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## M E M O

February 21, 2008

To: Mayor Tom Potter  
Commissioner Sam Adams  
Commissioner Randy Leonard  
Commissioner Dan Saltzman  
Commissioner Erik Sten

From: Robert H. Glascock, Convenor  
City Asset Managers Group

Cc: Gary Blackmer, City Auditor

**Subject: City of Portland Asset Status and Conditions Report, December 2007**

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The City Asset Managers Group (CAMG) submits its fifth annual report. The data represents a snapshot of the City's capital assets, as of June 30, 2007. Key findings and CAMG recommendations are in the report's Executive Summary.

The report responds directly to a key Council focus area: to rebuild and maintain the City's infrastructure. A properly maintained and sound infrastructure is critical to delivering the quality services Portland's citizens and businesses need and expect. The report spells out the significant funding gap and work needed to address this significant issue.

In 2005, CAMG added common definitions, data confidence levels and bureau observations, for clarity and transparency on the quality and completeness of the data. In 2006, CAMG added affordable housing as an asset category (the sixth category). The 2007 report has two new features: appendices on risk rating and green infrastructure.

There are three levels of asset management. In past years, the focus was on maintaining the deteriorating infrastructure. This (2007) report extends the reach into mandates. With the Portland Plan, the extent will also cover infrastructure needed to serve new growth.

Asset management is a continuous cycle of asset inventory, condition and performance assessment. Its goal is the cost-effective provision of a desired level of service. CAMG uses internationally-recognized principles and practices to evaluate our combined assets with a citywide perspective. We will continue to improve this report and provide annual updates to you.

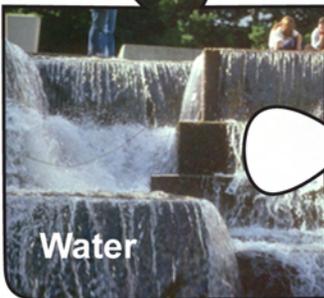
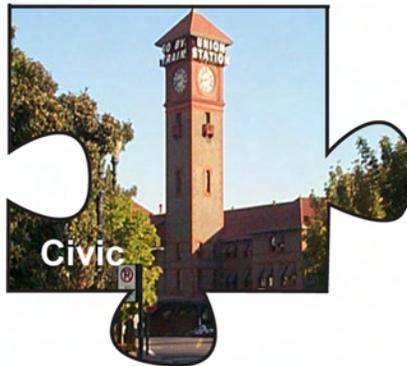
Attachment: *City of Portland Asset Status and Conditions Report, December 2007*

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City of Portland

# Asset Status and Conditions Report

December 2007



**RISK** = Likelihood x Consequence



# Acknowledgements

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# City of Portland

## Asset Status and Conditions Report—December 2007

### Executive Summary

This is the fifth year of reporting on the status and condition of the City's physical infrastructure. In 2005, the City changed from focusing on a single condition of assets - deteriorating infrastructure - to a holistic asset management approach. This approach seeks to ensure that the City's assets are adequate to provide desired levels of service.

The City's infrastructure bureaus<sup>1</sup> have partnered to collect and analyze data for this report, using internationally recognized asset management (AM) principles and practices to enable informed decisions that best meet customer needs. The City Asset Managers Group (the Staff group) is developing a coordinated Citywide AM program for all City assets, using a common approach, while allowing each bureau to strategically employ AM for their particular asset groups. This report supports City Council's move toward that 'whole-of-city' decision-making, using readily available information.

The report includes current replacement value, current and projected physical condition, and annual funding gaps. Each bureau identifies their confidence in the information presented. In some cases, information is not yet available, or more time is needed for detailed data collection and analysis. This year's report also introduces two concepts – risk management and green infrastructure. The risk management process involves identifying, understanding, and responding to risks to the City's physical infrastructure and can inform short term and long term management and funding decisions. Green Infrastructure, which uses natural processes, systems, or features to provide traditional infrastructure services, offers an opportunity to protect environmental quality, reduce long term costs, improve service provision, and advance sustainability. It should be considered a core component of the City's infrastructure systems.

### General Findings

1. The City's physical infrastructure has a current replacement value of \$21.5 billion.
2. An annual funding gap of at least \$112 million exists between available funding and need.
3. At current funding levels, some of Portland's infrastructure will continue to deteriorate.
4. The risk of asset failure is a key measure and should be identified and reported in future asset reports. A risk management approach may also help inform management and funding decisions.
5. The City's green infrastructure plays a key role in infrastructure services and should be accounted for similarly to traditional built infrastructure. Green infrastructure includes natural and engineered solutions and varies in the extent of City ownership.

### Directors' Recommendations

1. Continue to prepare the annual asset status and conditions reports, and explore ways to shrink the unmet budget needs for infrastructure maintenance.
  - a. Increase the allocation for the General Fund Capital Set-aside to fund additional projects that will cost-effectively address extreme and high risk City assets.

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<sup>1</sup> Participating bureaus include the Bureau of Environmental Services (BES), the Office of Management & Finance (OMF) for City-owned buildings, Portland Parks and Recreation, Portland Development Commission (PDC), Portland Office of Transportation (PDOT) and the Water Bureau. The Bureau of Planning organizes the group's meetings and reporting. OMF budget and finance staff attend to ensure overall coordination with City Council priorities and budgeting.

- b. Starting with the FY 2009 - 10 budget process, instruct bureaus to include risk-based ratings in capital budget requests (amend the CIP Budget Manual accordingly).
  - c. Explore minimum standards for business case to include a systematic evaluation of project benefits and costs, and evaluation of asset risk, and triple bottom line factors (social, environmental, economic).
2. Employ the risk management process, outlined in Appendix 5, to identify and evaluate risk to the City's physical infrastructure. Risk ratings will be used to better inform short term and long term management decisions, including funding allocations.
  3. Adopt the proposed green infrastructure framework (Appendix 6) for use in asset management discussions in all City bureaus.

## Introduction

This fifth report on the status and condition of the City's physical infrastructure takes a holistic approach to ensure that the City's assets are adequate to provide desired levels of service. A wide range of asset categories is tracked over the lifecycle of assets (new, operation, maintenance, and renewal).

This report seeks to provide coordinated, integrated, fact-based information about the City of Portland's physical assets that will enhance a 'whole-of-city' approach to asset management (AM). It provides an accounting of the number of assets, condition, replacement value, current service levels, and cost of unmet needs. Information in the report will assist the City's efforts to ensure infrastructure is in good condition and that operation, maintenance, rehabilitation, and development programs are as efficient and effective as possible.

To reflect the current state of City asset management, this report includes:

- current replacement values of city assets (see Appendix 1);
- assessment of the current condition of each asset group, based on a five tiered rating system and associated confidence levels (see Appendix 2);
- annual estimated funding gap (see Appendix 3);
- bureau observations on their AM activities (see Appendix 4); and
- common definitions for basic AM terms (see Appendix 7)<sup>2</sup>.

This year's report also introduces two concepts – risk management (Appendix 5) and green infrastructure (Appendix 6). The risk management process involves identifying, understanding, and responding to risk. It can be used to identify and evaluate risk to the City's physical infrastructure to better inform short term and long term management decisions, including funding allocations. Further information on the risk management approach can be found in Appendix 5. Green Infrastructure, which uses natural processes, systems, or features to provide traditional infrastructure services, offers an opportunity to protect environmental quality, reduce long term costs, improve service provision, and advance sustainability. It should be considered a core component of the City's infrastructure systems. More information on the City's green infrastructure can be found in Appendix 6.

## Goals and Objectives of Asset Management

The goal of strategic asset management is to develop a sustainable asset base that responds to social, economic, and environmental needs. It focuses on how the asset provides an appropriate level of service. Asset management seeks to address the need to maintain, repair, rehabilitate, replace and dispose of assets. These needs can be driven by asset deterioration, regulations, and community needs (based on service levels).

Asset Management informs:

- asset acquisition;
- maintenance and operations;
- renewal and adaptation; and
- asset disposal.

Applying AM principles and practices will:

- reduce dependence on assets (for example, disconnecting downspouts);

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<sup>2</sup> The definitions and confidence levels draw on several AM sources, including GHD Consultants (used by PDOT and Water Bureau), trained bureau staff, and literature searches.

- support the efficient delivery of services with assets that are cost-effective, well maintained, accessible, energy efficient and safe;
- improve the ability to make sound business and planning decisions at all levels;
- promote effective use of resources;
- improve bureau support and accountability;
- develop a culture of service throughout the City; and
- improve and coordinate City AM planning across bureaus.

Asset management activities will differ for each asset type based on maintenance management techniques, scheduling and priorities of activities, failure modes, treatment options, renewal strategies, equipment and practices, and renewal techniques. However, a whole-of-city approach ensures that the most innovative and cost-effective techniques are employed as each bureau's practice improves. Using this cross-bureau effort will continually improve performance-based information that is available to citizens, bureaus, and city leaders as they make choices in the types and levels of service desired.

A prerequisite for sound AM is relevant, reliable, and timely information about asset resources. As much as possible, information provided in this report is comparable across bureaus and asset groups, and the confidence levels for the information were assigned using a common scale.

Common elements for managing assets include:

- information systems that provide data on asset inventories and their condition;
- good documentation of life-cycle costs, and optimum renewal strategies that ensure the lowest life-cycle cost;
- a needs assessment to evaluate current practices, asset risks, and opportunities;
- links between service outcomes, bureau programs, AM plans, and performance measures;
- community engagement to better define desired and affordable levels of service; and
- clear assignment of roles and responsibilities to guide AM efforts.

## **Background of Citywide Asset Reporting**

In 2003, asset managers from the City's infrastructure bureaus formed a City Capital Maintenance Committee to collaborate on AM issues and prepare an annual report on the City's physical assets. Their reports to City Council in 2003 and 2004 focused on the current and projected condition of infrastructure, not on the strategies needed to manage assets over their whole life. Efforts to describe assets and needs varied from bureau to bureau as did confidence in the information. This made it difficult for City Council to make decisions using that information.

In 2005, this committee became the City Asset Managers Group, a Staff group, adopting a more holistic approach to AM and looking for ways to collaborate on common AM issues. While Transportation had an existing program of AM, other bureaus were just beginning to adopt AM principles and techniques. By joining forces, the Staff group identified common long-term AM needs and helped frame AM throughout the City using a consistent approach. The Staff group produced the *City of Portland Asset and Conditions Status Report—December 2005 and December 2006*, and met this year to produce the 2007 report.

In the FY 2005 - 06 budget process, City Commissioners asked for better data on the funding gap in capital maintenance. There were questions about the quality and completeness of the data, and doubts about bureaus' stated funding needs. To address Council's concerns and to

reflect the current state of City asset management, the 2005 report added three features: common definitions for basic asset management terms, data confidence levels, and bureau observations on their asset management activities. These features also appear in subsequent annual reports.

The 2006 report added affordable housing as an asset category. For purposes of this report, affordable housing is defined as multi-family rental housing units with direct City investment (leveraged financing) and a regulatory agreement with the Portland Development Commission. This represents 9,000 housing units. Excluded from the report are public housing units owned and operated by the Housing Authority or “federal preservation” properties owned and operated privately under regulatory agreements with HUD. (see Appendix 2.g).

The Staff group briefs the Directors’ group regularly. Findings of the annual assets reports are reviewed, and the Directors’ group updates recommendations to City Council. As asset management improves across the bureaus, so will the ability of City Council, bureau managers, and citizens to make informed decisions about asset-related services.

## **Policy Drivers**

In FY 2001–02, City Council set strategic priorities as part of a *Managing for Results* exercise. The Council identified the City’s deteriorating physical infrastructure as an immediate strategic priority. The deteriorating infrastructure remains a top Council strategic priority. For the FY 2006–07 budget, full Council named “infrastructure” as a primary Council concern and focus area, and urged bureaus to collaborate and involve stakeholders in the budget process.

For FY 2008 - 09, Mayor Potter set three budget priorities and a specific priority for ongoing and one-time funds.

- Take care of current assets before adding more assets. Bureaus must show that requests extend beyond their ability to fund internally. Future asset status and conditions reports can play a role, in posting measurable results of funded decision packages for capital maintenance, renewal and replacement.
- Make strategic, long-term investments in core programs, by providing a stable source of funding to those programs that have operated with one-time or otherwise non-recurring funds. Specific priorities include Parks operations and maintenance (backfilling expiring levy funds).
- Use one-time funds to update public safety infrastructure. In FY 2007 - 08, City Council committed to replace three public safety projects, the Computer Aided Dispatch system (BOEC), Police Data System, and Citywide 800 MHz radio system. Mayor Potter has added two other projects, a new regional public safety training center and an Emergency Coordination Center. The strategy is to make headway to fund these essential projects while economic times are good.

Other policy drivers (federal, state and City) underscore the importance of the condition of municipal infrastructure in supporting a community’s economic health, active neighborhoods, and environmental stewardship, including:

- State and federal regulations.
- Public Facilities Plan, a long-range, citywide plan which requires a major projects list, for use in annual capital budgets.
- Portland Comprehensive Plan
- Municipal bonded debt covenants
- City CIP budget manual, which requires bureaus to analyze operations and maintenance costs and savings in new projects.

- U.S. Governmental Accounting Standards Board 34, which allows the City to capitalize costs that extend an asset's useful life.
- Other Council Priorities

## Regulatory Compliance

Regulatory compliance requirements can have major impacts on the management of infrastructure systems and on the resources available for repair and expansion projects. Currently there are a number of federal, state, and local regulations which require additional compliance measures by the City. These mandates vary in the degree of investment needed, compliance requirements and timeline, and the degree necessary investments are funded through current revenues.

Regulatory mandates impact many or all of the City's infrastructure systems, including sewer and stormwater, transportation, water, parks, civic facilities, and affordable housing investments. The following regulations represent some of the major regulations currently impacting capital systems:

- Clean Water Act, such as the Long Term Enhancement Rule (LT2) and CSO Amended Stipulated Final Order;
- Environmental Protection Act, including Superfund cleanup requirements;
- Safe Drinking Water Act, including Underground Injection Control requirements;
- Endangered Species Act, such as Habitat Conservation Planning;
- Americans with Disabilities Act;
- Uniform Building Code, including minimum seismic standards; and
- Green Building and Energy Efficiency Policies.

Many of these regulations do not have dedicated funds set aside for compliance measures. Compliance often requires significant capital investment and funding these improvements may require diverting financial resources from capital repair and rehabilitation projects. In addition to existing mandates, possible future regulations could further impact management of the City's infrastructure systems.

The bureau funding gaps presented in this report include regulatory compliance needs to a varying degree. Certain requirements, such as ADA accessibility and building code improvements may occur as part of capital repair or rehabilitation projects. The Water Bureau's anticipated costs related to the Long Term Enhancement Rule (LT2) are also reported.

## Progress on Previous Recommendations

In previous years, the Directors' group endorsed the following eight major recommendations for citywide AM practices. Progress on these recommendations is also noted below.

1. Continue with "whole-of-city" approach. The City should use the "whole-of-city" approach to AM, working across bureaus and systems. This approach will be used for data gathering, analysis, and reporting as well as for the preparation of recommendations on program modifications, funding strategies, and impact analysis. Progress: In this report, the City Asset Managers Group defines risk management and green infrastructure. The intent is that bureaus use these appendices as a group and individually. The group also managed the General Fund Capital Set-aside process (a relatively small part of the capital budget). In late February 2008, the CAMG will host a federal study team to document Portland's use of asset management for water, wastewater and transportation systems. The study team will interview the capital

bureaus, planning director and city auditor. In the last two years, PDOT participated in a national scan of best transportation AM practices, and the Water Bureau reported on benchmarking with international best practices. Further, bureaus participate in the Pacific Northwest Asset Management Users Group, a peer exchange of AM case studies and training. Participating bureaus are committed to expanding this collaborative effort and making continuous improvements in the City's AM process.

2. Continue annual reports and improvements. The City Asset Managers Group will continue to produce an annual report on the City's physical assets and the AM plans used to evaluate them. Bureaus should continue to improve asset management practice.  
Progress: Each year, bureaus work to improve confidence levels in the available data, and work collaboratively on AM. The Staff group shares training opportunities and AM literature. The risk and green infrastructure appendices (new to this report) responded to identified needs.
3. Integrate Asset Management into other planning efforts, including community visioning, strategic planning, and long term capital planning.  
Progress: Asset management will be a key component of the Citywide Systems Plan. The cross-bureau steering committee for that plan has tracked this annual report process, with an eye to long-range infrastructure needs.
4. Review service levels and pursue community consultation. Service levels affect findings of current condition and annual funding gap. Setting service levels and/or significantly revising the current service levels can only be done with public involvement.  
Progress: The 2007 asset reports assume adopted levels of service. The City Asset Managers Group has continued to refine consistent terms and methods to define the annual funding gap. In future years, the City Asset Managers Group will develop some alternative scenarios for levels of service as one approach to reducing the funding gap. In addition, the bureaus will develop Operating and Maintenance cost information and alternatives to support decisions about new infrastructure. Some infrastructure bureaus discuss service levels in their individual budget plans. Bureaus will also work with the community to develop appropriate, sustainable, and affordable service levels in the Citywide Systems Plan.
5. Prepare strategies related to service levels, funding allocations, and management practices to align revenues with service levels.  
Progress: This is a future activity.
6. Track local and regional discussions related to infrastructure financing.  
Progress: Metro is evaluating infrastructure needs to accommodate projected growth of the region. PDC and the Water Bureau serve on the project advisory committee. The Bureau of Planning collected and assembled data from City bureaus, for use in the Metro analysis. Bureaus are also tracking other local infrastructure financing issues and initiatives, such as the Safe Sound and Green Streets and the Grey to Green initiatives.
7. Develop a funding strategy to shrink the unmet budget needs for infrastructure maintenance, by:
  1. Making a policy commitment to set aside a portion of unanticipated one-time General Fund revenues specifically for infrastructure maintenance.  
Progress: Mayor Potter is driving budget policy, as described above.

2. Replenish funding for the General Fund capital set-aside that has diminished with recent funding shortfalls.  
Progress: In recent years, the General Fund capital set-aside has hovered around \$2 million a year. It continues to be a very small proportion of the full capital budget. Mayor Potter supports using a portion of surplus funds to address the aging infrastructure.
3. Convene a cross-bureau financial team to prepare a gap finance plan for infrastructure maintenance. The plan will identify key decision points, relative costs, and potential funding sources of major projects (to be defined). Along with one-time General Fund revenues, this team will consider stable transportation funding at the local and State levels; a cross-bureau, citywide infrastructure bond measure that focuses on our most critical community needs; and incorporating in the CIP's and financial plans of the infrastructure bureaus, a discussion of unmet maintenance needs and an estimate of budget and rate impacts to meet those needs.  
Progress: Such a team has not yet met for this purpose.

## Key Findings

This report includes data on three key measures: current replacement value, current and projected physical condition, and annual funding gap. The confidence level in the data is included. In some cases, data is not available or is pending more detailed data collection and analysis. Most of these "not available" responses are for projected condition.

1. Similar to other countries and U.S. cities facing this challenge, asset management is the best immediate way to ensure maximum use of existing assets, understand tradeoffs, and optimize decision-making and investment planning while other initiatives examine shared services.
2. As a City enterprise, the physical infrastructure has a current replacement value of \$21.5 billion. By bureau, the infrastructure value is: PDOT (\$8.1 billion); BES (\$5.0 billion); Water (\$5.3 billion); Civic (\$0.9 billion), Parks (\$0.8 billion); and Affordable Housing (\$1.4 billion).
3. A gap exists between the funding required to maintain the City's infrastructure in a sustainable way, and existing funding. For 2007 alone, there is a sustainable level investment gap of at least \$92 million for these assets. This gap increases substantially with the federal mandate to treat the City's domestic water supply and cover two open reservoirs. Cost estimates await project design, and are reported as an annualized range. The LT2 Enhanced Surface Water Treatment Rule may cost between \$20 million/year and \$50 million/year. Compliance with this rule alone represents a growth of a third to a half of last year's Annual Funding Gap (\$83.5 million/year).
4. Unfunded federal mandates and external funding of capital works drive the expansion of the number and type of physical assets which, although primarily built with leveraged monies, become the long-term obligation of the City to maintain and operate. Typically, there is little or no set-aside for ongoing operating or maintenance funding for these assets prior to their construction.

5. At current funding levels, some of Portland's infrastructure will continue to deteriorate. In 10 years, three asset groups are projected to remain or shift into mostly poor condition. They are traffic signals, Union Station, and the 800 MHz radio system.
6. This report introduces two concepts--risk management and green infrastructure. The risk of asset failure is a key measure worthy of reporting in future asset reports. Green infrastructure includes natural and engineered solutions and varies in the extent of City ownership.
7. For the first time, the risk rating approach has been applied to the FY 2008 - 09 General Fund Capital Set-Aside process. This process will be evaluated and considered for broader application to the capital budgeting process in future years.

## **Recommendations**

1. Continue to prepare the annual asset status and conditions reports, and explore ways to shrink the unmet budget needs for infrastructure maintenance.
  - a. Increase the allocation for the General Fund Capital Set-aside to fund additional projects that will cost-effectively address extreme and high risk City assets.
  - b. Starting with the FY 2009 - 10 budget process, instruct bureaus to include risk-based ratings in capital budget requests (amend the CIP Budget Manual accordingly).
  - c. Explore minimum standards for business case to include a systematic evaluation of project benefits and costs, and evaluation of asset risk, and triple bottom line factors (social, environmental, economic).
2. Employ the risk management process, outlined in Appendix 5, to identify and evaluate risk to the City's physical infrastructure. Risk ratings will be used to better inform short term and long term management decisions, including funding allocations.
3. Adopt the proposed green infrastructure framework (Appendix 6) for use in asset management discussions in all City bureaus.

## **Funding Strategy**

A major finding of the annual asset reports (2002 through 2007) is that a substantial annual funding gap persists. The gap is defined as the difference between the funding needed to address infrastructure needs at a defined condition or level of service and the funding that is currently available. The gap is the amount of money needed to eliminate the backlog and/or maintain the asset to achieve its useful life. A full definition is available in Appendix 7.

As the asset managers have refined methods and updated data, the estimates of annual funding gap have gone up, not down. This year, the combined annual funding gap for Transportation, BES, Water, Parks, Civic assets and affordable housing is \$92 million.

Running a constant funding gap or under-investing in capital maintenance is not a sustainable business practice. With this trend, we can expect lower levels of service and more frequent system failures.

In 1996, City Council increased the General Fund capital set-aside, from a base of \$3 million, with the intent to add \$1 million to it each year until the Office of Management and Finance found the amount to be sufficient. That fund rose to \$7 million in FY 2002-03, then declined after a series of annual budget cuts. The General Fund capital set-aside is now a residual amount.

In 2002, the City Council and Directors held a series of work sessions, called Managing for Results. A Council priority area was “the deteriorating physical infrastructure.” That report recommended that City Council consider a Major Maintenance Fund, to increase the investment in capital maintenance. City Council did not act on that recommendation.

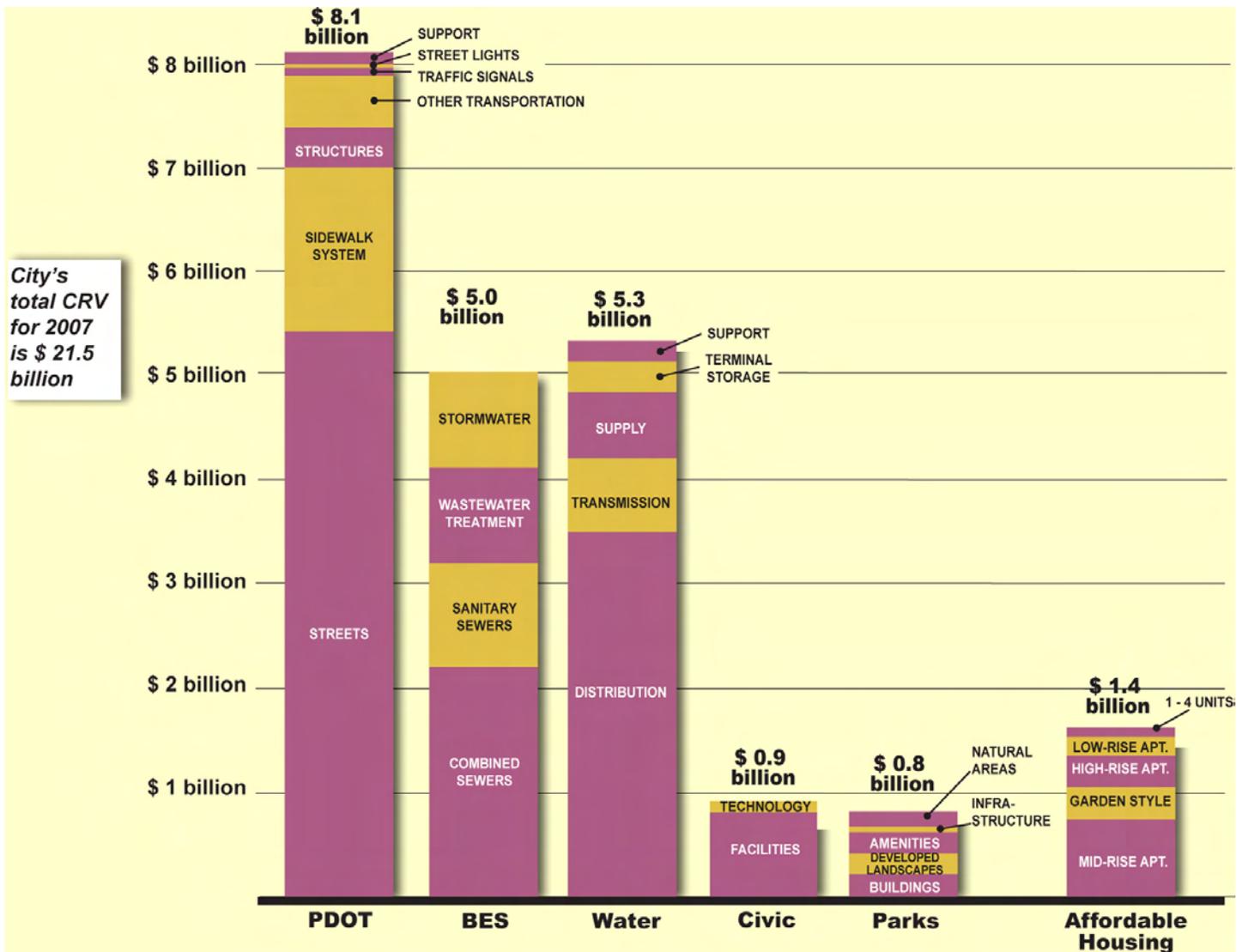
In January 2007, the Directors’ group reviewed key findings of this report, and asked staff to prepare ideas to start closing the annual funding gap, and more fully maintain existing infrastructure. It is understood that City Council must balance many competing demands, and such an effort will take a number of years. The concept is to build a funding gap finance plan, with a trajectory of 10 to 15 years.

In 2007, the City Asset Managers Group worked with Financial Planning to improve the General Fund Capital Set-Aside allocation process. The revised process used a new set of criteria based on the risk management process outlined in Appendix 5. The risk rating process allows ranking of projects based on how effectively they reduce the risk of the high and extreme risk assets.

## VI. Appendices

1. **Current Replacement Values of City Assets**
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# Appendix 1a: Current Replacement Values of City Assets December 2007



## Appendix 1b: Current Replacement Value of Capital Assets Data Sheet

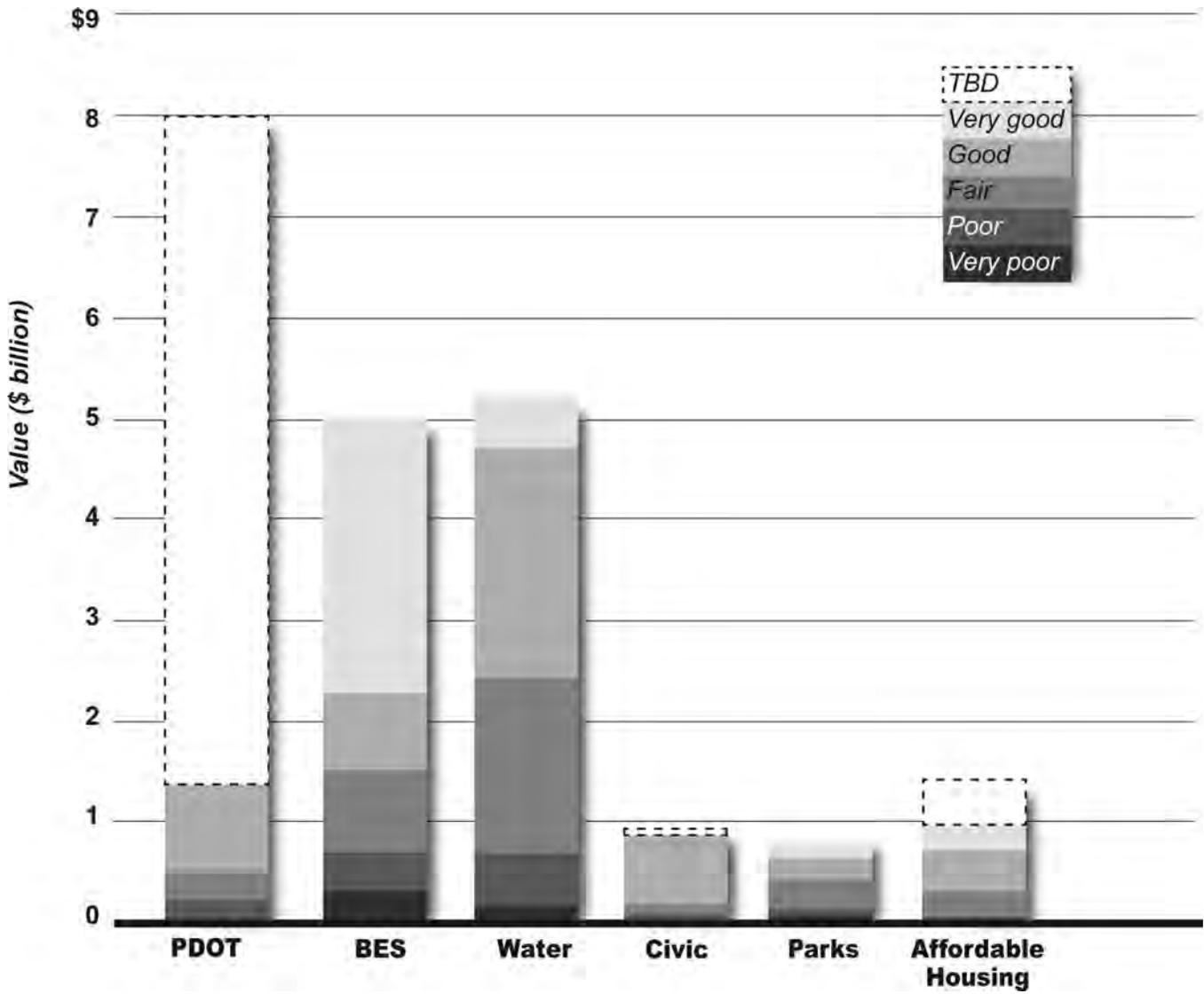
December 2007

Bureau and capital asset type	Value (in millions)	Confidence level	Notes	
<b>PDOT</b>				
streets (by lane mile, improved)	\$5,371.1	2 - Low	<-- Work in progress to determine ownership of inlet and inlet leads for 2008 report.	
sidewalk system				
sidewalks	\$860.6	5 - Optimal		
curbs	\$649.9	4 - High		
corners	\$113.5	5 - Optimal		
structures (bridges only)	\$398.7	5 - Optimal		
traffic signals (hardware only)	\$110.3	3 - Moderate		
street lights	\$103.6	2 - Low		
support facilities (for PDOT & BES)	\$5.4	2 - Low		
other transportation assets	\$465.3	Low to High		<-- "Other" includes streetcar, aerial tram, traffic calming devices, street signs, pavement markings, parking meters, retaining walls, stairways, guardrails and harbor wall.
<b>Total Transportation</b>	<b>\$8,078</b>			
<b>Environmental Services</b>				
sanitary sewers	\$1,002.0	3 - Moderate	2007 values calculated from 2006 values by adding final CIP Expenditures per category from the past fiscal year final CIP report. Values were then increased using the ENR-CCI increase from 7700 to 7940 (3.1%).	
stormwater system	\$893.9	2 - Low		
combined sewers	\$2,183.6	4 - High		
wastewater treatment systems	\$944.3	4 - High		
<b>Total Environmental Services</b>	<b>\$5,024</b>			
<b>Water</b>				
supply	\$623.0	3 - Moderate		
transmission	\$688.0	3 - Moderate		
terminal storage	\$301.0	3 - Moderate		
distribution	\$3,524.0	4 - High		
facilities (buildings and support facilities)	\$115.0	4 - High		
<b>Total Water</b>	<b>\$5,251</b>			
<b>Parks and Recreation</b>				
buildings (includes support facilities)	\$210.1		Parks used a 3.1% inflation factor, based on ENR-CCI data. Infrastructure value is based on partial information.	
amenities	\$185.3			
infrastructure (partial data only)	\$46.3			
landscapes	\$197.1			
natural resources	\$144.3			
<b>Total Parks</b>	<b>\$783</b>			
<b>Civic</b>				
<b>Facilities (buildings, structures)</b>				
police facilities	\$56.3	4 - High		
office buildings	\$108.5	4 - High		
other buildings	\$26.1	4 - High		
Union Station	\$24.5	4 - High		
parking garages	\$104.5	4 - High		
spectator facilities	\$333.7	4 - High		
Portland Center for the Performing Arts	\$70.2	2 - Low		
<b>Fire facilities</b>	<b>\$62.8</b>	4 - High		
<b>Technology Services</b>				
800 MHz radio system	\$46.9	2 - Low		
telecommunications	\$14.6	2 - Low		
IT operations	\$3.9	2 - Low		
strategic technology	\$76.1	2 - Low		
<b>Total Civic</b>	<b>\$928</b>			
<b>Affordable Housing</b>				
high rise apartment	\$267.6	4 - High	Based upon historic blend, 1999-2006.	
mid rise apartment	\$634.4	3 - Moderate	Valuation based upon 2005 costs	
low rise apartment	\$212.5	3 - Moderate	Based upon historic blend, 1999-2006.	
garden style	\$279.4	3 - Moderate	Valuation based upon 2005 costs.	
one to four units	\$36.6	3 - Moderate	Valuation based upon 2005 costs.	
<b>Total Affordable Housing</b>	<b>\$1,430</b>			
<b>Total Capital Assets</b>	<b>\$21,495</b>		(1) Replacement Value represents the amount using 2006 construction costs inflated by 3.5%.	

# Appendix 2a: Current Condition of Capital Assets

All Assets

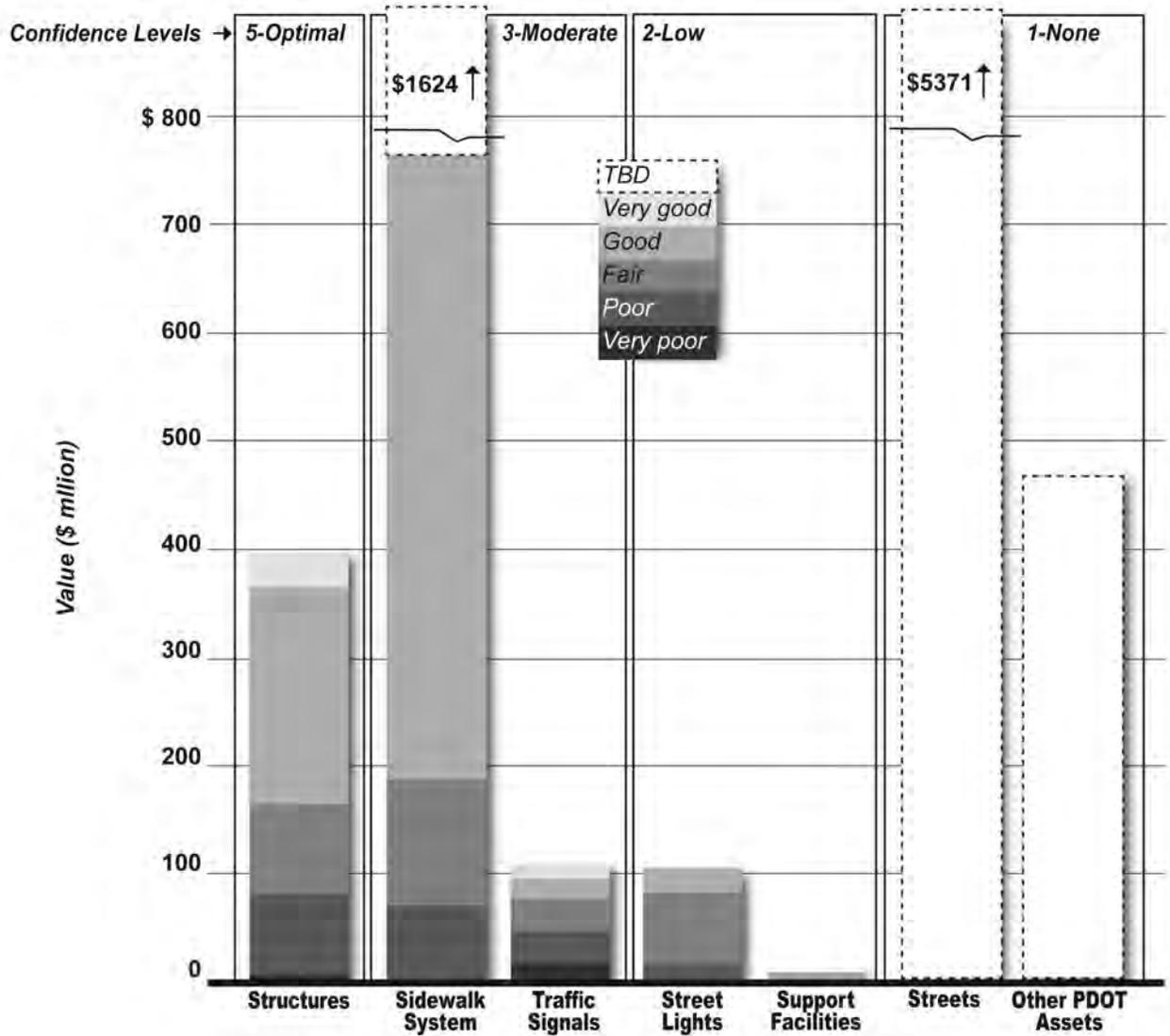
December 2007



# Appendix 2b: Current Condition of Capital Assets

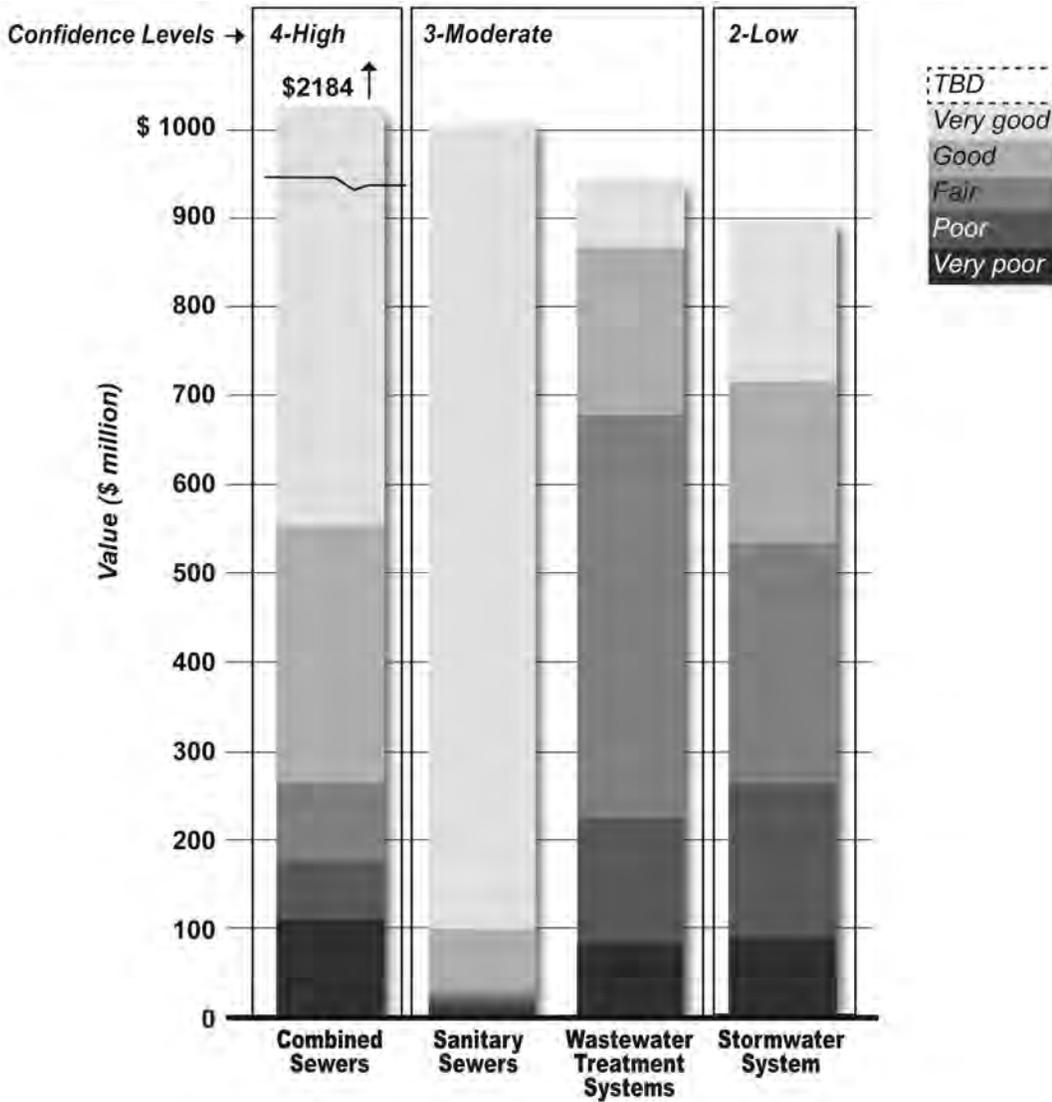
Office of Transportation

December 2007



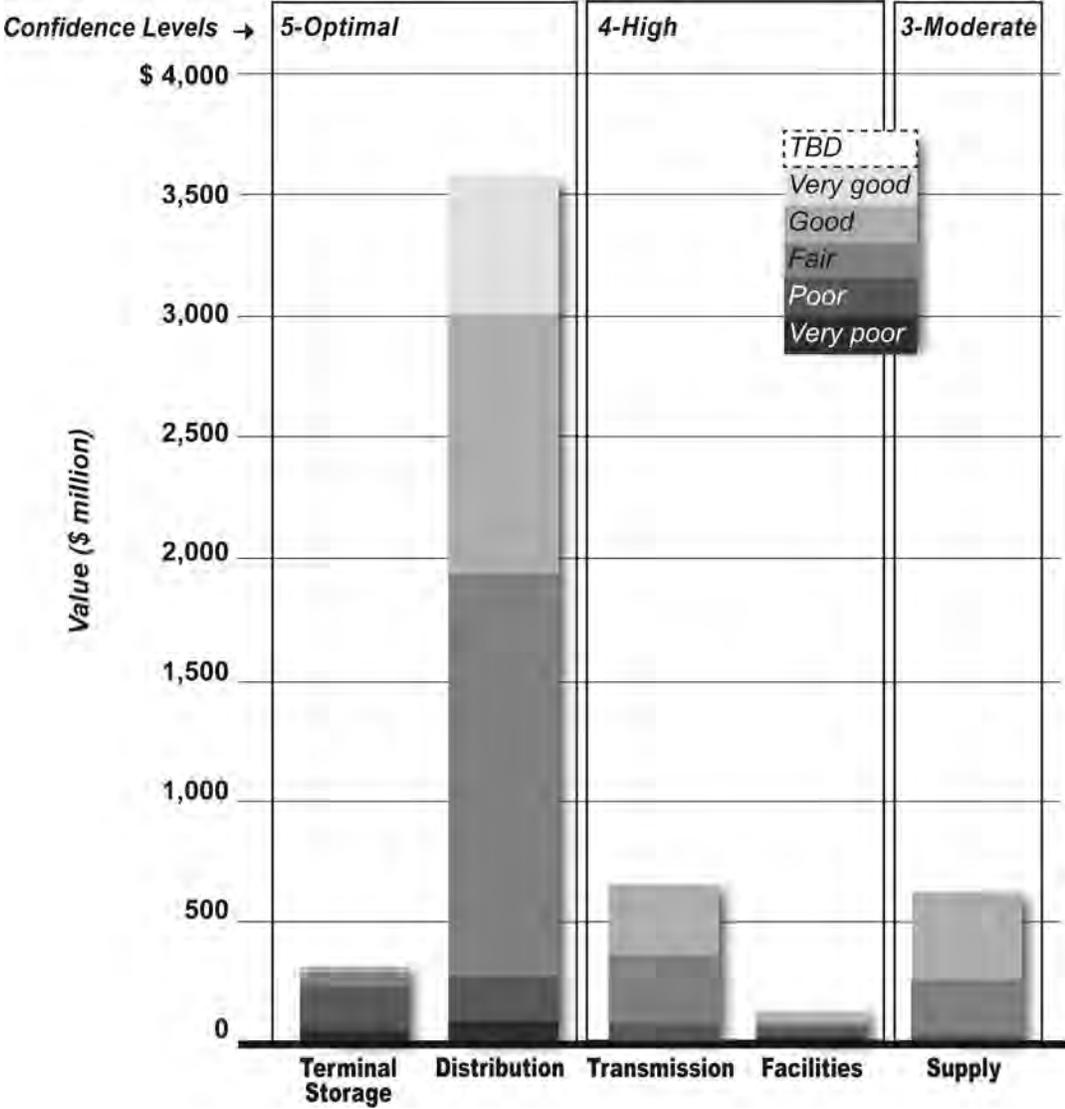
# Appendix 2c: Current Condition of Capital Assets Environmental Services

December 2007



# Appendix 2d: Current Condition of Capital Assets

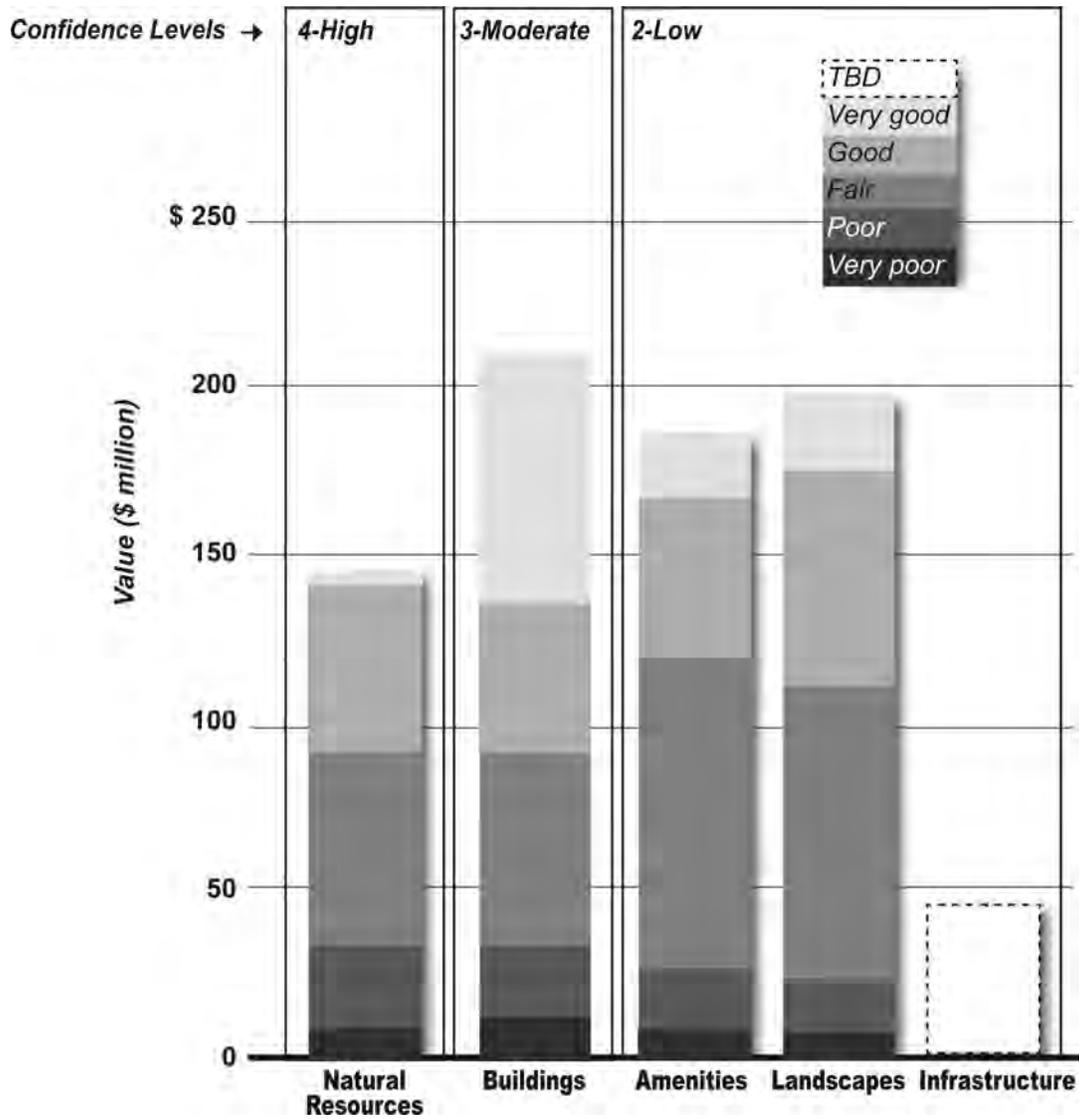
Water Bureau                      December 2007



# Appendix 2e: Current Condition of Capital Assets

Parks Bureau

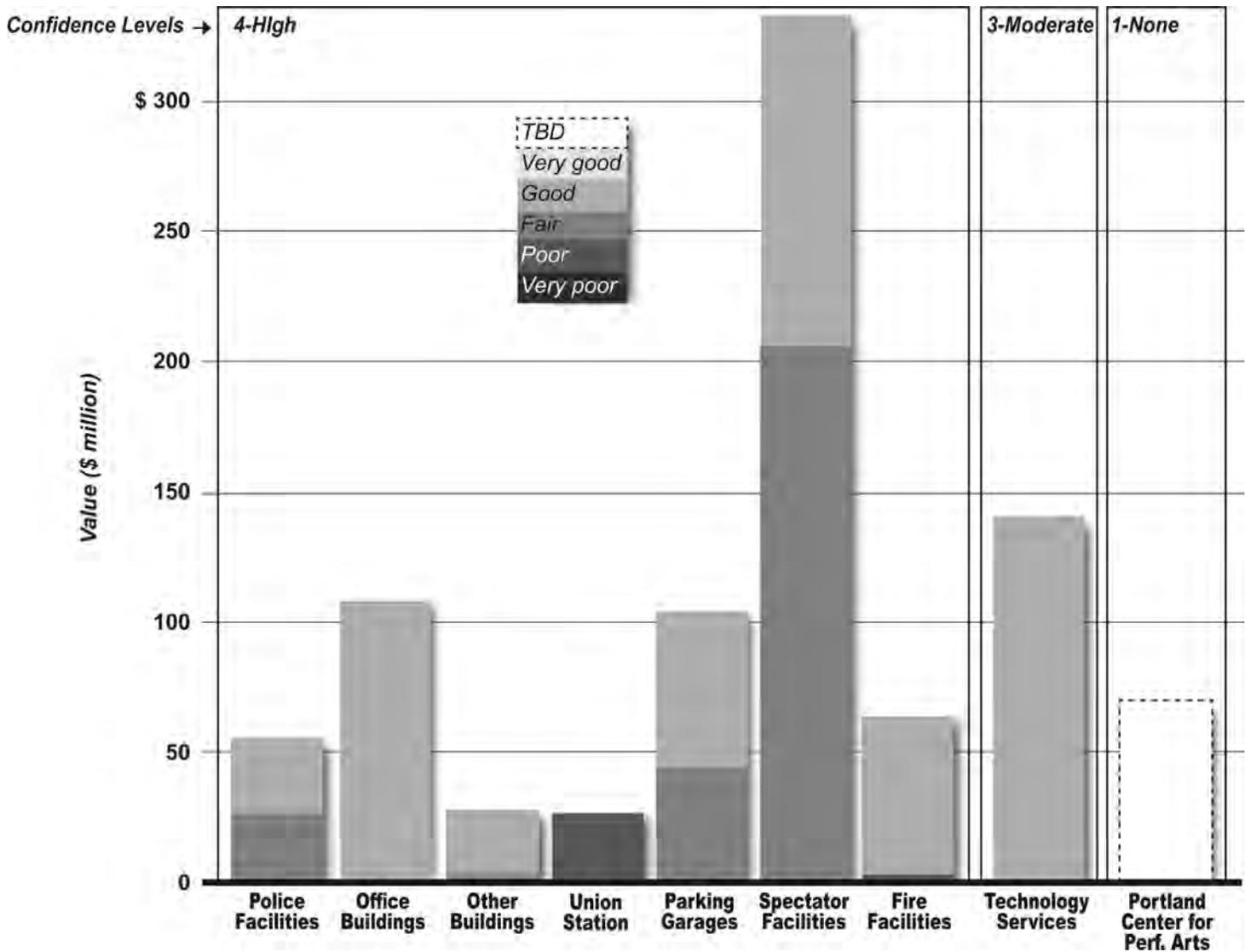
December 2007



# Appendix 2f: Current Condition of Capital Assets

Civic (OMF, Police, Fire)

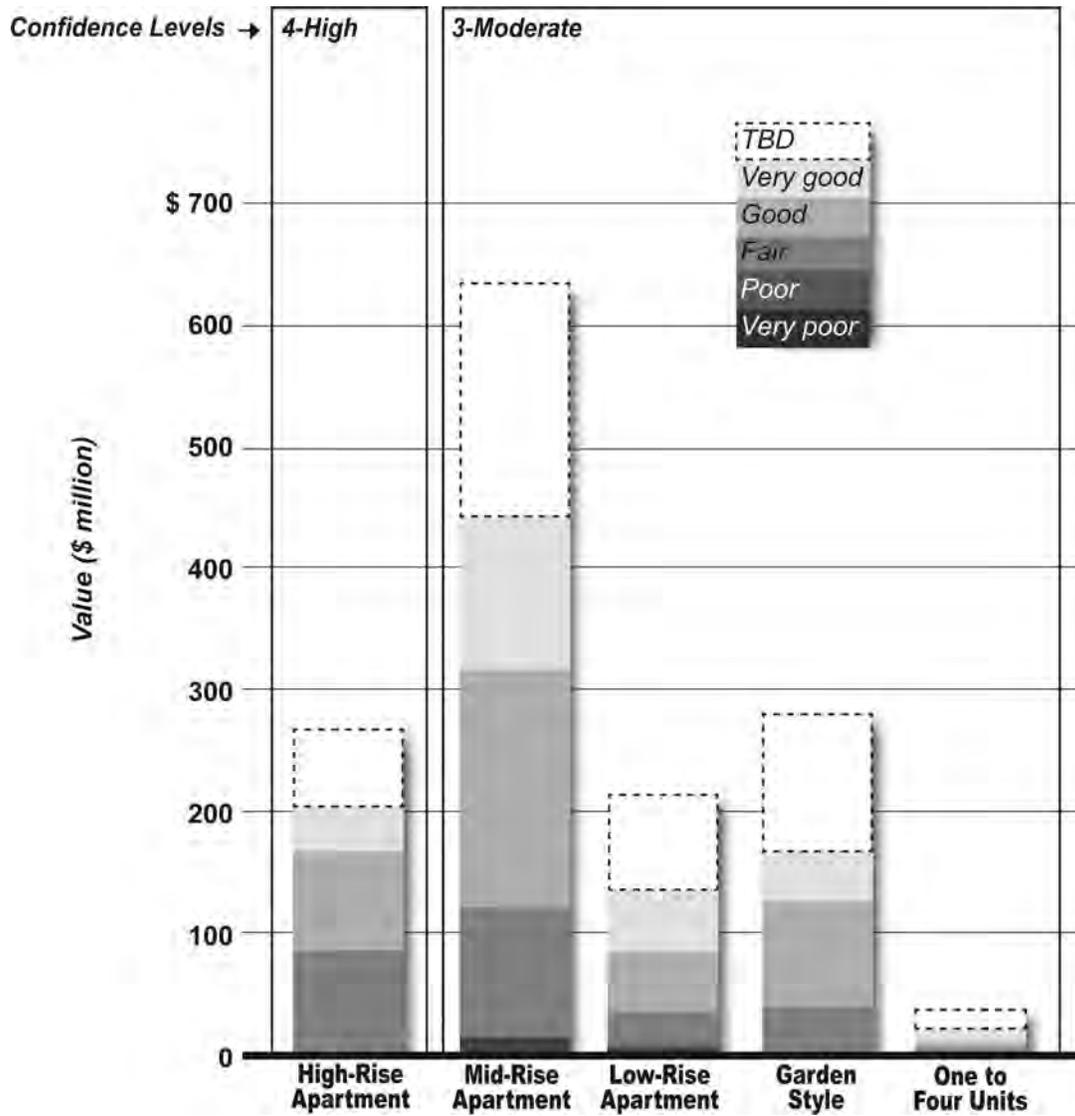
December 2007



# Appendix 2g : Current Condition of Capital Assets

## Affordable Housing

December 2007



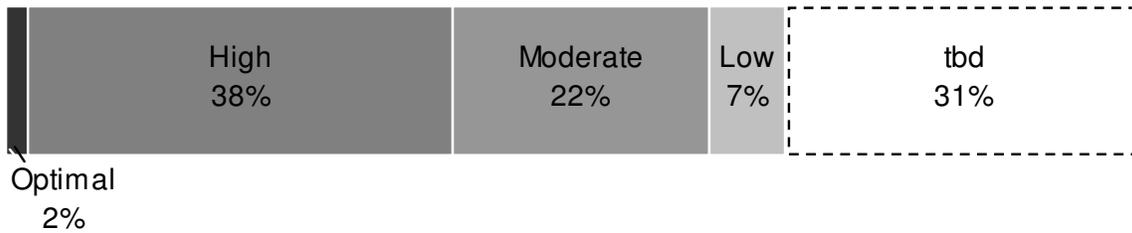
## Appendix 2h: Current Condition of Capital Assets Confidence Level Summary

December 2007

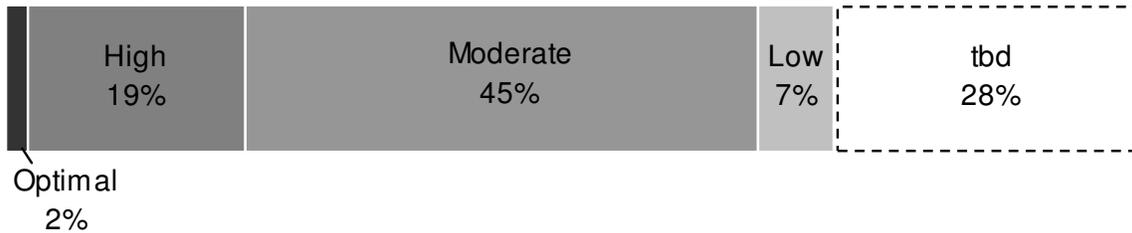
### Replacement Value



### Current Condition



### Funding Gap



# Appendix 2i: Current Condition of Capital Assets Data Sheet

December 2007

Bureau and capital asset type	Current Condition (in %)					Confidence level	Notes	
	Very Good	Good	Fair	Poor	Very Poor			
<b>PDOT</b>								
streets (by lane mile, improved)	tbd	tbd	tbd	tbd	tbd	tbd	<-- PDOT is changing the way pavement condition is inspected, and implementing new software	
sidewalk system								
sidewalks	tbd	tbd	tbd	tbd	tbd	tbd		
curbs		75	15	10		3 - Moderate		
corners		80	15	5		3 - Moderate		
structures (bridges only)	8	50	22	19	1	5 - Optimal		
traffic signals (hardware only)	14	16	29	27	14	3 - Moderate	<-- Working on improved inspection program	
street lights		22	67	11		2 - Low	<-- Weighted average of Option B & C lights	
support facilities (for PDOT & BES)	<i>multiple facilities, condition range from poor to very good</i>						low to moderate	
other transportation assets	tbd	tbd	tbd	tbd	tbd	tbd	<-- A few of the other assets have condition assessment	
<b>Environmental Services</b>								
sanitary sewers	90	7	1	1	1	3 - Moderate	Sanitary & combined systems determined from recent assessments. Wastewater values based on estimate of current repair costs required for each process area.	
stormwater system	20	20	30	20	10	2 - Low		
combined sewers	75	13	4	3	5	4 - High		
wastewater treatment systems	33	30	20	10	7	4 - High		
<b>Water</b>								
supply	1	56	40	3	0	3 - Moderate		
transmission	1	47	41	11	0	3 - Moderate		
terminal storage	0	7	24	56	13	4 - High		
distribution	14	45	33	6	2	4 - High		
facilities (buildings and support facilities)	10	23	16	42	9	3 - Moderate		
<b>Parks and Recreation</b>								
buildings (includes support facilities)	35	22	28	10	5	3 - Moderate	While progress has been made in the past year, percentages are best estimates extrapolated from inspected data, with the exception of natural area information which is quite reliable.	
amenities	10	26	50	10	4	2 - Low		
infrastructure (partial information)	na	na	na	na	na	2 - Low		
landscapes	10	34	45	7	4	2 - Low		
natural resources	2	35	40	18	5	4 - High		
<b>Civic</b>								
<i>Facilities (buildings, structures)</i>								
police facilities	-	53	47	0	-	4 - High		
office buildings (incl. support facilities)	-	100	0	0	-	4 - High		
other buildings	-	94	6	0	-	4 - High		
Union Station	-	0	0	100	-	4 - High		
parking garages	-	59	41	0	-	4 - High		
spectator facilities	-	37	63	0	-	4 - High		
fire facilities	-	97	0	3	-	4 - High		
<i>Technology Services</i>								
800 MHz radio system	-	0	0	100	-	3 - Moderate		
Telecommunications	-	100	0	0	-	3 - Moderate		
IT operations	-	0	71	29	-	3 - Moderate		
Strategic technology	-	63	8	29	-	3 - Moderate		
<b>Affordable Housing</b> <span style="float: right;"><i>Assumes Exact Housing Configuration is rebuilt</i></span>								
high rise apartment	15	31	31	-	-	4 - High	23% TBD	
mid rise apartment	19	31	17	-	2	3 - Moderate	31% TBD	
low rise apartment	24	22	13	2	2	3 - Moderate	37% TBD	
garden style	14	31	11	-	3	3 - Moderate	41% TBD	
one to four units	26	14	14	-	-	3 - Moderate	46% TBD	

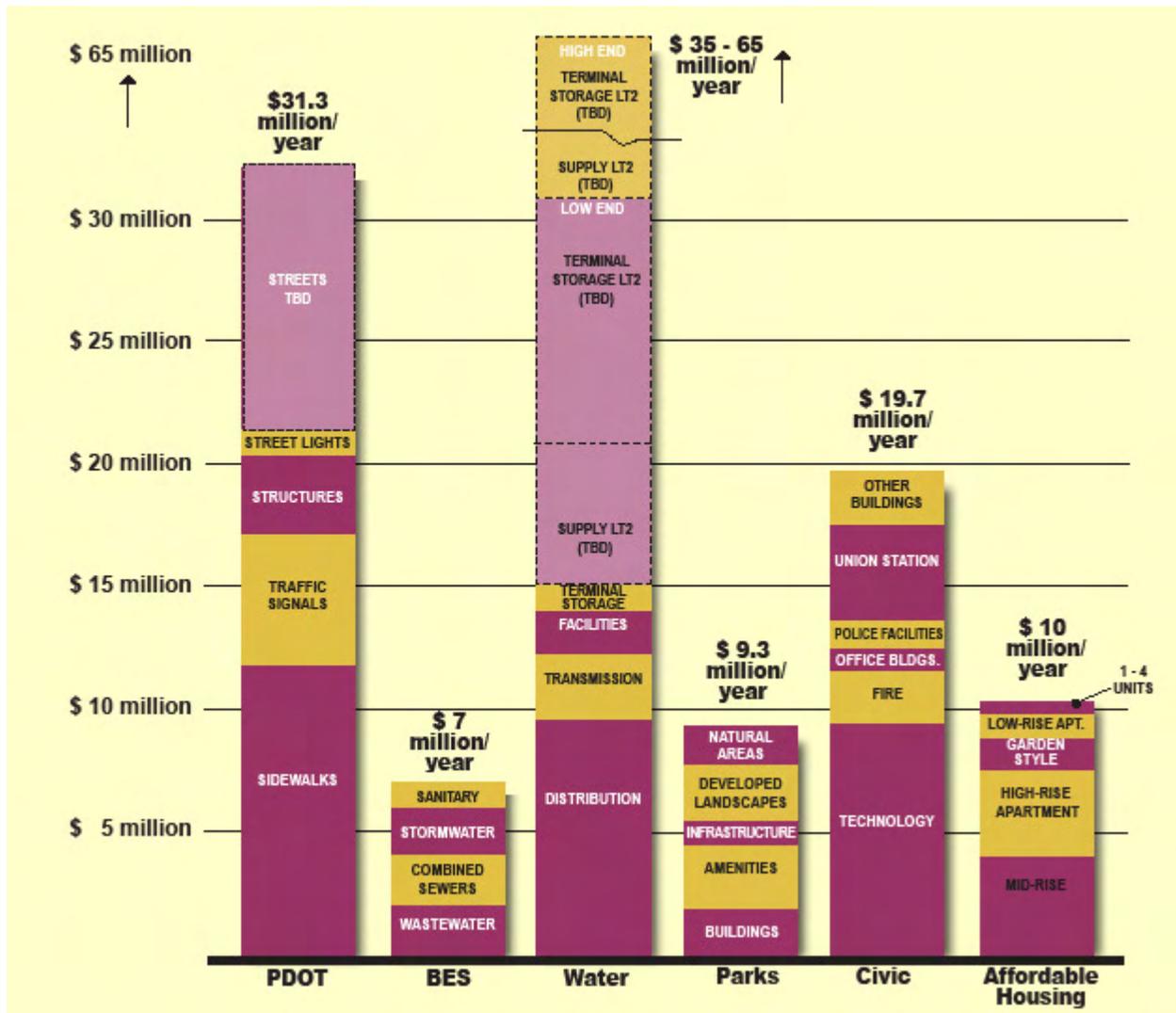
## Appendix 2j: Projected Condition of Capital Assets - 2017 Data Sheet

December 2007

Bureau and capital asset type	Projected Condition (in %)					Confidence level	Notes	
	Very Good	Good	Fair	Poor	Very Poor			
<b>PDOT</b>								
streets (by lane mile, improved)	tbd	tbd	tbd	0	0	tbd	At Current Service Level	
sidewalk system								
sidewalks	tbd	tbd	tbd	0	0	tbd		
curbs	0	62	14	24	0	3 - Moderate		
corners	0	73	13	14	0	3 - Moderate		
structures (bridges only)	tbd	tbd	tbd	0	0	tbd		
traffic signals (hardware only)	6	12	21	28	34	3 - Moderate		
street lights	0	11	65	24	0	2 - Low		
support facilities (for PDOT & BES)	tbd	tbd	tbd	0	0	tbd		
other transportation assets	tbd	tbd	tbd	0	0	tbd		
<b>Environmental Services</b>								
sanitary sewers	93	4	1	1	1	3 - Moderate	Assumes shift of resources to pipe rehab and treatment system improvements after 2012 (GSO Program completion)	
stormwater system	20	20	30	20	10	2 - Low		
combined sewers	78	10	5	4	3	4 - High		
wastewater treatment systems	40	25	20	10	5	3 - Moderate		
<b>Water</b>								
supply	15	20	45	10	10	4 - High	<-- Assumes new treatment required by 2017 to meet LT2 requirement; this will prevent needed maintenance on other parts of supply system.	
transmission	5	40	40	15	0	3 - Moderate		
terminal storage	80	0	15	5	0	4 - High	<-- Assumes LT2 rule mandates rebuilding open reservoirs before 2017	
distribution	10	40	40	10	0	3 - Moderate		
facilities (buildings and support facilities)	50	30	20	0	0	4 - High		
<b>Parks and Recreation</b>								
buildings (includes support facilities)	tbd	tbd	tbd	tbd	tbd		No information available at this time. Anticipate developing this information for next year's report.	
amenities	tbd	tbd	tbd	tbd	tbd			
infrastructure (partial information)	tbd	tbd	tbd	tbd	tbd			
landscapes	tbd	tbd	tbd	tbd	tbd			
natural resources	tbd	tbd	tbd	tbd	tbd			
<b>Civic</b>								
<i>Facilities (buildings, structures)</i>								
police facilities	0	53	47	0	0	4 - High	The Technology Services programs with conditions at poor in FY 2017 are really beyond poor at that point because without replacement they will become unusable as they are no longer supported by vendors, or will become technologically obsolete.	
office buildings (incl. support facilities)	0	100	0	0	0	5 - High		
other buildings	0	94	6	0	0	6 - High		
Union Station	0	0	0	100	0	7 - High		
parking garages	0	59	41	0	0	8 - High		
spectator facilities	0	37	63	0	0	9 - High		
fire facilities	0	97	0	3	0	10 - High		
<i>Technology Services</i>								
800 MHz radio system	0	0	0	0	100	3 - Moderate		
telecommunications	0	100	0	0	0	3 - Moderate		
IT operations	0	0	71	0	29	3 - Moderate		
strategic technology	0	63	8	0	29	3 - Moderate		
<i>Assumes Exact Housing Configuration is rebuilt</i>								
<b>Affordable Housing</b>								
high rise apartment	15	31	31	0	0	4 - High	23% TBD	
mid rise apartment	19	31	17	-	2	3 - Moderate	31% TBD	
low rise apartment	24	22	13	2	2	3 - Moderate	37% TBD	
garden style	14	31	11	-	3	3 - Moderate	41% TBD	
one to four units	26	14	14	-	0	3 - Moderate	46% TBD	

# Appendix 3a : Annual Funding Gap in millions per year

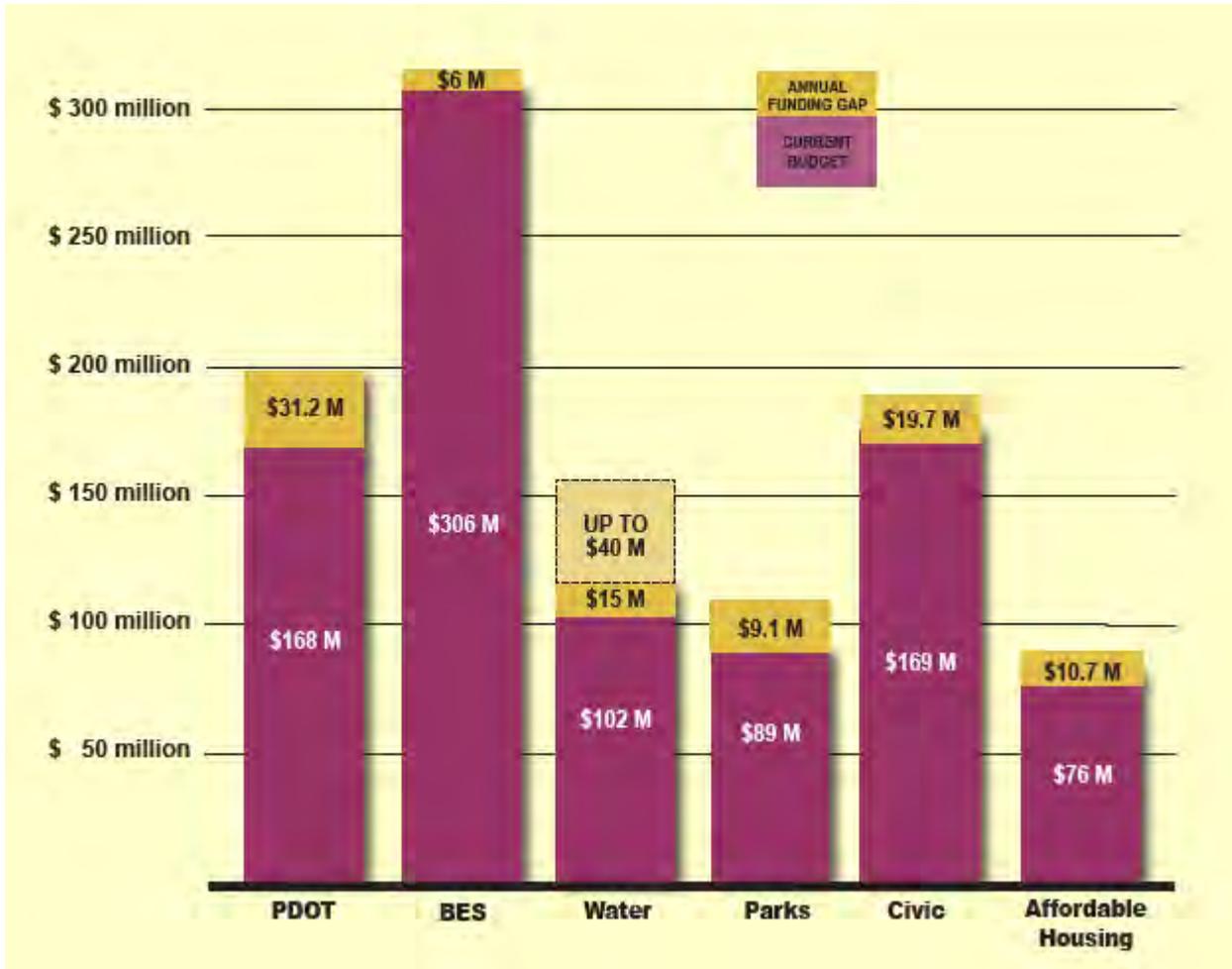
December 2007



# Appendix 3b: Annual Funding Gap in Relation to Bureau Overall Budgets

in millions per year

December 2007



# Appendix 3c: Annual Funding Gap Data Sheet

December 2007

Bureau and capital asset type	Value (in millions)	Confidence level	Note	
<b>PDOT</b>				
streets (by lane mile, improved)	tbd	tbd	<-- Pavement condition and performance target is expected to change as PDOT is in the process of replacing current rating method and replacing software.  Annual Gap at Sustainable Level	
sidewalk system	\$12.2	3		
structures (bridges only)	\$13.7	5		
traffic signals (hardware only)	\$3.4	3		
street lights	\$2.0	2		
support facilities (for PDOT & BES)	tbd	tbd		
other transportation assets	tbd	tbd		
<b>Total Transportation</b>	<b>\$31.3</b>			
<b>Environmental Services</b>				
sanitary sewers	\$1.0		Reflects recent findings from Fanno/Tryon Reflects Basin Relief Projects Reflects recent findings from CBWTP Fac Plan Update	
stormwater system	\$2.0			
combined sewers	\$2.0			
wastewater treatment systems	\$2.0			
<b>Total Environmental Services</b>	<b>\$7.0</b>			
<b>Water</b>				
supply	0+(6.5-24.5)	3	Additional amount reflects anticipated obligations under LT2 Additional amount reflects anticipated obligations under LT2	
transmission	\$3.0	3		
terminal storage	1+(13.5-25.5)	3		
distribution	\$9.5	3		
facilities (buildings/support facilities)	\$1.5	3		
<b>Total Water</b>	<b>15+(20 to 50)</b>			
<b>Parks and Recreation</b>				
buildings (includes support facilities)	\$1.9	3	Council provided additional one-time funds in 2006-07 that were applied primarily to buildings, thereby addressing important needs and reducing last year's funding gap. However, the funding gap will not be materially affected without consistent additional funds over time. A 3.1% inflation factor was applied to last year's estimated gap.	
amenities	\$2.6	2		
infrastructure	\$1.0	2		
landscapes	\$2.3	2		
natural resources	\$1.5	3		
<b>Total Parks</b>	<b>\$9.3</b>			
<b>Civic</b>				
<i>Facilities (buildings, structures)</i>				
police facilities	\$1.0	4	These figures include an amortization over 10 years of the following one-time costs: \$45M for Union Station renovation, \$7.346M for Spectator facilities reserves funding, \$46.941M for MHz system replacement, \$16.595M for CAD replacement, and \$8.17M for PPDS replacement. These figures are only intended to provide an order of magnitude since actual costs will depend on project approach.	
office buildings	\$1.0	4		
other buildings	\$0.5	4		
Union Station	\$5.1	4		
parking garages	\$0.0	4		
spectator facilities	\$0.7	4		
<i>Fire facilities</i>	\$1.9	4		
<i>Technology Services</i>				
800 MHz radio system	\$5.9	3		
telecommunications	\$0.6	3		
IT operations	\$0.2	3		
strategic technology	\$2.7	3		
<b>Total Civic</b>	<b>\$19.7</b>			
<b>Affordable Housing</b>				
high rise apartment	\$3.7	4		
mid rise apartment	\$4.1	3		
low rise apartment	\$1.0	3		
garden style	\$1.1	3		
one to four units	\$0.2	3		
<b>Total Affordable Housing</b>	<b>\$10.1</b>			
<b>Total Capital Assets</b>	<b>\$112.4 to \$132.4</b>			

## Appendix 4: Bureau Observations

### A. Transportation

Transportation manages transportation assets valued at \$8.1 billion. Improved streets, the sidewalk system, bridges, traffic signals, and streetlights make up 94 percent of the dollar value.

In addition to these key assets that make up the bulk of the transportation investment, the City of Portland owns 10 streetcars; an aerial tram; various support facilities; 1,568 traffic calming devices; 143,449 signs; 1,697 parking meters; 1,601 miles of pavement markings; 204 centerline miles of bikeways; 26 centerline miles of guardrail; 519 retaining walls; the Harbor Wall; 185 stairways; and 1,003 traffic signal computer controllers. These assets are worth \$470.7 million.

Changes to pavement management practices are underway which comply with 2006 audit recommendations. New pavement condition rating methods, replacement of 25-year old software and changes to street preservation activities are in progress. During this transition, pavement condition and unmet need will not be reported until 2009. Pavement condition and performance target are expected to change following this transition in management practices and tools.

Since 2006, bridges in good condition declined from 65% to 58%, based on recently completed bridge inspections. Of the 157 bridges the city owns, 57% are deficient; 31 of these are in poor condition including 29 that are weight restricted. This reflects on-going concern about City bridges that are required to carry an increasing volume and weight of trucks, vehicles and buses.

Curbs, corners and streetlights in good condition held mostly steady between 2006 and 2007. Due to City road projects that replaced several signals on Sandy, Hawthorne, and Naito, the overall condition of traffic signal hardware improved slightly in 2007. Curb maintenance was eliminated from the FY 2006-2007 budget. Curbs represent 8% of the transportation system value and are required to channel water runoff and protect the edge of the pavement.

The transportation maintenance liability continued to increase faster than revenues. The primary source of PDOT's discretionary operating revenue, the State Highway Trust Fund, is not indexed to inflation and has not been increased by the Oregon Legislature since 1993. The result is a continuing loss of general transportation revenue purchasing power from 1993, which is projected to continue over the next five years. Additional parking revenues while increasing have been dedicated to streetcar operations (33% City share), aerial tram operations (15% City share) and transit mall match debt service. While funds are identified to build projects, ongoing operating and maintenance costs become the long-term obligation of the City's Office of Transportation.

**AM approach**—Transportation is in the twenty-first year of annually reporting on the inventory, condition, replacement value, and deferred maintenance. Since 2001, PDOT's asset teams (which include engineers and operations staff as well as maintenance, finance, and information technology managers) have completed 8 asset management plans in the following areas: streetlights, structures, traffic signals, sidewalks, signs, pavement, pavement markings, and parking. These plans provide ongoing guidance for asset preservation and renewal strategies.

Level of service options and targets are presented in PDOT's Financial Plan. In 2004, a life cycle perspective on level of service options was adopted by Transportation. In 2005, consultation with transportation stakeholders helped management establish budget priorities as Transportation reduced services by \$4 million in Fiscal Year 2006-2007. In 2007, a Stakeholder group helped identify the desired level of service and local funding alternatives that begin to address the maintenance and safety unmet need on arterial streets and City-owned bridges. In FY07-08, PDOT received \$6.3 million in General Fund one-time funding; \$1.9 million to partially address a projected out year funding gap and \$4.4 million to fund the Safe Streets Initiative, including the streetlight capital project. Many of the twin traditional streetlighting systems in the central city had direct burial/lead-jacketed power cables. These corroded cables will get replaced with new copper wire conduits.

**Status of AM**— Implementing the City Auditor's recommendations will address many of these improvements in pavement management, which accounts for 66% of the replacement value of the transportation system. The pavement management system will be replaced with more robust software by December 2008. This will provide greater ability to target future investments for pavement assets.

Transportation's confidence in the current status of inventory, condition and replacement value information varies from low (street lights) to optimal (bridges). The confidence of future funding scenarios is low or moderate. PDOT's asset management practice needs improvement. Improvements include: keeping asset inventories current; developing explicit data maintenance standards and quality assurance protocols for data; conducting condition assessment on each asset class; and developing deterioration modeling for the major five asset classes—pavements, bridges, traffic signals, street lights and the sidewalk system.

**Annual funding gap**—PDOT's annual \$31.3 million gap at the sustainable level breaks out as follows:

- **Streets:** Transportation is changing the way pavement is inspected and the software that identifies current needs and strategies that optimize available resources. Pavement network condition and unmet need will not be reported until July 2009 when this transition is complete.
- **Sidewalks:** Add sidewalk inspectors and posting support (\$200,000 annually); \$10.8 million additional needed annually to repair curbs based on 60-year expected life cycle; and an additional \$1.2 million needed annually to repair/replace corners based on 40-year expected life cycle. Combined, these activities require an additional investment of \$12.2 million annually over the next 10 years.
- **Bridges:** The total cost to replace bridges in poor condition, and address bridge deficiencies is \$13.7 million annually or \$137 million over the next 10 years.
- **Signals:** A total increase of \$3.4 million per year, or \$34 million over the next 10 years, is needed to achieve a hardware condition of 25 percent poor in 2017.
- **Street lights:** In addition to fully funding the PGE contract, an increase of \$2 million per year above CSL (combined capital, operations and maintenance funding) for 10 years would achieve a condition of 10 percent poor in 2017.
- **Maintenance Facilities:** Kerby and Albina Yards are antiquated and in need of upgrading to modern standards. However, the total need is not defined at this time. These facilities are used to maintain transportation, storm and wastewater services. Sunderland Yard, used for recycling, has identified needs which are being addressed.

## **B. Environmental Services**

**AM approach**—To optimize limited budgets, public works agencies worldwide are beginning to adopt an AM approach to infrastructure management. The Bureau of Environmental Services is implementing elements of AM in its operations and planning functions. Implementation of AM is a long-term process to be performed in an adaptive management approach over a period of many years.

**Status of AM**—BES currently applies AM practices of asset inventory, condition assessment, and computerized maintenance management systems for its treatment and pump stations as well as the collection system. The bureau is now using Risk as a priority-ranking criteria for evaluating and recommending planning projects. BES recognizes the value of focused planning and has established a new System Planning Program to provide continuous and coordinated infrastructure planning that integrates the bureau's watershed and wastewater plans. Currently, the bureau is two years into a three-year infrastructure planning effort to upgrade its System Plan. Included will be a sewer rehabilitation plan, updated treatment plan, and updated combined and sanitary sewer system plans.

**Uses of AM data**—But more important than the delivery of the above-mentioned plans, will be the development of the planning processes, software tools, and the data management systems that will support the bureau's business functions for decades to come. Raw data on the system will be analyzed to provide condition assessments of the system's components. Sewer pipe hydraulic deficiencies and/or structural defects will be addressed in a system-wide perspective. Recommended infrastructure plans will be available for all stages of AM—design construction and maintenance.

The BES System Plan will incorporate system inventory, condition, GIS data, and failure records in an AM context to develop a risk register consisting of Likelihood of Failure x Consequence of Failure. Recommended solutions (projects) will be based on life-cycle cost analysis that looks at the "triple bottom line" ranking of projects that considers financial, social, and environmental benefits of a project. The intended result is that project expenditures will result in optimal asset value and customer service for possibly lower costs than in the past.

The System Plan Update Project is driven by the need to address the bureau's aging infrastructure and a desire to provide a prioritized list of potential projects for inclusion in the bureau's capital improvement program after year 2011 (upon the completion of the CSO program). The new sewer rehabilitation plan element will identify the appropriate sewer maintenance routines (and repairs) to enable the individual infrastructure components to reach an optimal useful service life at an overall least cost. The AM-driven sewer rehabilitation program will blend both operational and capital expenditures to optimize the system's performance.

**Annual funding gap**—At present, BES estimates an annual funding gap of \$7 million. This breaks out as \$2 million in Combined Sewers, \$1 million in Sanitary Sewers, and \$2 million in Stormwater, and \$2 million for wastewater treatment and pumping. Anticipated maintenance and pipe rehabilitation funding gap will be refined with completion of the System Plan in 2008. New CSO facilities will also add to operations, treatment and maintenance needs.

## C. Parks

**AM approach**—Parks' restructured AM program includes five asset groups: Buildings, Amenities, Infrastructure, Developed Landscapes, and Natural Resources.

Parks is currently verifying all assets in the inventory and assessing their condition. Parks has adopted industry-accepted methodologies and standards to determine current replacement values, useful life and asset conditions in a documented, repeatable process. This will allow coordinated management of data, accurate asset inventories and up-to-date reports using credible information in an ongoing iterative process that will improve Parks' ability to make informed decisions about assets.

Parks' AM program continues to implement *Parks 2020 Vision* by ensuring the provision of high-quality facilities, providing for long-range capital planning and developing best management practices. It allows Parks to fulfill a major part of its mission of "...*developing and maintaining excellent facilities and places for public recreation.*"

**Stakeholder involvement** —This work is a direct result of the extensive public involvement process used to produce *Parks 2020 Vision*, which determined that excellent public facilities were a goal. Continuous public involvement in PP&R planning and budget development helps determine which services Parks should provide. These directly guide the provision of assets and determine the appropriate levels of service. The PP&R System Plan, currently nearing completion, will provide additional information on park acquisition and development.

**Status of AM**—Inventory and condition assessments for all buildings are generally complete, and the health and inventory of Natural Resources are well documented. Furnishings in all developed parks were assessed in summer 2007. Inventories for other asset groups are planned or underway.

Data is available for the land component of Parks' 10,600 acres of developed parks and natural areas, although this aspect of asset management is not part of the City infrastructure bureaus' approach to asset management.

Progress since 2006 includes completion of the first portion of the Draft *Asset Inspection and Condition Assessment Manual* and an assessment of all the furnishings in developed parks. Parks Asset Management Steering Committee, made up of representatives of all departments, continues to meet on a bimonthly basis to discuss asset management issues. PP&R has hired an Asset Services Manager to manage the inventory and assessment of PP&R assets in addition to the Senior Planner for Asset Management who coordinates the Asset Management program.

**Uses of AM**—AM data is being utilized in Parks' capital planning and budget preparation to develop consistent maintenance and operations regimes, fulfill City and federal reporting requirements, inform system planning and support financial forecasting. As asset management continues to be integrated into PP&R management practices, Parks is able to determine acquisition and capital improvement needs, appropriate levels of maintenance, and which assets to dispose of to develop a stable asset portfolio.

**Initial results**—Initial assessments for community centers and aquatic facilities showed that many are in better condition than anticipated. This is due to constant work by Park staff and the infusion of levy and bond funds into capital improvements and new construction for some of

these major public buildings. Other buildings have not fared as well, including Park maintenance facilities. While there are many specific problems (serious in some cases), most problems require one-time funding and then sufficient funds for ongoing maintenance.

What is needed is a stable funding source that results in sufficient set-aside funds for these ongoing and, generally, anticipated problems. Without it, Parks is always in the position of seeking special funding for deferred maintenance. While grants, partnerships, and donations are vitally important to Parks' ability to provide and maintain assets, they are not consistent over time.

**Service levels and annual funding gap**—Parks is working to develop appropriate levels of service. As that work is completed, Parks will be able to determine the funding gaps between the current funding level and what is needed to provide the desired level of service.

Given a certain funding level, the resulting level of service can be forecast; or given a desired level of service, the funds needed to achieve it can be estimated.

**Deferred maintenance needs**—Over the years, funding has been insufficient to keep up with needed repairs and replacement. Specific maintenance needs have been identified, and the most serious are being addressed. Parks has identified \$8.1 million in urgent infrastructure improvements. Council has committed to providing \$0.8 million annually to address some of those urgent needs and is working with Parks to address the remaining needs on an ongoing basis.

The industry standard for building maintenance is to reinvest from 2 percent to 4 percent of a building's current replacement value. On average, Parks has spent about 1 percent, but this is improving with the current budget climate and the infusion of additional capital.

Applying asset management principles and practices will help prioritize projects and the allocation of scarce resources.

## **D. Water**

**AM approach**—In preparing the FY 08-09 budget, we identified a funding gap, primarily in the replacement of assets in poor condition. Following a recent court decision, the Water Bureau has additional significant unfunded requirements related to terminal storage reservoir replacement and treatment of supply.

**Status of AM**—In 2007, the Bureau continued to make progress in asset management, introducing and applying concepts such as risk, service levels and business cases.

Some of the highlights for the year include:

- A system-wide evaluation of risks, of the likelihood and consequence of failure of many of our key assets. As of November 2007, the Bureau has assessed 200 asset / failure mode combinations. Projects that address high risk assets were the largest category in the FY 08-09 budget proposal.
- Asset management plans for mains, meters, pump stations and tanks.
- Customer Service benchmarking.

**Annual funding gap**— Baseline unmet needs amount to \$15 million a year. The following list reflects the Bureau’s anticipated system needs beyond the current level of funding.

- **Distribution**
  - **Replacement of hydrants:** Replacement of all screw type and those Corey style hydrants in poor condition.
  - **Replacement of service lines:** Replacement of all plastic and galvanized service lines in poor condition.
  - **Replacement of valves:** Replacement of all large valves in poor condition.
  - **Replacement of mains:** Replacement of all pump main segments in poor condition.
  - **Replacement of high risk pipe segments in poor condition:** Replacement of all poor condition pipe segment crossings of bridges, major arterials, freeways and railroad lines.
  - **Valve installation:** Installation of valves to address tank vulnerability to draining during a pipe break.
  
- **Transmission – Conduits:** There is a need to replace / upgrade sections of the oldest conduits. Much of the Willamette River crossing project is also unfunded.
  
- **Facilities:** The proposed FY 08-09 budget funds basic life /safety needs of only the Maintenance facility building at the Interstate site. A gap reflects the unfunded needs to address improvements in functionality and needed expansion at the Interstate maintenance and operations complex.

**LT2 Response annual funding gap**— The Bureau is anticipating obligations to fulfill LT2 requirements ranging from \$20M/year to \$50M/year. Obligations may include replacing uncovered finished storage reservoirs (terminal supply) at Mt Tabor and Washington Park, and treatment of the Bull Run supply.

## **E. OMF/Fire/Police Fire Facilities**

### General Observations

Voters approved a GO bond measure in November of 1998 to rehabilitate, relocate, and construct new City fire stations. The program addresses deferred maintenance in addition to addressing seismic requirements and program changes within Fire. The program is over two-thirds complete and will run through FY 2010.

Fire has no ongoing budget authority for major maintenance projects for these new facilities. Fire does have regular O&M budgets for these facilities. Over the 10-year period of FY 2007 to FY 2017, overall condition won’t decrease. However, without saving major maintenance money up for the future when the large needs come due in 20-30 years, no money will be available. The City will find itself in the same position as in 1998 when there was too much deferred maintenance to fund and the buildings hadn’t been modified for the changing needs of the bureau. The Fire facilities should be put on the same program of setting aside money for major maintenance in each budget year as is done for Police facilities and office buildings.

### Confidence Level

OMF has high confidence in this assessment. It is based on very recent completed projects to rehabilitate and construct new, or projects in progress for which we have gained considerable experience.

## **Facilities Services**

### General Observations

Through its rental rates Facilities Services collects major maintenance money for office buildings (Portland Building, City Hall, and 1900 Building), Police facilities, maintenance facilities, the Portland Communications Center, and the Records Center. Major maintenance money is also carved out from net income of Union Station and parking garages to fund major maintenance projects at these facilities.

While this is a good practice, OMF is not at industry standards and our goal of 3 percent of replacement value per year. We average 1.0 percent for facilities we manage. This 1.0 percent allows OMF to cover immediate needs on the 5-year horizon. This is also enough so that over the 10-year period of FY 2007 to FY 2017 overall conditions aren't expected to decrease from the very broad categories of good, fair, and poor. Contributing to this is the relative low age of these facilities. However, funding major maintenance money at the full 3 percent, when the large needs come due in 20-30 years conditions may then decrease.

Since the likelihood of rental rate increases is very low, funding for major maintenance should be increased by directing savings from efficiencies identified to major maintenance until the 3 percent goal is achieved.

In FY 2009 we have another option available to us. The original Portland Building construction debt was issued in 1980, with the debt to be retired in 2008. The final Portland Building debt payment of \$2,455,000 will be made on April 1, 2008. As a result of the expiration of the Portland Building debt service, in the FY 2009 budget process the City has the opportunity to decide if it wants to reinvest a portion of the savings to address significant issues. Facilities is proposing to reinvest \$600,000 of annual debt service savings to bring up major maintenance collections for all three downtown office buildings (Portland Building, City Hall and the 1900 Building) up to 3% of replacement value.

The City has recently addressed two of its poorest rated facilities by replacing them. The Archives Center will move from an old building in Chimney Park to a newly constructed building on the PSU campus. The Police Property Warehouse is moving from an old building at SW 17<sup>th</sup> and Jefferson to new space in the Guilds Lake commercial development. While this is one way to address a backlog of maintenance issues, it is expensive. But, in both of these cases the physical capacity of the old buildings was limited and restricting operations.

For all facilities, except spectator facilities and Union Station, the funding gap is the annual difference between what is collected in rental rates, or set aside from net income, for major maintenance and the industry standard of 3 percent of replacement value. For spectator facilities the gap is the one-time difference between actual fund reserves for capital maintenance and a target level of \$10 million based on the costs to upgrade Memorial Coliseum and address the long-term capital needs of PGE Park. Union Station's one-time funding gap is \$45 million based on unfunded deferred maintenance, in addition to the annual gap. The annual gap of \$500,000 assumes the \$45 million one-time gap is funded to catch up on deferred maintenance and bring the building up to current standards. In other words, the \$500,000 does not stand on its own.

### Confidence Level

OMF has high confidence in this assessment. It is based on a complete inventory of buildings. The conditions are assessed based on visual inspection by qualified personnel on a regular schedule.

## **Technology Services**

### General Observations

Establishing replacement values, current conditions, projected conditions, and funding gaps for technology infrastructure requires a different approach than for facilities infrastructure. Unlike buildings, technology infrastructure can quickly become unusable. This is primarily due to the short lives/quick obsolescence and the critical need to stay current with technologies that may not be supported by vendors in the future and render the technology unusable. Below is a discussion of the unique nature of BTS infrastructure replacement values, conditions and funding gaps.

### 800 MHz Radio System – Core System

The 800 MHz system is a system that has to be replaced prior to FY 2017 because its condition goes beyond Poor by then. The system has to be replaced prior to FY 2017 because prior to then Motorola, the system's vendor, will not provide support to it. This is because the technology is becoming obsolete. The underlying component chips are old, it is an analog system, and Motorola is focusing on digital systems. We have included in the funding gap the one-time cost to replace it.

### 800 MHz Radio System-Devices

Just as the core system has to be replaced prior to FY 2017 because the condition goes beyond poor, the system's devices which use the system have to be replaced. The one-time funding gap is the cost of replacement less money that has been collected for replacement so far. This replacement money could be used for a grant match.

### CAD and PPDS

The CAD system has to be replaced or rebuilt prior to FY 2017. Doing nothing would cause the system to be unusable prior to FY 2017. Likewise, the PPDS system has to be replaced or rebuilt prior to FY 2017. Doing nothing would cause the system to be unusable prior to FY 2017.

OMF has established a multi-bureau committee to address the replacement of major Public Safety technology systems including the 800 MHz radio system, BOEC CAD, and Portland Police Data System. This work, called the Public Safety Systems Revitalization Project, will address funding, governance, coordination, timing, and other issues related to the replacement of these major systems. The replacement values of these systems vary depending on the approach planned and so should only be considered orders of magnitude.

Debt financing and/or General Fund cash financing is proposed for FY 2009 costs of projects in the PSSRP. The Mayor and Financial Planning will determine which mix of in these resources is best for the General Fund. Funding of out year costs for the 800 MHz system will be dependent on intergovernmental agreements, the ability to obtain grants and a number of other factors.

### Telecommunications – IRNE

The annual major maintenance funding gap for this new system is 5 percent of replacement value less \$124,000 we have in the rates for major maintenance. Five percent of replacement is the industry standard for large technology infrastructure and reflects the shorter life of components compared to buildings. The original IRNE financial plan assumed that efficiencies as achieved would be retained in the rate base to provide replacement and major maintenance funding; however, the budget reduction requirements over the last few years have necessitated

those efficiencies being turned into rate relief as opposed to replacement/major maintenance funding. The replacement value listed doesn't include the fiber provided to the City as part of franchise agreements and CTIC partnerships.

### IT Operations

The assets in IT Operations include:

- o Storage Area Networks (SAN)
- o Data networks
- o Email System
- o Core servers

This infrastructure has a life of 5 - 7 years. Our assumption about condition in FY 2017 then is based on the infrastructure needing to be replaced twice in the 10-year period. BTS should be collecting one-seventh to one-fifth the replacement value of the hardware per year. However, the fund is collecting below this level and having to supplement these collections with money from its reserves to avoid conditions going to poor. The fund has been able to redirect some savings from efficiencies into this replacement fund.

### Strategic Technologies - Corporate Applications

The replacement for IBIS is funded through the EBS project and will replace an asset in poor condition with one in good condition in FY 2008. Annual maintenance of GIS and CIS are funded.

### Confidence Level

OMF has medium confidence in this assessment, except in the replacement values assessment where we have a medium-low confidence level. The replacement value assessment is based on recently completed projects and the experience of other governments, but we have not had an opportunity to analyze their experiences to assess the degree of similarity.

## **Portland Center for the Performing Arts**

### General Observations

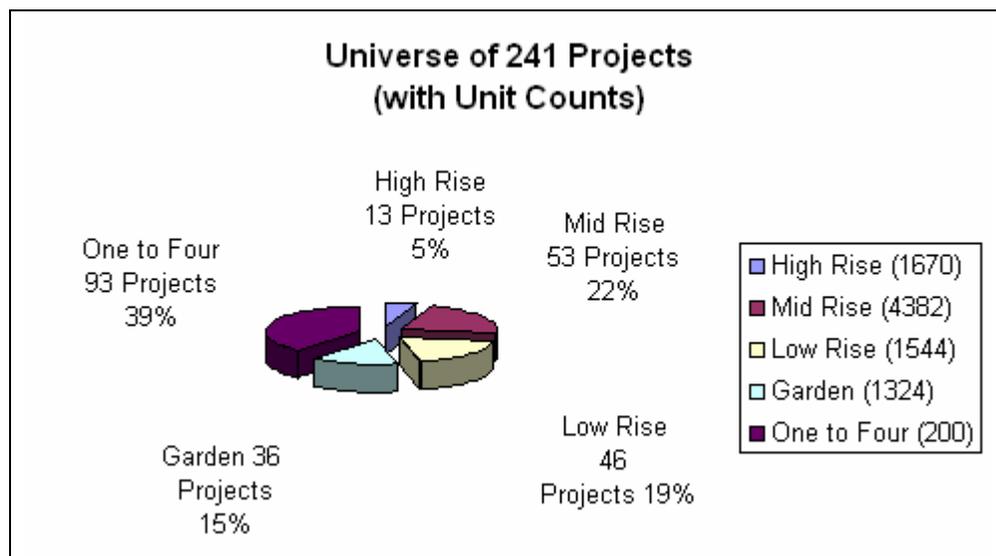
New for this year's report is the inclusion of the assets of the Portland Center for the Performing Arts complex. This complex includes the Keller Auditorium, Arlene Schnitzer Concert Hall, and the New Theater Building. The City owns these assets and through an intergovernmental agreement Metro manages, operates and maintains them. We have include the replacement values of these three assets. Over the next year the City will begin discussions with Metro on the status of these assets to determine their condition and the status of major maintenance funding.

## **F. Affordable Housing**

NOTE: Portland Development commission/Bureau of Housing and Community Development (herein referred to as City)

**General Observations**— The City continues to work towards aligning the Affordable Housing evaluation processes so that it generates meaningful and useful information. The difference remains that the City does not own these assets, but has made significant public investment in projects to ensure the stock of affordable units/projects continue to be available to its citizens. It remains a goal/policy of the City to implement a 60 year affordability period when public funds are utilized in the development of rental housing.

The 2007 Universe of projects and units reflected in this report are indicated below. The number of projects was increased by 12 projects resulting in a total of 9120 units of affordable housing. It should be noted that two mid size projects (316 units) were included in the 2006 Universe that should not have been as they were under construction or being used for other temporary purposes. They will be coming on line in 2008. These two projects (316 units) are not included in the 2007 counts. The 2007 Universe of projects is categorized (as was in 2006) by construction style:



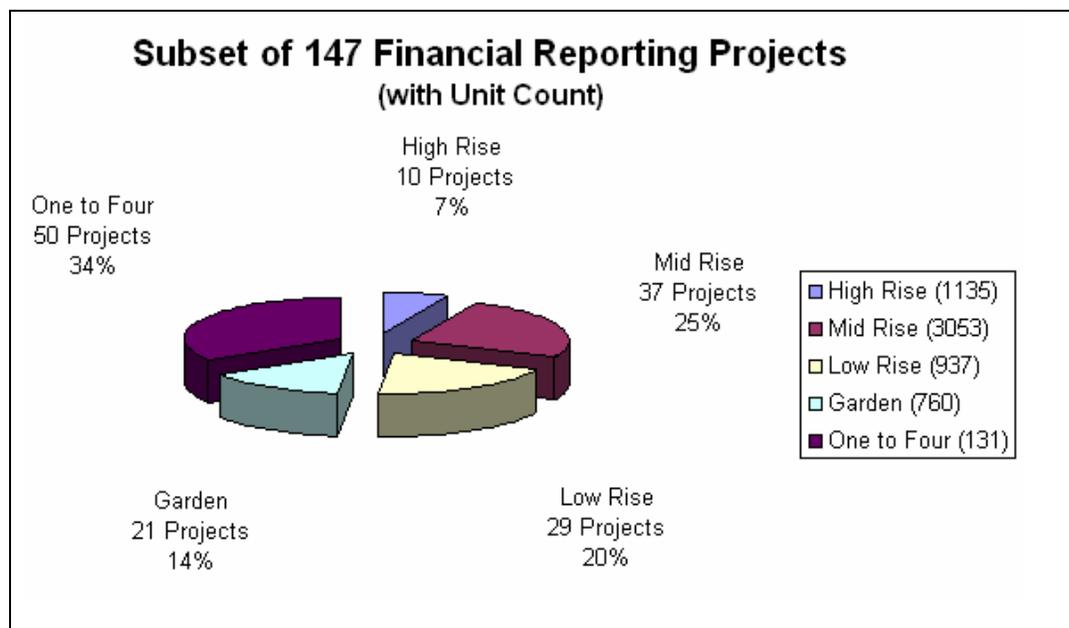
These 241 projects are identified by construction style and were utilized in the development of the Current Replacement Value, Appendix 1a and 1b, \$1.430 billion

**AM approach**— The City has reviewed and adjusted its 2007 Universe of projects to reflect projects with active regulatory agreements. A subset of projects has submitted project financial information as detailed in their published Asset Management Guides. No major changes occurred in our process for this 2007 edition.

**Status of AM**— The City continues to make progress in drafting an Industry Plan. We will be incorporating the existing Preservation Policy as well as parts of other guiding strategic programs/policies that guide us in delivering a stable inventory of housing rental units for and to the City of Portland.

**Current Condition of Capital Assets** (Appendix 2i): The City, as a lender, does not perform an in depth physical inspection or capital needs cost assessment on the 6/30/07 affordable housing portfolio (241 projects). Therefore, for purposes of aligning to the City's report, we have again used the same risk analysis methodology that was created and implemented with the 2006 report. This methodology combines physical and financial conditions of the portfolio. These methodologies extrapolate the existing data on a subset of total projects in the 6/30/07 portfolio.

For 2007, a subset of 147 projects (6,016 units) were examined and evaluated more closely for financial performance. These projects are grouped into five construction styles and indicated below. Each of these projects were rated using the 2006 methodology.



This subset (147 projects) represented 65% of the total Universe of projects. This percentage is considered a fair representation of the affordable housing portfolio. These units were used to develop Appendix 2i - Current Condition and Appendix 3c – Annual Funding Gap.

**Risk Calculation Methodology:** The same methodology as developed in 2006 was utilized again with this year's report. To summarize it contains two basic categories; Physical and Financial Risk elements. Physical risk; assessed the age of construction, and the date in which the project was rehabilitated/remodeled. Financial risk was evaluated using standard operating expense ratios, debt coverage ratios and consideration given whether the project was being monitored due to a recent debt restructure.

Each project that submitted project financial information was evaluated under this methodology which resulted with a score from 0 to 5 points. Last year (2006) a 5 points score represented the best performance or lowest risk. This year (2007) City Asset Managers used the reverse; 1 being the best and lowest risk. We have adopted the same for consistency.

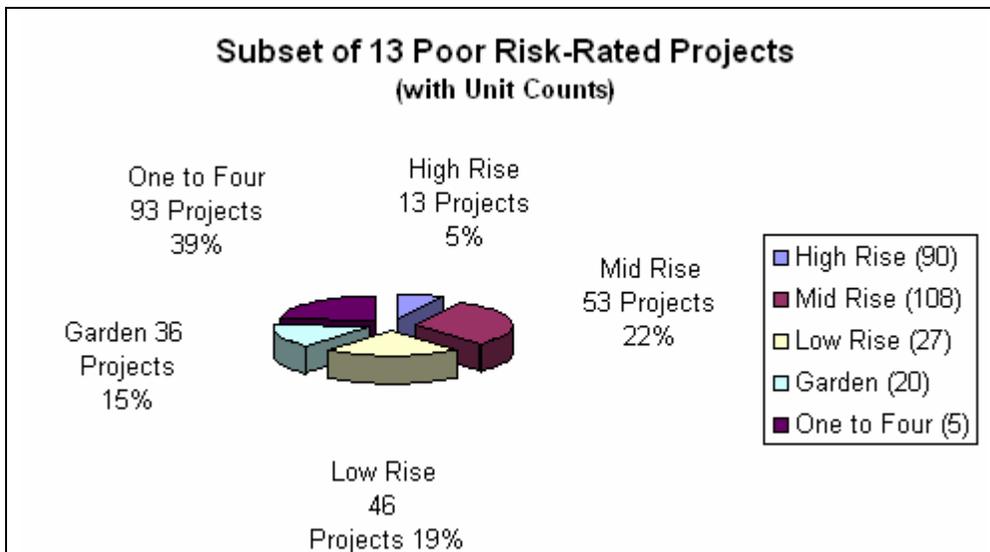
The affordable housing portfolio is managed as a loan portfolio along with the additional scrutiny of Borrower compliance to regulatory and loan documentation and project financial performance.

**Confidence Levels—**

- **Current Replacement Value (Appendix 1b):** Since the City is a lender of public funds, provided to for-profit or non-profit borrowers for the development and operation of the affordable housing projects, replacement value is a reflection of the existing June 30, 2007 portfolio of 241 projects. These projects are broken out by construction style multiplied by the cost to produce the same construction style. The cost to produce, as used in this year's report utilized the 2006 construction cost model inflated by 3.5%. The more current the construction cost the higher the confidence level.

- *Condition and Annual Funding Gap (Appendices 2g, 2i, and 2j):* The same 2006 schedule was used with this 2007 edition. As stated earlier the City does not conduct in depth physical inspections, however, through direct communications with the owners during the year we are made aware of certain financial strains to the project or any abnormal maintenance concerns. Based on the number of units reporting financial data the following confidence level indicators were utilized again for 2007. Optimal: 95 percent projects reporting, High: 75-94 percent, Moderate: 50-74 percent Low: <50 percent reporting. TBD: represents projects where additional research is required in order to assess Risk.

**Annual Funding Gap**— 2007 estimated unmet financial need/Gap amounts to \$10 million a year. The City evaluated the affordable housing inventory in the same manner as represented in the 2006 report. The 2006 estimate of \$10.7 million remains a reasonable reflection of the annual anticipated need. This need is actually the demand from our Borrowers in meeting the demands of managing and maintaining the City’s affordable housing projects.



The 2007 subset of 13 projects (250 units) are not the same as reporting in 2006, which will be the case each reporting year. Reasons for this are multiple:

- Affordability regulatory agreement could have expired
- Improved financial condition
- Poor financial condition remedied via
  - Additional equity, debt restructure or refinance
  - Rehabilitation of project

## Appendix 5: Risk Rating and Management of Infrastructure

This appendix is the first step in developing a common approach to risk management for the city's infrastructure bureaus. It is an iterative process that will be refined and expanded over time. The goal of risk management is to manage uncertainty by preparing for a range of possibilities, reduce the effect of adverse impacts on services, minimize losses, and increase the City's ability to meet community needs.

### What is Risk?

A widely accepted definition of risk is "the chance of something happening that will have an impact upon objectives. It is measured in terms of likelihood and consequences"<sup>3</sup>. For the purposes of infrastructure risk management, risk can be calculated by multiplying the relative likelihood of failure by the consequence of failure. The impact on a bureau's objectives may be either positive or negative.

$$\text{RISK} = \text{Likelihood} \times \text{Consequence of Failure}$$

Risk may be associated with threats, or failure modes, due to natural events, external impacts, physical failures, or operational failures. A broader process also considers risk associated with opportunities, which while producing favorable outcomes, enhancements or savings, may also have associated risks.

### What is Risk Management?

Risk management provides a structure for identifying and analyzing risk and determining appropriate responses to the possible impacts. It deals with degrees of uncertainty by identifying possible events, understanding their likely consequences and determining an appropriate response. Effective risk management allows bureaus to maximize opportunities and achieve their goals.

Applied to asset management, risk management identifies specific business risks associated with the ownership and management of public assets, determines the direct and indirect costs associated with not responding and having an asset failure, and forms priority-based action plans to address them. In this context, risks can be associated with social, environmental, and economic consequences, which differentiates this type of approach from traditional, finance-based asset and risk management approaches.

### Why Manage Risk?

Risk is managed to:

- Ensure good business practices;
- Assist in strategic planning;
- Reduce unexpected and costly surprises;
- Improve decision making;
- Ensure compliance with regulations;
- Assist in audits; and
- Balance opportunity and risk.

Risk management is increasingly seen as a core business process that informs decision-making and not as a stand-alone activity. Risk assessment minimizes potential failures through risk

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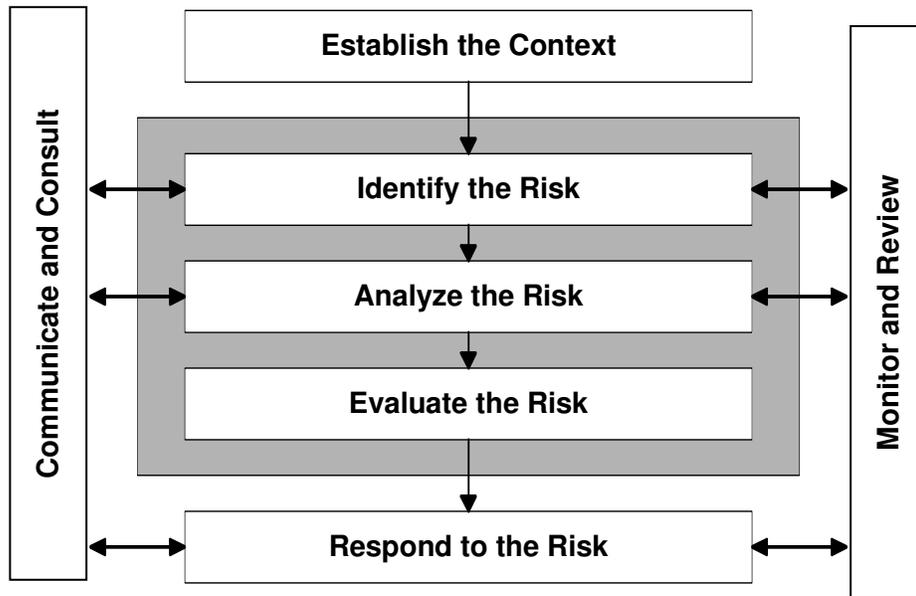
<sup>3</sup> Australian/New Zealand Standard for Risk Management (AS/NZS 4360).

awareness and proactive management.<sup>4</sup> It can be used to help set and evaluate level of service standards based on relative risk, tolerance, and willingness to pay. Risk management can be applied at strategic and operational levels and to specific projects.

### Risk Management Process Overview

The risk management process involves identifying, understanding, and responding to risk. It recognizes community priorities and involves ongoing monitoring to ensure that risk ratings reflect current and evolving service demands and the assets that support them.

The figure below outlines the process steps for infrastructure risk management. It is followed by an explanation of each component. Examples of how these steps can be applied to existing City of Portland assets can be found in Appendix 5d.



The major elements of risk assessment and management are<sup>5</sup>:

#### 1. Set Context of the Risk

Establish the objectives, stakeholders, key issues and criteria against which risk will be evaluated. These are directly related to bureau goals and service delivery objectives.

#### 2. Identify the Risk

Identify the failure modes that are likely to impact the assets. Failure modes include:

- Natural events: Events such as floods, windstorms or earthquakes for which the city has little or no control over the timing or extent of the event. The probabilities of the events may be understood. *Example: An earthquake structurally weakens a bridge's main support, causing it to collapse.*
- External impacts: These are impacts that are outside the organization's direct control, but are not a result of a natural event. These could include failure of others to provide a

<sup>4</sup> Risk Process Management Manual, Transit New Zealand, 2004.

<sup>5</sup> Based on information from the International Infrastructure Management Manual – Version 2.0, 2002.

good or service on time or impacts from the failure of their assets. *Example: A railroad car derails striking and seriously damaging a bridge's support.*

- **Physical failure:** The condition or performance of an asset could lead to failure. *Example, natural deterioration of a 100-year old bridge causes a significant crack in its deck, leading to closure.*
- **Operation risks:** Management of the asset or asset management activities might impact on an asset. *Example: Due to resource constraints, a bridge is not inspected on a regular schedule. Unmonitored corrosion weakens the support system. This results in weight restrictions.*
- **Opportunity risks:** Risks resulting from the negative consequences of an action that otherwise produces positive results. *Example: Transportation receives grant funding to develop a water taxi marina, which is not a priority project for the bureau. The maintenance and operation of this new facility means less funding is available for bridge maintenance projects.*

### **3. Analyze the Risk**

Analyze the likelihood of a failure occurring (Appendix 5a) and the consequence of the failure (Appendix 5b). Possible consequences depend on the type of asset and may include: repair costs, loss of income, loss of service, injury or loss of life, health impacts, damage to property, failure to meet statutory requirements, or loss of image. Since the probability of asset failure is directly related to its condition, it is vital to have accurate condition assessments.

### **4. Evaluate the Risk**

Determine the relative level of risk (low to extreme) and rank identified risks based on this scale. (See the Risk Probability Ratings matrix, Appendix 5c). Risk reduction or treatment options are needed for those higher risks. Review current controls and associated costs that can reduce the probability and impacts of failure and improve the positive consequences.

### **5. Respond to the Risk**

Identify the strategies and actions to be taken to reduce negative consequences or improve positive consequences of the risk. Options include reducing the probability of failure (e.g. through asset renewal), reducing the possible impacts of failure (e.g. through redesign of an asset), or accepting some risk. Actions can include repairing, renewing, or replacing the asset; or operational solutions, such as increasing the frequency of inspections, posting warnings (e.g. weight limiting bridges), or reducing demands on an asset through pricing strategies.

### **6. Monitor and Review**

Constantly review the risks and proposed responses to ensure that risks are kept at an acceptable level. This "risk register" is the summary of identified risks and the explicit strategy that manages them.

### **City of Portland Risk Rating and Management Policy for Infrastructure Bureaus**

The City of Portland will develop a Risk Management process to identify both threats and opportunities. Threats will be managed by acceptance, reduction or elimination of the likelihood and/or consequence of the event. Opportunities will be managed by either acceptance or maximizing the likelihood and/or benefit of the event.

As risk management is adopted by the infrastructure bureaus, common procedures will be added to this policy.

## **Application**

The risk management process will be used to identify and evaluate risk to the City's physical infrastructure. Risk ratings will be used to better inform short term and long term management decisions, including funding allocations.

## **Expected Outcomes**

The application of a risk management process within the City's infrastructure systems should result in:

- Better understanding of the existing risks across all City-owned and managed assets;
- Broader agency perspectives on needed actions and their economic, environmental, and community impacts;
- Improved coordination between city infrastructure bureaus regarding asset management;
- Improved policies, performance-based goals, service levels, performance measures, management and monitoring systems;
- Reduction in surprises and costly mistakes through systematic planning;
- Improved efficiency in use of resources;
- More effective contingency planning;
- Improved transparency and accountability; and
- Reduced liability.

## **Risk Analysis Results**

Edmonton, Alberta in Canada and Wairoa District Council in New Zealand are two communities that use a whole-of-city risk assessment process to assign resources. They track the risks associated with asset failures in hospitals, education facilities, housing, water, sewer, parks and transportation.

To date, Portland Transportation and Portland Water have initiated formal risk assessment processes. Though independent of one another, the bureaus used similar processes. It is the objective to create a consistent methodological approach and have that applied by all bureaus as part of next year's Asset management process.

## **Next steps**

1. Planning and Development Directors will discuss this draft, along with the *2007 City of Portland Asset Status and Conditions Report*.
2. City Asset Managers Group will apply risk management process to evaluate capital rehabilitation/renewal projects for the FY 2008 - 2009 General Fund Capital Set-Aside process.
3. Planning and Development Directors will recommend a specific budget for the FY 2008 - 2009 General Fund Capital Set-Aside process.
4. Planning and Development Directors will identify next step improvements to whole-of-city infrastructure risk management.

## Appendix 5a: Risk Consequences Ratings Table

The consequences arising from a failure can involve economic, legal, community, health, environmental, or reputation impacts. Each consequence can be further categorized by the level of impact (insignificant to catastrophic), based on a set of criteria. The following table provides general examples of these criteria, which may vary by bureau (see example at bottom of page).

**Sample Risk Consequences Ratings Table**

Factor	Insignificant	Minor	Moderate	Major	Catastrophic
Score	1	2	3	4	5
Service levels					
<b>Economic</b> (damages to society, losses, additional expen.)	Less than \$10,000	\$10,000 to \$100,000	\$100,000 to \$1 million	\$1 million to \$10 million	Greater than \$10 million
<b>Legal and compliance</b>	City fully complies and is on course with regulators to anticipate mandates.	City agrees to compliance schedule, and avoids lawsuits and fines.	City warned of compliance issues, and adopts corrective action.	City sued or fined for missing mandates. Expects to comply in six months.	City sued or fined for missing mandates. No viable plan to comply.
<b>Community</b>	Community complaints	Unplanned disruption to a household, a firm, or a community service / structure	Simultaneous unplanned disruption to multiple households, firms, or community services / structures	Unplanned disruption to large number of customers	Unplanned disruption to essential services
<b>Human health and safety</b>	No injuries or primary / secondary routes affected	Minor injuries and/or a secondary route affected	Serious injuries and/or multiple secondary routes affected	Single fatality / multiple serious injuries and/or a primary route affected	Multiple fatalities and/or primary routes affected
<b>Reputation</b>	No adverse media (all week)	Local media criticizes City for 1 week	Regional media criticizes City for two days	National media criticizes City for two days	National media criticizes City for a week
<b>Environment</b>	Short-term damage	Limited but medium-term negative effect	Major but recoverable ecological damage	Heavy ecological damage, costly restoration	Permanent, widespread ecological damage

### Example of Application by Bureaus

The table above represents general examples of consequence rating criteria, however these criteria may vary by Bureau. For instance, the Portland Water Bureau currently uses a risk management process and has adjusted the criteria to reflect the individual needs of the water system. For example, the general Level 4 Community impact above reads “Unplanned disruption to a large number of customers”. The Water Bureau’s more specific definition of this risk is “Major service area out of water for 24 to 72 hours”. In this example, the general criterion and the Water Bureau’s criterion are slightly different but reflect a similar level of risk.

## Appendix 5b: Rating the Likelihood of Failure (Interim)

Failure of an asset can result from any one of, or multiple, threats. The likelihood of failure is based on the probability that a threat will occur, the level of information on the potential impacts of the threat, and the probability that the threat will cause failure of the asset. The likelihood of a failure can be categorized (Likely to Rare) based on these criteria, as shown in the following table. *(Note: A separate table would rate the likelihood of an opportunity risk.)*

**Likelihood of Failure Rating Matrix**

Likelihood	Probability	Frequency	Description	Rating
<b>Almost Certain</b>	>20%	Once every 5 years or less	The threat can be expected to occur Or A very poor state of knowledge has been established on the threat.	<b>5</b>
<b>Likely</b>	10%-20%	Once per 5-10 years	The threat will quite commonly occur Or A poor state of knowledge has been established on the threat.	<b>4</b>
<b>Moderate</b>	5%-10%	Once per 10-20 years	The threat may occur occasionally Or A moderate state of knowledge has been established on the threat.	<b>3</b>
<b>Unlikely</b>	1%-5%	Once per 20-50 years	The threat could infrequently occur Or A good state of knowledge has been established on the threat.	<b>2</b>
<b>Rare</b>	<1%	Once per 50 years +	The threat may occur in exceptional circumstances Or A very good state of knowledge has been established on the threat.	<b>1</b>

*(Note: The Water Bureau uses a different set of frequencies. They are: <5, 5-20, 20-50, 50-100, and >100).*

## Appendix 5c: Relative Risk Ratings

The relative risk is the combined likelihood and consequence of failure, which can be determined by using a matrix like the one below. The recommended response might be:

- E - EXTREME RISK**      Immediate action required to reduce risk.
- H - HIGH RISK**        Senior management attention to manage risk.
- M - MEDIUM RISK**    Management responsibility specified and risk controls reviewed.
- L - LOW RISK**         Manage by routine procedures.

**Relative Risk Rating Matrix**

Likelihood	Consequence				
	1 Insignificant	2 Minor	3 Moderate	4 Major	5 Catastrophic
5 Almost Certain	M	H	H	E	E
4 Likely	M	M	H	H	E
3 Moderate	L	M	H	H	H
2 Unlikely	L	L	M	M	H
1 Rare	L	L	M	M	H

## Appendix 5d: Examples of Risk Assessment

Six Portland examples of risk assessment follow:

1. Carolina Pump Main (Water Bureau)
2. North Going Bridge to Swan Island (Transportation)
3. Historic NW Thurman St. Bridge (Water and Transportation)
4. Forest Park (Parks)
5. Sewer Pipe under Light Rail (BES)
6. Portland Building HVAC System (OMF-Facilities)
7. Equity Gap Loan (PDC)

### Example #1: Carolina Pump Main (Water Bureau)

Example #1: Carolina Pump Main (Water Bureau)	
<b>Asset</b>	<b>Carolina Pump Main, near I-5 pier</b>
<b>Failure Mode</b>	Steel Pipe fails due to multiple leaks, which go undetected
<b>Consequence Rating: 4-5</b>	<b>Major - Catastrophic</b> High potential for loss of life and significant social disruption (the cost to society of losing the key transportation pathway in lost work time and increased commute time is enormous); also, potential for landslides and damage to homes and other buildings.
<b>Likelihood Rating: 3</b>	<b>Moderate</b> 1960's steel main with no cathodic protection. A leak has recently been fixed on another segment. Joint dug up at base of hill under I-5 looked to be in good shape- just starting to show signs of corrosion. May be 20-50 years away from failure which could be catastrophic, but could be more likely.
<b>Overall Risk: 12-15</b>	<b>High</b>
<b>Risk Management Strategy</b>	Perform detailed condition assessment to assess likelihood of failure; if likelihood rating remains 3 or higher, consider alternatives, such as casing the existing pipe, or replacing the pipe using another path.

### Example #2: N. Going Bridge to Swan Island (Transportation)

Example #2: N. Going Bridge to Swan Island (Transportation)	
<b>Asset</b>	<b>N Going Bridge to Swan Island (Built in 1930)</b>
<b>Failure Mode</b>	Support collapse caused by train derailment, Earthquake collapse, Inspection Omission, Deteriorated state.
<b>Consequence Rating: 5</b>	<b>Catastrophic</b> Bridge is sole access to Swan Island Industrial Park. Potential Fatalities, Unplanned disruption to essential services and primary routes, approximately \$15 Million damages to bridge, City criticized. Two years or more to replace bridge. Loss of access for thousands of citizens to jobs. Immense loss to local economy.
<b>Likelihood Rating: 1 - 3</b>	<b>Rare to Moderate</b> Train collision to bridge pier supports may occasionally occur. Earthquake threat may occur in exceptional circumstances, Inspection oversight may infrequently occur.
<b>Overall Risk: 5-15</b>	<b>High</b>
<b>Risk Management Strategy</b>	Secure funding to strengthen bridge for earthquake loading (Funds secured). Replace bridge with new structure to clear span rail yard (Unfunded \$20 Million project). Secure other access to Swan Island.

### Example #3: NW Thurman Street Bridge and Pipe (Water and Transportation)

<b>Asset</b>	<b>Historic NW Thurman St. Bridge</b> 1905 Historic Bridge carrying critical water line
<b>Failure Mode</b>	<b>Transportation:</b> Earthquake, Illegal Overweight Use, Inspection Omission, Deteriorated state. <b>Water:</b> Pipe break due to age, corrosion, or bridge failure
<b>Consequence Rating:</b> <b>Transportation: 4 - 5</b> <b>Water: 3-4</b>	<b>Transportation: Major to Catastrophic</b> Potential Fatalities, Unplanned disruption to essential services and primary routes, approximately \$6 Million damages, City criticized. Two years or more to replace. Loss of Historic Landmark structure. <b>Water: Moderate to Major</b> (if the bridge fails) Service area out of water for longer than 72 hours (4), release of chlorinated water that results in moderate damage to aquatic habitat in Balch Creek (3); (if the pipe fails on the bridge) Service area out of water for 24-72 hours (3), similar environmental impact (3)
<b>Likelihood Rating:</b> <b>Transportation: 1 - 2</b> <b>Water: 3</b>	<b>Transportation: Rare to Unlikely</b> Earthquake threat may occur in exceptional circumstances; Illegal overweight use may occur in exceptional circumstances. <b>Water: Moderate</b> (pipe breaks) Considered to be 10-20 years away from failure, 3 (bridge failure) likelihood established by Transportation
<b>Overall Risk:</b> <b>Transportation: 4 to 10</b> <b>Water: 9 to 12</b>	<b>High</b>
<b>Risk Management Strategy</b>	<b>Transportation:</b> Secure funding to strengthen bridge for heavy weights and earthquake loading (Funds secured). <b>Water:</b> Consider an alternative source of water, monitor pipe for leaks and add cathodic protection to the pipe

### Example #4: Forest Park (Parks)

<b>Asset</b>	<b>Forest Park</b> – Heavily wooded natural resource area
<b>Failure Mode</b>	Fire: Area is heavily wooded, some areas are overgrown, and the area has burned before.
<b>Consequence Rating:</b> <b>4</b>	<b>Major</b> Damage to habitat, flora and fauna; Possible loss of life; Possible damage or loss of nearby homes.
<b>Likelihood Rating: 2</b>	<b>Unlikely</b> Major fires are an infrequent threat.
<b>Overall Risk: 8</b>	<b>Medium</b>
<b>Risk Management Strategy</b>	Thin forest and remove brush in high risk areas.

### Example #5: Sewer Pipe under Light Rail (BES)

<b>Asset</b>	<b>Twelve (12) inch vitrified-clay combined sewer</b> in SW Morrison Street adjacent to Pioneer Square and closely parallel to the Max light rail.
<b>Failure Mode</b>	Pipe suffers local collapse at end of service life.
<b>Consequence Rating: 4</b>	<b>Major</b> A hole opens up in the street posing a safety threat to pedestrians, traffic, and Max, with possible litigation. Potential sanitary spills in high profile area. Potential disruption of Max for several days. Economic impact of emergency pipe repair and subsequent whole pipe replacement.
<b>Likelihood Rating: 5</b>	Engineers estimate failure likely in 1-5 years.
<b>Overall Risk: 20</b>	<b>Extreme</b>
<b>Risk Management Strategy</b>	Perform spot repair to mitigate immediate risk. Consider lining pipe to mitigate long-term risk or relocate laterals to adjacent sewer, fill, and abandon pipe.

### Example #6: Portland Building HVAC System (OMF)

<b>Asset</b>	<b>Portland Building (HVAC System)</b>
<b>Failure Mode</b>	HVAC system's chillers break down and have to be replaced on short notice.
<b>Consequence Rating: 2</b>	<b>Minor</b> The building has reduced air conditioning for occupants during warm weather. Separate computer room HVAC units continue to operate.
<b>Likelihood Rating: 2</b>	<b>Unlikely</b> HVAC failure is unlikely because OMF Facilities Services regularly maintains the HVAC system and regularly replaces components at the end of their useful lives.
<b>Overall Risk: 4</b>	<b>Low</b>
<b>Risk Management Strategy</b>	Fully fund and perform regular preventive maintenance of equipment and fully fund replacement on standard schedules. Do not run to failure.

### Example #7: Any Loan/Any Borrower (PDC)

The Affordable Housing industry works in collaboration with other related agencies and community stakeholders to achieve neighborhood revitalization and affordable housing goals. This includes developing housing neighborhood revitalization strategies and plans, as well as developing new housing programs. We share industry data, emerging and development issues and or concerns related to the performance of the affordable rental housing portfolio. Many factors affect our ability to sustain the inventory of projects and affordable rental housing units including:

- Market forces and HUD MFI restrictions that impact the amount of revenue projects can produce from rental income. For example, over the last few years HUD has frozen median family income in the Portland metro area resulting in the inability of many

projects of increase rents at the level projected at the time of construction and underwriting. In addition, over the last 10 years the rental market had remained relatively soft resulting in lower rents achievable in the market and therefore less revenue.

- Increases in operating costs including increase in utility and management expenses that exceed projections at the time of underwriting.
- Changes in population served impacting operating costs, management costs, vacancy rates, replacement reserves, etc.
- Expiring federal contracts, including Section 8 and LIHTC, and property tax abatements that impact revenues and operating costs associated with maintaining the properties as affordable.

Asset: Equity Gap Loan	
<b>Failure Mode(s):</b>	<b><u>Vacancy</u>   <u>R/M demands</u>   <u>Loss of Tenant Services</u></b> Nature of Borrower's tenants: heavy social service component. Vacancy low probability, however, if social services removed, Vacancy will have a major impact to project and revenue stream.
<b>Consequence Rating:</b>	<b>Vacancy</b> impact is related to the size of the project; the smaller the project, the larger the impact/consequence to revenue thus putting additional strain on ability to pay project expenses. <b>Repairs/Maintenance</b> – deferred maintenance over the years and a projects lack of adequate Capital Replacement Reserves both increase probability the borrower will need additional public funding assistance. <b>Tenant Services</b> - The more service enriched a project and more dependent the tenant population. They need the assistance in order to pay rent etc. If assistance is removed, result move-out – loss of project revenue, more financial strain on project, expenses go up impacting ability to pay debt and make necessary/required R/M.
<b>Likelihood Rating:</b>	See detail risk rating structure as outlined in the 2006 report
<b>Overall Risk</b>	See detail risk rating structure as outlined in the 2006 report
<b>Risk Management Strategy</b>	City works with borrowers and partners to keep informed as to critical project needs and their impact resulting in additional public funding need.

## Appendix 6: Green Infrastructure

Environmental challenges, such as global climate change, pollution, and habitat loss, stress the City of Portland's ability to provide traditional infrastructure services while maintaining environmental and community health. Green Infrastructure, which uses natural processes, systems, or features to provide traditional infrastructure services, offers an opportunity to protect environmental quality, reduce long term costs, improve service provision, and advance sustainability.

The purpose of this appendix is to:

- Propose a common definition and framework for discussion of green infrastructure assets within the City of Portland;
- Identify City owned and/or managed green infrastructure assets for capital planning, budgeting and reporting purposes;
- Provide an initial report on the status of these assets; and
- Recognize the role and potential of natural features in providing ecosystem and infrastructure services.

### Green Infrastructure Framework

Municipal green infrastructure is being recognized by cities across the country for its role in protecting both environmental and community health and for providing infrastructure services. However, municipalities vary in their definition of green infrastructure and in the extent to which they plan for, manage, and report on these assets. This section outlines a framework and definitions for green infrastructure assets within the City of Portland.

Some municipalities consider only engineered facilities, such as green street treatments or eco-roofs, which use natural processes in an infrastructure setting, to be green infrastructure. This type of green infrastructure is referred to as "Engineered" green infrastructure in this appendix. Others apply the term strictly to the natural networks of streams, rivers, and open space that naturally manage stormwater, provide habitat, improve air and water quality, reduce flooding risk, and provide areas for human recreation and respite. This type of green infrastructure is referred to as "Natural" green infrastructure in this appendix. Future discussions are planned to define the role of the city in protecting natural green infrastructure for its ecosystem, infrastructure, and human values. This appendix primarily addresses assets under some level of City ownership or management.

The City of Portland employs and benefits from both engineered and natural green infrastructure. A coordinated approach to planning, managing and reporting on these assets that recognizes the value and appropriate place for these assets is recommended. The following definitions of engineered and natural green infrastructure are proposed:

#### Engineered Green Infrastructure

Ecosystem-based alternatives to traditional infrastructure projects.

*Examples: Green streets, eco-roofs, engineered wetlands*

#### Natural Green Infrastructure

Naturally occurring ecosystem features that provide infrastructure functions, benefits, or reduce the need for traditional built systems.

*Examples: Natural wetlands, streams and rivers, trees and vegetation*

For this discussion, natural and engineered green infrastructure assets were divided into three groups based on the level of City or Community ownership and management. The Portland

Green Infrastructure matrix on the page 3 of this appendix provides examples of green infrastructure assets and programs within these three categories.

1. **City Owned and Managed:** These assets are physically owned and managed by the City of Portland.  
These assets are the primary focus of the initial asset reports included in the *Bureau Observations* section of this appendix.
2. **City – Community Partnerships:** These assets or programs are conducted through a City – Community partnership, which may involve ownership or management by another agency, jurisdiction, or organization; or substantial community involvement.  
The status of Partnership assets and programs, as currently available, is included in the *Bureau Observations* section of this appendix.
3. **Community Assets:** These assets are owned and managed by other jurisdictions, agencies, organizations, or by the community at large. The City may encourage or oversee the protection and use of these assets but does not have a direct role in their management.  
The *Bureau Observations* section also discusses community assets critical to providing effective infrastructure services, as applicable.

It is important to note that the City also employs a number of programs, practices, and regulations that encourage environmental sustainability. These are not included in this discussion except where they directly affect the creation or restoration of ecosystem function that provides infrastructure benefits or reduces the need for built infrastructure systems.

# Appendix 6a Portland's Green Infrastructure



	<b>CITY</b> City Owned & Managed	<b>City - Community Partnership</b>	<b>COMMUNITY</b> Community Asset <i>(City may influence through incentives or regulations)</i>
 <p><b>Natural Green Infrastructure</b> <b>Natural Areas &amp; Parks</b></p> <p>Parks and natural areas provide wildlife habitat; improve water and air quality; reduce stormwater runoff; and provide areas for people to play, relax, and enjoy nature.</p>	Portland parks & natural areas	Parks & natural areas owned by other jurisdictions/agencies & managed by the City; <i>Re-vegetation and watershed restoration programs;</i> <i>Invasive species removal;</i> <i>Watershed Council projects</i>	Parks and natural areas owned by private citizens, organizations, and other government agencies.
 <p><b>Trees</b></p> <p>Trees improve water quality, provide shade, cool streams, capture rainwater, improve air quality, and provide food and habitat for wildlife.</p>	Trees located on City-owned land	Street Trees; <i>Urban Forestry;</i> <i>Friends of Trees projects</i>	Private Trees
 <p><b>Rivers, Streams, Lakes, Floodplains, &amp; Wetlands</b></p> <p>These provide drinking water, habitat for fish and wildlife; and opportunities for public recreation and transportation; and also reduce the impacts of floods by helping to manage stormwater.</p>	Streams, lakes, and ponds in Portland parks	Bull Run Watershed; Watershed projects (Kelly Creek, Brookside, etc); <i>Riparian enhancement projects</i>	Neighborhood streams; Primary streams (Johnson Creek, etc); Columbia and Willamette Rivers; Watersheds
 <p><b>Engineered Green Infrastructure</b></p> <p>These are constructed facilities that are designed to mimic natural processes. They reduce stormwater runoff, improve wildlife habitat, and improve water quality.</p>	City-owned Eco-Roofs; Green inf. improvements in City owned or financed buildings; Engineered wetlands; Swales & stormwater quality facilities; Fish and wildlife passage improvements; In-stream improvements	Green Streets; <i>Downspout Disconnect</i>	Private swales and engineered wetlands; Private eco-roofs and other green building improvements

## Appendix 6b: Green Infrastructure Bureau Observations

### A. Portland Parks & Recreation

#### Overview

Portland Parks & Recreation owns and/or manages a significant portion of Portland's parks, natural areas, and urban forest. These areas provide wildlife habitat; improve water and air quality; reduce stormwater runoff; and provide areas for people to play, relax, and enjoy nature.

#### Summary and Condition of Inventory

Portland Parks & Recreation owns and manages 10,600 acres of land: about 7,000 of those acres are classified as natural areas; the remainder is developed parks or land that will be developed. This is about 10% of the city's land base. Natural areas include wooded lands, streams and wetlands that provide a high degree of wildlife habitat, improve water and air quality, reduce stormwater runoff, and provide areas for people to learn about and enjoy nature. Developed parks do the same, though to a lesser degree.

Over one-third of the City's natural areas are currently rated in good or healthy condition (37%). Another 40% of natural areas are in fair condition, while the remainder are listed in poor (18%) or severely degraded (5%) condition. Developed and undeveloped park lands have not yet been evaluated.

PP&R is also responsible for the city's urban forest, with special responsibility for the trees located on PP&R property and all the street trees within the city. This public tree canopy currently covers 26% of the city though the City has a stated goal of 33%. The existing canopy traps a half billion gallons of rain water, saving stormwater management costs. It also reduces energy use and captures carbon dioxide from the atmosphere. Replacing all of the city's trees would cost \$5 billion; public trees account for \$2.3 billion of that total.

#### Critical Community Assets

All parks and open spaces, including those owned by other agencies, jurisdictions, and private landowners, are important to the health of the environment. Natural areas in healthy condition provide the greatest degree of environmental benefits.

#### Major Programs

The *Protect the Best Weed Management Program* (PTB) is designed to remove incipient weed infestations in PP&R's most pristine natural areas. Our approach is to identify ecologically healthy "core habitat" and then create relatively weed-free "buffer habitat" surrounding it. We work at sites in northern and central Forest Park, the southern half of Gentemann Property, and all of Maricara Park and Elk Rock Island. PTB full-time staff controls introduced species such as English ivy, English holly and Himalayan blackberry using hand tools, chainsaws and herbicides. This program is expected to reduce weed occurrences on a greater number of acres, at lower cost and using less herbicide compared with other weed management approaches.

PP&R supports the Neighborhood Tree Liaison program that encourages the public to care for trees on private property. The program covers general tree care, tree biology, tree planting, preservation, and identification.

In 2004, PP&R became the first-ever park district to be certified as Salmon Safe. The rigorous evaluation criteria considered programs and policies as well as on-the-ground conditions and maintenance of parkland.

## B. Bureau of Environmental Services

### Overview

Environmental Services plays a key role in the maintenance and enhancement of both the engineered and the natural green infrastructure of the city. Green infrastructure plays a critical role in stormwater management which is central to the core mission of the Bureau: “The Bureau of Environmental Services ... by protecting public health, water quality and the environment. We provide .... stormwater collection... We protect the quality of surface and ground waters and conduct activities that plan and promote healthy ecosystems in our watersheds.” The Bureau has recognized that “...the best way to improve water quality is to have a healthy functioning watershed that has the ability to infiltrate and treat stormwater runoff before it enters our rivers and streams.” (BES Ten Actions for Success, March 2000.) Efforts to improve stormwater management and flood mitigation have recently resulted in an improved risk rating from FEMA. This will translate into lower costs for flood insurance for city residents.

### Summary and Condition of Engineered Green Infrastructure Inventory

Though BES has constructed a number of engineered green stormwater controls, there is currently no single, centralized location from which to get comprehensive information on the Bureau’s green infrastructure. This makes it difficult to clearly state the condition of these assets. However, when a more formal and comprehensive inventory is developed, condition assessments will be more readily available and compiled for these types of facilities.

During 2008, the bureau hopes to begin development of a common data framework and establish stewardship responsibilities for the inventory. One of the proposed inventory systems includes the following general categories and definitions of stormwater controls which play a significant role in green infrastructure. The terms for the different categories of green controls were derived from computer models that simulate the hydrologic and hydraulic functions these controls provide. More common names are also provided for consistency with other BES projects and programs.

A *Structural Stormwater Control* is an object that modifies stormwater amounts and or quality after rainfall reaches the surface or just before it reaches the surface. We have identified seven types of engineered SSWCs: Redirector, Storage Facility, Swale, Green Roof, Porous Pavement, Mechanical Control, and Underground Injection Control. The first four types may include green infrastructure elements; the last three types are generally not considered green facilities, but are critical non-pipe stormwater management solutions.

- a. A *Redirector* redirects impervious area away from a direct sewer connection to surface flow. An example is a downspout disconnection, which redirects roof impervious area away from the sewer lateral and onto a lawn or garden or perhaps the street surface. The Bureau provides incentives to property owners in the combined sewer service areas to disconnect their downspouts. This program has resulted in the disconnection of over 50,000 downspouts on 24,485 homes since the mid 1990s. These, combined with the more than 33,000 surveyed homes found to have one or more downspouts disconnected, has resulted in removing an estimated 1.2 billion gallons of stormwater from the system annually.
- b. A *Storage Facility* typically uses vegetation and soils to store, retain, treat, and gradually release water via infiltration(?) or by draining to the collection system. It has the capability to hold water, but may not necessarily do so (i.e., water can either flow through the control or stay in a holding receptacle for an indefinite/calculated amount of time). Examples include ponds, constructed wetlands, curb extensions, planters, and vegetated infiltration basins(?).

- c. A *Swale* is a vegetated flow-through facility used primarily for conveyance, slowing, and water quality purposes that may infiltrate stormwater. Both storage facilities and swales occur in the right-of-way and on private property. Through its Maintenance Inspection Program, BES has inspected approximately 7,000 private facilities – primarily commercial or industrial – and approximately 400 large facilities in the right-of-way. These facilities are specifically identified in our MS4 (stormwater management) permit. Specific examples of these asset-types include vegetated swales, parking lot swales and (to a lesser degree) drainage ditches.
- d. A *Green Roof or ecoroof* is a roof-based impervious area that has been vegetated to absorb rainwater. The Bureau has helped finance ecoroofs on a number of public buildings including the Portland Building and the Multnomah County office building. We have an inventory of 67 ecoroofs within the city limits. These 67 roofs total just over six acres of previously impervious surface. The majority of eco-roofs have been constructed in the last three years.
- e. A *Porous Pavement* is a semi-impervious area that has an intended capacity to infiltrate a portion of rainwater. These are found in the right-of-way, primarily in parking strips, and in parking lots.
- f. A *Mechanical Control* is a structure that manipulates the delivery of stormwater sent to it via mechanical action. These structures include vortex valves and sedimentation manholes and are generally considered to be part of our “grey” infrastructure.
- g. An *Underground Injection Control (UIC)* is a perforated cylinder that infiltrates stormwater back into the ground. There are approximately 9,000 city owned and maintained UICs within the city limits. The Bureau has an active capital improvement program to upgrade approximately 380 of these to meet requirements of the Water Pollution Control Facilities Permit.

#### Critical Community Assets

As indicated above, critical elements of the stormwater management system require active community involvement. In addition to the SSWCs discussed above, watershed health is heavily dependent on the vegetated environment. Trees and native vegetation are the backbone of a healthy ecosystem. A single mature tree with a 30 foot crown can intercept 4,600 gallons of water per year.

#### Major Programs

The Bureau strives to plant trees, native vegetation, and increase shade along streams. Riparian vegetation and woody debris provide shade over the creeks. Maintaining mature shade trees can reduce stream temperatures by 5°F or more. Maintaining upland recharge areas and vegetated corridors also helps connect streams to the groundwater. In summer, cooler groundwater slowly seeps into streams, helping to reduce water temperature – critical to fish survival and compliance with water quality standards. In partnership with the Friends of Trees and non-profit community groups, the City participates in a number of tree planting projects. The Watershed Revegetation Program plans, facilitates and implements watershed revegetation projects throughout Portland. Since 1996, the program has revegetated 2,038 acres with over 2 million trees and nearly 1 million shrubs.

The Bureau develops, maintains, and enforces the Stormwater Management Manual. The manual requires developers to treat stormwater and control post development off-site flow. To meet these requirements, the manual provides the information necessary to select, design, and size stormwater facilities in a wide range of development conditions. Inspections during and after construction along with education and training will ensure that this vegetation is not

removed and that stormwater facilities are adequately maintained. An update to the manual is expected to be complete by July 2008.

The Bureau completed a comprehensive Watershed Management Plan in 2005. The Bureau is prioritizing short-term projects to implement the plan and developing comprehensive procedures for monitoring and evaluating conditions. As an example, in the Johnson Creek watershed, we are working to improve flood management through stream enhancement and by purchasing properties within the ten-year flood plain through a willing seller program. In the Fanno and Tryon Creek watersheds, future capital investment will focus on the issues identified in the TMDL – reductions to water temperature and pollutant loads of phosphorus. Investments will also address riparian habitat.

#### General Direction

The Bureau is continuously adjusting its approach to stormwater management and watershed health as we gain more knowledge of the science and engineering. We strive to engineer solutions that comprehensively address the quality of the environment within regulatory and fiscal constraints.

To achieve best management practices, we have developed watershed plans for the Columbia Slough, Johnson Creek, the Fanno/Tryon Creek basin, and the Willamette River. The plans are tailored to the specific issues in each watershed including flood control, pollutant types, temperature control, endangered species. All plans specifically address regulatory compliance issues and provide an overall framework for surface water issues. More detailed implementation plans are developed through basin predesigns. Two recent predesigns, Taggart D and Fanno and Tryon Creeks, reflect the Bureau's current philosophy of managing stormwater through non-pipe solutions, whenever feasible. As these predesigns are implemented, we anticipate a significant increase to the engineered green infrastructure in the form of green streets, conversion of ditches to swales, tree planting, etc. Along with traditional engineering stormwater conveyance; such as culverts, pipes, ditches, and ponds; these controls affect both the hydrology and hydraulics of the city's stormwater in its efforts to manage stormwater.

The Bureau is making capital investment decisions based on green practices. The "big pipe" was sized for the future with the assumption that a percentage of stormwater would be managed through non-pipe alternatives in the combined sewer areas. Non-pipe alternatives include SSWCs and maintenance and enhancement of the vegetated environment. Future green investments are critical to our ability to comply with permit requirements and for the city to develop in a sustainable manner.

### **C. Transportation**

#### Overview

The Portland Office of Transportation owns and/or manages a number of open spaces located in the public right-of-way. These areas, referred to as Street Area Landscapes and Transportation Maintenance Sites, generally include trees or other vegetation and require irrigation and maintenance. These areas provide wildlife habitat and can reduce stormwater needs.

#### Summary of Inventory and Condition

The City of Portland's Bureau of Transportation has responsibility for over 600 Street Area Landscape (SAL) sites. Many of these sites have trees, vegetation, and irrigation systems. Street area landscape sites include traffic calming devices (traffic circles) in residential neighborhoods, park block settings like Reed College Place, the Ainsworth Blocks, and

landscaping at the north end of the Esplanade along the east-bank of the Willamette River. In addition, these sites are often where entry is made to the City, such as medians and planting strips along SE Powell Boulevard. Some of the sites are decorative fountains in the heart of the City.

In addition to SALs, there are Transportation Maintenance Sites (TMS). These are areas with many of the same attributes as SALs built as part of transportation improvements, for example curb extensions, planted areas along street car lines, and planters between the SE McLoughlin viaduct. These sites may require irrigation and maintenance, including inspection, brush control, trash removal and mowing for fire prevention and visibility. The number of these sites exceeds 200 and is increasing.

#### General Direction

Funding for maintenance of SAL sites has been reduced by about 85 percent over the last ten years, from FY97-98 to FY07-08. The budget cuts mean deferred or minimal maintenance resulting in considerable deterioration of this asset class. Trees and vegetation are not pruned or replaced when they are damaged or die, and irrigation systems break or fail. Public safety, neighborhood livability, and the many benefits associated with "green assets" are adversely impacted by the reduced funding. Maintenance funding for TMS sites is also insufficient and therefore is restricted to inspection and hazard repair.

### **D. Portland Water Bureau**

#### Overview

The Water Bureau's primary green infrastructure asset is the Bull Run Watershed, over 100 square miles of protected forest and the main source of the City's drinking water. The Bureau also owns portions of the Powell Butte and Mount Tabor parks. All of these natural areas provide wildlife habitat.

#### Summary of Inventory and Condition

About 95% of the Bull Run Watershed is located on the Mt. Hood National Forest and is administered by the USDA Forest Service. The City owns the remaining 5%, primarily along the lower Bull Run River. Detailed information about the condition of the Bull Run watershed is available in the Sandy River Basin Characterization Report ([www.sandyriverpartners.org](http://www.sandyriverpartners.org)). The Water Bureau owns 560 acres of Powell Butte (approx. 350 acres in a natural condition) and 190 acres at Mount Tabor. Inventory information is not currently available from the Water Bureau on specific habitat conditions at Powell Butte and Mount Tabor.

#### Critical Community Assets

The Bull Run watershed provides a protected source of clean drinking water for the City of Portland. Of primary benefit to the City is the protection of both water quality and quantity that the healthy forest ecosystem provides. The Bull Run watershed also provides habitat for both aquatic and terrestrial wildlife including 4 species listed as threatened under the federal Endangered Species Act (northern spotted owl, Chinook salmon, coho salmon and winter steelhead).

#### Major Programs

The Water Bureau works in cooperation with the USDA Forest Service – Mt. Hood National Forest to protect the Bull Run watershed. Programs include road maintenance to prevent erosion, security to prevent human-caused water pollution, fire detection and response, and wildlife protection.

### General Direction

The Water Bureau recently signed a Memorandum of Understanding with the Mt. Hood National Forest to update and clarify roles and responsibilities for protection of the Bull Run watershed.

The Water Bureau has also drafted a Habitat Conservation Plan to protect habitat salmon and steelhead in the lower Bull Run River and in the larger Sandy River Basin. The conservation measures proposed in the Plan include in-stream habitat improvements, riparian protection, fish passage improvements, and wildlife protection measures.

## **E. Office of Management and Finance: Civic Facilities**

### Overview

The City owns a number of buildings, police and fire stations, garages, and spectator facilities. Two of these facilities have eco-roofs, sometimes referred to as “green” roofs, in place of traditional roofs. Eco-roofs are generally covered with some type of vegetation and reduce stormwater runoff, filter pollutants, provide wildlife habitat, and decrease building heating and cooling needs.

### Summary and Condition of Inventory

Two city facilities currently have eco-roofs, the Portland Building (installed in 2007) and Fire Station 12 (installed in 2002).

### General Direction

Facilities Services has identified several facilities that potentially need new roofs over the next 5 to 8 years and is in the process of evaluating possible roof/eco-roof systems. These facilities include the Portland Communications Center, North Precinct, East Precinct, Materials Testing Lab, 1<sup>st</sup> & Jefferson parking garage helipad, elevator and stairwell roofs, and the Walnut Park Cleaners building. The SE Precinct building may also be a possible candidate if the purchase from Multnomah County proceeds. Facilities Services is currently examining City Hall for a potential eco-roof and has determined that the NE Precinct can support an Energy-Star roof proposed for FY 2011-12.

## **F. Portland Development Commission: Affordable Housing**

The PDC Green Building Program requires developers receiving financial assistance from the Commission, and direct Commission funded construction projects, to integrate green building practices into construction projects and meet established Leadership in Energy and Environmental Design (LEED) standards. Improvements made under this policy may include green infrastructure facilities, such as swales, eco-roofs, and open space.

## Appendix 7: Asset Management Definitions

**Asset:** A physical component of infrastructure or a facility which has value and has an expected useful life of more than one year, that would be replaced if destroyed, and is not surplus to needs.

**Asset Management:** The continuous cycle of asset inventory, condition, and performance assessment that has as its goal the cost-effective provision of a desired level of service for physical assets. Investment decisions consider planning, design, construction, maintenance, operation, rehabilitation, and replacing assets on a sustainable basis that considers social, economic, and environmental impacts.

**Backlog:** The sum of deferred activities, such as maintenance, operations, and rehabilitation, needed to achieve the lowest life-cycle cost for an asset. Backlog results from lack of money, materials, or staff to perform the needed work. (See Funding Gap.)

**Capital Expansion:** Projects or facilities that create new assets, increase the capacity of existing assets beyond their original design capacity or service potential, or increase the size and service capability of a current service area, including service to newly annexed, undeveloped, or under-served areas. Generally increases the total maintenance requirements because it is increasing the total asset base.

**Civic:** A collection of City-owned assets, including facilities (office, police, fire, parking garages, spectator facilities, Portland Center for the Performing Arts) and technology services (800 MHz radio system, telecommunications, IT operations, strategic technology). Bureau maintenance facilities are assets of the operating bureau.

**Condition Assessment:** The method used to quantify the deterioration rate and remaining useful life of an asset. Methods of condition assessment vary by asset classification and range from use of industry estimates for deterioration rates up to documented physical inspection regimens on established cycles that ensure optimum economic life of an asset.

**Condition Measure /Rating:** A means of classification using information from periodic inspections or measurements to indicate the ability of an asset to deliver a particular level of service.

**Confidence Levels (in data/information):** The expression of accuracy and reliability in the areas of information (source and reliability), process (ad hoc or repeatable) and documentation (documented or not documented).

The following chart addresses this information:

	<b>Inventory completeness</b>	<b>Condition assessment method and frequency</b>	<b>Process and documentation</b>	<b>Resulting confidence level</b>
1	No inventory	No assessment method	No process	No confidence
2	Partially complete inventory	Estimates used to assess condition	Process not well documented	Low confidence
3	Inventory complete	Subjective process to estimate condition	Some documentation in	Moderate confidence

	<b>Inventory completeness</b>	<b>Condition assessment method and frequency</b>	<b>Process and documentation</b>	<b>Resulting confidence level</b>
		estimated followed on a regular schedule	place	
4	Inventory complete	Condition surveys conducted on a regular schedule by well-trained personnel	Well documented process followed	High confidence
5	Inventory complete	Condition surveyed on a regular schedule	Objective process followed; Accuracy of data verified and well documented	Optimal confidence

**Consequence of Failure:** The outcome of an event expressed qualitatively or quantitatively, being a loss, injury, disadvantage or gain. There may be a range of possible outcomes associated with an event.

**Current Replacement Value (CRV):** The CRV is the total cost to replace the entire asset to meet current accepted standards and codes.

**Failure Mode:** The reason why an asset failed to provide the function for which it was installed.

**Funding Gap:** The difference between the funding needed to address infrastructure needs of an asset at a defined condition or level of service and the funding that is currently available. The funding gap varies with the funding level and affects the level of service. The funding gap is the amount of money needed to eliminate the backlog and/or maintain the asset to achieve its useful life. Given a certain funding level, the resulting level of service can be forecast; if a certain level of service is desired, the funds needed to achieve it can be estimated.

**Green Infrastructure:** Infrastructure that uses natural processes, systems, or features to provide traditional infrastructure services. There are two types of green infrastructure:

- 1) Natural networks of streams, rivers, and open spaces that naturally manage stormwater, provide habitat, improve air and water quality, reduce flooding risk, and provide areas for human recreation and respite; and
- 2) Engineered facilities, such as green street treatments or eco-roofs, which use natural processes in an infrastructure setting.

**Infrastructure:** Consists of assets in two general networks that serve whole communities—transportation modalities (roads, rail, etc.) and utilities. These are necessary municipal or public services, provided by the government or by private companies and defined as long-lived capital assets that normally are stationary in nature and can be preserved for a significant number of years. Examples are streets, bridges, tunnels, drainage systems, water and sewer lines, pump stations and treatment plants, dams, and lighting systems. Beyond transportation and utility networks, Portland includes buildings, green infrastructure, communications, and information technology as necessary infrastructure investments that serve the community.

**Inventory:** A list of assets and their principal components.

Level of Service: A defined standard against which the quality and quantity of service can be measured. A level of service can include reliability, responsiveness, environmental acceptability, customer values and cost.

Life-Cycle Cost: The sum of all costs throughout the life of an asset, including planning, design, acquisition, construction, operation, maintenance, rehabilitation/renewal and disposal costs.

Likelihood of Failure: The probability or possibility of an event that will cause the asset to fail.

Maintenance: Activities that keep an asset operating as designed or prevent it from deteriorating prematurely, excluding rehabilitation or renewal which may extend asset life. Maintenance can be planned or unplanned.

Planned maintenance is:

- Preventive – maintenance conducted at regular scheduled intervals based on average statistical/anticipated lifetime.
- Condition-based – maintenance based on objective evidence of need from tests, measurements and observations.
- Deferred – the shortfall created by postponing prudent but nonessential repairs to save money or materials. Generally, a policy of continuing deferred maintenance results in higher costs when repairs are eventually made, or failure that occurs sooner than if normal maintenance had been performed.

Unplanned maintenance is:

Reactive or Emergency – corrective actions taken upon failure or obvious threat of failure, usually at a higher cost than planned or preventive maintenance.

Operations: The ongoing activities that allow the use of an asset for its intended function.

Performance Indicator: A qualitative or quantitative measure used to compare actual performance against a defined standard. Indicators are commonly used to measure cost, performance, or customer satisfaction.

Performance Monitoring: The periodic assessments of actual performance compared to specific objectives, targets, or standards.

Rehabilitation / Renewal: Maintenance performed on an asset to restore it to its original level of service or capacity and achieve its useful life, which may result in an extension of the asset's service life.

Retirement/Removal: Decommissioning or removal of an asset through disposal, abandonment, demolition, or sale that may involve retiring deteriorated assets and recovering salvage value.

Risk: The chance of something happening that will have an impact upon objectives. Risk is measured in terms of likelihood and consequences.

Risk Analysis: A systematic use of available information to determine how often specified events may occur and the magnitude of their consequences.

Risk Management Strategy: The systematic application of management policies, procedures and practices to the tasks of establishing the context, identifying, analyzing, evaluating, treating, monitoring and communicating risk.

Triple Bottom Line: A method to categorize the benefits and impacts an organization can expect from investing in its assets. The benefits are categorized into Social, Economic, and Environmental benefits to ensure a comprehensive evaluation in the decision-making process (measure, manage and report).

Useful Life: The period of time over which an asset is expected to deliver efficient service with normal or appropriate maintenance (defined as accepted industry standard or documented local experience).

