square feet of new bridge deck annually. This figure represents an average taken over the last fifteen (15) years.

The estimated replacement value of SDOT-owned bridges is $1,422,800,000 in 2007 dollars.

Condition Ratings:

SDOT conducts an annual bridge inspection program. Components of each bridge are inspected on a regular cycle:

- ✓ Routine Inspection – every 1-2 years
- ✓ Underwater Inspection – every 5 years
- ✓ Fracture Critical – every 2 years
- ✓ Special Features – every 2 years

An inspection schedule is established for each bridge, and a bridge may undergo more than one inspection in any given year if condition dictates. Inspections are conducted according to federal regulations. Condition information collected during the inspection is recorded in the Structures database.

The condition rating of bridges for which SDOT has sole/partial responsibility is:

Bridge Condition Rating
July 2007

% in Good Condition	% in Fair Condition	% in Poor Condition
51	10	39

A bridge rated in poor condition does not imply that the bridge is unsafe for vehicular traffic. A bridge condition rating considers many factors, such as traffic volumes. Bridges rated in poor condition qualify for replacement funding, and replacement funding may be pursued, for example, when current traffic demand has grown to a level that exceeds the traffic volume for which the bridge was designed when it was originally constructed. If the condition of a bridge deteriorates below a level considered safe for the load carrying capacity, the allowable vehicle weight is restricted on that bridge. SDOT has eight (8) bridges where weight restrictions have been posted and two (2) bridges that have been closed to vehicular traffic.

Funding Requirements:

Routine Maintenance:

In 2007, Roadway Structures has base funding of $813,246 for bridge maintenance and $2,198,382 for bridge operations. BTG has provided an additional $416,000 for bridge maintenance.

As of the date of this report, bridge maintenance has a backlog of 1,348 work slips, and 457 new work slips are generated each year. The average cost of a work slip for a bridge is $2,404. Under the combined routine maintenance budget of $1,229,246, approximately 511 work slips can be completed each year which will reduce the backlog by 54 work slips each year. At this funding level, the backlog would be eliminated within 25 years.

Fremont Bridge

There is, however, the addition of 6,400 square feet of new bridge deck each year which will add to the number of work slips generated each year. On average, $1.78 is spent on routine maintenance for each square foot of bridge deck for a total of approximately $11,395 each year, or an equivalent of five (5) additional work slips. Factoring in this new growth, the backlog would slowly be reduced until year twelve (12) at which point the backlog would again begin to grow under the current funding level.

The average number of new work slips generated each year is an estimate as of 2007. As a bridge ages, there is a point when a bridge will hit the deterioration curve at which point the amount of required routine maintenance will begin to rise significantly. Where rehabilitation is completed, the number of work slips will decrease. Both of these factors will affect the rate of increase/decrease of the backlog, and, if maintenance is deferred, the number of new work slips will increase accordingly.

Ballard Bridge

Major Rehabilitation and Replacement of Major Bridge Components:

The funding for bridge maintenance that has been described above is for routine maintenance only. It does not cover major rehabilitation work that is necessary to preserve the bridges. Funding for major rehabilitation is provided through CIP projects and annual programs. BTG funding in 2007 has provided:

- ✓ $1.047 million for bridge rehabilitation and replacement. Bridges undergoing rehabilitation are the 15th Ave NE & NE 105th St bridge, and the E Duwamish Waterway bridge.
- ✓ $928,000 for bridge seismic retrofit. The Fauntleroy Expressway bridge is undergoing seismic retrofit.

Bridge rehabilitation work requires additional funding.

Unmet Funding Needs:

Bridge engineers believe that if maintenance is deferred longer than ten (10) years, the rate of deterioration will accelerate and result in an even larger backlog. To enable the elimination of the backlog within ten (10) years, an additional $275,000 would be required each year for routine maintenance.

The unmet need for major rehabilitation and replacement is classified in three (3) ways:

- ✓ Annual Programs, which includes such maintenance as bridge painting and replacement of railing
- ✓ CIP rehabilitation projects
- ✓ CIP bridge replacement projects

A complete list of the unfunded major rehabilitation and replacement projects is listed in Appendix C.

In summary, the unmet funding need for major rehabilitation and replacement is:

Unfunded Bridge Major Rehabilitation & Replacement
2007 Dollars

Project Type	Total Cost (Millions)
Annual Programs	$ 131.4
CIP Rehabilitation Projects	$ 152.0
CIP Bridge Replacement Projects	$ 387.6

Bridge Hydrant Vaults:

Bridge hydrant vaults are utility vaults located on bridges that house the piping and electrical systems which provide water to hydrants used by the Seattle Fire Department (SFD). Hydrant vaults are built to meet SFD guidelines for hydrant placement.

Current Inventory and Anticipated Annual Growth:

There are thirteen (13) bridges with hydrant vaults which are located on the Klickitat Bridge, the WS Swing Bridge and Highrise, and the 1st and 4th Avenue bridges. The inventory of bridge hydrant vaults is tracked through bridge utility maps that show where they are located underground.

Anticipated annual growth has not been determined for bridge hydrant vaults.

Estimated replacement value is not available.

Condition Ratings:

Condition is not currently recorded for bridge hydrant vaults, however, preventive maintenance is performed monthly to ensure that they remain in service 98% of the time on a 24/7 basis.

Additional information was not pursued for this reporting period.

Funding Requirements and Unmet Funding Needs:

This information was not pursued for this reporting period.

Retaining Walls:

A retaining wall is a roadway structure that supports streets when there is a near-vertical grade separation as the result of fill or cut of a slope. A retaining wall prevents earth matter and/or water from collapsing onto Seattle's transportation infrastructure by establishing level areas on hillsides

when roadways are constructed. Seawalls are a category of retaining walls that are built along the shore and are partially or fully submerged.

Retaining wall construction varies by type and materials used: cantilevered reinforced concrete, concrete gravity, slab & rail, rockery, timber pile & lagging, mechanically stabilized wall, steel "H" pile & RC, steel "H" pile & reinforced concrete lagging.

The Alaskan Way Seawall is the city's longest retaining wall, measuring over 7,000 feet long, and protects the central city waterfront along Elliott Bay.

Retaining Wall

Current Inventory and Anticipated Annual Growth:

The inventory of retaining walls has been maintained in the Structures database since 1994. SDOT owns and maintains 582 retaining walls in the city of Seattle.

On average, 1-3 new retaining walls are built each year, or approximately 1,125-3,375 square feet. Retaining walls are often built by developers, and ownership and maintenance responsibility is turned over to SDOT. The number of new retaining walls built per year may increase dramatically if there is a high incidence of landslides in any given year, as was the case in 1996-1997 when ten (10) new retaining walls were built.

The estimated replacement value of retaining walls is $786,127,000 in 2007 dollars. The replacement value of the Alaskan Way Seawall is approximately $915 million in 2007 dollars.

Condition Ratings:

Retaining wall condition is assessed through periodic inspection. Complete inspection of retaining walls started in the late 1980s and has been conducted on the average of once every ten (10) years given current funding levels. Roadway Structures engineers believe a preferred approach is to conduct condition assessment every five (5) years.

Retaining Wall Condition Rating
1999

% in Good Condition	% in Fair Condition	% in Poor Condition
43	37	20

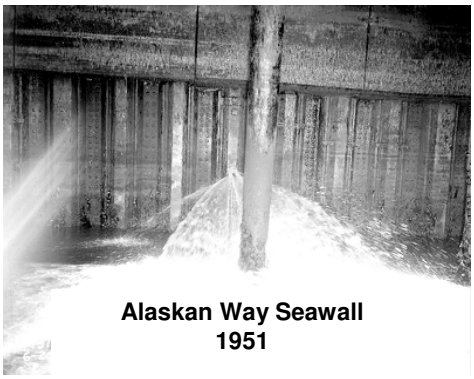
SDOT conducts regular inspections, including underwater inspections, and monitoring of the Alaskan Way seawall. The seawall is considered in poor condition, and SDOT is working with state and federal agencies to develop a project to replace the central waterfront section of the seawall. In recent years, SDOT has performed some major repair work via capital projects on portions of the seawall, including earthquake damage repair following the 2001 Nisqually Earthquake. The seawall has effectively reached the end of its useful life, however, and replacement is the preferred alternative.

Condition information is recorded in the Structures system.

Funding Requirements:

Roadway Structures has a modest budget of $400,000 for routine maintenance of retaining walls, 25% of which is used to build small erosion control walls that support a bridge or stairway. The annual funding for routine maintenance is a static figure and additional funding to cover the annual increase in square footage of new retaining walls is needed.

If allocated equally across the inventory of retaining walls, maintenance funding averages approximately $515 per year per retaining wall.



Alaskan Way Seawall
1951

The estimated cost to raise the condition of retaining walls rated in fair condition to good condition is $291 million in 2006 dollars. The estimated cost to replace the retaining walls rated in poor condition is $157 million in 2006 dollars, plus another $915 million in 2007 dollars for the Alaskan Way seawall.

An effort to replace the worst section of the Alaskan Way seawall is in development in conjunction with state and federal agencies. In the interim, a repair effort has been initiated for the wood facing along one portion of the seawall where the deterioration is such that it is in danger of a localized failure. Design work is funded through the Alaskan Way Seawall Interim Repairs project at $250,000. Construction costs are estimated at $1.475 million.

Unmet Funding Needs:

Unmet funding needs in the near term are focused on replacement of retaining walls in poor condition starting with the top 26 needing replacement (see Appendix C) for a total in excess of $7,649,000 as well as the replacement of the Alaskan Way seawall.

Asset Class – Seattle Streetcars:

The Seattle Streetcars asset class is new to SDOT in 2007 and includes:

- ✓ Streetcar System

Streetcar System:

The streetcar system consists of streetcars, paved trackway, station platforms and shelters, the traction power system, a train-to-wayside communication system, and a real-time passenger information system. The streetcars are maintained through a separate streetcar maintenance facility.

Current Inventory and Condition Rating:

The new South Lake Union line is expected to begin operation in late 2007. Three (3) modern streetcars will serve eleven (11) stops along the 2.6 mile South Lake Union line and connect thousands of people to new homes, jobs, and other public transit systems, including King County Metro buses, Sound Transit buses, light rail, and the Monorail.

South Lake Union Streetcar

Initial ridership is estimated between 330,000 and 380,000 riders, increasing to over one (1) million once South Lake Union is fully developed. The streetcar will run seven (7) days a week at 15-minute intervals during the following hours:

- ✓ Monday through Thursday: 6:00 a.m. to 9:00 p.m.
- ✓ Friday and Saturday: 6:00 a.m. to 11:00 p.m.

- ✓ Sunday: 10:00 a.m. to 7:00 p.m.

The condition of the streetcar system is considered in "as new" or good condition and future condition rating of the system elements will be assessed using American Public Transportation Association (APTA) rail industry standards.

The estimated replacement value of the streetcar system is $52,000,000 in 2007 dollars and is based upon the CIP project that designed and built the streetcar line.

Anticipated Growth:

SDOT is developing plans to extend the Seattle Streetcar system, either as independent city projects or through interlocal agreements with Sound Transit and/or the Washington State Department of Transportation (WSDOT) which is cooperating with the city in development of a Surface Transit alternative for the replacement of the Alaskan Way Viaduct.

Funding Requirements:

The operating and maintenance finance plan of the South Lake Union line is a result of an innovative partnership between the city of Seattle and King County Metro. Through an interlocal agreement, King County Metro will operate the streetcar and the city will retain ownership of streetcar facilities and vehicles. When Sound Transit's LINK Light Rail service becomes operational, King County Metro will contribute 75% of total operating costs minus the farebox revenue.

The operations and maintenance finance plan projects costs of $1.8 million in 2008 and is adjusted for inflation in future operating years. The operations and maintenance budget includes operation and preventive maintenance, including allowance for SDOT expenses. Revenue for the South Lake Union line of the Seattle Streetcar is generated through ticket sales and private sponsorship of vehicles and stations. Federal Transportation Administration (FTA) formula funds will also contribute toward preventive maintenance costs.

Unmet Funding Needs:

Unmet funding needs are not yet known. The Major Maintenance Plan will specify a major maintenance program and associated costs. Fund sources will need to be identified for the Major Maintenance Plan.

Asset Class – Signs:

The Signs asset class includes:

- ✓ Sign Assemblies

All of the assets within the Signs asset class are maintained by Traffic Maintenance crews at the direction of the Traffic Operations group in the Traffic Management Division.

Sign Assemblies:

A sign assembly is a static message board that conveys essential information to road users, pedestrians and bicyclists about how to negotiate city streets and trails. A sign assembly includes the sign face or blade and the mount.

There are four (4) major categories of signs that are located on sign assemblies:

- ✓ Regulatory
- ✓ Warning
- ✓ Directional/Guide
- ✓ Temporary

Current Inventory and Anticipated Annual Growth:

An inventory of signs has been maintained since the 1920s when it was recorded in card files. From 1979-1981, this inventory was transcribed into electronic format in the Data General system which was later imported into the Hansen system in 2000 where it is currently maintained. This inventory of signs counted the signs rather than the sign assemblies. Multiple signs may exist on any sign assembly.

The number of signs owned by SDOT is:

Category of Signs	Number of Signs
Regulatory	94,445
Warning	18,249
Directional/Guide	37,398
Temporary	TBD

The count of signs/sign assemblies has not been verified by a physical inventory.

Sign Assembly

The electronic inventory does not have a full count of street name signs (estimated at 57,600 sign blades) or bike trail signs, most of which are informational. Funding has been provided by BTG to replace many of the signs/sign assemblies. As these signs/sign assemblies are replaced, a more accurate inventory is being developed.

The electronic inventory does not include an accurate count of temporary signs since these signs are regularly rotated to different locations and are more difficult to track.

The anticipated growth in sign assemblies has not been determined.

The estimated replacement value for sign assemblies is in excess of $48,600,000 in 2007 dollars.

Condition Ratings:

Sign assemblies are not regularly inspected and are maintained on a customer request basis. Age is often used as a surrogate for the condition of a sign assembly. When newly installed, the expected useful life of a sign assembly is twelve (12) years. It degrades to fair condition in ten (10) years, and, at the end of its useful life, it is considered in poor condition and is eligible for replacement.

BTG has provided the opportunity to replace many of the aging sign assemblies on a programmed basis.

In 2007, a newly installed sign assembly costs $100 - $1,000 to acquire and install. In twelve (12) years at the end of its useful life, this cost is expected to increase to $245 - $2450 (2007 inflated dollars).

Street Name Sign

Funding Requirements and Unmet Funding Needs:

In 2007, Traffic Operations has base funding of approximately $1,406,000 to repair and replace sign assemblies. BTG has provided an additional $1,064,000.

A sizable component of the sign assembly replacement budget is for emergency repair/replacement of sign assemblies that are damaged. These emergency replacement costs average $440,000 per year.

Based on the financial performance through the first half of 2007, the funding requirements are adequate to meet the performance measures described above.

Replacement of regulatory signs is performed at a rate of 6.6% per year. If all regulatory signs are to be replaced by the end of the useful life, 8.33% should be replaced each year. To do so will require an additional annual amount in excess of $170,400.

Limited analytical information is available that would enable a precise determination of funding requirements for replacement of the other categories of signs.

Asset Class – Structures Other Than Roadway:

This asset class consists of a few one-of-a-kind roadway structures that do not belong in any other asset class. It includes:

- ✓ Air Raid Siren Tower
- ✓ Piers

Limited information was pursued for this reporting period.

The Roadway Structures group in the Capital Projects and Roadway Structures Division is responsible for these assets. Programmed maintenance has not been established or funded for these assets.

Air Raid Siren Tower:

The air raid siren tower was built in 1957 by the Seattle Engineering Department, the precursor to SDOT, in conjunction with the Department of Civil Defense as a response to the threats of the Cold War. It is located in the Phinney Ridge neighborhood at the intersection of N 67th St and Phinney N. The Phinney Ridge community has petitioned that the structure be recognized by the city as an historical landmark.

Emergency maintenance was completed on the tower in 2006. Funding for additional maintenance is needed. The tower is no longer in service.

Air Raid Siren Tower

Piers:

A pier is a structural deck over water that provides a viewing platform for both pedestrians and vehicles.

There is one (1) pier in the city of Seattle, and it is located at the Washington Street Boat Ramp at the intersection of South Washington Street and Alaskan Way. The Boat Ramp was built in 1920.

Asset Class – Traffic Safety Structures & Devices:

The Traffic Safety Structures & Devices asset class includes all of the SDOT assets whose main purpose is to provide a reasonably safe transportation system. It includes:

- ✓ Chicanes
- ✓ Crash Cushions
- ✓ Curb Bulbs
- ✓ Delineator Posts
- ✓ Guardrails
- ✓ Median Islands
- ✓ Speed Cushions
- ✓ Speed Dots

- ✓ Speed Humps
- ✓ Traffic Circles

Primary responsibility for traffic safety structures and devices lies with the Traffic Operations group of the Traffic Management Division.

Many of these assets have been installed as a component of a CIP project, or under the Neighborhood Spot Improvement or Neighborhood Street Fund CIP project in response to a citizen or neighborhood interest. These are traffic calming devices that supplement the more traditional traffic control devices, such as regulatory signs. These assets are not maintained through a regular maintenance program, and maintenance is currently performed on an emergency damage/repair basis that is often directed by customer request. Repair is handled either by the Street Maintenance Division as part of its spot safety repair program or by Traffic Maintenance crews. Maintenance costs are not tracked separately for these assets. Funding has generally been considered adequate for many of these assets based on the level of customer request received. The Traffic Management Division may revisit the need for a regular maintenance program and request additional funding if it concludes that these assets require more aggressive maintenance.

Chicanes:

A chicane is a set of landscaped curb extensions that extend out into the street, narrowing the road to one lane, thereby forcing motorists to decrease vehicle speed in order to maneuver between them. Chicanes increase safety and also encourage walking as a mode of travel.

Current Inventory and Anticipated Annual Growth:

There are nineteen (19) chicanes within the city of Seattle.

The inventory of chicanes is maintained in manual files in the Traffic Operations engineering office and is based on installation records.

The anticipated annual growth in new chicanes has not been determined.

The estimated replacement value of the chicanes is $285,000 in 2007 dollars.

Chicane

Condition Ratings:

Chicanes are not regularly inspected and are maintained on a customer request basis.

Funding Requirements and Unmet Funding Needs:

Funding is generally considered adequate based on the level of customer request.

Crash Cushions:

A crash cushion is a disposable device used to increase safety for motor vehicle operators and passengers who collide with safety barriers in gore areas. Crash cushions improve safety and also help protect the transportation infrastructure.

Crash Cushion

Current Inventory and Anticipated Annual Growth:

There are 34 crash cushions within the city of Seattle.

The inventory of crash cushions is maintained in manual files in the Traffic Operations engineering office and is based on installation records.

The anticipated annual growth in new crash cushions has not been determined.

The estimated replacement value of crash cushions is $595,000 in 2007 dollars.

Condition Ratings:

Crash cushions are not regularly inspected and are maintained on a customer request basis.

Funding Requirements:

Approximately $40,000 has been provided from BTG funds to replace obsolete crash cushions. An additional $26,000 of base dollars funds emergency repair of crash cushions.

There are 34 crash cushions, each of which has an estimated useful life of ten (10) years. At the current BTG funding level of replacing two (2) crash cushions per year, it would take seventeen (17) years to replace all of these crash cushions. To ensure that the crash cushions are replaced on a cycle that is compatible with the estimated useful life, approximately four (4) would require replacement each year.

Unmet Funding Needs:

An additional $40,000 will be required each year in addition to the $40,000 currently provided by BTG to replace crash cushions consistent with the useful life.

Since maintenance costs are not tracked at the crash cushion level, the adequacy of funding for emergency repair of crash cushions has not been determined.

Curb Bulbs:

Curb bulbs are extensions of the sidewalk or curb line into the parking lane that physically narrow the roadway, thereby reducing pedestrian crossing distance. Curb bulbs improve pedestrian safety by increasing the amount of protected, dedicated space for walking and encourage walking as a mode of transportation.

Curb Bulb

Current Inventory and Anticipated Annual Growth:

There are 92 curb bulbs within the city of Seattle.

The inventory of curb bulbs is maintained in manual files in

the Traffic Operations engineering office and is based on installation records.

The anticipated annual growth in curb bulbs has not been determined.

The estimated replacement value of the curb bulbs is in excess of $2,300,000 in 2007 dollars.

Condition Ratings:

Curb bulbs are not regularly inspected and are maintained on a customer request basis.

Funding Requirements and Unmet Funding Needs:

Funding is generally considered adequate based on the level of customer request.

Delineator Posts:

Delineator posts are rigid, self-supporting posts containing reflective material and are mounted into a base that flexes between the post and the base. Delineator posts are intended to provide positive guidance to operators of motor vehicles to alert them to a change in roadway alignment.

Delineator posts have been installed as an alternative traffic safety tactic.

Additional information about delineator posts was not pursued for this reporting period.

Guardrails:

Guardrails are devices designed to keep pedestrians and motor vehicles from straying off the road into potentially dangerous or off-limit areas of the ROW. Guardrails improve safety and also protect the transportation infrastructure.

Current Inventory and Anticipated Annual Growth:

There are 66,913 linear feet of guardrail within the city of Seattle.

The inventory of guardrails is maintained in an Excel spreadsheet in the Traffic Operations engineering office and is based on installation records. A manual file that includes pictures and engineering drawings further supports this inventory.

Typical Guardrail

The anticipated annual growth in guardrails has not been determined.

The estimated replacement value of the guardrails is $8,085,320 in 2007 dollars.

Condition Ratings:

Guardrails are not regularly inspected and are maintained on a customer request basis.

Funding Requirements and Unmet Funding Needs:

Approximately $57,000 has been provided from BTG funds to replace aging guardrail. An additional $76,000 of base dollars funds emergency repair of guardrails.

Based on the unit cost of $500 (12-foot segment) for replacing guardrail, the total cost of replacing 3,500 linear feet is approximately $145,835. The BTG funding amount will provide enough money to replace approximately 1,368 linear feet. An additional $88,835 will be required annually to meet this BTG target.

Although the engineering records in Traffic Operations files contain information on each of the guardrails, the information on the specific age of each guardrail is easily accessible. However, with an

estimated useful life of 25 years, approximately 2,675 linear feet of guardrail will need replacement each year to ensure that guardrail is replaced in a manner consistent with the expected useful life. If 3,500 linear feet are replaced each year, all of the guardrail inventory will be replaced in approximately nineteen (19) years, or six (6) years sooner than is required.

If the BTG target were adjusted to align with the expected useful life, a total annual amount of $111,500 would be required, or $54,500 in addition to current BTG funding. [Note: This statement assumes that a condition assessment of the guardrails would not conclude that a more rapid replacement of guardrails is required.]

Since maintenance costs are not tracked at the guardrail level, the adequacy of funding for emergency repair of guardrails has not been determined.

Median Islands:

A median island is a physical barrier that divides a street into two or more roadways. It serves as a place of refuge for pedestrians crossing the roadway and also restricts certain vehicular turning movements. Median islands increase safety and also encourage walking as a mode of transportation.

Current Inventory and Anticipated Annual Growth:

The inventory of median islands is maintained in manual files in four (4) separate locations by the sponsor of the project under which the median island was installed: Arterial Operations, Neighborhood Traffic Calming, Bicycle/Pedestrian, and Capital Projects. The manual files are based on installation records.

A total count of the median islands was not provided for this report as it requires a laborious process of searching the files which was not completed as of the publication date of this report.

The anticipated annual growth in median islands has not been determined.

The estimated replacement value of median islands has not been determined.

Pedestrian Refuge Island, a Type of Median Island

Condition Ratings:

Median islands are not regularly inspected and are maintained on a customer request basis.

Funding Requirements and Unmet Funding Needs:

Funding is generally considered adequate based on the level of customer request.

Speed Cushions:

A speed cushion is a set of several small speed humps that are installed across the width of the roadway with space in between. Spacing of the speed humps is designed to force cars to slow down as one or both wheels ride over one of the humps. The spacing is also designed to allow wider-axle emergency vehicles to pass through without slowing down. Speed cushions reduce motor vehicle speeds in neighborhoods and encourage walking as a mode of transportation.

Current Inventory and Anticipated Annual Growth:

There are nineteen (19) speed cushions at six (6) locations within the city of Seattle.

The inventory of speed cushions is maintained in manual files in the Traffic Operations engineering office and is based on installation records.

The anticipated annual growth in speed cushions has not been determined.

The estimated replacement value of the speed cushions is $209,000 in 2007 dollars.

Condition Ratings:

Speed cushions are not regularly inspected and are maintained on a customer request basis.

Funding Requirements and Unmet Funding Needs:

Funding is generally considered adequate based on the level of customer request.

Speed Dot

Speed Dots:

A speed dot is a raised section of pavement in the middle of an intersection that is intended to slow traffic.

There is one (1) speed dot that was installed as an experimental traffic safety tactic in the Fremont Neighborhood under the Aurora Bridge in front of the Troll.

Additional information about the speed dot was not pursued for this reporting period.

Speed Humps:

A speed hump is a paved mound that extends the width of a street and forces motor vehicles to slow down. Speed humps improve safety and encourage walking as a mode of transportation.

Current Inventory and Anticipated Annual Growth:

There are 47 speed humps within the city of Seattle.

The inventory of speed humps is maintained in manual files in the Traffic Operations engineering office and is based on installation records.

The anticipated annual growth in speed humps has not been determined.

The estimated replacement value of the speed humps is $199,750 in 2007 dollars.

Condition Ratings:

Speed humps are not regularly inspected and are maintained on a customer request basis.

Funding Requirements and Unmet Funding Needs:

Funding is generally considered adequate based on the level of customer request.

Traffic Circle with Landscaping

Traffic Circles:

Traffic circles are raised islands constructed at intersections of residential streets. Traffic circles provide separation of oncoming vehicles and cause motorists to decrease speed. Many of the traffic circles include landscaping that is maintained by a neighborhood group. Traffic circles increase safety for pedestrians and bicyclists and encourage walking

and bicycling as modes of transportation. When landscaped, they also contribute to a more vibrant neighborhood.

Current Inventory and Anticipated Annual Growth:

There are approximately 1,000 traffic circles within the city of Seattle.

The inventory of traffic circles is maintained in manual files in the Traffic Operations engineering office and is based on installation records.

The anticipated annual growth in traffic circles has not been determined.

The estimated replacement value of the traffic circles is $10,000,000 in 2007 dollars.

Condition Ratings:

Traffic circles are not regularly inspected and are maintained on a customer complaint basis.

Funding Requirements and Unmet Funding Needs:

Funding is generally considered adequate based on the level of customer request.

Asset Class – Traffic Signal System:

The Traffic Signal System asset class includes of all of the assets that are either electrically- or solar-powered and comprise the system that regulates and manages the flow of traffic. It includes:

- ✓ Beacons
- ✓ CCTV Camera Assemblies
- ✓ Detection Systems
- ✓ Traffic Management Center
- ✓ Traffic Signal Assemblies
- ✓ Traffic Signal Communication System

Prior to 2007, many of these assets were not funded at a level that would allow preventive maintenance to take place. As a result, condition assessments have not been conducted for the assets in this asset class, and condition ratings are not available for this report. BTG has given SDOT the funding to establish maintenance programs that will provide condition information in subsequent years.

Budgets for the assets in this asset class are included in a combined general maintenance budget of $7,458,000, which also includes the assets in the Intelligent Traffic Signs asset class.

The traffic signal system is maintained by Traffic Maintenance crews at the direction of the Traffic Signal Operations group in the Traffic Management Division.

Beacons:

A beacon is a warning device the purpose of which is to draw a vehicle operator's attention to an associated message that is important to the safe operation of the vehicle on a specific stretch of roadway.

There are a variety of beacons, examples include school zone beacons, all-way stop beacons, and emergency warning beacons.

Many of the beacons operate on schedules and have one or more scheduled periods of operation during the day. School beacons are operational twice daily (morning and afternoon) during pre-determined ranges of hours when children are present. All-way stop beacons and emergency/warning beacons are operational on a 24/7 basis.

Current Inventory and Anticipated Annual Growth:

There are an estimated 380 beacons in the city of Seattle, 56 of which are school beacons. Traffic maintenance crews will verify the number of beacons within the 2007 annual maintenance program.

The inventory of school beacons is maintained in the Hansen system by staff members in the Traffic Management Center who are also responsible for programming/scheduling the hours of operation for these devices. An accurate inventory of the remaining beacons will be completed as of year end 2007 as a result of the preventive maintenance program that was funded by BTG.

School Beacon

Approximately 10-12 new beacons are installed each year.

The estimated replacement value of beacons is $1,140,000-$7,600,000 in 2007 dollars. Where expressed elsewhere in this document for summary purposes, a replacement value of $2,280,000 has been used.

Funding Requirements and Unmet Funding Needs:

Approximately $250,000 from the combined general maintenance budget has been allocated for preventive maintenance of beacons. All of this funding has been provided by BTG.

This is the first year of programmed maintenance for the beacons, and accurate information on the costs of maintenance is not yet available. More precise information will be available in 2008.

Since limited information is available about the beacons, specifically age and condition, it is difficult to assess funding needs in any specific year. However, with an estimated life cycle of twenty (20) years, approximately nineteen (19) of the beacons should be replaced each year at an annual cost of $114,000 (2007 dollars). Since accurate information on maintenance costs is not yet available, a conclusion cannot be reached as to how many of the beacons can be replaced each year within the $250,000 maintenance budget.

CCTV Camera Assemblies:

A CCTV (closed circuit television) camera assembly provides video images of traffic and roadway conditions to the Traffic Management Center, as well as to the public on the city's web page. These images provide information to assist motorists in making intelligent decisions with respect to their trips, and thereby reduce travel time. A CCTV camera assembly also assists SDOT in diagnosing potential and actual traffic congestion and in making good decisions about changes in synchronization of traffic signals that will enhance the flow of traffic.

A CCTV camera assembly consists of multiple components:

- ✓ CCTV camera
- ✓ CCTV camera cabinet
- ✓ CCTV camera mount
- ✓ CCTV panel
- ✓ CCTV camera power and video cables

The first CCTV camera assembly was installed in 2002.

Current Inventory and Anticipated Annual Growth:

There are 46 CCTV camera assemblies in the city of Seattle. The inventory of CCTV camera assemblies is maintained in an Excel spreadsheet maintained at the Traffic Signal Shop.

Approximately 5-10 new CCTV camera assemblies have historically been installed each year.

The estimated replacement value of CCTV camera assemblies is $230,000-$460,000 in 2007 dollars. Where expressed elsewhere in this document for summary purposes, a replacement value of $345,000 has been used.

Funding Requirements and Unmet Funding Needs:

Approximately $100,000 from the combined general maintenance budget has been allocated for maintenance of CCTV camera assemblies.

Accurate costs of maintenance have not been determined.

Replacement of these devices should be expected starting in 2012 and is not an immediate funding need.

Detection Systems:

A detection system is a set of assets that collectively provide constant input regarding vehicular and pedestrian traffic volumes and presence so that the traffic signal system will respond safely to accommodate the traffic demand that was triggered by the detection system. These demand-driven adjustments ensure more equitable usage of city streets by all traffic modes, and, since they are demand-driven, also ensure more efficient vehicular and pedestrian traffic flow.

There are several categories of detection systems:

- ✓ Pavement loop. A pavement loop is a detection device installed in the pavement and is used to detect vehicles approaching an intersection.
- ✓ Video detection device. Where the pavement is in poor condition, a video detection device may be used instead of a pavement loop.
- ✓ Magnetometer. A new device introduced in August 2007 that can possibly be used in lieu of a pavement loop is a magnetometer. Magnetometers are smaller, hockey-puck-sized devices that are installed in the pavement and include a wireless transmitter that will detect the presence of a vehicle that passes over them. They may be more cost effective than a pavement loop and are being considered as a viable alternative.

Video Detection System

- ✓ Pedestrian push button. Pedestrian push buttons are detection devices installed at traffic-signal locations and other locations where circumstances warrant their use. These are detection devices that rely on the action of a pedestrian to activate the device.
- ✓ Infrared detection device. Infrared detection devices are passive detection devices that are activated by the presence of a bicyclist or pedestrian. When the infrared detection device detects the presence of a pedestrian, it automatically turns on the flashing lights at the affected intersection so that vehicle operators are aware of the presence of the pedestrian. These are new devices that were installed in August 2007. Operational testing of these devices is underway as of the date of this report.

- ✓ Emergency pre-empt assemblies. Emergency pre-empt assemblies detect the presence of an emergency vehicle approaching an intersection and provide the vehicle with a green light to reduce delay.
- ✓ Railroad sensor. The railroad sensor detects approaching trains and turns on flashing lights that notify vehicle operators that a train is approaching. Information recorded about this detection system is limited to specifying its location.

Current Inventory, Condition Ratings, and Anticipated Annual Growth:

Accurate counts for two (2) types of detection systems that were installed in 2007 are:

Category of Detection System	Number
Magnetometer	18
Infrared Detection Device	2

A partial list of detection systems has been maintained in the Hansen system, and this information has been updated when preventive maintenance has been performed on the traffic signal assembly associated with the detection system. A physical inventory of detection systems has not been conducted.

When preventive maintenance has been performed on the associated traffic signal assembly, problems with the detection system are usually corrected. For this reason, independent assessment of detection-system condition has not been undertaken nor has it been recorded. Traffic Operations will conduct a condition assessment of detection systems in 2008.

Since the magnetometers and infrared detection devices were installed in August 2007, these are considered to be in good condition.

Anticipated annual growth has not been determined for detection systems.

An estimated replacement value for detection systems has not been determined.

Funding Requirements and Unmet Funding Needs:

Pavement loops are budgeted separately, and $229,000 has been budgeted in 2007 for routine maintenance and replacement of pavement loops. Approximately $425,000 from the combined general maintenance budget has been allocated for maintenance and/or replacement of all other detection systems.

Since routine maintenance generally means replacement of the detection system, the number of detection systems that are replaced each year is dependent on the amount of funding provided each year. Replacement is performed on a case-by-case basis according to maintenance priorities rather than through programmed maintenance, and since limited information is available about the detection systems, specifically number, age and condition, it is difficult to assess accurate funding needs for replacement of devices in any specific year. While many of these devices are more effectively maintained through a "run to failure" approach, a programmed replacement schedule could be established for video detection devices and emergency pre-empt devices. A determination of funding requirements for programmed replacement can be determined when inventory and condition assessments are completed in 2008.

Traffic Management Center:

The Traffic Management Center (TMC) is the central command center for the SDOT computerized traffic signal system. The TMC plays a vital role in the overall operation of Seattle's transportation system, housing the central computerized control system for nearly 600 of the 1000+ signalized intersections, as well as the main communication hub that provides connectivity between the central system and those intersections. The TMC is home of the CCTV camera control system, providing the necessary equipment and computer power to operate the system and produce the video images generated for public viewing on the SDOT web page. The TMC also controls the dynamic message signs deployed on Seattle's streets.

The TMC was put into operation in 2002 in the Seattle Municipal Tower (SMT). It is staffed intermittently from 6 AM to 6 PM to monitor the effective operation of the TMC and the traffic signal system.

TMC Video Wall

Current Inventory and Condition Ratings:

The TMC houses numerous electronic components. These components have not been inventoried and recorded separate from the TMC.

Condition ratings have not been assigned to the components, although most electronic components have life cycles of four (4) years or less at which point they will be replaced by newer technology.

The estimated replacement value for the TMC has not been determined.

Funding Requirements and Unmet Funding Needs:

The budget for the TMC is allocated from the combined general maintenance budget. Approximately $50,000 is allocated to the costs of maintenance, which covers the annual cost of replacement of electronic components that make up the TMC, and $675,000 is allocated to the cost of operations.

A more detailed inventory of TMC components and a programmed schedule for replacement of them will determine if additional funding is required. The video wall is the longest-lived component of the TMC, requiring replacement in 2014 and does not present an immediate funding need.

The TMC is a one-of-a-kind asset that will not grow in number similar to other infrastructure assets. However, there are elements of growth that may require additional funding:

- ✓ Increasing functionality as newer technology is made available
- ✓ Creation of a back-up site

The CIP project that includes the implementation of the Central City portion of the ITS Development Plan includes the construction of a satellite TMC at a site other than the Central Business District.

Traffic Signal Assemblies:

BRIDGING the GAP

A traffic signal assembly is the set of assets that comprise a functioning traffic signal at a given intersection or location, from the overhead equipment and poles, to the controller cabinet and electronics within it that operate the traffic signal.

A traffic signal assembly controls the movement of vehicles, pedestrians and bicyclists, minimizes conflicts, and optimizes the flow of traffic throughout the street network.

Traffic Signal Assembly

Current Inventory, Condition Rating, and Anticipated Annual Growth:

There are 1,001 traffic signal assemblies in the city of Seattle as of August 2007. The signal inventory is maintained in the Hansen system. The inventory of traffic signal assemblies is verified annually during preventive maintenance visits to each location.

Although an overall condition rating has not been assigned to the traffic signal assemblies, general condition assessments have been made for some of the component assets, such as poles, mast arms, spans and connections. This condition information has been collected during regular preventive maintenance of the controller cabinets, and it is stored in the Hansen system. A condition assessment of traffic signal assemblies will be conducted in 2008.

Approximately ten (10) new traffic signal assemblies are installed each year. Some of these new traffic signal assemblies are installed by developers as a requirement under a development permit. These new signals are then turned over to SDOT for maintenance and operation.

The estimated replacement value of traffic signal assemblies is $50-100 million in 2007 dollars. Where expressed elsewhere in this document for summary purposes, a replacement value of $75,000,000 has been used.

Funding Requirements and Unmet Funding Needs:

Approximately $5,291,000 from the combined general maintenance budget has been allocated for maintenance of traffic signal assemblies. Approximately 33% of this budget allocation has been provided by BTG. In addition, a total of $913,000 has been provided in a separate budget for installation of new traffic signal assemblies; BTG has funded $415,000 of that total.

Maintenance costs are not tracked at the asset level, so accurate information on the actual cost of maintenance is unavailable, and it is difficult to determine whether current funding is sufficient to address routine maintenance needs for the existing traffic signal assemblies. As the number of traffic signal assemblies increase each year, additional funding will be required to maintain these devices.

A traffic signal assembly consists of numerous components, all of which have differing useful lives. BTG provided the ability to allow replacement of cabinets/controllers in 2007 which will fund the replacement of up to twenty (20) cabinets/controllers. For the 1,000+ signalized locations, it will take in excess of fifty (50) years to replace the SDOT inventory of cabinets/controllers, and additional funding will be required to replace cabinets/controllers in accordance with the useful life or to upgrade the cabinets/controllers to introduce enhanced features or functions at signalized locations.

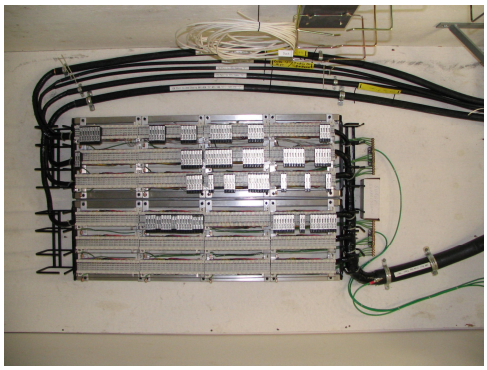
A replacement program will need to be developed for the other components of a traffic signal assembly as well. Absent such a replacement program and accurate tracking of maintenance costs, the number of aging components that can be replaced given current funding levels is indeterminate.

Traffic Signal Communication System:

The traffic signal communication system is the network of cables, switches, cabinets, and controllers that link the traffic signal system and is the vital link between the traffic signal assemblies, the CCTV camera assemblies, and the TMC. It is the backbone through which all traffic signal data, as well as video, are transmitted, allowing for communication between these devices and assisting in the efficient operation of the traffic signal system, dynamic message sign system, and the CCTV camera system.

The traffic signal communication system is comprised of two (2) major components:

- ✓ Terminal cabinets – These serve as junctions in the communication system, housing a variety of electronic communications equipment.
- ✓ Interconnect – The Interconnect is the network of communication cables which run overhead or through underground conduits.



Components of the Traffic Signal Communication System

Current Inventory and Anticipated Annual Growth:

There are 25 terminal cabinets in the traffic signal communication system. The inventory of terminal cabinets is maintained in a database in the Traffic Signal Shop. Approximately one (1) new terminal cabinet is installed each year.

The number of linear feet of the Interconnect is unknown. The location of the conduits and hand holes has not been recorded. Approximately two (2) miles of new cable are installed each year.

The estimated replacement value has not been determined.

Funding Requirements and Unmet Funding Needs:

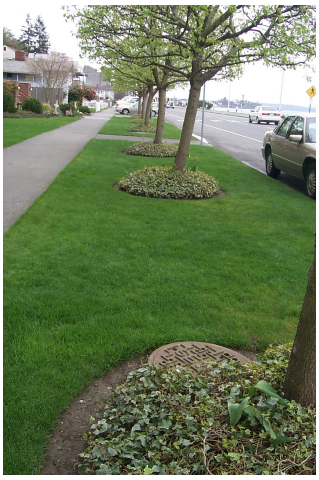
Approximately $350,000 from the combined general maintenance budget has been allocated for maintenance of the traffic signal communication system.

Maintenance costs are not tracked at the asset level, so accurate information on the actual cost of maintenance is unavailable. One (1) FTE has been allocated for maintenance of the traffic communication system, and this appears adequate to keep the system functioning.

A replacement program has not been developed for the terminal cabinets. Since each cabinet has a useful life of twenty (20) years, approximately 1.25 of these should be replaced each year and will require additional funding of $12,500 annually.

Very limited information is available about the interconnect. Maintenance is performed as needed, however, the information is not available to determine what level of replacement activity is included in this maintenance. At some point, portions of the interconnect can be expected to be replaced. A replacement program has not been developed for the interconnect, and an annual funding figure for replacement is not available.

Asset Class – Urban Forest:



Planting Strip

The SDOT Urban Forest is comprised of the publicly and privately owned and maintained vegetation that is growing within the designated street ROW within the corporate limits of Seattle. An estimated 20% of the land base in the ROW, or approximately 2800 acres, is considered plantable. SDOT has jurisdiction over the entire Urban Forest that exists in the ROW, although only a portion of the Urban Forest is actually owned by SDOT. For privately owned and maintained portions of the Urban Forest, this jurisdiction entails permitting, administration of land use and/or other municipal code requirements, and abating potential hazards to vehicles and people.

This Asset Class includes two (2) primary assets:

- ✓ Landscaped Areas
- ✓ Trees

These assets are funded through a single combined budget, and the funding requirements discussed in this section are based on an approximation of the percentage of the budget allocated to each asset. The total budget for maintenance and operation of the SDOT Urban Forest for 2007 is $3,459,000. This includes some one-time startup costs associated with new crews provided by BTG.

Both asset classes are managed by the Urban Forestry group in the Street Use and Urban Forestry Division.

Landscaped Areas:

Landscaped areas include the land and landscape-related improvements, such as vegetation and irrigation, within the street ROW.

Landscaped areas are an integral component of the transportation system. Appropriately designed and maintained landscapes ensure the safety and security of facilities for all users in a manner that preserves and protects the environment, promotes non-motorized modes of transportation, and enhances the economic viability of neighborhoods and business districts throughout the city.

Current Inventory and Anticipated Annual Growth:

Approximately 4.4% of the total plantable land base in the ROW, or an estimated 5,371,000 square feet (approximately 123 acres), is actively planted and maintained by SDOT. The landscaped areas are comprised of:

Type of Landscaped Area	Square Feet	% Total SDOT Landscape
Traffic Island Area	659,020	12
Median Area	1,236,710	23
Planting Strip Area	1,984,541	37
Under Structure Area	569,070	10.6
Traffic Circle Area	21,821	0.4
Tree Pit Area	900,000	17

SDOT has jurisdiction over an additional 16,200,000 square feet of privately owned landscaped areas within the ROW.

The inventory of SDOT-owned landscaped areas constructed prior to 1999 is maintained in the Hansen system. These landscaped areas are also maintained as a GIS layer in the Street Network Database (SND).

Landscaped Median Island

The inventory of SDOT-owned landscaped areas constructed after 1999 is maintained in manual files. These landscaped areas are scheduled to be added to the Hansen system and the SND in 2008.

Approximately 75,000–100,000 square feet of new landscaped areas are constructed each year. This figure represents an average taken over the last ten (10) years.

As of the end of 2007, the estimated replacement value of the landscaped areas is $31,250,000.

Condition Ratings:

The latest physical condition assessment was conducted in 1992 on the 4,356,000 square feet of landscaped areas maintained by SDOT. At that time, approximately 50% of the landscaped areas were considered in good condition. Since that time the amount of landscaped area has increased by more than 23% without a corresponding increase in resources to maintain those areas prior to BTG. As a result, the condition of landscaped areas has been reassessed and the assessment is based on the higher square footage of landscaped areas and the cost per square foot to maintain them.

Landscaped Area Condition Assessment
2007 Estimate

% Good Condition	% Fair Condition	% Poor Condition	% Condition TBD
30	30	30	10

Given the importance of protecting the economic viability in business districts and the public investment in new construction, landscaped areas in business districts and those created by new projects are typically maintained in good condition. This necessitates the reduction of maintenance in other areas which, as a result, makes it a challenge to preserve the condition of these assets.

Funding Requirements:

Maintenance and Operations for Current Inventory:

In 2007, the actual costs for maintenance are projected to be $1,497,000 and the actual costs for operations is $20,000 based on financial performance through the first half of 2007. BTG has

Maintaining Landscaped Areas in Current Condition:

The cost of maintaining landscaped areas where current condition is known is:

Landscape Condition	Average Cost to Maintain	
	Cost/sq. ft	Total
Good	0.50	$806,000
Fair	0.25	$403,000
Poor	0.05	$80,575
Total		$1,289,575

Of the $1,497,000 budget, only $1,207,000 is available for maintaining the landscaped areas if the BTG contribution to the budget for restoration is subtracted. This results in a shortfall of $82,575 for maintaining the landscaped areas in existing condition. At this funding level, there will be some degree of deterioration of current landscaped areas.

Approximately 10%, or 537,100 square feet, of current landscaped areas are in unknown condition. While funding requirements for maintenance of these landscaped areas is not available, the minimal average cost to maintain these landscaped areas is $0.05 per square foot (assuming these areas are all in poor condition), or $26,855 per year.

Raising the Condition of All Landscaped Areas Rated in Fair Condition to Good Condition:

BTG has provided funding to restore one (1) acre equivalent of landscaped area per year.

In 2007, an estimated 1,611,500 square feet, or 37.5 acres, of landscaped area is rated in fair condition. At the rate of one (1) acre equivalent per year, this would require 37.5 years to restore all of these landscaped areas.

The cost of restoring a landscaped area from fair to good condition is $2.50/square foot, or $4,028,750 in 2007 dollars to restore all of the landscaped areas rated as in fair condition. This will require $107,433 (2007 dollars) each year for the next 37.5 years. Since the remaining useful life of a landscaped area in fair condition is twenty (20) years, almost twice this level of funding would be required to ensure that these landscaped areas do not deteriorate to poor condition during this restoration window.

Landscaped Area in a Business District

Once the landscaped areas are restored to good condition, it will cost an additional $0.25 per square foot over current funding levels to maintain that restored landscape in good condition, or approximately $10,890 per acre per year (2007 dollars).

Replacing All of the Landscaped Areas Rated in Poor Condition:

In 2007, another estimated 1,611,500 square feet, or 37.5 acres, of landscaped area is rated in poor condition. Replacing, or fully restoring, these landscaped areas will require more than twice the cost per square foot to do so as it would to restore the landscaped area if it were in fair condition, or $6 per square foot. This will require $9,669,000 in 2007 dollars. If approached over a twenty (20) year period, this will require $483,450 (2007 dollars) per year to restore all landscaped areas rated as in poor condition.

Once the landscaped areas are restored to good condition, it will cost an additional $0.45 per square foot over current funding levels to maintain that restored landscape in good condition, or approximately $19,350 per acre per year (2007 dollars).

Maintaining Annual Growth in Landscaped Areas:

The amount of new landscaped area added each year is 75,000-100,000 square feet. The cost of routine maintenance per square foot of new landscape is:

- ✓ $1/square foot in year 1 of establishment
- ✓ $0.50/square foot in each of the successive years

Assuming an average of 87,500 square feet per year, the cost of maintaining this new landscaped area once it is constructed is shown in the following table.

Maintenance Cost of New Landscaped Areas
Five Year Cost

Year	New Landscaped Areas (square feet)	Year 1 Cost ($1/sq ft)	Year 2 Cost ($0.50/sq ft)	Year 3+ Cost ($0.50/sq ft)	Total Cost
2007	87,500	$87,500			$ 87,500
2008	87,500	$87,500	$43,750		$131,250
2009	87,500	$87,500	$43,750	$43,750	$175,000
2010	87,500	$87,500	$43,750	$87,500	$218,750
2011	87,500	$87,500	$43,750	$131,250	$262,500

In 2007, 27 planters were also added to the landscaped areas. Maintenance of planters is more labor-intensive than other landscaped areas, requiring renovation at least twice per year and regular maintenance three (3) times per week. The cost of this maintenance is approximately $300/square foot. For the planters added in 2007, this averaged $1,200 per planter. Additional staff has been allocated in 2007 for maintenance of these planters. It is not clear whether the addition of new planters to the landscaped area inventory will happen on a recurring annual basis. If it continues, the annual cost of maintenance will need to be increased.

Landscaped Planting Strip

Unmet Funding Needs:

The current funding for landscaped areas must be increased to maintain new landscaped areas that are added each year and maintain existing landscape in fair condition and prevent deterioration.

The unmet funding needs (2007 dollars) of SDOT landscaped areas are:

Action	Time Period (years)	Cost per Acre	Annual Cost
Prevent Deterioration of Current Landscaped Areas	ongoing		$109,430
Restore areas in fair condition to good condition (in addition to BTG funding - 1 additional acre)	20		$107,433
Additional cost to maintain areas restored from fair to good condition (2 acres/year)	ongoing	$10,890	$21,780 (compounded each year)
Replace areas in poor condition (2 acres/year)	20		$483,450
Additional cost to maintain replaced landscape (2 acres/year)	Ongoing	$19,602	$39,204 (compounded each year)
Maintain new landscape added each year for 1st year	Ongoing		$87,500 (compounded each year)

Action	Time Period (years)	Cost per Acre	Annual Cost
Maintain new landscape added each year after year 1	Ongoing		$43,750 (compounded each year)
Total			$700,313 each year + $192,234 compounded each year

Trees:

BRIDGING the GAP

According to studies conducted by the University of Illinois, the Center for Urban Forest Research, and the International Society of Arboriculture, trees serve multiple purposes in the transportation system:

- ✓ From a transportation perspective, street trees serve as traffic calming devices along arterial corridors, and also serve as a buffer between pedestrian and vehicular traffic. A tree-lined street is more attractive to bicyclists and pedestrians and promotes these modes of transportation.
- ✓ From an environmental perspective, street trees provide storm water attenuation, remove particulate matter from the air, sequester carbon dioxide, provide wildlife habitat, and provide shade which cools the air and provides energy savings to homes and businesses.
- ✓ From a social perspective, street trees aid in the reduction of crime and contribute significantly to improvement in the general quality of life in the city.

Street Trees

Current Inventory and Anticipated Annual Growth:

The most current physical inventory of street trees was taken between 1990 and 1992. At that time, there were approximately 23,000 SDOT maintained trees and approximately 75,000 privately maintained trees. This data inventory of SDOT-owned trees has not been actively maintained as new trees were planted, but Urban Forestry estimated that an additional 12,000 trees have been planted since 1992. A large number of trees have been planted by several different city departments, as well, with an estimated 30,000 additional privately maintained trees having been planted since 1992. The inventory data is stored in the Hansen system.

A non-BTG-funded inventory effort is being undertaken in 2007-2008 to verify the number and location of all SDOT-owned trees, identify the trees that have been removed, and record the condition of the trees. Budgeted cost of this inventory effort is $140,000 for the two years. This inventory effort does not include the privately-owned trees.

Approximately 1,000 new trees are planted each year, supported in part by BTG. Eight hundred (800) of these trees are planted by a combination of contract crews and SDOT maintenance crews. The remaining 200 are planted as a result of other capital projects, some of which are undertaken by other city departments, such as Seattle Public Utilities (SPU). Maintenance responsibility for these trees is turned over to SDOT. Approximately 15% of the newly planted trees are undertaken as replacement of trees that have been previously removed.

Street Trees along Greenlake

As of the end of 2007, the estimated replacement value of the tree inventory is $17,750,000. This replacement value reflects only the actual cost of planting 35,000 2"caliper trees and does not capture the actual value of the asset or the loss of canopy cover. (For example, the appraised value of an average 10" diameter tree is approximately $5,000, and the appraised value of an average 24" diameter tree is approximately $29,000. On a "trunk area" basis, the replacement of one (1) 20" diameter tree would require the planting of 100 2" caliper trees.)

Condition Ratings:

At the time of the 1990-1992 inventory, a visual inspection of the 23,000 trees was conducted and the condition assessed as follows:

Tree Condition Rating
January 1992

Type of Tree	% in Good Condition	% in Fair Condition	% in Poor Condition
SDOT Maintained	73	19	8
Privately Maintained	59	30	11

This condition rating included inspection of the vigor and health of the trees, and it did not assess a key element of a condition rating that considers interference with other infrastructure assets, such as low branches over streets or sidewalks. SDOT arborists estimate that approximately 4,000 of the 23,000 trees, or 17%, can be judged as in good condition using this updated criterion. Of the estimated 12,000 new trees planted since 1992, SDOT arborists estimate that 50% remain in good condition. Incorporating these considerations into the tree condition rating, provides a revised assessment of tree condition:

Revised Tree Condition Rating
SDOT Maintained Trees
July 2007 (Estimated)

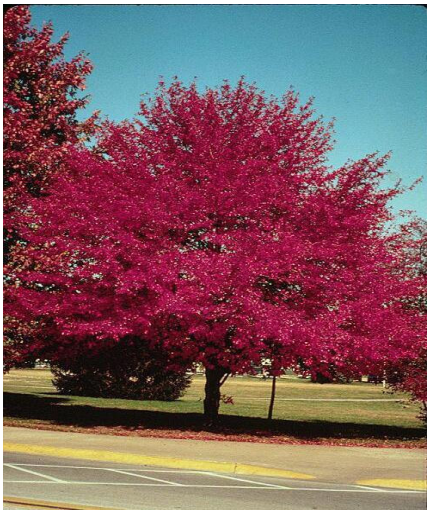
Tree Population	% in Good Condition	% in Fair Condition	% in Poor Condition
Trees Planted Prior to 1992	17	75	8
Trees Planted After 1992	50	50	
All Trees	28.5	66.25	5.25

The 2007-2008 inventory effort will provide an updated condition assessment. SDOT arborists recommend updates every five (5) years.

Funding Requirements:

Maintenance and Operations:

In 2007, the actual costs for maintenance are projected to be $738,000 and the actual costs for operations is $791,000 based on financial performance through the first half of 2007. BTG has provided an additional tree crew, which costs approximately $369,000, to increase the number of trees pruned annually to 3,000. BTG has also provided dollars for planting an estimated 800 new trees each year, or approximately $413,000, which includes watering the newly planted trees for the first three (3) years.



Street Tree: Tupelo

Maintaining Trees in Current Condition:

The extent of the BTG-funded pruning is to address public safety concerns and reduce conflicts with other infrastructure assets. Additional funding is needed to allow Urban Forestry to address structural anomalies of the tree which, if not addressed, will allow a tree to degrade from good to fair condition.

Trees that are newly planted require a 3-year establishment period that requires additional waterings, eighteen (18) waterings per tree per year. After the 3-year establishment period, these new trees will also require pruning in order to keep them in good condition. At the rate of planting 1,000 new trees each year, the cost of this additional maintenance is:

Maintenance Cost of Additional Trees
2008-2011

Year	Number of New Trees Planted	Number of New Trees Pruned	Cost of Additional Maintenance
2008	500		
2009	1300		
2010	1000	500	$ 31,500
2011	1000	1800	$113,000

BTG funding includes provisions for the waterings required for each tree for three (3) years of establishment. Additional funding is required for pruning starting after the third year.

To maintain the trees, including the newly-planted trees, at their current condition ratings and prevent deterioration would require two (2) additional tree crews at an annual cost of $738,000. Additional funds would be needed for tools and equipment for the crews.

Raising the Condition of Trees Rated in Fair Condition to Good Condition:

Over 65% of SDOT trees are rated in fair condition. The addition of two (2) tree crews, as stated above, will allow SDOT to prevent further deterioration. If the condition of these trees is to be raised to good condition, it will require additional pruning to correct tree conflicts with private infrastructure and perform all of the pruning necessary for the long-term health and viability of the tree. The Society of Municipal Arborists recommends a 7-year pruning cycle for mature trees (minimum 21" DBH), and a 3-5 year pruning cycle for small trees. The addition of two (2) additional tree crews and a tree crew supervisor would be required to raise the condition of the trees rated in fair condition to good condition over a period of six (6) years at an annual cost of $869,000.

Replacing the Trees Rated in Poor Condition:

Approximately 1,837, or 5.25%, of the SDOT-owned trees are considered in poor condition. Trees in this condition require replacement. The removal and replacement of all of these trees would cost $5,327,300. If addressed over a twelve (12) year period, this would cost approximately $445,000 per year. This would require an additional tree crew at a cost of $369,000 annually.

Tree-Lined Sidewalk in a Commercial Area

In 15-20 years, a greater number of trees will reach an age that will suggest they be removed and replaced. The majority of SDOT trees were planted in the mid 1970s. Given an estimated life span of fifty (50) years, removal and replacement figures may be 4-5 times higher within twenty (20) years.

Unmet Funding Needs:

SDOT will require additional funding to sustain newly planted trees in good condition after the establishment period. Additional funding is required to raise the condition of the majority of the trees rated in fair condition to good condition and to replace the number of trees that die each year.

The unmet funding needs of SDOT trees are:

Action	Time Period (years)	Requirement	Annual Cost
Prevent Deterioration		2 tree crews	$738,000
Raise trees in fair condition to good condition	6	2 tree crews + tree crew supervisor	$869,000
Replace dead/dying trees	12	1 tree crew	$369,000
Total	12	5 tree crews + tree crew supervisor	$1,976,000

Appendix A: Vision and Goals of Asset Management

Asset Management Principles:

These principles are expressions of intention to reach an "end" state, and SDOT recognizes that we are embarking on a long-term effort to achieve that end state through a process of continuous improvement.

- ✓ Asset Inventory: SDOT will develop information on our asset inventories that will include all those assets that we are responsible for and will be ordered according to a hierarchy that reflects SDOT's business responsibilities and advanced asset management practices.
- ✓ Condition Assessment: SDOT will collect information on the condition of our assets that will be consistent and easily understood across all the categories of our assets. This information will be used to develop asset management plans for the maintenance and operation of our assets that will achieve sustainable service levels.
- ✓ Maintenance: SDOT will develop and adopt a maintenance policy for our assets that moves us toward an operation that achieves sustainable and high levels of performance based on agreed upon service levels. This policy will be assisted in its implementation by the development and use of a work management system that will work in cooperation with asset management practices to retain necessary maintenance and condition information.
- ✓ Levels of Service (LOS): SDOT will develop and use as benchmarks level of service information that reflects and includes to the extent feasible our customer and stakeholder input. We will use this information to report on our performance in meeting, or not meeting, the LOS and the implications thereof.
- ✓ Financial Planning: SDOT will incorporate full life-cycle costing into our financial planning to achieve cost-effective asset management planning and operation to minimize full life-cycle costs. Our financial reporting will reflect full lifecycle costing, and will include the implications of meeting, or failing to meet the funding requirements indicated by full life-cycle costing.
- ✓ CIP and Annual Budget Funding Processes and Procedures: SDOT will incorporate asset management principles into budgeting and CIP decision-making, across the Department so that decisions are based on critical asset needs, conditions, and levels of service.
- ✓ Capital Improvement Planning: SDOT capital planning for replacement, renewal or new infrastructure will include asset management principles related to LOS, full life-cycle costing and an understanding of the criticality of the asset and its sustainable service levels.
- ✓ Information Technologies and Analysis and Evaluation: SDOT will adhere to its integrated systems strategy in developing information systems that support the business and user needs of Asset Management; be they inventory, condition, work management, financial, or project planning systems.
- ✓ Reporting: SDOT will report on its performance in relation to an annual strategic asset management plan and report, and in annual asset status and condition reports.
- ✓ Triple-Bottom Line: SDOT will align the environmental and social costs and impacts of asset decisions with the city's policy as embodied in its Race and Social Justice Initiative.
- ✓ Service Delivery Continuance: SDOT will continue effective and efficient service delivery while we implement Asset Management.

- ✓ Transportation Strategic Plan: The Transportation Strategic Plan targets will be guidance for asset management planning.
- ✓ Continuous Improvement: Asset Management will be implemented through a process of continuous improvement.
- ✓ Environmental Management System: SDOT's Asset Management Program will align with the Department's Environmental Management System (EMS).
- ✓ Information Management: SDOT will adopt an information management policy to ensure accurate, complete and timely information is readily available to support asset management. Asset information is an essential but expensive foundation for effective asset management decisions. Our information management practices will ensure that we collect and actively maintain only the critical minimum information at the level of quality needed by the business, and that this information is accessible from a single authoritative source.

SDOT Policy Guidance within the Asset Management Program:

SDOT recognizes that an explicit discussion and acceptance of asset management principles also involves the reconciliation of certain policy issues, and SDOT is committed to this effort as an immediate task of the Asset Management Program Steering Committee. The issues needing reconciliation include:

- ✓ Reconcile the stated policy goal: Preserve and Maintain Transportation Infrastructure" with the TSP, that does not call out a priority for preservation. From the CH2MHill report[5]: "SDOT's policy framework needs to be refined to ensure that existing assets are properly managed, and that maintenance needs are weighed against improvement projects in a way that minimizes life cycle costs across asset types."
- ✓ Establish policy support for rigorous life-cycle cost benefit analysis. The CH2MHill report notes that such analysis is not routinely required for prospective improvement projects. Such analysis is a core practice in asset management.
- ✓ Establish policy support for Level of Service-based approach. The CH2MHill report notes that the Department has some measurable targets for some goals, but these are not couched in level of service terms.
- ✓ Establish policy regarding Customer Consulting. The CH2MHill report notes that the Department has performance targets but it is not clear to what extent these are reflective of customer or stakeholder expectations. The principles as stated in the first section of the Manifesto call for customer consulting "to the extent feasible".
- ✓ The program's tie-in with established finance practices: budget and CIP development. The Department recognizes and accepts that assets will be built and maintained within the CIP and annual budget that ultimately is adopted.
- ✓ The program's tie-in with other business practices: most especially project management in the CIP.

[5] **Final Gap Analysis**, Asset Management Business Case Definition, dated January 2007

SDOT Asset Management Definition, Vision and Goals:

SDOT defines Asset Management as:

A strategic and systematic process that guides decisions about construction, maintenance and operation of SDOT infrastructure

Asset Management in SDOT will be developed and conducted to achieve this vision:

Transportation excellence
through
expert, credible, responsive
asset management

Asset Management in SDOT will be guided by these goals as we move toward the vision:

Sustainability
Accountability
Transparency
Equitable
Smart Decisions
Stewardship
Agile

Appendix B: The Asset Hierarchy

The hundreds of transportation infrastructure components owned by SDOT have been organized into a hierarchy to enable more effective management and communication about the assets. This table depicts the hierarchy down to the level 2 assets to more clearly communicate the nature of each level 1 asset discussed in this report. Many of these level 1 assets can be decomposed to even lower levels. Further details about the SDOT Asset Hierarchy can be provided by contacting the SDOT Asset Management Program staff.

Asset Class	Level 1 Assets	Level 2 Assets	Asset Categories
Bike/Ped System	Bicycle Rack		
	Marked Crosswalk		Raised, Painted, Torch-down, Thermoplastic
	Pedestrian Crossing Underpass/Tunnel		
	Pedestrian Viewing Platform		
	Sidewalk System	Sidewalk	Block, Improved Corner
		Curb	
		Curb Ramp	
		Improved Filler	
	Stairway	Rail	
		Rail Post	
		Tread	
		Riser	
		Landing	
		Stringer/Support	
		Cleat	
	Trail	Trail Surface	Paved, Gravel/Dirt
		Bollard	
	Transit Loading Platform		Bus Island, Streetcar Platform
Channelization	Pavement Marking		Pavement Delineators, Legends, Hatchings, Stop Lines, Parking Space, Curb Markings
	Roundabout		
Intelligent Traffic Signs	Dynamic Message Sign	Display Panel	
		Controller Cabinet	
		Communication Equipment	
	Radar Speed Sign		

Asset Class	Level 1 Assets	Level 2 Assets	Asset Categories
Parking Payment Devices	Pay Station	Pay Station Body	
		Mother Board	
		Display	
		Card Reader	
		Button Board	
		Coin Box	
		EPROM	
		Printer	
		Coin Acceptor	
		Pay Station Sign	
	Parking Meter	Meter Head	
		Meter Pole	
Pavement System	Pavement		Arterials, Non-Arterials, Alleys, Excess ROW in use for access & parking
Real Property	Building		
	Excess/Unopened ROW in Public Use		
	Parcel		Former Railroad ROW, Other Real Estate
Regulated Assets	Areaway	Beams	
		Building Wall	
		Deck/Sidewalk	
		End Walls	
		Floor	
		Skylight	
	Shoreline Street End		
	Unimproved Filler		Shoulder, Planting Strip, Other
	Unopened ROW		
Roadway Structures	Areaway Street Wall		
	Bridge	Superstructure	
		Substructure	
		Approach Slab	
		Machinery	
		Control System	
		Protection Pier	
	Bridge Hydrant Vault		
	Retaining Wall	Railing	
		Drainage	
		Tie Back	
		Lagging	
		Pile	
		Expansion Joint	
		Whaler	
		Structural Face	

Asset Class	Level 1 Assets	Level 2 Assets	Asset Categories
Seattle Streetcar	Streetcar System	Streetcar	
		Paved Trackway	
		Streetcar Station Shelter	
		Traction Power System	
		Train-to-Wayside Communication System	
		Passenger Information System	
Signs	Sign Assembly	Sign	Regulatory, Warning, Directional/Guide, Temporary
		Mount	
Structures Other Than Roadway	Air Raid Siren Tower		
	Pier		
Traffic Safety Structures & Devices	Chicane		
	Crash Cushion		
	Curb Bulb		
	Delineator Post		
	Guardrail	Rail	
		Post	
	Median Island	Median Island Curb	Paved or Landscaped; Pedestrian Refuge Island or Other
		Raised Asphalt Interior	
		Fencing	
	Speed Cushion		
	Speed Dot		
	Speed Hump		
	Traffic Circle		

Asset Class	Level 1 Assets	Level 2 Assets	Asset Categories
Traffic Signal System	Beacon		School, Traffic, Emergency/Warning,
	CCTV Camera Assembly	CCTV Camera	
		CCTV Camera Cabinet	
		CCTV Camera Mount	
		CCTV Panel	
		CCTV Camera Power & Video Cables	
	Detection System		Pavement Loop, Video Detection, Pedestrian Pushbutton, Magnetometer, Infrared, Emergency Pre-empt, Railroad
	Traffic Management Center	Modems	
		Video Multiplexor	
		Port Server	
		File Server	
		Work Station	
		Video Wall Screen	
		Video Switch	
		Video Encoder/Decoder	
		Switch	
		Firewall	
	Traffic Signal Assembly	Controller Cabinet	
		Overhead Assembly	
		Vehicle Signal Head Assembly	
		Pedestrian Signal Head Assembly	
		Electrical Sign	
	Traffic Signal Communication System	Terminal Cabinet	Copper, Fiber
		Interconnect	
Urban Forest	Landscaped Area	Plant Material	
		Irrigation System	
		Soil	
	Tree	Tree Specimen	
		Tree Pit	

Appendix C: Supporting Materials

The information and tables presented in this appendix provide supporting details about the status and condition of SDOT assets.

Bridge Information:

Unfunded Bridge Maintenance Needs
2007

Annual Programs:

Program Name	Program Description	Est. Cost (Thousands)	Priority
Bridge Painting Program	Corrosion protection of steel bridges	$ 34,588	H
Annual Routine Maintenance Program	Annual routine repair of bridges	$ 5,570	H
Bridge Maintenance Facility	Build bridge maintenance facility	$ 4,800	H
Bridge Control System Replacement	Replace University Bridge control system	$ 378	H
Bridge Seismic Retrofit Program – Phase 3	Seismic retrofit of high priority bridges	$ 56,000	H
Bridge Vehicle Rail Safety Program	Rehabilitation of bridge rails	$ 30,000	H
	Total for Programs:	$131,336	

Rehabilitation Projects:

Bridge Name	Project Description	Features Intersected	Year Built	Est. Cost (Thousands)	Priority
SW Spokane St Viaduct	Widening (tied to RTID)	E Marginal Way 1 & 4 Ave	1941	$ 70,000	H
Cowen Park Bridge	Rehab	Cowen Park Ravine	1936	$ 8,500	H
Fauntleroy Expressway	Rehab	Harbor Ave	1963	$ 3,600	H
Ballard Bridge	Rehab	Salmon Bay & RR	1940	$ 5,600	H
West Seattle High-level Bridge	Deck Sealing	Duwamish River	1983	$ 2,400	H
4th Ave S Jackson to Airport	Rehab	Railroad Station	1910	$ 2,700	H
Airport Way/Argo RR Yards	Main span replacement	Argo Railroad Yards	1928	$ 32,700	M
Ravenna Park Pedestrian Bridge	Rehab	Ravenna Park Ravine	1912	$ 2,100	M
Schmitz Park Bridge	Deck Sealing	Schmitz Park Ravine	1935	$ 1,100	M
University Bridge N Approach	Rehab	NE Pacific St/E 40th St	1930	$ 3,600	M
W Emerson St Viaduct	Rehab	Railroad Tracks	1949	$ 3,400	L
Colman Park Bridge #4	Rehab	Lake Washington Blvd/Bike Trail	1900	$ 1,500	L
Colman Park Bridge #2	Rehab	Bike Trail	1900	$ 1,500	L
Colman Park – Lakeside	Rehab	Bike Trail	1900	$ 3,200	L
Colman Park Bridge #3	Rehab	Bike Trail	1900	$ 1,500	L
E Boston Terrace Bridge	Rehab	Ravine	1948	$ 9,300	L
		Total for Rehabilitation Projects:		$152,000	

Replacement Projects:

Bridge Name	Features Intersected	Year Built	Est. Cost (Thousands)	Priority
Magnolia Bridge Viaduct	Smith's Cove & Railroad	1929	$252,000	H
E Pine St Pedestrian Trestle	Gulch @ Madrona Drive	1949	$ 3,200	H
Marion St Footbridge West	Midblock section of Overpass	1908	$ 1,300	M
E Waterway (N bridge) Pedestrian Overpass	Duwamish River E Waterway	1944	$ 8,000	M
Fairview Ave N – W Bridge	Lake Union	1948	$ 17,000	M
2nd Ave Extension S	Railroad	1928	$ 20,500	M
E Interlaken Blvd	26th Ave E	1912	$ 3,400	M
Airport Way between 4th & 5th	Railroad Station	1910	$ 43,000	M
Admiral Way N Bridge	Ravine, Fairmount Ave	1927	$ 33,100	M
33rd Ave W/Railroad Pedestrian Bridge	Rail Roads	1914	$ 2,600	L
Washington Street Pier	Puget Sound	1920	$ 2,400	L
Frink Park Bridge	Stream	1908	$ 1,100	L
	Total for Replacement Projects:		$387,600	

Bridge Painting Program
Bridges with Steel Elements

Bridge Name	Last Year Painted	Next Proposed Painting
University Bridge	1993	2008
Airport Way S / Argo Railroad	1991	2019/2020
2nd Ave S Extension	2005	2021
Fremont Bridge	1997	2012
Jose Rizal Bridge	1992	2007
Admiral Way S Bridge	2001	2019/2020
Ballard Bridge	1994	2010
20th Ave N / NE 98th St	1990	2016
Magnolia Bridge Viaduct	2002	2017
Airport Way / 4th Ave – 5th Ave	1989	2013
Yesler Way / 4th Ave – 5th Ave	1994	2014
1st Ave S / Argo Railroad	1989	2013
Marion St Footbridge	2001	2016
Pike Place Hillclimb Pedestrian Bridge	1989	2019/2020
W Emerson St Viaduct	2005	2021
W Howe St Bridge	1995	2009
Ravenna Park (20th Ave NE)	2003	2019/2020
Mathews Beach Pedestrian Bridge	2004	2019/2020
S Spokane St Viaduct	1989	2015
N Queen Anne Dr Bridge	1996	2012
4th Ave S / Argo Railroad	1998	2014
Washington Street Pier	1987 (spot)	2014
Galer St Flyover / 15th Ave W Bridge	2003	2018

Retaining Wall Information:

Retaining Wall Priority for Replacement
Costs in 2006 Dollrs

Location	Length (Feet)	Date Built	Major Deficiency	Est. Cost (Thousands)
605 24th Ave E at E. Mercer	183	1905	100 ft of wall has cracked and tilted; 73 foot portion of wall on 24th Ave failed in 1989 and was temporarily replaced with ecology blocks; remaining 40 feet has cracked and tilted	$ 756
1916 NE 125th St	240	1971	Weathered, cracked and displaced rocks	$ 1,440
15th Ave NE & NE 130th ST	300	1971	Bulging and cracking of rocks	$ 210
1402 NE 125th St	100	1971	Weathered, cracked and displaced rocks	$ 60
E Boston at 15th Ave	245	1910	Portion of retaining wall have moved out by about 3"; the paved street adjacent to displaced wall has also sunk	$ 1,029
Poplar Pl S at S Dean St	50	1940	Tilting of wall	$ 490
Aurora Ave N – between Galer St and Hayes St	200	1933	Bulging and weathering of rocks	$ 100
Olson Pl SW & 3rd Ave SW	250	1973	Bulging and weathering of rocks	$ 150
Pedestrian bridge at Roxbury & 45th Ave SW	40		Slope above bridge has moved to the bridge and is pushing it; some of the dirt has over-topped the bridge deck	$ 240
Republican St between Eastlake & Yale Ave	145	1904	West end tilting & pushing against a house	$ 870
8th Ave & Columbia St	117	1909	Wall tilting and has several cracks	$ 702
49th Ave SW & SW 98th St	67	1955 & 1987	Wall slid in 1987 and was backfilled with light weight concrete. Early 1997, a crack developed on the roadway parallel to the wall.	$ 402
Northlake Pl N & N 34th St	120	1920	Three of the wall segments have tilted out and cracked	$ 720
E Miller & 13th Ave E	80	1911	Wall cracked horizontally and vertically, cracks as wide as 1". Top rail has moved, creating a gap from the road. Traffic impact on the rail is contributing to the movement of the wall	$ 480
49th Ave SW & SW 98th St	67	1955	Tilting	TBD
14th Ave W between Gilman & Wheeler St	78	1941	Settlement behind wall	TBD
1900 block of Brook Ave SW	50	1974	Cracks and settlement on road	TBD
Columbia St between 7th Ave & 8th Ave	135	1910	Tilting of wall	TBD
S Jackson St at 3rd Ave S	58		Crack and displacement of wall	TBD
Upper Gilman Dr W & 14th Ave W	120	1913	Tilting	TBD

Location	Length (Feet)	Date Built	Major Deficiency	Est. Cost (Thousands)
NE 98th St at 20th Ave NE	100	1987	Wall has undermined about 7 feet; may need 2nd tieback as planned	TBD
38th Ave SW & SW Andover St	320	1911	Tilting, corrosion on tieback system; non-standard guardrail	TBD
Terry Ave N between Thomas & Harrison St	372	1907	Rotation	TBD
8516 block of Sandpoint Way NE	70		Wall is covered with thick growth. The road above has long cracking and settlement	TBD
John St between Terry Ave N & Westlake Ave N	70	1943	Tilting and settlement of road	TBD
3rd Ave W at W Fulton St	200	1923	Tilting	TBD
			Total:	> $ 7,649

Stairway Information:

Stairway Priority for Replacement

Location	Cross Streets	Date Built	Length (Feet)	No. of Treads	Est. Cost (Thousands)
Randolph Ave	Walington Ave & James St		117	101	$ 100
18th Ave SW	Charleston & West Marginal Way		328	228	$ 150
SW Genessee St	21st Ave SW & 22nd Ave SW		98	74	$ 60
SW Genessee St	2nd Ave SW & 23rd Ave SW		100	77	$ 65
52nd St	20th Ave NE & 21st Ave NE	1911	90	62	$ 5
52nd St	21st Ave NE & 22nd Ave NE		104	79	$ 25
46th Ave SW	Charleston & Andover		11	10	$ 10
Bonair Dr SW	Alki Ave SW & Halleck Ave SW		168	109	$ 168
Comstock St	Queen Anne & 1st	1909	96	86	$ 10
W Lee St	Willard & 6th		23	2	$ 3
20th Ave NE	N of 98th	1996	55	51	$ 15
SW Massachusetts	Sturgus & 17th Ave S		145	78	$ 50
E Republican St	Melrose & Bellevue		117	90	$ 10
Warren Ave	Ward & Ward		67	42	$ 6
6th Ave W	Comstock & Highland	1908	57	45	$ 10
14th Ave W	Raye		29	18	$ 5
SW 21st Ave	Genessee		4	14	$ 25
N 88th St	Meridian & Burke Ave N	1967	21	11	$ 100
NE 95th St	20th Ave NE & Lake City Way	1981	153	108	$ 100
Lee St	4th Ave & 5th Ave		34	25	$ 100
S College St	Beacon & 13th	1945	27	24	$ 80
SW Raymond St	Atlas & 50th	1945	86	76	$ 400
53rd Ave SW	Bonair Pl & Halleck Ave	1945	178	136	$ 100
Brook Ave SW	SW Hill St		30	27	TBD
21st Ave SW	Elmore & Commodore		10	9	TBD
Norman St	33rd & Lake Washington Blvd		52	38	TBD
38th Ave E	Newport & Union	1912	196	137	TBD
N 41st St	Aurora & Aurora		82	73	TBD
52nd Pl SW	Oregon & Genessee		49	30	TBD
8th Pl W	7th & 8th		64	57	TBD
S Bayview St	MLK Way & 28th Ave		78	54	TBD
45th St	Palatine Ave N & 1st Ave N	1916	62	33	TBD
Palatine Ave N	N 45th St & N 46th St	1916	64	24	TBD
20th Ave	98th St & Creek		12	13	TBD
SW Kenyon St	14th Ave S & 15th Ave S				TBD
2nd Ave N	Prospect & Highland	1980	81	66	TBD
25th Ave E	Harrison & Thomas		16	14	TBD
31st Ave	Cherry & Arlington		37	31	TBD
				Total:	> $1,597

GASB-34 Reporting:

A major initiative undertaken by the Governmental Accounting Standards Board (GASB), which establishes requirements for the annual financial reports of state and local governments, may provide a significant impetus for state Departments of Ttranportation and local governments to deploy an asset management system.

In June 1999, GASB issued Statement No. 34, "Basic Financial Statements for State and Local Governments," which requires state and local agencies to enhance the types of information provided as part of their annual financial statements in a manner more consistent with that used by private-sector companies and governmental utilities. Annual reports in compliance with the new rule will include financial statements prepared using full accrual-based accounting practices which reflect all of the government's activities — not just those that cover costs by charging a fee for service.

This new approach will cover all capital assets and long-term liabilities, including infrastructure as well as current assets and liabilities. Accrual accounting reports all of the costs and revenues of providing services each year.

GASB recommends that state, city, and county government agencies, in reporting capital assets as part of their modified financial statements, use an historical-cost approach to establish transportation infrastructure values. If historical cost information is not available, GASB provides guidance for a proxy estimate using the current replacement cost.

Statement 34 indicates that governments may use any established depreciation method and identifies both straight-line depreciation and condition-based depreciation as acceptable. However, the GASB requirements indicate that infrastructure assets that are part of a network or subsystem of a network do not have to be depreciated if two distinct criteria are met — namely, if the government manages the infrastructure assets using an asset management system, and if the government documents that the infrastructure assets are being preserved at, or above, a condition level originally established for the assets. The asset management system should:

- ✓ Have an up-to-date inventory of assets;
- ✓ Perform condition assessment of the infrastructure assets at least once every three (3) years and summarize the results using a measurement scale; and
- ✓ Estimate the annual amount required to maintain and preserve the infrastructure assets at the condition level originally established for those assets.

Source: United States Department of Transportation (USDOT) Asset Management Primer

Appendix D: Staff Who Participated in Preparation of this Document

This document was prepared with the assistance of staff throughout SDOT.

Asset Management Program Staff:

Anne Fiske-Zuniga, Executive Sponsor, Deputy Director SDOT
Bryant Enge, Resource Management Director
Elizabeth Paschke, Program Manager
Diane George, Project Manager (consultant)

Division: Capital projects and roadway structures

Group: Property & Environmental Services

Larry Huggins, Manager
Fay Alexander

Group: Roadway Structures

John Buswell, Manager
Angel Garcia
Ainalem Molla

Division: Major Projects

Group: Project Management

Ethan Melone

Division: Policy and Planning

Kristen Simpson

Division: Resource Management

Lou Brennen
Nancy LaWall

Division: Street Maintenance

Charles A. Bookman, Pavement Manager
Benjamin Hansen
Elizabeth Ellis

Division: Street Use & Urban Forestry

Group: Street Use

Cathy Abene
Patti Quirk

Group: Urban Forestry

Roy Francis, Manager
Shane DeWald
Darren Morgan
Nolan Rundquist

Division: Traffic Management

Group: Parking Operations

Mike Estey, Manager
Margo Polley
Sue Partridge
Bill Timmer (consultant)
Joyce Kenyon

Group: Traffic Maintenance

Paul Roberts, Manager

Group: Traffic Operations

Eric Widstrand, Manager
Kent Grasso
Megan Hoyt
Reiner Blanco
Mike Hendrix
Luke Korpi

Group: Traffic Signal Operations

Brian Kemper, Manager
Loren Raynes
Rosemary Bachmann
Chuck Morrison

Appendix E: Glossary

Terms and acronyms used in this document:

Term/Acronym	Definition/Description
AC	Asphalt concrete over flexible base
AC/PCC	Asphalt concrete over Portland cement concrete or other rigid base
ADA	Americans with Disabilities Act
Asset Class	A grouping of Level 1 Assets that is based on commonality of function of the Asset
Asset Hierarchy	The decomposition of an Asset into its successive lower-level component Assets; the overall framework into which SDOT has organized its Assets
Asset Owner	A position in the SDOT organization that is recognized as the primary source of information and knowledge about capital investment needs, preservation, maintenance and operation of an asset.
Bike Boulevard	A shared roadway which has been optimized for bicycle traffic. In contrast with other shared roadways, bicycle boulevards discourage cut-through motor traffic but typically allow local motor vehicle traffic. Bike boulevards are designed to give priority to cyclists as through-going traffic
Block Face	One side of a street segment
Block Face Equivalent	2000 square feet
BST	Bituminous surface treatment, commonly referred to as Chip Seal
Catenary	Curve of cable; the curve adopted by a length of heavy cable, rope, or chain of uniform density, hanging between two points, or something with this shape; refers to the overhead cables associated with the streetcar system
CBD	Central Business District
CIP	Capital Improvement Program
Complete Streets	Resolution 30915 and Ordinance 122386 that define maintenance practices for SDOT assets
DBH	Diameter at Breast Height, or 4.5 feet; used as a standard measure of tree size
Encroachment	Non-permitted private use of the public ROW
GASB-34	Governmental Accounting Standards Board, Statement 34
Gore Area	The area of the roadway in-between two (2) diverging lanes before reaching a structural delineator
Lane-Line Mile	A measure of pavement marking that is equivalent to a 4” line of painting that extends one (1) mile in length
Level 1 Asset	The highest level of the physical Asset Hierarchy; the level at which investment decisions are commonly considered

Term/Acronym	Definition/Description
Movable Bridge	A bridge with one or more spans that open to allow passage of vessel traffic
PCC	Portland cement concrete
Real Property Asset	An item owned by SDOT that is of indirect value to the mission of SDOT or indirectly affects the delivery of SDOT services
Regulated Asset	ROW that is not yet improved but is regulated by SDOT; an item that exists in the ROW that is not owned by SDOT, but for which SDOT either shares liability or for which SDOT regulates the proper use
Replacement Value	The total cost in today's dollars to replace the physical inventory of an asset
ROW	Right of Way
RPAMIS	Real Property Asset Management Information System; an automated system operated by the Fleets and Facilities Department that contains asset data for SDOT buildings and parcels
Sight Triangle	A triangular area measured thirty (30) feet back from the point where two (2) curb lines meet if extended beyond the radius until they intersect at 90 degrees; used by Urban Forest staff to assure that plant material is pruned back from visual obstruction of vehicle operators
Spall	A section of concrete that cracks and separates from the larger concrete structure
Steel "H" pile & RC	Steel "H" pile refers to the shape of the steel pile that is used as a structural member of a retaining wall; RC is reinforced concrete
TCIP	Transportation Capital Improvement Program - Published in the City of Seattle's Capital Improvement Program, it includes a six-year plan for improvement and preservation projects for SDOT assets
TSP	SDOT Transportation Strategic Plan - The 20-year plan, describing the actions SDOT will take to accomplish the goals and policies in the City of Seattle's Comprehensive Plan and the Puget Sound Regional Council's Destination 2030 plans, and in support of Mayor Nickels' four (4) priorities for Seattle.

Revision History

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1.0	2007 Report	04/22/2008	Approved for publication by Steering Committee