CITY OF PORTLAND
2015 CITYWIDE ASSETS REPORT
Status and Best Practices
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1. Executive Summary

The City of Portland’s physical infrastructure assets include roads, pipes, treatment facilities, parks, buildings and more. What does it take to be steward of these community assets? What will we turn over to future generations? This report compiles data and best practices useful to City bureaus and decision-makers in answering these questions. Understanding the value and condition of assets and current asset management (AM) practices will help City decision makers allocate scarce financial resources to deliver public services.

This report provides integrated information about the City of Portland’s physical assets. It provides a summary of the number of assets, replacement value, condition, and unmet funding needs. Information in the report assists the City’s efforts to ensure infrastructure is in adequate condition and that operation, maintenance, rehabilitation, and development programs are as efficient and effective as possible.

Purpose of Report

This report serves to:

- Provide City of Portland staff, policy makers and general public with information needed to make more informed decisions that extend the life of the City’s physical assets and deliver agreed upon service levels.
- Account for the community’s investments and track assets over time — past, present and future.
- Relate challenges, progress and future opportunities.
- Share best practices with peer communities and infrastructure professionals.

This report collects and assembles key data, observations and best practices into a single report. This report leverages asset management expertise, contacts and trainings, through the cross-bureau City Asset Managers Group (CAMG), and enables more effective information exchange and the sharing of best practices within and outside of the City. This report dovetails with bureau-specific reports, City audits and policy reports, and is shared with City Council through the annual budget process.

To develop this report, the City’s infrastructure bureaus collect and analyze data on all City-owned buildings and infrastructure. The bureaus strive to follow internationally recognized asset management principles, and use best practices to develop a coordinated approach to citywide asset management. This approach includes determining key measures, such as the value and condition of infrastructure assets, identifying confidence levels for the information presented and acknowledging when information is not available.
Relation to City Policy and Budget

Policy Development

From a policy perspective, there are three key factors to effectively manage the City’s infrastructure systems: service levels, funding and risk. Defining service levels and managing risk are described as key best practices, in Section 5 of this report. Annual funding gaps, by asset group, are described in Section 4 of this report.

At current funding levels, some of Portland’s infrastructure will continue to deteriorate and bureaus may have to decrease their service levels as those assets are no longer able to deliver service. Three bureaus, Parks & Recreation (PP&R) and the Bureau of Transportation, and Fire & Rescue (PF&R) lack reliable and stable funding sources to adequately invest in maintaining their assets, which means levels of service will decline and risks will increase by default. Water and BES seek to limit rate increases, which impacts their long-term ability to maintain their assets. Facilities Services, which provides services to other city Bureaus, also faces pressure to minimize costs and rates charged to city Bureaus, which makes it difficult to address major maintenance needs and preserve the long-term value of civic assets, like the Portland Building, the Portland Communications Center and the 1900 Building. Citywide, infrastructure bureaus are challenged to find the funding needed to improve seismic safety and to bring buildings into compliance with the Americans with Disabilities Act. In addition, the City owns a number of civic assets for which funding streams are insufficient for long-term maintenance and replacement.

Conservatively, infrastructure bureaus estimate a combined annual funding gap of $411.7 million per year to maintain existing facilities, address regulatory requirements, and continue to meet service levels. This gap will likely grow for each of the next ten years. Some new assets often add to ongoing operations and maintenance needs, potentially adding to the funding gap. Some new assets may also replace existing asset functions and add new functionality.

City infrastructure policies are shaped by the Portland Plan and by the Recommended Draft 2035 Comprehensive Plan, currently the subject of public hearings. The Recommended Draft identifies seven key directions: complete neighborhoods, encourage job growth, create a low-carbon community, improve natural areas and open spaces, provide reliable infrastructure, improve resiliency, and one size does not fit all. Staff and the public are discussing policies to guide priorities to manage and invest infrastructure assets. A parallel process is updating the City’s Transportation System Plan.
City Budget Process

The information contained in this report is intended to help decision-makers make more informed decisions in the annual budget process. Bureaus are encouraged to cite terms, data and graphics from the CAMG products (annual report, brochure, etc.) in their budget presentations. Some service level data is also coordinated with the City Budget Office’s budget mapping exercise.

Citywide Funding Options Report

Based on a request made by a team of bureau directors during last year’s Budget Work session, Council included a budget note in the FY 2014-15 Adopted Budget that directed bureau asset managers to work with CBO to develop options for funding and allocating resources to address recurring major maintenance and replacement needs.

As directed, a workgroup submitted a final report, complete with recommendations and an implementation timeline, to Council on October 2014. The report outlined a suite of options for closing the major maintenance and asset replacement funding gap, noting that there was no single solution.

The report also recognized that without a substantial realignment of resources (existing or new) to address this issue, the City risks higher costs and lower levels of service in the future. Other report recommendations included:

- Re-establish a General Fund Capital Set-Aside.
- Generate new revenue sources for transportation.
- Make incremental increases in internal service fund rates.
- Develop options for ongoing General Fund allocations to bureaus.
- Initiate policy changes and project prioritization activities.

Council took action on two of the report recommendations in the FY 2014-15 Fall BMP. Additionally, Council passed Resolution 37107 in January 2015 which sets aside 50 percent of one-time General Fund resources identified in the forecast ($7.2 million in FY 2015-16) and states Council’s intent to dedicate these funds to emergency preparedness, transportation and parks infrastructure. Council may consider accepting several of the other recommendations in the FY2016-17 budget process. Status of the recommendations will be provided in future publications.

You can view the full report online at www.portlandoregon.gov/cbo/article/507450.

General Fund Capital Set-Aside Project Ranking

In parallel to drafting the funding options report, and at the request of Council, the workgroup also developed a process for ranking unfunded major maintenance and infrastructure replacement projects. This effort was helpful in addressing City Financial Policy 2.03 which states Council’s direction to dedicate a minimum of 25 percent (revised upward to 50 percent per Resolution 37107 in January 2015) of excess General Fund ending balance to major maintenance and infrastructure replacement needs.

The projects included on this list were submitted and self-scored by bureaus using criteria developed to evaluate both the risks of asset failure and the benefits of completing the projects. In order to ensure consistency and accuracy in the scoring process, bureau-scored projects were individually reviewed by a Validation Committee. The Validation Committee, comprised of representatives from the asset managing bureaus, adjusted scores when necessary.

That ranking process has been utilized and refined during the FY 2014-15 and FY 2015-16 Fall Supplemental Budget processes as well as the FY 2015-16 budget development process. Over these three funding rounds, the process has funded projects totaling $24 million in a variety of bureaus. A fourth round of ranking and funding has been incorporated into the FY 2016-17 budget development process and is expected to result in at least $8 million in project allocations, based on the February 2015 forecast of one-time resources.
Continuous Improvement

In 2009, the Citywide Assets Report included a shared work plan that laid out approaches for collaborative work to apply best practices across all member bureaus. That workplan was refreshed as part of the 2014 report and continues to be a focus in 2015. More details are provided in Chapter 5 of this report. Elements of the workplan include:

1. Refine service levels, as needed. Each bureau will guide and determine any changes to its service levels.

2. Improve data collection for high-risk assets, and apply mitigation strategies based on asset risk classification. Identify opportunities for bureaus to collaborate on risk assessments and mitigation strategies.

3. Develop bureau and asset-specific templates and application processes, for business case.

4. Apply reliability-centered approach to bureau maintenance.

5. Complete long-term investment profiles, develop tools and methodologies, and develop investment profiles for high-risk assets.

There is also interest in deepening discussions with customers and the public, about service levels, risk and investments in infrastructure systems. These discussions need to extend beyond each bureau’s budget advisory committees.

Looking Ahead

In 2015, the CAMG marks advances in data improvements, the shared work plan, and funding.

Data Improvements
- Completing PP&Rs’ baseline asset inventories.
- Completing the Citywide ADA Transition Plan.
- Added vehicles, fueling stations and fire apparatus to Civic asset group (from OMF and PF&R).
- Focusing on high risk assets.
- Conducting analysis of risk exposure to inform Capital Program priorities (BES and Water Bureau).
- Applying risk exposure to candidate projects for General Fund Capital Set-aside funds (CBO as lead).

Work Plan
- Using bureau responses to the best practices survey to advance shared priorities.
- Creating visual report cards, consistent with the Council Performance Management Dashboard.
- Dovetailing with Council budget priorities.

Funding
- Voters approved the 2014 Parks Bond.
- Community discussed a street fee proposal.
- Helping to implement recommendations from CBO’s Funding Options Report.

In motion for 2016
- Configuration and implementation of the three new SAP modules to be used in Facilities Services asset management.
- Organizing a companion report, Green Infrastructure Assets (BPS as lead).
2. Key Findings

This report cites data and processes for the year ending June 30, 2015. This section includes information regarding the value and condition of city assets, the quality of that data, and an update on improvements to bureau business practices for managing their assets.

Status and Conditions

Highlights from the 2015 data are:

1. The current replacement value of the City’s physical infrastructure is estimated at $34.7 billion. Current replacement value is an estimate of what it would cost to construct these assets today. It represents substantial investments by several generations of Portlanders. Current replacement value excludes the value of land.

2. At current funding levels, some of Portland’s infrastructure will continue to deteriorate and bureaus may have to decrease their service levels. Three bureaus, Parks & Recreation, PF&R, and the Bureau of Transportation, lack a reliable resource base to adequately fund investments in maintaining assets. By default, levels of service will decline and the risk of failure will increase. Water and BES seek to limit rate increases, which impacts their long-term ability to maintain their assets. Facilities Services, which provides services to other city Bureaus, also faces pressure to minimize costs and rates charged to city Bureaus, which makes it difficult to address major maintenance needs and preserve the long-term value of civic assets.

3. Conservatively, infrastructure bureaus estimate a combined annualized 10-year funding gap of $411.7 million per year to maintain existing facilities, address regulatory requirements, and/or meet service levels. This gap will likely grow for each of the next ten years. Transportation infrastructure needs represent 66% of this gap, Parks represents 18%, Water and Environmental Services represent 10%, Police and Fire represent 1%, and Civic (Facilities and Technology) represents 5%.

4. New assets often add to ongoing operations and maintenance needs, potentially adding to the funding gap. Some new assets may also replace existing asset functions and add new functionality while reducing risk.

5. The consistent finding of the City’s annual citywide asset reports (since 2002) is that a substantial annual funding gap persists.

Asset Management

In 2015, bureaus continued to advance selected business practices. These include:

Transportation reported service levels and captured the unmet need to meet levels of service for asset condition. These unmet needs are factored into a long-term replacement strategy and short-term maintenance budget needs. These needs have been a part of the effort to identify transportation maintenance and safety needs.

Environmental Services applied enhanced risk-based evaluation and decision-making for Capital Improvement Plan projects during planning and design phases. Environmental Services also developed a risk-based Equity Lens to review the distribution of CIP projects across the community.

Water completed another set of Asset Management Plans (AMPs) and continue efforts on risk management (especially for high failure consequence pipes) and business cases. Its approach to estimate the consequence of failure of some water pipe crossings of highways and railroads is innovative.

PP&R started to implement the MicroMain improvement strategy. This overhauls PP&R’s current work order system to implement asset framework standards across all facilities. For example, this improvement ensures that all parks are entered as an asset and the amenities within them (playgrounds, sports fields, etc.) are also all consistently entered and tracked. Work has also begun to migrate asset inspection program data from MS Excel to MicroMain. This will allow PP&R much greater flexibility in extracting reports, standardizing inspection procedures and recording, and eventually incorporating
mobile asset management tools similar to what is being offered in products like SAP Plant Maintenance.

Management and Finance (OMF) Management and Finance (OMF) partnered with consultant Cardno TEC and other City bureaus to conduct building condition assessments of 27 City buildings. Buildings were visually assessed for physical condition and seismic vulnerability. The findings are currently being reviewed by OMF staff. The Facilities Services Division also started a Strategic Planning and Development program. More information on this program is provided in the annual update for Civic Assets.

These bureaus continued to share their best practices.

Trends, Challenges and Opportunities
The Planning and Development Directors (the CAMG’s sponsor) see three general policy trends:

- Assets age and wear out, even with best of maintenance.
- Bureaus are making the best of limited resources, but have a large funding gap.
- The funding gap results in increased risk of failures, reduction in levels of service and perpetuation of long-standing inequities.

There are several challenges to advancing citywide asset management best practices. These include:

- Limited resources to reduce the annual funding gap.
- Prioritizing limited resources. As bureaus seek out long-term, cost-effective approaches to service delivery, the community also wants to reduce historic inequities by ensuring all Portlanders receive at least basic minimum services.
- Challenge of coordinating and communicating across multiple bureaus.
- A steep learning curve, for City staff and decision makers, to understand and apply asset management practices.
- Pending retirements of City staff with hands-on knowledge of how to operate and maintain infrastructure assets (so-called succession planning issue).

Opportunities include:

- Cross-functional teams — the Water Bureau has used cross-functional management plans and ranks risks of asset failure. PP&R is engaging in cross-functional work teams to assess and quantify the risk of certain assets and to determine priorities for investments. Staff from other City bureaus (BES, PBOT, PP&R) have also attended trainings on fundamentals of asset management, and committed to cross-training their departments.
- More shared understanding of infrastructure asset management by decision-makers, managers and line staff.
- Community interest in best value for public services, setting realistic service levels and reducing risk of assets failing. Reducing inequitable access to services is another strong community interest. Process tools, such as Triple Bottom Line and risk assessments, can be calibrated to account for social impacts.
- Extensive contacts with peer communities (especially for utilities) and consultants.

For more details on citywide best practices, see Section 5 of this report.
3. Asset Management Context

General Goals
The goal of strategic asset management (AM) is to develop a sustainable asset base that provides appropriate levels of service and responds to social, economic, and environmental needs. Asset management addresses the full life cycle of the design and specifications, maintenance, repair, rehabilitation, replacement, acquisition and disposal of assets.

Asset management is a set of industry standard best practices that provides a risk mitigation approach to decision making. It is commonly defined as meeting agreed upon public, customer and environmental service levels, while minimizing life cycle costs at an acceptable level of risk.

Asset management activities are driven by asset deterioration, regulations, and community needs (based on service levels). They 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.

Benefits and Elements
Asset management informs asset acquisition, maintenance and operations, renewal and adaptation, and asset disposal. It focuses on reliability and the lowest total life-cycle cost to provide desired levels of service.

Applying AM principles and practices will:
- 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.
- Improve and coordinate City AM planning across bureaus.

Common elements for managing assets include:
- Information systems, such as GIS, CADD and Computerized Maintenance Management Systems (CMMS), 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.
- Clear assignment of roles and responsibilities to guide AM efforts.

Collaboration
Some local governments seek to improve AM best practices across their asset groups. A few local governments aspire to a whole-of-city approach. For the City of Portland’s commission for of government, a cross-bureau approach seems more achievable. Either way, the objective is to continually improve performance-based information that is available to the public, bureaus, and city leaders as they make choices in the types and levels of service desired.

Drivers
In FY 2001–02, City Council set strategic priorities as part of the Managing for Results exercise. The Council identified the City’s deteriorating physical infrastructure as an immediate strategic priority. It remains a top Council strategic priority.

Other policy drivers (federal, state and local) 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.
- Transportation System Plan.
The Portland Plan.
Climate Action Plan, with Climate Change Preparation Strategy.
Municipal bonded debt covenants.
City of Portland Budget Manual, which requires bureaus to analyze operations and maintenance costs and savings in new projects.
U.S. Governmental Accounting Standards Board statements.
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 a number of federal, state, and local regulations require additional compliance measures by the City. These mandates vary in compliance requirements, timeline, and level of funding through current City revenues.

Regulatory mandates affect all of the City’s infrastructure systems, including sewer and stormwater, transportation, water, parks and civic facility investments. The following represent some of the major regulations on capital systems:
- Clean Water Act, such as the Long Term Enhancement Rule (LT2) and CSO Amended Stipulation and 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.

These regulations represent newly, and often externally, defined levels of service, and many do not have dedicated funds set aside for compliance measures. Compliance often requires significant capital investment, which requires new financial resources or the diversion of existing resources from current or future services levels (e.g. reduced funding for programming or capital repair and rehabilitation projects). In addition to existing mandates, future regulations may further impact management of the City’s infrastructure systems.

Bureau funding gaps presented in this report include varying degrees of regulatory compliance. Certain requirements, such as ADA accessibility and building code improvements may occur as part of capital repair or rehabilitation projects.

Update on ADA Transition Plan – In November 2014, Office of Equity and Human Rights presented the non-park facility Citywide Transition Plan to City Council for approval. In September, 2015, Office of Equity and Human Rights and Portland Parks & Recreation (PP&R) presented the Parks Supplement to the Citywide Transition Plan.

Portland’s Transition Plan is a comprehensive report that identifies barriers to persons with disabilities at City owned, managed, or leased facilities. Three hundred and forty-two facilities were assessed, and roughly 25,000 barriers were identified citywide, with the majority of the facilities (260) and barriers (20,355) on properties owned or managed by PP&R.

Development of the Transition Plan was a collaborative multi-bureau and community effort, with assessments conducted by a consultant team. Addressing the barriers will result in a more accessible, and equitable City for everyone. Providing accessible facilities that meet the Americans with Disabilities Act requirements is, in effect, a minimum regulatory level of service. Bureaus will be working per the schedule outlined in the ADA Transition Plan to address these barrier removals.
4. Citywide Asset Status and Condition

This section discusses key citywide data, bureau profiles and bureau methodologies. Several appendices support this status and condition analysis, and define terms. The City Asset Managers Group continues to seek opportunities to more closely align methods across bureaus.

A. Key Data

The annual citywide assets reports cite three key measures of the health of infrastructure systems. The measures are: current replacement value, current condition, and annual funding gap. These are fully loaded costs, including overhead. Confidence levels are assigned to communicate the relative quality of the data. In some cases, data is not available or is pending more detailed data collection and analysis.

- **Current replacement value (CRV)** — This is the total cost to replace the entire asset to meet current accepted standards and codes. CRV represents past investments of Portlanders in the City's transportation, water, sewer, stormwater, parks and civic facilities. At critical points in Portland's history, the community has supported major investments — to deliver drinking water from Bull Run (using headworks treatment, conduits and storage reservoirs), to treat sewage water (using sewer pipes and two sewer treatment plants), to improve access for people and goods (by paving streets and accommodating pedestrians and bikes), to provide safe places to play (with landscape plantings, recreation buildings and features), and to provide civic facilities and technology services (including police and PF&R facilities).

The City’s physical infrastructure has a current replacement value of $34.7 billion. By bureau, the infrastructure value is: PBOT ($9.9 billion); BES ($13.5 billion); Water ($8.2 billion); PP&R ($1.4 billion); and Management and Finance ($1.8 billion).

- **Current condition** — This is the physical condition of the asset, used to assess its rate of deterioration and remaining useful life. Bureaus set priorities for inspecting the condition of assets, and potential high-risk assets may get priority. Methods range from actual field condition assessment, to staff estimates (based on repair history), to deterioration or failure rate curves. Some assets (like buried pressure water pipes) are typically assessed by age and type of pipe, break history and spot excavations.

Other assets can be inspected directly, but may be dispersed (as with parks buildings, recreation features, trails, benches and other furnishings).

- **Annual funding gap** — This is the difference between the funding needed to address infrastructure needs of a group of assets at a defined condition or level of service, and the funding that is currently available. It is the amount of money needed to eliminate the backlog and/or maintain the asset to achieve its optimal useful life. There are three types of funding gap:
  - **Repair, Rehabilitation, Replacement (R/R/R):** Additional funding necessary to repair, rehabilitate and replace existing assets to bring them up to current service levels, or replace assets considered obsolete.
  - **Mandate:** Additional funding necessary to improve existing assets to meet regulatory requirements, exclusive of improvements that fall under Repair, Rehabilitation, Replacement or Capacity.
  - **Capacity:** Additional funding necessary to address existing inequities and deficiencies in levels of service for current customers and citizens.

Appendix 3 includes charts and data sheets for each bureau’s total funding gap, their funding gap by type (with capacity split out) and compared to their annual budgets (capital and operating). The bureau observations below, describe each bureau’s approach to asset management, recent experiences and improvement priorities.

Unfunded federal mandates, dedicated resources like Parks System Development Charges, and external funding of capital projects add to the number and type of physical assets. Although primarily built with leveraged funds, these assets become a long-term City obligation to maintain and operate. While City Council has a policy in place to ensure that operations and
maintenance costs are accounted for in bureau budgets, typically, there is little or no set-aside funding for ongoing major maintenance and replacement of these assets prior to their construction.

**Sustainable Funding Levels**

This year, the combined annual funding gap for Transportation, Environmental Services, Water, PP&R and Civic assets is $411.7 million, including street pavement. The ongoing funding gap is the result of under-investing in capital maintenance. This is not a sustainable business practice. With this trend, lower levels of service and more frequent system failures are predictable.

**Past Responses**

In 1996, City Council increased the General Fund capital set-aside from a base of $3 million. The Council’s intent was to add $1 million to it each year until a $10 million set-aside pool was formed. That fund rose to $7 million in FY 2002–03, and then declined after a series of annual budget cuts. The General Fund capital set-aside funded a variety of maintenance, replacement, and improvement projects. Major funded projects included ongoing replacements of fire apparatus, ongoing street lighting improvements, renovation of the Hillside Community Center, major maintenance of the 800 MHz system, purchase of a bomb robot, funding of debt service for the Gateway Child Receiving Center and Streetcar #7, and funding of several PP&R maintenance projects and acquisitions. In FY 2008–09, City Council redirected the capital set-aside to fund the Public Safety Systems Revitalization Project.

The Auditor’s 2002 report Managing for Results identified the deteriorating physical infrastructure as a priority. 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 1) start closing the annual funding gap, and 2) more fully maintain existing infrastructure. The City Council must balance many competing demands. This effort would take a number of years. The concept was to build a funding gap finance plan with a planning horizon of 10 to 15 years.

In 2007, the City Asset Managers Group worked with OMF 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 (see Appendix 5 of the City of Portland Asset Status and Conditions Report, December 2007).

City Council adopted revised Financial Policies effective July 1, 2008. A new provision stated that at least 25 percent of General Fund discretionary revenue that exceeds the budgeted beginning balance (adjusted) be allocated to infrastructure maintenance or replacement in the fall budget monitoring process (BMP). The percentage calculation is based on any discretionary funds in excess of the budgeted beginning balance, adjusted for the difference in encumbrances carried over from the prior year. As discussed in the ‘City Budget Process’ section above, Council resolution has since increased this figure to 50% of excess balance. The City Budget Office has been coordinating a group of bureau asset managers that reviews requests and ranks them utilizing a tool that makes an effort to prioritize based on the likelihood and consequence of failure.
B. Transportation

Profile

The Portland Bureau of Transportation (PBOT) manages transportation assets with a replacement value of nearly $10 billion. Improved streets, the sidewalk system, bridges, traffic signals (signal hardware), and streetlights make up 93 percent of the dollar value ($9.2 billion). In addition to these key assets, the City of Portland owns other assets that ensure the safety and movement of people and goods: streetcars; an aerial tram; various support facilities; traffic calming devices; signs; parking meters; parking garages; pavement markings; bikeways; guardrails; retaining walls; the Harbor Wall; stairways; and traffic signal computer controllers. These other assets are worth $703 million.

Asset Management Approach

PBOT's approach to asset management allows the bureau to monitor asset status and condition, determine level of service, measure performance, and determine unmet need. By using good data and information, PBOT can better plan how to maintain, rehabilitate and replace assets through a timely and cost-effective management program. PBOT can also better allocate limited resources where they provide the highest return on investment.

Asset Management Achievements

Condition Monitoring — Transportation currently conducts condition monitoring on pavement, bridges, structures, street lights and traffic signal infrastructure. PBOT recently expanded condition monitoring to include guardrails. Condition monitoring allows PBOT to plan for appropriate preventive maintenance, rehabilitation or replacement needs and budget accordingly.

Risk Assessment — PBOT has established a risk assessment for failure of assets. Criteria for assessing consequences and likelihood of failure have been created and are being applied to transportation assets. A risk registry, identifying failure modes and assigning risk of failure will be created. Risk of failure is used to prioritize pavement preservation across the city.

Asset Levels of Service — Levels of service for each infrastructure asset class have been established to track and monitor performance and outcomes achieved. Performance measurement is a way of monitoring progress toward a result or goal. It is also a process of gathering information to make well-informed decisions.

Asset Management Priorities

Over the last two years, PBOT has been using asset management as the foundation for community discussions on raising new revenue for maintenance and safety needs. Based on the unmet need calculations and the levels of service targets, PBOT does not have adequate revenue to maintain existing infrastructure. Generating new revenue to address unmet needs has been a priority and has led to a current proposal to ask voters to approve a ten cent gas tax.

Asset Value and Condition

Maintaining and operating the transportation infrastructure are key activities of PBOT. Emerging needs include:

Street Lighting — Street lights are important for the safety of our neighborhoods and for those who use the transportation system. Many of the city’s 55,864 street lighting luminaries were replaced in the early 1980s when mercury vapor lights were converted to high pressure sodium lamps. About 45,000 of those street lights are being switched over to LEDs. City Council passed an ordinance in December 2012 to authorize the conversion. Savings in energy and maintenance will be invested in system replacement.

Signals — Traffic signals are made up of several components (e.g. hardware, software, mast arms, controllers, cabinets and signals). Approximately 31 percent of the traffic signals are in poor or very poor condition. Traffic signals in poor condition are more prone to increased trouble calls, causing safety and congestion problems. Traffic signals in optimal condition provide efficient movement of people and goods and, when synchronized, reduced greenhouse gases.

Pavement — Approximately 45 percent of the collector and arterial system is in poor or very poor condition, 18 percent is fair and 37 percent is in good or better condition. PBOT’s goal is that 80 percent of the arterial and collector system is in fair or better condition and no more than 2 percent is in very poor condition.

Bridges — The City owns 157 bridges. Of these, 2 percent are classified in poor physical condition as defined by the National Bridge Inspection rating criteria. However, 16 percent of the City’s bridges are classified as in distressed condition. This classification is used
for bridges with a combination of poor condition, structurally deficiencies and/or weight restrictions.

In prior years PBOT had listed all distressed bridges as in poor condition. However, beginning in 2015, the definition of poor bridges includes only those in poor physical condition only. This change is in accordance with the NBI rating criteria and helps to compare the City of Portland with other jurisdictions at a national level.

Weight restrictions on bridges impact the ability to move freight and goods, which ultimately has an impact on our economy. Additionally, freight has to find alternate routes, extending travel time requiring the use of more fuel and impacting the environment.

**Sidewalk System** — The ADA requires the City’s public facilities be designed and constructed so that they are accessible to all people, including those with disabilities. In total, 50 percent of corners have accessible corner ramps, which met both current and past ADA standards.

**Annual Funding Gap**

The funding gap, or unmet need, is defined as the amount of additional funding and resources that are required to bring or restore an asset to fair or better condition. The City’s commitment to Vision Zero and Equity initiatives requires that we consider not just the current condition of existing infrastructure, but the desired condition.

As a result, PBOT describes our unmet need as two distinct components. The first component is the cost of preventive maintenance, rehabilitation and the replacement cost of existing assets. The second is the cost to ensure that our system is complete and safe.

PBOT’s primary source of discretionary funds are not keeping pace with inflation. This means PBOT has had to make reductions to the budget, resulting in the ability to do less preventive maintenance. At the same time, transportation infrastructure is aging, resulting in an increase in maintenance and liabilities.

PBOT estimates that the overall total funding gap for the next ten years is $2.75 billion. As noted above, this overall total gap has two components. The first component, Maintenance/Rehabilitation of existing infrastructure, is estimated at $2 billion, or nearly $200 million per year each year for ten years. This number is derived from the Portland Status and Condition Report. The second component of the gap, the cost of ensuring a complete and safe system (capacity gap), is estimated at $1.5 billion total, or $75 million per year, each year for the next 20 years. This number is derived from Portland’s Transportation System Plan, and is not included in the breakout of funding gap by asset type below.

Portland’s Transportation System Plan meets state and regional planning requirements and addresses local transportation needs for cost-effective street, transit, freight, bicycle, and pedestrian improvements. The plan will provide a balanced transportation system to support neighborhood livability and economic development.

It is worth noting that PBOT’s unmet need numbers do not include the cost of adding sidewalks to local streets or paving gravel streets since these costs have traditionally been the responsibility of abutting properties.

**Pavement System** — The funding gap is estimated at $73.8 million for collector and arterial streets per year for ten years; another $57.7 million for local streets per year for ten years. Costs for ADA work that is required for a paving project in the Federal Guidelines are included in the funding gap. Ratings of collector and arterial streets have been completed. Calculations of need are based upon assigned treatment rules, which are based upon pavement condition, road type and road usage.

A road in good repair provides a smooth ride, limits the wear and tear on vehicles and improves safety. The key to keeping pavements in good condition is to prevent water from getting under the surface of the pavement. With proper maintenance, streets last longer and maintenance costs less. Proper pavement preservation techniques mean that the right treatment to fix the road is applied at the right time.

When a road deteriorates to the point where it requires major rehabilitation or reconstruction, the costs are very high. In contrast, it is less expensive to perform preventative maintenance on pavement that is still in good condition. Preventing major deterioration and keeping roads at the preventative maintenance level or better is the best way to invest limited funds. Like other transportation agencies across the nation, PBOT’s policy is to prioritize these early-stage repairs.

**Sidewalk System** — $13.2 million is needed annually to repair, restore or replace curbs to bring them to a fair or better condition and $9.1 million is needed annually to build ADA accessible corners, where there are currently none, and maintain the corners in a fair or better condition. While the sidewalks are owned by the City, it is the adjacent property owner’s responsibility to repair, restore or replace sidewalks. Therefore, unmet need for sidewalks is not calculated.
Bridges — The total cost to replace city-owned bridges in poor condition, and address bridge deficiencies is $23.1 million per year for 10 years.

Signal Hardware — A total increase of $12.9 million per year is needed in capital funding.

Street Lights — $4.2 million per year for ten years is needed to improve the lights to a fair or better condition, mostly for replacement of old dilapidated poles, conduits and panels. For example, twin ornamentals were erected in the 1920s are still in use today in many downtown streets and other special lighting districts. The LED conversion only replaces luminaires, not poles, conduits and panels.

Support Facilities — Unmet need for support facilities totals $0.5 million in annual estimates.

Other — Unmet need for pavement markings, street signs, traffic calming devices, traffic signal controllers, other equipment, guardrails, retaining walls and stairways totals $2.9 million in annual estimates.

Calculation Methodologies

Replacement Value

Generally, the replacement value is based on the most recent estimates available, including the costs of removal and installation. Overhead in replacement value is accounted for as part of in-house costs. This is consistent with how PBOT capitalizes overhead at year-end on infrastructures for two accounts, improvements (closed projects) and work-in-progress (open projects). Efforts continue to improve in estimating replacement value, with varying levels of confidence. Please note that actual replacement costs would vary by location.

Current Condition

Condition methodology is reported as a percentage of the total number of assets. The methodology for determining asset condition varies by asset group, see below.

<table>
<thead>
<tr>
<th>Asset Group</th>
<th>Method of Asset Condition Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pavement</td>
<td>• Visual inspection of pavement using the Metropolitan Transportation Commission rating methodology.</td>
</tr>
</tbody>
</table>
| Sidewalk System      | • Sidewalks: Visual inspection; Guidelines in the Operating Policy and Sidewalk Repair Program.  
                    | • Curb: Functional purpose, that is, if they protect the street edge and direct runoff and if they present a traffic hazard.                                                                                                           |
| Structures           | • Bridges: Inspection rating system based on Oregon Department of Transportation and National Bridge Inspection.  
                    | • Retaining Walls, Harbor Wall: Visual inspection.  
                    | • Stairways: Visual inspection.  
                    | • Guardrails: Visual inspection.                                                                                                                                         |
| Traffic Signals      | • Hardware & Controllers: Age; Visual inspection.  
                    | • ITS and Other Equipment: To be determined.                                                                                                                              |
| Streetcar            | • All Components: Age; Visual inspection.                                                                                                                                                                                                 |
| Aerial Tram          | • Age; Visual inspection; Structural inspection for stations and towers (every 2 years), cables (annually).                                                                                                                             |
| Traffic Calming Devices | • Visual inspection.                                                                                                                                                                                                                 |
| Street Lights        | • Field inspections; Age of the components; Type of luminaire; Type of system (underground vs. above ground).                                                                                                                         |
| Pavement Markings    | • Painted Markings: Currently no condition assessment.  
                    | • Durable Markings: Type of material; regular maintenance; visual inspection.                                                                                           |
| Parking Meters       | • Single Meters: Age; Visual inspection.  
                    | • Pay Stations: Notifications of maintenance issues from software system connected to meters.                                                                          |
C. Environmental Services

Profile

The Bureau of Environmental Services (BES) provides sewer and stormwater collection and treatment services to approximately 600,000 people, numerous commercial and industrial facilities, and six wholesale customers. The existing public system, which is valued at approximately $13.5 billion consists of:

- 1,001 miles of separated sanitary sewers.
- 910 miles of combined sewer that carry both stormwater and sanitary waste.
- 667 miles of sewer laterals (owned in the Right of Way, from the mainlines to the property owned).
- 40,468 sewer access structures (such as manholes).
- 437 miles of stormwater pipes (including 74 miles of culverts and 363 miles of storm mains).
- 9,034 storm access structures (such as manholes).
- 2,187 water quality facilities (including green street stormwater planters and swales, ponds, constructed wetlands, and manufactured stormwater treatment facilities).
- 99 pump stations (including 82 owned by BES and 17 others that are maintained by BES) with a total of 6,134 assets within those stations.
- Two wastewater treatment plants with a total of 8,820 assets within the plants.

Asset Management Approach

Asset Management has been part of the business practices at BES for over 25 years beginning with the implementation of the Hansen Maintenance Management Database and condition assessment scoring in 1990. BES’ updated Systems Plans incorporate asset management principles to prioritize projects to address the highest risks. The bureau’s performance measures include levels of service (LOS).

Asset Management Practices

BES applies AM practices of asset inventory, condition assessment, and computerized maintenance management systems for its system components: treatment, pump stations, and collection systems. The Systems Plan for the sanitary and combined collection system incorporates system inventory, condition, GIS data, and failure records in an AM context to develop a risk register consisting of likelihood of failure times consequence of failure. This work has been incorporated into the annual planning process for the CIP. The plan identifies the appropriate sewer maintenance routines (and repairs) to enable individual infrastructure components to reach an optimal useful service life at an overall least cost. A similar multi-year effort focused on the stormwater system is underway.

The companion Capacity, Management, Operation & Maintenance (CMOM) project identifies 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.

Asset Value and Condition

The overall replacement value of BES assets increased to $13.5 billion in 2015. This reflects an adjustment for ENR (9800 to 10039). There has been no significant change to overall asset condition for sanitary and combined assets. There has been a change to the stormwater assets to reflect the large portion of the stormwater system (approximately 70%) that does not have a current condition assessment; and a change in the wastewater treatment plants to reflect updated condition assessment information.
**Annual Funding Gap**

The financial plan includes an ambitious pipe rehabilitation program focused on pipes with the highest risk, primarily in the combined system. The financial plan also includes many, but not all, of the recommended capacity related projects from the Systems Plan. The funding gap is based on the following:

- **R/R/R** — The difference between the replacement value of assets in very poor condition and the amount of funding in the financial plan for rehabilitation of those assets. The gap assumes all wastewater pipe rehab projects in the proposed financial plan proceed as programmed.

  The extent of stormwater system needs is unknown. The estimated gap makes very broad assumptions about rehab and capacity needs from the Stephens Creek pilot.

- **Capacity — Combined** — Projects recommended in the Systems Plan with positive benefit/cost ratios (primarily those that address conveyance of the 2-year storm in combination with deteriorated pipes) that are not included in the financial plan. Note that the gap does not include projects required to meet stated LOS for conveying the 25-year storm.

  The value of the stormwater system reflects only the piped system and other constructed facilities (such as sumps, green streets, water quality facilities). It does not include natural systems – either the value of them or the funding gap to address watershed health/habitat or anticipated regulatory changes related to the MS4 permit.

**Asset Management Improvement Priorities**

BES reported on updated performance measures which incorporate levels of service and expanded use of asset management to refine prioritization of sewer rehab work. BES also made further progress on documenting the amount of risk reduced by completed projects. BES is developing an approach to expanding its condition assessment program to include more robust and timely analysis of assets at the wastewater treatment plants, pump stations, force mains and stormwater system assets. BES will also be working to continue to connect its strategic planning work throughout the bureau with its levels of service and performance measures, ensuring measures that are tracked are meaningful for both guiding staff work and meeting rate payer expectations.
D. Water

Profile

The Portland Water Bureau (PWB) delivers drinking water for consumption and fire protection. The City is the largest supplier of domestic water in Oregon, serving more than 900,000 people and providing about 100 million gallons of water per day, or about 36 billion gallons per year. About 60 percent of the water is delivered to customers within Portland city limits. The remaining 40 percent is sold to customers in 20 surrounding cites and special water districts. Water flows from the Bull Run Watershed and Columbia South Shore Well Field through more than 2,000 miles of pipes. The water system is valued at $8.2 billion.

Asset Management Approach

The Water Bureau has an Asset Management Branch (AMB), located within the Engineering Department, that coordinates asset management activities within the organization. An Asset Management Steering Committee makes policy decisions related to asset management and approves major work items.

Uses of Asset Management

The approach to Asset Management in the Water Bureau has been to focus on key asset management actions:

The Water Bureau has incorporated key service levels into its Strategic Plan. Those service levels have been tracked since Fiscal Year 2008-09. In 2015, a City dashboard was developed that includes six Water Bureau Key Performance Measures (KPMs). The bureau’s annual budget includes a report on progress toward meeting KPM goals. The bureau has launched a survey of customers to gather opinions about selected key service levels.

The Water Bureau actively focuses on risk management. The bureau identifies key assets, assesses the potential risk of asset failure, and then is committed to either better characterizing the risks or taking steps to mitigate those risks. The bureau also measures its progress on meeting a goal to inspect, test, repair, or replace at least 80 percent of its high-risk assets. Between 2007 and 2015, the bureau identified 86 high-risk assets. Of the 86 risks, 55 (64%) have been addressed, through mitigation or downgraded following an assessment; 23 (27%) are being addressed; 7 (8%) will be managed; and one asset failed before it could be addressed. The bureau has also developed an overall strategy for high-consequence pipes, which includes identifying the primary failure modes for pipes that cross major transportation and trade corridors. PWB staff inspected pipes on 64 bridge crossings in 2014 and 30 pipes enclosed in the bridges in 2015. A high-consequence key supply main was found to be at risk of imminent failure, repaired, and included in the 5-year CIP for replacement. PWB has also performed risk assessments of approximately 40 high-consequence mains that cross major highways and railroads; performed condition assessments of the valves at these locations; and recommended for replacements, installations, and monitoring improvements. The bureau has also focused on leaks in large-diameter pipes. Large-diameter pipe leak detection was completed at 18 sites in 2014. A visual inspection of the large conduits—which are 104, 90, and 63 years old—is planned for 2016-2018. An assessment of the water system for seismic vulnerability will be completed in 2016. Both of these projects will add significantly to the bureau’s understanding of assets that would likely be categorized as high-consequence.

The bureau uses business cases for decision support. Staff perform business cases and use the results to evaluate project planning, design, construction and operations investment projects and alternatives.

The bureau is implementing Reliability-Centered Maintenance to meet the Key Service Level for implementing maintenance best practices. The bureau has developed a registry of assets and codes for asset failure modes.

The bureau has developed asset management plans (AMPs) that define maintenance, repair and replacement strategies for 23 different asset classes and evaluated more than 400 potential strategies from the AMPs. The strategies cover projects and methods for operating the asset and/or mitigating the risk of failure (including maintenance, renewal, or replacement) in the most cost-effective manner. The AMPs include initial estimates for needed resources. The bureau has selected 80 strategies to move forward for implementation during the next two years.

Asset Management Practice

As noted above, the bureau continues to track service levels, identify and mitigate risks, assess asset condition, develop business cases, and create asset management plans.
Asset Value and Condition

The overall replacement value of the Portland Water Bureau's assets is estimated at $8.2 billion in 2015.

Since 2007, the overall condition of the water system has improved (although the conduit assessments and seismic vulnerability study will likely impact this conclusion). The replacement of the open finished drinking water reservoirs at Mount Tabor and the Maintenance Facility at the Interstate site has greatly improved the reported conditions for the terminal storage and facilities categories.

Annual Funding Gap

A funding gap exists in the need to replace assets in poor condition and to maintain the overall condition of other groups of assets. Baseline unmet needs amount to $210 million over 10 years. The following list reflects the Water Bureau's anticipated system needs beyond the current level of funding.

Distribution:

- Replacement of high consequence pipe segments in poor condition: Replacement of all poor condition pipe segment crossings of bridges, major arterials, freeways and railroad lines; and funding a pipe condition assessment program.
- Replacement of pump mains: Replacing the sections of two major pump mains that are currently in poor condition but not funded for replacement.
- Pipe relocations and replacements in response to bike boulevards, green improvements, or inadequate cover on road reconstruction.
- Replacement of valves: Replacement of all large valves in poor condition.
- Facility valves: Install drainage valves at active tanks and pump stations.
- Expanded predictive/preventive maintenance program for site valves and pipes, tanks and fountains.
- Establishment of a west-side hub for emergency operations and maintenance and construction crews, equipment, and vehicles.
- Tank cathodic protection and seismic upgrading.
- Replacement of manual meter reading with an automated meter reading system.
- Replacement of hydrants: Replacement of all screw-type (obsolete) hydrants not being met by current funding levels.
- Replacement of services: Replacing all plastic and galvanized services, and aging copper services, not expected to be replaced under the current funding levels.

Transmission — Conduits:

- There is a need to further assess condition and to replace/upgrade sections of the oldest conduits east of Portland.
- Relocating and strengthening Conduit 3 where it crosses the Sandy River is a project that was identified in the bureau's System Vulnerability Assessment in 2000.
- West-side transmission mains: large transmission mains are needed to strengthen the supply to terminal storage on the west side of the Willamette River.

Supply:

- Master planning for the bureau's Headworks Facility recommended replacement of several high-consequence assets to mitigate risks associated with supply reliability, meeting water-quality regulations, conforming to safety requirements, meeting state and local building codes, and efficient water-supply operations. The assets include an emergency generator and replacing several operations facilities with a single building.
- Access roads in the Bull Run Watershed must be brought up to current safety and condition standards.
- Piping that connects the groundwater wells to the Groundwater Pump Station are seismically vulnerable and should be improved to withstand an earthquake.

Facilities:

- As a major tenant, the Portland Water Bureau shares in the cost of the upgrade to the Portland Building at 1120 SW Fifth Avenue.
Asset Management Improvement Priorities

An Asset Management Tactical Plan for 2015-2017 was completed and approved by the Asset Management Steering Committee. The plan includes 15 tactical areas with recommended next steps. Efforts include completing a customer survey for service levels; complete asset management plans and implement high-priority recommended strategies for 23 asset classes; exercising more high-consequence pipe and facility valves; expanding on preventive maintenance efforts; forecasting the long-term asset replacement level; and further developing asset management competency within the bureau.

Calculation Methodologies

Replacement Value

In most cases, the replacement value is based on the current costs to install assets and includes all overhead costs.

Current Condition

Condition can be based on age, visual inspection, deterioration curves or failure curves. The Water Bureau matches one of these methods to each asset type.

The Water Bureau uses available information to assess the physical condition of its assets. The least specific is a rating based on asset age relative to useful life. The most specific method of rating is based on actual field condition assessment of individual assets. Intermediate forms of estimating condition involve ratings based on the judgment of Bureau personnel most knowledgeable about a particular asset or group of assets or partial inspection data, extrapolated to an entire asset class. Deterioration curves are used for pump, tank and several other assets. For pipes, the Water Bureau uses Weibull curves of the failure rate by age of the asset class.

All reported condition information values are based on the percentage of values of the assets. All notable asset groups are included.
E. Portland Parks & Recreation

Profile

Bureau Highlights

Portland Parks & Recreation (PP&R) continues to refine and implement its asset management practices.

- **Technology** — PP&R upgraded the MS2000 work order system to the current version of MicroMain. This transition will help PP&R more accurately track and maintain assets over their useful lives. PP&R is also refining terminology and definitions to ensure more accurate and consistent reporting.

- **Assessments** — PP&R continues to conduct inspections and assessments of the asset system, with regular inspections of all buildings, pools, and play equipment. The bureau continues to add new assets to its inspection and condition assessment program. In 2015, PP&R conducted an assessment of all bridges in the system. A comprehensive asset condition survey and Asset Risk Profiles were completed in 2013. The Asset Risk Profiles project created a baseline of asset condition.

- **Capital Planning** — PP&R has been making process improvements to the capital improvement planning (CIP) process to ensure that the 20-year CIP more accurately reflects the range of needs in the PP&R portfolio. PP&R has used information from assessments to ensure that the CIP includes projects to address needs for high-risk assets.

- **Strategic Plan** — PP&R’s 2012–15 Strategic Plan includes Asset Management as one of six key strategic themes. Five initiatives are aimed at adapting best practices to the widely diverse portfolio of public parks, recreation and natural area assets. Of the five initiatives, two have been completed, and one is underway. Two others were placed on hold pending the hire of the Asset Program Manager.

- **Bureau Structure** — Three existing positions, previously partially involved in asset management, have been wholly dedicated to the Asset Management program. PP&R recently hired a fourth member of the Asset Management team. The new team member will be focused on facilities condition inspections. In November 2015, PP&R hired a new Asset Program Manager. The program manager reports directly to the Senior Manager for Planning, Development and Asset Management.

Asset Management Approach

- All PP&R assets, both built and natural, that are owned and managed by PP&R are accounted for in six asset class groups: Amenities, Buildings/Pools, Recreation Features, Utilities, Circulation, and Green Infrastructure. All major assets are identified in PP&R’s Geographic Information System (GIS). Work continues to add all assets to the GIS and CADD systems, as well as keep up with changes on the ground.

- Asset Management practices and principles are used to coordinate asset data, develop accurate asset inventories and produce up-to-date reports. Accurate AM data coupled with statistically valid information on customer needs and desires allows PP&R to make informed decisions about the assets needed to provide specific services.

- PP&R’s AM program continues to help implement Parks 2020 Vision by ensuring the provision of high-quality facilities, providing for long-range capital needs and developing best management practices. It allows PP&R to fulfill a major part of its mission of developing and maintaining excellent facilities and places for public recreation.

- Initial work focused on the more heavily used facilities and on the basic elements that provide good visitor experiences. Current efforts expand inventory and condition assessments to parks and natural areas circulation systems and infrastructure.

Uses of Asset Management

AM information is utilized in preparing PP&R’s capital plans and budgets, developing consistent maintenance and operations regimes, fulfilling City and federal reporting requirements, informing system planning, and supporting financial forecasting. Applying asset management principles and practices helps prioritize capital projects and allocate scarce resources.

As asset management continues to be integrated into PP&R management practices, PP&R is better able to determine acquisition and capital improvement needs, provide appropriate levels of maintenance, and determine which assets to acquire and which to dispose of in order to develop a stable asset portfolio that meets service needs.
**Asset Management Practices**

- Current efforts focus on improving the inventory, attribution and condition of circulation systems and utilities infrastructure. Buildings and playgrounds have been inventoried and are assessed regularly. A new green infrastructure, natural area condition methodology has been developed, and PP&R intends to continue updating the condition using the new methodology. Marine facilities, docks and ramps have been assessed and are included in a longer-term rotation. PP&R has developed an inspection and condition assessment work plan intended to bring new assets into the condition assessment rotation.

- For many assets, PP&R has completed the initial inventory and condition assessments and is in the process of inspecting 20 percent of all assets each year. In 2015, PP&R conducted a special assessment of all bridges in the PP&R system. Due to the wide variety of asset types, PP&R will continue to pursue a blended approach of ongoing inspections and special assessment projects.

- PP&R is pursuing a lean approach to developing and implementing asset management. A small staff team is developing and implementing best practices system-wide, working in collaboration with parks, recreation facilities, and natural areas maintenance staff.

**Asset Value and Condition**

The overall replacement value of PP&R’s assets was nearly unchanged from $1.31 billion in 2014 to $1.36 billion in 2015. PP&R’s understanding of the portfolio asset conditions improved due to a 2015 condition assessment of PP&R’s bridges that hadn’t previously been included in reported results.

**Annual Funding Gap**

PP&R has an expected total capital annual unmet funding need of $72.0 million for each of the next 10 years. This includes $47.2 million for expanding the system to provide standard levels of service for all residents, in addition to $24.8 million in funding needed to maintain existing assets. The funding need calculations are based on the 1- to-10-year list of all identified potential PP&R projects, less anticipated funding resources over the 10 year period. The forecast for SDC funds, plus grants and donations has held steady between 2014 and 2015 at $8 million annually. These funds are dedicated to addressing new growth. In 2014, city voters passed a $68 million maintenance and replacement parks bond, which averages to $6.8 million per year over the 10 year CIP period to be spent on existing asset R/R/R and Safety categories. Additionally, City Council has been able to provide about $1.5 million annually to address some of the most urgent needs for repair, rehab and replacement and mandated work. In the Fall of 2015, City Council also allocated over $2 million in one-time major maintenance funding which helped reduce the backlog of accumulated needs. On an annual basis, the total growth and maintenance anticipated funding averages to $16.3 million, while the need averages to $88.3 million. The resulting total funding gap per year is $72.0 million.

Parks system capacity, meaning addressing growth, represents two-thirds of the Annual Funding Gap. Realization of these projects would mean more and improved parks, community centers, aquatics facilities, trails, and natural areas. Some areas of the City are underserved, notably neighborhoods east of I-205. However, there are neighborhoods that are not within one-half mile of a park or natural area throughout the city (one of PP&R’s key Level of Service targets).

Maintaining existing assets in good condition requires regular repair and replacement, which in turn depends on sufficient regular funding. The recommended standard for reinvestment needed to maintain building assets in good condition is from 2 percent to 4 percent of the asset’s current replacement value (CRV). With an average of below 2 percent of CRV in funds to reinvest in past years, PP&R has experienced consistent shortfalls in meeting repair and investments needs.
**Asset Management Improvement Priorities**

The 2012–15 Strategic Plan includes asset management as one of six strategic themes. Five initiatives outline the bureau’s priorities over the next three years, as follows below:

- Establish levels of service by asset classes.
- Assess condition of assets to determine remaining useful life.
- Develop asset risk profiles.
- Prepare asset management plans.
- Develop funding strategies for capital improvements.

**Calculation Methodologies**

**Replacement Value**

PP&R calculates the replacement value for its assets by estimating the installed cost to replace the asset in kind, without increasing its size or changing its functionality, but bringing it up to current code. As PP&R expands and improves its asset management program, more specific valuations are being gathered for all assets. Where specific information is not available, general estimates of the value of all assets are provided, albeit with varying levels of confidence.

<table>
<thead>
<tr>
<th>Asset Group</th>
<th>Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amenities</td>
<td>Per each for assets such as benches, tables, drinking fountains, etc.</td>
</tr>
<tr>
<td>Buildings and Pools</td>
<td>Square foot costs per type of facility.</td>
</tr>
<tr>
<td>Recreation Features</td>
<td>Square foot costs or per each.</td>
</tr>
<tr>
<td>Built Infrastructure</td>
<td>Lineal feet by asset type.</td>
</tr>
<tr>
<td>Green Infrastructure</td>
<td>Per acre or square foot.</td>
</tr>
</tbody>
</table>
Current Condition

Condition is primarily determined by visual inspections and tests unless the asset is hidden from view. In those cases, previous experience or manufacturer’s recommended replacement dates are used to estimate condition and remaining life. Additional testing may be required in some cases.

<table>
<thead>
<tr>
<th>Asset Group</th>
<th>Method</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amenities</td>
<td>Visual inspection</td>
<td>Furnishings in developed parks are complete; furnishings in natural areas are in process.</td>
</tr>
<tr>
<td>Buildings and Pools</td>
<td>Visual inspection and/or remaining life</td>
<td>Major and minor building assessments complete and ongoing.</td>
</tr>
<tr>
<td>Recreation Features</td>
<td>Visual inspection</td>
<td>Assessments for most recreation features have been completed. Ongoing assessments are in place for certain assets, but need to be developed for many others.</td>
</tr>
<tr>
<td>Built Infrastructure</td>
<td>Visual inspection and remaining life</td>
<td>Roads and parking lots have been inventoried and assessed; many regional trails have been assessed; paths and walks in developed parks need to be assessed; utilities have been inventoried but few have been assessed.</td>
</tr>
<tr>
<td>Green Infrastructure</td>
<td>Visual inspection</td>
<td>Natural Area green infrastructure were inventoried and assessed in 2010.</td>
</tr>
</tbody>
</table>

PP&R is updating its annual asset inspection program to determine the condition of all assets and aims to inspect 20 percent of all critical assets each year. All assets will be inspected at least once every five years and more often in the cases of pools and play equipment or other items that require more oversight and maintenance. PP&R is working to add asset classes to the Asset Management Program each year.

Annual Funding Gap

PP&R identifies capital needs for the next 20 years on its Capital Improvement Project (CIP) list. The PP&R funding gap represents the difference between the anticipated annual revenue PP&R receives for CIP projects and the cost it would take to complete all the projects within the first 10 years of the 20 year CIP list, annualized over ten years and based on today’s dollars.

PP&R tracks four categories of projects on its CIP list. Preserve (repair, rehabilitate, and replace) and Efficiency (projects that improve the cost effectiveness of maintaining and operating assets) are combined into the R/R/R category for the citywide report. Safety (projects needed to bring existing assets up to current codes and meet mandates such as ADA) is reported as Mandate. Growth (projects that expand the system and are needed to meet level of service targets for all customers) is reported as Capacity. Examples of Capacity projects include developing new parks, new community centers, and new trails, or building new features in parks, like new spray play features or skate parks in neighborhoods where current levels of service are below PP&R standards.
F. Civic

Profile

Asset Management Approach

The Civic Asset’s current AM program includes the following groups: Facilities Services, Spectator Venues and Visitor Activities, Technology, CityFleet, and Fire Facilities and Apparatus. OMF is the lead for the Civic group; however OMF is not the lead for all assets addressed in the Civic Group. In 2014, Fire Apparatus was added to the Civic section. Portland Fire and Rescue is responsible for information related to PF&R Facilities and Apparatus.

Asset Management serves as the basis for documenting the physical and financial status of these assets, coordinating asset data, developing accurate asset inventories and producing up-to-date reports and maintenance plans. Accurate AM data allows OMF and other organizations to make informed decisions about assets. The annual and one-time funding gaps are the main indicators of financial status of these assets.

Uses of Asset Management

OMF uses AM information to prepare its capital planning and budgets; develop consistent maintenance, operations, and replacement programs; fulfill City and other reporting requirements, and support financial forecasting. Applying asset management principles and practices helps to prioritize projects and allocate scarce resources.

Annual Update

OMF-wide Asset Managers Group — OMF includes multiple bureaus and groups that are responsible for managing many elements of the Civic Assets addressed in this section of the Citywide Assets Report, including the following: Facilities Services and CityFleet divisions within the Bureau of Internal Business Services; Spectator Venues and Visitor Activities; and the Bureau of Technology Services. OMF has recently started an OMF-wide internal asset management group that will coordinate work; and share best practices and experiences to collectively improve asset management within OMF.

Overall Facility and Vehicle Replacement Values and Conditions — The replacement value for assets in the Facilities Services, Spectator Venues and Visitor Activities, and CityFleet portfolios increased from $1.14 billion to $1.44 billion dollars. Since replacement values for facilities increased and funding for major maintenance was relatively flat, this year Facilities Services was only able to collect 0.9 percent of the replacement value. Last year, Facilities Services collected 1.2 percent of the replacement value. This is due to the increase in replacement value. As a result, the funding gap for major maintenance increased from $6.8 million to $10.7 million. The overall percentage of facilities in poor condition has increased from 30 to 43 percent. The Portland Building, Union Station and the Sears/Westside staging facility moved from fair to poor condition as a result of the level of deferred maintenance relative to their replacement values.

Strategic Planning and Development — In 2015, the Facilities Services division in OMF’s Bureau of Internal Business Services created a new program group called Strategic Planning and Development. This program is responsible for working with City agencies to plan for long-term facility needs based on business and community needs, identifying and helping to organize partnerships; and supporting master planning activities. Current projects include facilitating the Portland Building renovation approval process, working with PBOT and City Fleet on a joint master plan for the Kerby Garage/Albina Yard area (Municipal Service Center), and helping Portland Fire and Rescue (PF&R) find a new logistics, in-service training and prevention facility; and complete long-term master planning.

In addition to project-specific work, the Strategic Planning and Development program is working closely with the Facilities Services team, other work groups within the Bureau of Internal Business Services, and other bureaus such as the Bureau of Planning and Sustainability and the Citywide Asset Management Group, to develop the Facilities Services specific asset management program. Asset management allows Facilities Services to meet citywide goals and objectives, such as those identified in the 2015 Climate Action Plan, while improving operations, supporting the long-term value of facilities; and improving natural resource management, ADA compliance and seismic safety in buildings managed by Facilities Services.

This program builds upon a key existing component of current asset management practices within Facilities Services, which is the annual preparation of five- and ten-year maintenance plans. These plans
have traditionally been are developed from annual building inspection reports, input from internal and external customers, as well as from staff who maintain the infrastructure, and are informed by City Council’s established goals, objectives, and policies. Maintenance plan development each year us finalized by balancing needs with resources. Recent changes in Facilities Services that will affect asset management include the addition of EnergyCap software to track usage of utility resources; increased coordination with Risk Management and the City’s insurer’s, FM Global, on risk-related facility inspections; and the implementation of three new modules from the SAP Enterprise Asset Management system: Flexible Real Estate, Plant Maintenance, and Inventory.

**Portland Building** — In October 2015, the City Council directed OMF to move forward with the reconstruction of the Portland Building. The Council decision identified a total project cost not to exceed $195 million dollars, with a completion date of 2020. This significant and complicated project will be a focus for OMF, and specifically Facilities, from today to project completion. The project will correct significant core building deficiencies related to the building envelope, seismic stability, plumbing, and heating and cooling systems, among others. Many of these deficiencies have resulted in unsustainable annual maintenance costs. The project will also improve the quality of public spaces and interior work spaces, all while maintaining the integrity of this designated historic resource. Paired with this project is the development of an equalized rental rate structure for City facilities in the downtown core, and the development of a new process to provide community benefits.

**Technology** — A key component of the OMF Asset Management program for Technology Services is the preparation of five-year maintenance and replacement plans. These plans are produced by BTS staff responsible for AM and are reviewed and refined by a management review group. Priority is given to items that support public safety, improve reliability and availability of critical data systems and improve efficiency and reduce costs through the consolidation of infrastructure.

Over the last several years the City has invested in the replacement of large Civic assets. These investments include the replacement of the IBIS financial system with the SAP enterprise business solution, the replacement of the Police property warehouse, and the replacement of the Auditor’s archives center. Additionally, a combination of General Fund resources approved by the Council and General Obligation (GO) bonds approved by voters in November 2010 fully funds the Public Safety Systems Revitalization Project (PSSRP) that replaced the Computer Aided Dispatch in April 2011 and replaced the Portland Police Data System with RegJIN in April 2015 and the 800 MHz radio system replacement project, which is scheduled to be completed in December 2016.

**Facilities Services** — Facilities Services in the OMF Bureau of Internal Business Services, provides operations, maintenance, management, planning and capital improvements for many City-owned buildings, and provides assistance with acquisitions and leasing activities. As a part of OMF, Facilities functions as both a property owner/manager, and as a property manager for buildings owned by other bureaus. Facilities is responsible for major maintenance and operations of OMF-owned buildings, and provides services to other bureaus at their buildings upon request.

- **Funding Gaps and Major Maintenance** — Rental fees collected by Facilities Services provide funding for major maintenance projects for office buildings such as the Portland Building, City Hall, and 1900 Building, Portland Police Bureau (PPB) facilities, maintenance facilities, the Portland Communications Center, the Archives and Records Center and the Emergency Coordination Center. OMF’s goal, and the industry standard for facility maintenance is to reinvest three percent of a building’s current replacement value each year; however, OMF is currently only able to reinvest about 0.9 percent (in buildings entirely within Facilities’ portfolio) in buildings this year. Last year, Facilities was able to reinvest 1.2 percent. This lower reinvestment rate results in significant deferred maintenance. Many projects that should be completed within five years, are pushed to later years. Delays can increase project costs and turn nuisances into real problems, further straining budgets. This lower than desirable reinvestment rate is the result of efforts to balance budgets and services, of decisions to not increase rental rates at the level of regular inflation; as well as other causes, such as aging buildings that often cost more to maintain. Facilities Services is in the process of reviewing the condition of buildings in its portfolio, and developing a strategy to lessen the backlog and better prepare for anticipated and unanticipated future needs. This will likely include an increase in the annual reinvestment rate, and it will be aided by the rental rate equalization approach supported by City Council in October 2015.

Seismic Safety, Americans with Disabilities Act (ADA) Compliance and Natural Resource Use — Many City
structures managed by Facilities do not meet current seismic standards, nor do they meet ADA access requirements. Challenges are also posed by the need to upgrade facilities to operate more sustainably and reduce natural resource usage, particularly under the framework of the 2015 Climate Action Plan. Today, these needs are addressed opportunistically, typically as part of maintenance projects. However, the cost of the needs associated with ADA requirements, energy efficiency targets, and seismic safety are substantial. The Strategic Planning and Development program is looking closely at how to better incorporate these needs into Facilities Services’ asset management forecasting.

- **SAP Module Implementation** — Facilities is working with EBS to configure and implement three new SAP Enterprise Asset Management modules that will support Facilities work: Flexible Property Real Estate, Plant Maintenance and Inventory. From an asset management perspective, these modules work together to provide an asset identification system, based on real property databases, which will then be used in workflow processes to manage, document, and forecast operations and maintenance of the assets. The Flexible Real Estate module will also allow Facilities Services to automate workflow and document storage of many property management functions, creating greater efficiency and tracking of real property transactions.

- **CityFleet Vehicles** — This program includes all the City’s vehicles, except Fire apparatus, and is managed by the Fleet Services division of the Bureau of Internal Business Services. This program has been added to the City’s Capital Asset Manager Group report due to the significant capital investment the City has in vehicles. The replacement value of the vehicles is $157 million. The program is fully funded through replacement rates charged to bureaus which are assigned the vehicles. Fleet Services also performs repair and maintenance services on the vehicles and the condition of the fleet is good.

- **CityFleet Fueling Stations** — Facilities is working with CityFleet to renovate five existing fueling stations, and is coordinating a search for a location for a sixth (and new) fueling station. Facilities is also working on the development of an additional fueling station at the Jerome Sears site in West Portland. Cost estimates for much of this work is preliminary. Within the next year, Facilities will have a much more in depth understanding of costs, and will be able identify funding gaps, and develop priorities for these projects.

- **Union Station** — Union Station is managed differently than other buildings under Facilities’ care. Union Station is owned by Portland Development Commission and managed by Facilities Services through an intergovernmental agreement. At Union Station, major maintenance money is carved out from net income of Union Station to complete repairs at that location. Due to years of limited funds, the age of the facilities, and the constraints of the historic designation, there are significant deferred maintenance needs. For Union Station, the funding gap is the one-time difference between actual fund reserves for capital maintenance and costs to upgrade Union Station to address deferred maintenance. In the past several years, Union Station has received grants for major maintenance projects, including replacement of the roof and repairs to windows, skylights, doors and exterior materials. Some seismic upgrades have also been performed through the use of grants, but substantial seismic safety concerns still need to be addressed. Grants remain this facility’s best resource for addressing maintenance needs.

**Spectator Venues and Visitor Activities** — This program provides oversight of City-owned spectator and performance facilities. It also serves as liaison to organizations and venues involved with visitor and tourism activities. This program includes Veterans Memorial Coliseum, Portland’s Centers for the Arts, Rose Quarter parking garages, and Providence Park. This program is managed by OMF and operated by contractors.

The Portland’s Center for the Arts (formerly Portland Center for the Performing Arts) includes the Keller Auditorium, Arlene Schnitzer Concert Hall, and the Antoinette Hatfield Hall. The City owns these assets, and through an intergovernmental agreement Metro/MERC manages, operates and maintains them. The replacement values of these three assets are included, but the City has limited information on their status. OMF has made progress working with Metro/MERC to provide more City oversight for these assets, including the performance of Facility Conditions Assessments in 2015. An update of the City’s ADA Transition Plan will be completed for these facilities in the next year.
Technology Services — Establishing replacement values, current 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.

OMF has high confidence in these assessments.

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 (PSSRP), addresses funding, governance, coordination, timing, and other issues related to the replacement of these major systems. Replacement values of these systems are based on project budgets or actual costs incurred for completed projects.

As part of prior budget processes the Council authorized a mix of debt and cash financing for the PSSRP. This and GO bonds approved by voters in November 2010 fully fund the program.

- **800 MHz Radio System — Core System** — The 800 MHz system will be replaced by FY 2016-17. The system has to be replaced. Motorola, the system’s vendor, will not provide support to it, as technology is becoming obsolete. The underlying component chips are old, it is an analog system, and Motorola is focusing on digital systems.

- **800 MHz Radio System — Devices** — Just as the core system has to be replaced, the system’s devices which use the system have to be replaced and will be as part of the system replacement project.

- **CAD Computer Aided Dispatch** — A replacement for the CAD system was completed in April 2011. This system supports 911 call taking and dispatch for Police, Fire and AMR for the entire Multnomah County area.

- **Police Data System** — The legacy Portland Police Data System (PPDS) was successfully replaced as part of the PSSRP in April 2015. The new system, the Regional Justice Information Network (RegJIN) supports over 6,000 users in 43 agencies which serve more than 2.5 million people across an area of 4,419 square miles in Oregon and Washington.

- **Communications** — Integrated Regional Networking Enterprise (IRNE): Assets in this group include the City’s telephone switch, SONET gear, and software. The replacement value listed does not include the fiber provided to the City as part of franchise agreements and partnerships.

- **Production Services** — Assets in Production Services include storage area networks (SAN), data networks, email system, and core servers. This infrastructure has a life of five to eight years.

- **Strategic Technologies / Corporate Applications** — Corporate applications include GIS, TRACS, CAD, RegJIN, and CIS. CAD and RegJIN are discussed above as part of the PSSRP.

- **BTS** has some funding for major maintenance and replacement of its assets in FY 2015-16 and expects to continue that level of funding in the FY 2016-17 budget. Currently no replacement funding is collected on 800 MHz radio system devices. Sustaining the major maintenance funding and reinstituting replacement funding on 800 MHz radio system devices will continue to be a significant issue for BTS and the City.

- **EBS Services**: This asset grouping includes the City’s enterprise business system implemented to replace IBIS and numerous other information systems. Plans call for the asset to be continually improved and expanded in functionality.

- **PF&R Facilities and Apparatus** — Voters approved a GO bond measure in November of 1998 to rehabilitate, relocate, and construct new City fire stations. The program addressed deferred maintenance in addition to addressing seismic requirements and program changes within Fire & Rescue. The program was completed in FY 2012-13. An additional GO bond measure approved by voters in November 2010 provides for funding of the replacement of a fire station in inner SE on the Willamette River. This project was completed in FY 2014-15.

Fire & Rescue has regular maintenance supplies and services budgets for these facilities of approximately $700,000 annually, of which $250,000 is for major maintenance or replacement projects. However, without identifying major maintenance funding, Fire & Rescue may not have sufficient funding for scheduled building system maintenance, such as roof replacements, overhead door refurbishment, and
parking lot and driveway repaving. Without these upgrades, in 20-30 years the City will find itself in the same position as in 1998 when there was too much deferred maintenance to fund and the buildings had not been modified for the changing needs of the bureau. Funding for major maintenance of fire facilities should be set aside each budget year, as is done for Police facilities and office buildings.

In addition to facilities, Fire & Rescue must procure and maintain rescue apparatus such as engines, trucks, and fireboats. The replacement cost of major frontline apparatus ranges from $500,000 to $1.2 million. The 2010 GO bond measure also includes $19.8 million for fire apparatus replacement. Through 2016-17, apparatus replacement is funded by the GO bond, which is scheduled to replace 29 frontline apparatus. Apparatus replacement will have to be funded through General Fund discretionary resources thereafter. PF&R maintains a 15-year apparatus replacement plan, which calls for replacement of all frontline fire engines and trucks after 15 years or 120,000 miles. Once an apparatus reaches these thresholds, it is rotated into reserve status for a period of at least five years. Fire apparatus maintenance is included in PF&R’s General Fund operating budget.

**Asset Management Improvement Priorities**

OMF has identified the following asset management improvement priorities:

- Improving data (particularly condition and tracking of maintenance activities).
- Improving data integration.
- Completing system-wide asset management plans, particularly a Facilities Services System-wide Asset Management Plan; generally improving asset management activities and improving staff asset management knowledge.
- Evaluating service delivery.
- Integrating current asset management programmatic needs, such as seismic safety upgrades, ADA compliance and resource management.
Calculation Methodologies

Methods for civic assets fit into two categories: Facilities and Technology.

Facilities

*Replacement Value*

Replacement values are based on the size of facilities, the type of facility, and costs per square foot to construct that type of facility. To this are added percentage mark ups for indirect costs, including overheads or in cases of new facilities, actual cost incurred are used. Other methods for calculating replacement value may be reviewed in the future through the OMF internal asset management group.

*Condition*

Condition assessment is based on an inventory of buildings. Conditions are assessed based on visual inspection by qualified personnel on a regular schedule and are expressed as a percentage of assets in each rating category. Condition ratings for the Portland Center for the Performing Arts have not been determined at this time.

*Annual Funding Gap*

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. Current funding at 1.2 percent of replacement value will not allow relative condition (percentage in good, fair, and poor condition) to be maintained.

Due to the level of deferred maintenance at Veteran’s Memorial Coliseum, the spectator facilities funding gap is the one-time difference between actual fund reserves for capital maintenance and the costs to upgrade Veteran’s Memorial Coliseum. OMF is conducting a comprehensive review of the facility to identify all of the facility’s capital needs. Union Station has a similar one-time funding gap based on unfunded deferred maintenance. Unmet needs for the Portland 5 Center for the Arts are not included in the total.

Technology

*Replacement Value*

Establishing replacement values, current 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. Additionally, some technology assets require funding of their replacement and their major maintenance during their life.

*Condition*

Condition ratings for Technology assets are based on current age and expected useful life. Condition is expressed as a percentage of assets. Systems considered to be obsolete are included in the poor condition rating.

*Annual Funding Gap*

The funding gap includes annual funding necessary to meet industry standards for major maintenance; and annual needs to ensure replacement and upgrades of technology on accepted schedules.
5. Asset Management Practices and Process

Asset management is an industry standard that provides a risk mitigation approach to decision making. It is commonly defined as meeting agreed upon customer and environmental service levels, while minimizing life cycle costs at an acceptable level of risk.

At present, bureaus apply elements of AM best practices customized to meet each bureau’s unique needs. The City Asset Managers Group (CAMG) continues to prepare the annual Citywide Asset Report, and works to identify key measures, define terms, and collect and display each year's data.

A. History and Progress

For over 20 years, individual City bureaus have initiated components of Asset Management. Five of Portland’s infrastructure bureaus — Transportation (PBOT), Water (PWB), Environmental Services (BES), Parks & Recreation (PP&R), and Management and Finance (OMF) — apply AM principles to some of their practices. Separately, the Office of Housing Policy and Portland Development Commission (PDC) track affordable housing units. Unlike the five infrastructure bureaus, the City does not own most affordable housing units in the city.

Ten years ago, the AM focus began to broaden to a citywide focus. At that point, infrastructure bureaus began to prepare an annual citywide report on assets. These reports are presented annually to the Planning and Development Directors’ group, which represents infrastructure, development permitting, financial and planning bureaus. The Directors’ group oversees policies and resource allocation, coordinates long-range planning, and manages certain cross-bureau planning and development initiatives. After reviewing findings of the annual report, the Directors’ group provides recommendations to City Council. Each AM report is presented to the City Council at the start of annual budget work sessions.

Although the City’s infrastructure bureaus started with, and continue to use, different AM strategies, bureaus collaborate actively with the long-term goal of improving AM practices citywide. As such, bureaus use common definitions and terminology but apply techniques consistent with their bureau’s structure and the unique needs of their assets.

The following timeline identifies major milestones in the development of citywide asset management within the city.

2002
The Auditor, City Commissioners and bureau directors completed a strategic exercise, Managing for Results. They identified seven priority issues and flagged five of them for immediate action. One of the priority issues was aging physical infrastructure.

2003–2004
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.

A special feature of the 2003 report was to identify potential funding sources to bridge Portland’s maintenance funding gap. It used a matrix format, based on a January 2001 analysis of potential transportation revenue options (prepared by PBOT).
2005
The committee became the City Asset Managers Group (CAMG), 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 CAMG identified common long-term AM needs and helped frame AM throughout the City using a consistent approach.

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.

2006
The 2006 report added affordable housing as an asset category. For purposes of this report, affordable housing was defined as multi-family rental housing units with direct City investment (leveraged financing) and a regulatory agreement with the Portland Development Commission.

2007
The 2007 report included a pilot of risk analysis and a framework for the inclusion of green infrastructure. BES reported on some green infrastructure.

2008
To assess current capacity and interest in improving AM best practices, Transportation, Water, Environmental Services, and PP&R completed a survey, prepared by the Bureau of Planning. Generally, the survey found that the participating infrastructure bureaus have initiated elements of AM best practices, with each bureau taking a different approach. The survey identified five priority AM best practices areas for further exploration: data collection and management, service levels, asset management plans, risk management, and business case. The 2008 report introduced these AM best practices and reported on bureaus' current and potential capacities to adopt them.

2009
In 2008, the CAMG retained an outside consultant to assess the use of asset management best practices to optimize City investments in infrastructure. The assessment included research on high-performing peer communities in North America and established recommendations for a sequence of AM best practices. These recommended best practices were used as a basis for development of a citywide asset management work plan for 2010–2014, included in the 2009 report.

2010
The CAMG updated its work plan (see below) and edited definitions for annual funding need. Both actions respond to recommendations of the Planning and Development Directors in the 2010 City Assets Report.

2011
In 2011, the CAMG featured service level examples, from four City bureaus:

- **Transportation** showed service levels for thirteen transportation asset classes (from PBOT's Infrastructure Asset Report Card — 2010). The focus was on the maintenance of existing transportation infrastructure. Its purpose was to develop and implement levels of service for each asset class to track and monitor performance and outcomes achieved.

- **Environmental Services** showed service levels in seven action areas. It tied customer and technical service levels, based on customer core values and strategic outcomes.

- **Water** showed the status of eleven service level indicators, from Portland Water Bureau Strategic Plan 2008–2011. The Water Bureau has created key service levels (27) and programmatic service levels (40+).

- **PP&R** showed how performance measures track progress toward outcomes in its three year Strategic Plan. Each performance measure is linked to a target.

2012
This 2012 report separates out policy recommendations, distinguishes between data and business practices, and displays annual funding gap in more ways.
2013
The current report provides new data, using last year's structure. No changes were made to the shared work plan.

2014
At the Council Budget Work Session of April 2, 2014, a team of bureau directors presented Citywide Infrastructure and Investment Needs. On behalf of the Planning & Development Directors, the bureau directors proposed a budget note, with three parts:

- Review options to help pay for major maintenance of General Fund assets;
- Develop Major Maintenance policy and funding strategy that includes re-envisioning the General Fund Capital Set-Aside Fund; and
- Use Asset Management data, tools, best practices to inform and prioritize decisions about allocations.

The directors group sought to secure a more dependable, annual revenue stream to maintain, renew, rehab and replace parks, transportation and civic assets – including those of OMF, Fire & Rescue and Police. Specifically, the directors group asked for the opportunity to work with the Budget Office to propose a new and improved decision-making approach to the allocations of the Capital Set-Aside to help avoid some of the short-comings encountered previously. Asset Management can help identify and prioritize the most strategic projects.

With this context, the CAMG made two changes in the 2014 report:

- Some bureaus broke out Annual Funding Gap into one-time and recurring unmet funding needs (in bureau profiles).
- The Citywide AM work plan (next) was reorganized, to separate out process-related work tasks from content-related work tasks.

2015
The current report provides new data, using last year's structure. No changes were made to the shared work plan.
B. Citywide Asset Management Work Plan

Start up

In 2009, the City Asset Managers Group (CAM) developed a Citywide Asset Management Work Plan to guide asset management improvements between 2010 and 2014. The work plan was informed by the internal survey (completed in 2008–2009) and a review of peer communities (completed in 2009). This work laid a foundation for identifying the steps necessary to move the City towards more comprehensive asset management practices.

Between 2009 and 2013, four City bureaus participated in the work plan: Environmental Services, Water, Transportation and Parks & Recreation. In 2012, the CAMG realized that some tasks will take longer than the initial five years, and affirmed the importance of making continuous improvements. For the 2012 report, the CAMG outlined milestones for the tasks through the year 2019 (a second five-year interval).

How It Works

The CAMG anticipates that the work of individual bureaus will progress on varying timelines based on the status of current practice, resources, and relative priorities. As many of these best practices are interdependent, the CAMG recognizes that achieving the goals outlined in the work plan will require continuous and iterative improvements.

Each bureau director is tasked to implement the bureau’s core mission, goals and values, along with the City Charter, state and federal mandates, and community priorities. AM offers a framework and tools to examine and address infrastructure needs to help meet this charge. 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.

However, advances in AM practice are not accomplished overnight. Each bureau encounters a unique set of challenges and barriers to implementing AM best practice. Bureaus are constrained by budget and resources, limitations in data and data management systems, and other commitments and priorities.

To meet these challenges, the work plan relies on the CAMG to continue to share information and mentor each other to build AM capacity and expertise citywide. The work plan assumes a phased implementation of AM improvements, with flexibility to meet the needs and capacities of each bureau. The CAMG will report to the Planning and Development Directors.

The CAMG plans to apply these best practices to all assets in the future. However, due to limited resources and breadth of this work plan, many tasks focus initially on highest risk assets. The CAMG will report on progress in each of these tasks annually through the Citywide Assets Report and through updates to the Planning and Development Directors.

This work plan lays out general approaches and timelines for cross-bureau work. During this initial period, the work plan identified seven advanced asset management best practices:

- Service levels.
- Risk management.
- Report cards.
- Business case.
- Reliability-centered maintenance.
- Long-term investment profiles.
- Community information and consultation.
2014 Update

Work Plan Shift

In 2014, the CAMG shifted the process-related work tasks (#3 report card, and #7 community information and consultation) into the work plan context section of this report. This leaves five content-related work tasks:

- Task 1: Service levels
- Task 2: Risk management
- Task 3: Business case
- Task 4: Reliability-centered maintenance
- Task 5: Long-term investment profiles

In 2014, several bureaus in the CAMG took a Survey of Progress on Asset Management Best Practices. The survey is adapted from an EPA survey, and captures a bureau’s challenges, innovations and progress in advancing the best practices. In future years, participating bureaus will be invited to take the survey. Each year, bureaus can opt to take the survey.

The survey covers both parts of this report — data and best practices.

Report Card

Report cards are a clear and uniform metric (e.g., a letter grade) to indicate the health of the City’s infrastructure and bureau’s business practices. The metric could combine various measures, including the condition of assets; the degree to which customer requirements (i.e., service levels) are being met; the quality of the information and practices in place for maintaining the assets over their lifecycle; and the degree to which funding is available for lifecycle management of the assets.

Report cards can display the current and projected status of assets, identify trends and issues, and track the City’s path to sustainability. The report card will be highly graphic, and may take the form of a dashboard of selected data.

Report cards serve to educate the public, inform City decisions (operations, budget, etc.) and track progress over time. For content, the report card could address asset condition, achievement of levels of service, AM business practices, and/or levels of unmet need.

In the 2011 City of Portland Citywide Assets Report, several bureaus provided service level examples. For instance, PBOT provided a highly visual transportation maintenance report card. Each transportation asset group was compared against a defined target, with scores displayed over consecutive years. Other bureau report cards include:

- Customer and technical service levels (BES)
- Service level progress report and budget report (Water)
- Organizational performance report (PP&R)

Purpose of Best Practices Survey

Six years ago, five City bureaus (CAMG members) took a survey on asset management best practices. Surveys can capture a snapshot of performance levels across varied infrastructure providers, and help to identify next steps. Using the survey results, the CAMG created the shared work plan of AM best practices. Participating bureaus track progress over time, on seven work tasks.

In early 2014, the CAMG decided to overhaul the shared work plan. The Water Bureau brought to the CAMG’s attention a survey tool prepared by the US Environmental Protection Agency (EPA), for use by infrastructure agencies. In Fall 2014, the CAMG chose to
take the best practices survey, and added three narrative questions — inviting bureaus to describe challenges, progress and innovation. As with the first CAMG survey, bureau assess themselves. This section discusses survey results, in the form of findings and a report card. The report card is an initial effort, and expected to evolve over time.

The CAMG did not take this survey in 2015, but will revisit the survey in future years as a tool to track performance and inform the citywide AM work plan.

**Best Practices Survey Results**

BPS received responses from all five asset groups (PBOT, Water, BES, PP&R and Civic). OMF and Fire & Rescue participated for the Civic asset group.

- Water and BES had similar scores (107 and 110 points, respectively; out of a possible 150 points). For Civic, Fire & Rescue scored relatively higher than other civic facilities and technology. This is the CAMG’s first year of taking the survey. No attempt has been made to normalize bureau scores.

- In Challenges, Water and BES cited the need to engage their customers to discuss service levels. This is Task #7, Community Information and Consultation, from prior year CAMG work plans. Another Water challenge is to implement recommendations from AM plans and to complete some data management tasks. BES seeks to develop and implement a more comprehensive AM program that covers finance, operations, customer service in addition to the CIP program that is already well addressed.

- In Progress, Water is completing another set of AM plans, is evaluating the risks of asset failure, and are performing condition assessment and evaluating the likelihood of failure on some their highest risk pipes. Water is recognized nationally for its work on AM plans and pipe risk management. BES has made progress in enhanced risk-based evaluation and decision-making for CIP projects during planning and design phases. BES is developing AM operations and maintenance methods for the treatment plant based on Reliability-Centered Maintenance techniques.

- As to Innovation, Water cites its approach to estimating the consequence of failure of some water pipe crossings of highways and railroads. BES developed a risk-based Equity Lens to review the distribution of CIP projects across the community.

**Community Involvement**

The CAMG recognizes the importance of communicating with the public, especially in setting and refining service levels, understanding funding levels and gaps, and how asset management informs investments (build, operate, maintain and replace assets).

It is necessary to identify appropriate service levels, based on community needs, costs, and ability to pay. In addition, outreach and information can help broaden the base of support for revenues needed to adequately maintain the City’s infrastructure systems.

Objectives are to:

- Inform the public about the state of the City’s assets and to improve the public’s understanding of the City’s asset management program and needs.

- Involve the public at key decision points, including establishing service levels.

Typically, bureaus engage the public in bureau budget advisory committees. Bureaus may also hold service level-related meetings, conduct public surveys and convene focus groups.

All four bureaus will continue to consult with public members on their budget advisory committees, to help identify investment priorities. The CAMG anticipates that improvements in reporting and information to the public will improve as the tasks of this work plan are completed. However, the CAMG believes that it is particularly critical to have informed community conversations regarding desired levels of service, the cost of providing such service, and resulting investment priorities.

In particular, development of a report card with tangible performance measures can help the City better describe asset needs to the community.

The CAMG also prepares a high level brochure, Portland’s Infrastructure Investments. The brochure is updated with data and findings from the annual citywide assets reports.
Work Tasks
A summary chart and report card follow a profile of the five work plan tasks. Service levels (Task #1) and risk mitigation (Task #2) interact directly with funding levels.

Task #1: Service Levels

Definition
Service levels establish measurable goals against which actual achievement can be compared. Service levels set expectations for what service to provide, in what quantities, and how often. Service levels are most useful in a long term perspective (sustainable). There are internal and external service level targets. Service levels may address reliability, quality, quantity, and safety. AM planning allows bureaus to set service levels and cost of service. Both can be evaluated with customers and regulators to set the optimum service level they are prepared to support.

Goal
To develop meaningful and measurable service levels based on system needs that match the expectations of customers to guide funding and investment decisions.

Desired Outcomes
The four participating CAMG bureaus will have established tangible service levels or performance measures, with targets consistent with industry peers. Each bureau will use service levels to bridge its organizational strategies to its tactical assets. Progress in service level work is reported in the annual city asset reports.

Approach
For CAMG bureaus without refined service levels, research and information-sharing will help identify what service level changes they need. Bureau service levels will be developed or refined, in combination with appropriate community consultation. Any established service levels will be adopted as a component of the Citywide Systems Plan. Further refinement of service levels will occur over time, as needed.

Interrelationships
Defining service levels for assets sets a foundation for all of the remaining work plan tasks.

2015 Status
Currently, bureaus have capacity to measure and track a limited number of actual levels of service.

Environmental Services
BES has developed a draft Level of Service document, and will test and adjust service levels as needed. Benchmarks and performance measures are in progress. BES has 44 service levels (a mix of system and maintenance). There is no formal process to adopt the service levels.

Water
In addition to the dashboard Performance Measures, PWB has two tiers of service levels: 27 Key Service Levels and more than 40 Programmatic Service Levels. The bureau also has workload measures in each budget program that supports specific service levels. The bureau will conduct a survey of customers regarding some of its key service levels in 2016.

Transportation
PBOT has developed service levels for infrastructure maintenance.

Parks & Recreation
Parks 2020 Vision establishes broad levels of service for parks, trails, and recreation programs. Established performance measures report on progress toward Strategic Plan outcomes and service level targets. These provide additional management level of service targets. Linkages between broad levels of service to operational levels of service are in process.
Task #2: Risk Management

**Definition**  
Risk management provides a structure to assess and act on risk of assets failing to provide defined levels of service. It navigates degrees of uncertainty by identifying possible events, understanding their likely consequences and determining an appropriate response. Effective risk management relates asset failure to decisions to acquire, maintain and renew assets.

**Goal**  
To identify assets most critical to achieving sustained performance of agreed service levels. In more advanced stages, bureaus will use risk data to prioritize resources and collaborate with other bureaus to identify collateral risks to other public assets.

**Desired Outcomes**  
The four participating CAMG bureaus have identified high-risk assets and have begun to prioritize monitoring and data collection within available resources.

**Approach**  
The CAMG has discussed risk management methodologies. The CAMG will look for opportunities to collaborate, such for interdependent assets. As appropriate, bureaus will identify high risk assets, improve data collection for these assets and apply mitigation strategies based on asset risk classification.

**Interrelationships**  
Data collected will inform Task #3: Report Card, Task #5: Reliability Centered Maintenance, and Task #6: Long Term Investment Profiles. Data will also inform the Citywide Systems Plan (part of the Proposed Draft 2035 Comprehensive Plan).

**2015 Status**  
Bureaus collect a variety of data on their assets, though the extent of and confidence in this data varies by bureau. Bureaus are making progress in identifying high risk assets, at least on some of their asset groups. Bureaus continue to encounter limited capacity to predict likely failure modes for assets and have not estimated the likelihood and consequences of asset failure.

**Environmental Services**  
The combined and sanitary sewer elements of the BES Systems Plan estimates the likelihood and consequence of failure and identifies projects with positive benefit/cost ratios for near term investment. The stormwater system plan is in progress. Building on watershed work, BES is in the process of identifying high risk assets of the stormwater system.

**Water**  
One of the Water Bureau’s service levels concerns risk. PWB has identified high-risk assets through its Consequence Likelihood Evaluation Methodology (CLEM). CLEM identifies assets and failure modes that may pose substantial risk to the bureau, provides a process to evaluate the risk, and includes guidelines for action. Asset management plans also include a risk analysis of all assets. The ongoing evaluation of high-consequence pipes is described under Uses of Asset Management.

**Transportation**  
PBOT has an established risk approach for key infrastructure, including pavement, bridges and traffic signals. The risk assessment allows for improved prioritization of resources and management of risks.

**Parks & Recreation**  
PP&R completed a comprehensive review of risks to service delivery of all assets. The Asset Risk Profiles report provided a list of assets at high risk of failure to deliver levels of service. This report informed new capital projects to repair, rehabilitate or replace high risk assets. High risk assets are regularly inspected. Each year, the bureau will add new assets to the inspection program.
Task #3: Business Case Template

**Definition**  A business case is an economic analysis tool used to evaluate alternative investment decisions in a systematic and logical manner. At the project level, a business case compares project alternatives — such as do-nothing or status quo — and uses the costs and benefits to help the bureau make decisions on the best use of financial resources. Business cases are also used at the program level to determine the best level/type of maintenance and operational strategies.

**Goal**  To develop a framework or template to justify infrastructure improvements based on lifecycle costs, benefits, and impacts to the triple bottom line (economic, social and environmental factors).

**Desired Outcomes**  The four participating CAMG bureaus will have developed a methodology and template for business case and piloted application of the template within their bureau, as appropriate.

**Approach**  The CAMG will share information and research to build a foundational understanding of business case among bureaus. Bureaus will evaluate the applicability for their assets and practices and develop templates and application processes, as needed. Application of business case templates will be completed as appropriate for each bureau.

**Interrelationships**  Application of business cases could impact project priorities in the annual budget process.

**2015 Status**  Most bureaus evaluate multiple alternatives for significant asset investment decisions. Most bureaus consider life cycle costs to maintain and operate, and triple bottom line impacts (economic, social, and environmental).

**Environmental Services**  BES has applied business case analysis to the collection system (sanitary and combined). All BES CIP projects must have a business case analysis. Formats vary by project. BES expects to create a business case template and application process within two years. BES has modified its project request form for capital projects (CIP) to better reflect business case criteria. The CIP project evaluation criteria have also been modified. One of the next steps will be to use the revised criteria to re-evaluate CIP projects in the 10-year plan.

**Water**  PWB uses a standardized business case approach that incorporates total life-cycle costs with triple-bottom-line considerations. Business cases, mainly cost-benefit analyses, are used in investment decisions (capital planning). Many impacts of potential or avoided failures have been monetized (turned into dollar values) and the bureau has been able to select projects and programs that provide the greatest benefits for the cost.

**Transportation**  PBOT incorporates into the budget development process estimates of the full cost of infrastructure investments.

**Parks & Recreation**  PP&R uses established criteria for capital investment decision-making. In the future, the bureau will develop business case analysis for specific project alternatives.
Task #4: Reliability-Centered Maintenance

**Definition**
Reliability-centered maintenance is an approach to identify the optimal or safe minimum level of maintenance for assets. RCM includes identifying failure modes and maintenance tasks to address those failures before they occur, including preventative and predictive maintenance. An RCM investment strategy can form the basis for calculating a long-term investment profile for an asset type. Application of RCM is considered an advanced asset management best practice.

**Goal**
To develop cost-effective maintenance programs for assets to address the main causes of failure and ensure assets continue to perform important functions.

**Desired Outcomes**
The four participating CAMG bureaus will have identified appropriate maintenance strategies and schedules for high risk assets, based on RCM principles. Bureaus have begun to align maintenance practices as appropriate.

**Approach**
Application of the reliability-centered approach will occur on a bureau determined basis.

**Interrelationships**
RCM program should be based on performance measures and risk assessments. These steps should be completed for targeted assets before a full RCM program is developed. RCM should inform a bureau’s long-term investment strategy.

**2015 Status**
No collective progress reported.

**Environmental Services**
BES documented RCM in response to CMOM (Capacity, Management, Operations, and Maintenance) regulations of the federal Clean Water Act. CMOM products were submitted by DEQ in 2013. RCM is already utilized for the treatment system.

**Water**
PWB is working on reliability-centered maintenance (RCM) for some asset groups. Many recurring work orders for preventive maintenance activities are in place. Tracking of the amount of predictive versus reactive maintenance is occurring and the ratio of predictive to reactive maintenance is improving.

**Transportation**
PBOT utilizes infrastructure condition data, levels of service goals and risk of failure analysis to conduct the right treatment at the right time on the right asset. This is illustrated with the Pavement Management System that is used to guide where pavement preservation is applied to street segments.

**Parks & Recreation**
PP&R’s approach is asset-specific, focused on optimal operations and maintenance for each asset group.
Task #5: Long-Term Investment Profile

**Definition**
Long-term investment profiles are projections of major maintenance, repair, and replacement needs by asset group based on set service levels over a long-term forecast. By developing long-term investment profiles, bureaus will be better equipped to define funding gaps and identify future needs to maintain a sustainable system.

**Goal**
To project revenue needs for major maintenance, repair and replacement, by asset group, over a long-term forecast.

**Desired Outcomes**
The four participating CAMG bureaus will have collected necessary data, developed tools and methodologies to project investment needs. As possible, bureaus will have identified long-term investment profiles for high risk assets.

**Approach**
The CAMG will share information and research regarding long-term investment profiles. Bureaus will develop tools and methodologies to prepare investment profiles for their assets, as appropriate. Investment profiles will help bureaus determine the optimal mix of operations, maintenance and capital acquisition to achieve lowest long-term system costs.

**Interrelationships**
Development of long-term investment profiles is dependent on setting service levels (Task 1: Service Levels) and on identifying maintenance needs (Task 5: Reliability Centered Maintenance). Work on long-term investment profiles may also inform the 20-year capital project list under development for the Citywide Systems Plan.

**2015 Status**
In October 2014, the report *Closing the Major Maintenance and Asset Replacement Funding Gap* was delivered to City Council, responding to the FY 2014-15 budget not. Acknowledging that there is no single solution, the report recommends a five-point financial strategy to address the funding gap. It describes the need for ongoing funding of long-term predictable and recurring investments in existing assets as one of these key strategies. The CBO has requested bureaus to develop data supporting these periodic and recurring investment needs.

**Environmental Services**
BES’ work plan does not currently include development of 50-year investment profiles. BES has created remaining life models for pipes. This is complete for collection systems; it is in progress for the treatment plant.

**Water**
PWB has projected the long-term replacement needs of many of its asset classes. A large number of pipes with unknown installation year have now been assigned an estimated install year based on an analysis of surrounding assets and tax-lot information. This allows the bureau to refine its projection of pipe replacement timing.

**Transportation**
PBOT captures the unmet need that is needed to meet levels of services for asset condition. These needs have been articulated recent community conversations about proposed new revenue. These needs are factored into the long term replacement strategy and short term maintenance budget needs.

**Parks & Recreation**
PP&R is creating long-term investment profiles by asset group and will then create a PP&R composite profile. PP&R has completed 75-year investment profiles for community and arts centers and pools.
Survey Report Card

The following report card serves to summarize bureau responses for 2014, with an eye toward possible strategies that are tailored to a bureau’s recent experiences, capabilities and needs. Responses can be tracked over time. The CAMG invites feedback from readers, on this first attempt to capture key messages in the City of Portland’s asset management best practices.

Survey of Progress on Asset Management Best Practices

<table>
<thead>
<tr>
<th>Asset Group</th>
<th>Bureau Embraces AM</th>
<th>AM Data</th>
<th>Service Levels</th>
<th>Risk Mgmt.</th>
<th>Life Cycle Cost</th>
<th>Financing</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAMG Work Tasks, 2013 (details below)</td>
<td>n/a</td>
<td>Chapter 4 and appendix</td>
<td>Tasks #1 and #7</td>
<td>Task #2</td>
<td>Tasks #4, #5 and #6</td>
<td>Task #6</td>
<td>Total</td>
</tr>
<tr>
<td>PBOT</td>
<td>19</td>
<td>21</td>
<td>17</td>
<td>15</td>
<td>13</td>
<td>12</td>
<td>97</td>
</tr>
<tr>
<td>Water</td>
<td>17</td>
<td>19</td>
<td>16</td>
<td>20</td>
<td>16</td>
<td>19</td>
<td>107</td>
</tr>
<tr>
<td>BES</td>
<td>14</td>
<td>22</td>
<td>17</td>
<td>15</td>
<td>19</td>
<td>23</td>
<td>110</td>
</tr>
<tr>
<td>PP&amp;R</td>
<td>10</td>
<td>15</td>
<td>16</td>
<td>16</td>
<td>8</td>
<td>12</td>
<td>77</td>
</tr>
<tr>
<td>Civic:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fire facilities</td>
<td>9</td>
<td>15</td>
<td>17</td>
<td>8</td>
<td>10</td>
<td>9</td>
<td>68</td>
</tr>
<tr>
<td>OMF facilities</td>
<td>6</td>
<td>9</td>
<td>7</td>
<td>2</td>
<td>4</td>
<td>9</td>
<td>37</td>
</tr>
</tbody>
</table>

Work Tasks from 2013 Citywide Assets Report

1. Service Levels
2. Risk Management
3. Infrastructure Report Card
4. Business Case Template
5. Reliability-Centered Maintenance
6. Long Term Investment Profile
7. Community Consultation and Information

The CAMG will refine and adapt the report card from feedback received on this report.
Progress on Previous Recommendations

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

<table>
<thead>
<tr>
<th>Recommendation</th>
<th>Progress Update</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Improve asset management practices.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. Continue with Whole-of-City Approach.</td>
<td>CAMG continues to implement</td>
<td>Ongoing</td>
</tr>
<tr>
<td>b. Review service levels and pursue community consultation.</td>
<td>As part of Portland Plan and Comprehensive Plan update, bureaus are encouraged to set or amend service levels. Each bureau determines its scope, pace and community consultation.</td>
<td>Varies by bureau</td>
</tr>
<tr>
<td>2. Report on asset status and condition.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. Continue annual reports and improvements.</td>
<td>This remains a CAMG priority.</td>
<td>Ongoing</td>
</tr>
<tr>
<td>b. Include and distinguish between repair/rehabilitation/replacement, mandate, and capacity-related needs in the annual funding gap.</td>
<td>Starting in 2009, the annual report distinguishes between funding gaps for these various types of needs.</td>
<td>Ongoing</td>
</tr>
<tr>
<td>3. Prioritize infrastructure spending.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. Prepare strategies related to service levels, funding allocations, and management practices to align revenues with service levels.</td>
<td>This activity is detailed in the work plan, see Task #1 Service Levels, Task #6 Long Term Investment Profile, and Task #7 Community Consultation.</td>
<td>Future</td>
</tr>
<tr>
<td>b. Track local and regional discussions related to infrastructure financing.</td>
<td>Metro has evaluated infrastructure needs to accommodate projected growth of the region. PDC and the Water Bureau served on the project advisory committee. BPS collected and assembled data from City bureaus, for use in the Metro analysis. The City of Portland adopted Portland Plan and is updating the City’s Comprehensive Plan. Both plans will guide long-term growth and development in Portland. The CAMG is tracking and involved with this process.</td>
<td>Ongoing</td>
</tr>
<tr>
<td>c. Develop a funding strategy to shrink the unmet budget needs for infrastructure maintenance.</td>
<td>Bureaus are individually addressing infrastructure maintenance in the context of available budgets.</td>
<td>Fall 2014 BMP</td>
</tr>
<tr>
<td>4. Integrate with related planning efforts.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. Integrate Asset Management into other planning efforts, including community visioning, strategic planning, and long term capital planning.</td>
<td>Asset management will be a key component of the Citywide Systems Plan (part of the Comprehensive Plan).</td>
<td>Ongoing</td>
</tr>
<tr>
<td>b. Track local and regional discussions related to infrastructure.</td>
<td>City staff is tracking local and Metro discussions.</td>
<td>Ongoing</td>
</tr>
<tr>
<td>5. Prepare a plan to guide continued improvement in citywide asset management best practices.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. Identify key gaps based on research into best practices and each bureau’s unique needs.</td>
<td>The CAMG, with the support of an outside consultant, completed research on best practices within peer communities.</td>
<td>Updating</td>
</tr>
<tr>
<td>c. Prioritize improvements necessary to achieve best practices in asset management.</td>
<td>The work plan identifies and prioritizes AM best practices improvements.</td>
<td>Updating</td>
</tr>
<tr>
<td>d. Establish implementation steps and schedule.</td>
<td>The work plan identifies key implementation steps and timelines for each best practice.</td>
<td>Updating</td>
</tr>
<tr>
<td>e. Report on progress annually.</td>
<td>The 2010 report included the first annual progress report.</td>
<td>Ongoing</td>
</tr>
<tr>
<td>6. Build capacity to implement asset management best practices within capital bureaus and citywide.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. Enable bureaus to make continuous improvements to asset management practices based on their respective needs.</td>
<td>The work plan is based on cross-bureau collaboration but allows flexibility for bureaus to proceed on their own schedule.</td>
<td>Ongoing</td>
</tr>
<tr>
<td>7. Use asset management as a tool to improve decision making.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. Define and revise service levels to align service provision with system requirements, community needs, and sustainable funding levels.</td>
<td>This activity is detailed in the work plan; see Task #1 Service Levels.</td>
<td>Future</td>
</tr>
<tr>
<td>b. Determine appropriate asset management strategies to reduce maintenance liabilities.</td>
<td>This activity is detailed in the work plan, see Task #5 Reliability Centered Maintenance and Task #2 Data Collection for High Risk Assets.</td>
<td>Future</td>
</tr>
<tr>
<td>c. Set infrastructure investment priorities.</td>
<td>This is related to Task #4 Business Case and Task #6 Long Term Investment Profile.</td>
<td>Future</td>
</tr>
<tr>
<td>d. Identify sustainable funding levels.</td>
<td>This activity is detailed in work plan; see Task #6 Long Term Investment Profile.</td>
<td>Future</td>
</tr>
</tbody>
</table>
## Citywide Asset Managers Group
### Work Plan Tasks by Year — updated for 2011 City Assets Report

<table>
<thead>
<tr>
<th>Year/Best Practice</th>
<th>Service Levels (SLs)</th>
<th>Risk Management</th>
<th>Infrastructure Report Card</th>
<th>Business Case</th>
<th>Reliability-Centered Maintenance</th>
<th>Long Term Investment Profile</th>
<th>Community Consultation or Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>Scoping.</td>
<td>Discuss methodology and information needed.</td>
<td>Identify reporting needs (could include status of assets, service levels, business practices, and unmet need). Examples from Water and PP&amp;R (2011).</td>
<td>Research and share information. Evaluate appropriateness for each bureau. Each bureau experiments with business cases.</td>
<td>Apply reliability-centered approach on a bureau-determined basis.</td>
<td>Research and share information on long-term investment profiles.</td>
<td>Each bureau consults with public members on its budget advisory committee.</td>
</tr>
<tr>
<td>2011</td>
<td>Developing bureau service levels.</td>
<td>Identify high risk assets, by asset group.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2012</td>
<td></td>
<td>Start to collect condition data on high risk assets.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2014</td>
<td>Refine service levels, as needed.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Continue public consultation in budget advisory committees. Discuss lessons from Citywide Systems Plan and pilots from any bureaus.</td>
</tr>
<tr>
<td>2016</td>
<td></td>
<td>Refine risk assessment methods. Identify opportunities to collaborate, including assessment and mitigation strategies for cross-bureau asset risk.</td>
<td>Refine report card format.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2017</td>
<td></td>
<td></td>
<td></td>
<td>Share business case examples, and identify key questions in analysis.</td>
<td></td>
<td>Develop investment profiles for high-risk assets.</td>
<td></td>
</tr>
<tr>
<td>2018</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2019</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Appendices

1. Current Replacement Values of City Assets
   a. Current Replacement Value, by Asset Type
   b. Current Replacement Value Data Sheet

2. Current Condition of Capital Assets
   a. Summary of All Bureaus
   b. Transportation
   c. Environmental Services
   d. Water
   e. PP&R
   f. Civic
   g. Current Condition Data Sheet

3. Annual Funding Gap
   a. Annual Funding Gap by Asset Type
   b. Annual Funding Gap by Type of Gap
   c. Annual Funding Gap (Mandates, Repair, Rehabilitate, Replace) by Bureau
   d. Capacity Related Annual Funding Gap by Bureau
   e. Annual Funding Gap Compared to Bureau Program Expenditures
   f. Annual Funding Gap Data Sheet

4. Data Confidence Level Summary

5. Definitions

Table continued on next page.
Appendix 1a: Current Replacement Value by Asset Type

in billions, December 2015

2015 Total Replacement Value: $34.7 billion

- Transportation: $9.9 billion
- Environmental Services: $13.5 billion
- Water: $8.2 billion
- Parks & Recreation: $1.4 billion
- Civic: $1.8 billion

- Other assets
- Street lights
- Traffic signals
- Bridges
- Sidewalk system
- Sanitary sewers
- Combined sewers
- Terminal storage
- Supply
- Transmission
- Wastewater treatment systems
- Technology
- Built infrastructure
- Green infrastructure
- Buildings and pools
- Recreation features
- Amenities
- Facilities
## Appendix 1b: Current Replacement Value

### Data Sheet, December 2015

<table>
<thead>
<tr>
<th>Capital Asset Class</th>
<th>Description</th>
<th>Value (in millions)</th>
<th>Confidence Level</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Transportation</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>arterial &amp; collector streets</td>
<td>1,869 lane miles</td>
<td>$3,219.2</td>
<td>3 - Moderate</td>
<td></td>
</tr>
<tr>
<td>local streets</td>
<td>2,964 lane miles</td>
<td>$3,103.6</td>
<td>3 - Moderate</td>
<td></td>
</tr>
<tr>
<td>sidewalks</td>
<td>8,946,538 sq yds</td>
<td>$1,087.0</td>
<td>4 - High</td>
<td></td>
</tr>
<tr>
<td>curbs</td>
<td>3,275 centerline miles</td>
<td>$518.8</td>
<td>3 - Moderate</td>
<td></td>
</tr>
<tr>
<td>corners</td>
<td>37,987 corners</td>
<td>$171.7</td>
<td>4 - High</td>
<td></td>
</tr>
<tr>
<td>structures (bridges only)</td>
<td>157 bridges</td>
<td>$600.7</td>
<td>4 - High</td>
<td></td>
</tr>
<tr>
<td>traffic signals (hardware only)</td>
<td>934 traffic signals</td>
<td>$259.4</td>
<td>2 - Low</td>
<td></td>
</tr>
<tr>
<td>street lights</td>
<td>55,864 street lights</td>
<td>$202.6</td>
<td>2 - Low</td>
<td></td>
</tr>
<tr>
<td>support facilities</td>
<td>various buildings</td>
<td>$15.6</td>
<td>Low to Moderate</td>
<td></td>
</tr>
<tr>
<td>other transportation assets</td>
<td></td>
<td>$687.9</td>
<td>Low to High</td>
<td></td>
</tr>
<tr>
<td><strong>Total Transportation</strong></td>
<td></td>
<td>$9,866.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Environmental Services</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>combined sewers</td>
<td>910 mi. of pipe &amp; access structures</td>
<td>$5,125</td>
<td>4 - High</td>
<td>All dollars updated for ENR (construction cost index). No significant new assets accounted for in value.</td>
</tr>
<tr>
<td>sanitary sewers (owned and/or maintained)</td>
<td>1,001 mi. of pipe &amp; access structures</td>
<td>$4,191</td>
<td>4 - High</td>
<td></td>
</tr>
<tr>
<td>stormwater system</td>
<td>437 mi. of pipe; 2,187 water quality facilities</td>
<td>$1,988</td>
<td>2 - Low</td>
<td></td>
</tr>
<tr>
<td>wastewater treatment systems</td>
<td>2 treatment plants; 99 pump stations</td>
<td>$2,214</td>
<td>3 - Moderate</td>
<td></td>
</tr>
<tr>
<td><strong>Total Environmental Services</strong></td>
<td></td>
<td>$13,518</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Water</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>supply</td>
<td>158 miles of roads, 1609 culverts, 12 bridges, 1 195-ft high concrete dam, 1 145-ft high earth dam, 27 active production wells, 1 groundwater pump station (including treatment facility and storage tank), and 11 miles of groundwater collection mains</td>
<td>$1,044.9</td>
<td>3 - Moderate</td>
<td></td>
</tr>
<tr>
<td>transmission</td>
<td>60 miles of large diameter conduits, with various supports, 9 conduit trestles and 4 conduit bridges, 9 river crossings, 90 miles of large diameter transmission mains</td>
<td>$1,304.2</td>
<td>3 - Moderate</td>
<td></td>
</tr>
<tr>
<td>terminal storage</td>
<td>278 million gallons finished water storage (as of June 2015), interconnecting piping, post-storage treatment facilities, and microhydro facility.</td>
<td>$492.4</td>
<td>3 - Moderate</td>
<td></td>
</tr>
<tr>
<td>distribution</td>
<td>2100 miles of distribution pipes, 186,000 service lines, 52,000 valves, 178,000 meters, 14,500 hydrants, 257 active pressure regulating station, 39 pump stations, 54 active storage tanks</td>
<td>$5,160.8</td>
<td>4 - High</td>
<td></td>
</tr>
<tr>
<td>facilities (buildings and support facilities)</td>
<td>Buildings, SCADA, vehicles, construction equipment, lab equipment, computers, and infrastructure components in inventory</td>
<td>$176.9</td>
<td>3 - Moderate</td>
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<tr>
<td><strong>Total Water</strong></td>
<td></td>
<td>$8,179</td>
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*Table continued on next page.*
<table>
<thead>
<tr>
<th>Capital Asset Class</th>
<th>Description</th>
<th>Value (in millions)</th>
<th>Confidence level</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parks &amp; Recreation</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>amenities</td>
<td>decorative elements and furnishings</td>
<td>$99.5</td>
<td>4 - high</td>
<td>2014 valuation represents a new methodology. Current inventory of assets multiplied by the current replacement cost for each asset type. Project management and overhead costs are included.</td>
</tr>
<tr>
<td>buildings and pools</td>
<td>community and arts centers, pools, restrooms, maintenance facilities</td>
<td>$459.0</td>
<td>4 - high</td>
<td></td>
</tr>
<tr>
<td>recreation features</td>
<td>sports fields, courts, playgrounds, water play areas, community gardens, skate parks, etc.</td>
<td>$256.4</td>
<td>4 - high</td>
<td></td>
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<tr>
<td>built infrastructure</td>
<td>roads, major trails, utilities</td>
<td>$113.8</td>
<td>3 - moderate</td>
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<tr>
<td>green infrastructure</td>
<td>urban forest, turf, shrub beds, botanic gardens</td>
<td>$433.6</td>
<td>2 - low</td>
<td></td>
</tr>
<tr>
<td>Total PP&amp;R</td>
<td></td>
<td>$1,362.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Civic</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Facilities (buildings, structures)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Police facilities</td>
<td>Four precincts, Justice Center, property warehouse, equestrian division, and vehicle storage lot</td>
<td>$127.4</td>
<td>3 - Moderate</td>
<td></td>
</tr>
<tr>
<td>Office buildings</td>
<td>Portland Building, 1900 Building, City Hall</td>
<td>$300.4</td>
<td>3 - Moderate</td>
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<tr>
<td>Other buildings</td>
<td>Archives and Records Center, Kerby Garage, and Portland Communications Center</td>
<td>$94.5</td>
<td>3 - Moderate</td>
<td></td>
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<tr>
<td>PDC facilities</td>
<td>Train station and related buildings, Centennial Mills</td>
<td>$45.4</td>
<td>3 - Moderate</td>
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<tr>
<td>Spectator facilities</td>
<td>Memorial Coliseum, Rose Quarter parking garages, and PGE Park</td>
<td>$571.9</td>
<td>3 - Moderate</td>
<td></td>
</tr>
<tr>
<td>Portland Center for the Performing Arts</td>
<td>Portland Center for the Performing Arts</td>
<td>$130.0</td>
<td>3 - Moderate</td>
<td></td>
</tr>
<tr>
<td>Fueling stations</td>
<td>Fueling stations for use by City vehicles in various locations around city.</td>
<td>$13.3</td>
<td>3 - Moderate</td>
<td></td>
</tr>
<tr>
<td>City vehicles</td>
<td>All City vehicles except Fire apparatus</td>
<td>$157.3</td>
<td>3 - Moderate</td>
<td></td>
</tr>
<tr>
<td>Fire &amp; Rescue facilities</td>
<td>30 stations, administration building and support facility</td>
<td>$117.2</td>
<td>4 - High</td>
<td></td>
</tr>
<tr>
<td>Fire &amp; Rescue apparatus</td>
<td>Engines, trucks, other major apparatus</td>
<td>$43.5</td>
<td>4 - High</td>
<td></td>
</tr>
<tr>
<td><strong>Technology</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Communications-BTS</td>
<td>Data networks, WiFi network, 800 MHz radio system</td>
<td>$73.3</td>
<td>3 - Moderate</td>
<td></td>
</tr>
<tr>
<td>Production Services-BTS</td>
<td>Storage area network, core servers, and email system</td>
<td>$3.0</td>
<td>3 - Moderate</td>
<td></td>
</tr>
<tr>
<td>Strategic technology-BTS</td>
<td>Large corporate applications owned and managed by BTS such as GIS</td>
<td>$5.0</td>
<td>3 - Moderate</td>
<td></td>
</tr>
<tr>
<td>Electronic equipment and software — other bureaus</td>
<td>Video systems, electronic equipment, Office Suite software, bureaus’ PCs and laptops</td>
<td>$9.8</td>
<td>3 - Moderate</td>
<td></td>
</tr>
<tr>
<td>Strategic technology — other bureaus</td>
<td>Large corporate applications such as TRACS, CAD, PPDS, CIS and EBS</td>
<td>$98.6</td>
<td>3 - Moderate</td>
<td></td>
</tr>
<tr>
<td>Total Civic</td>
<td></td>
<td>$1,790.6</td>
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<tr>
<td><strong>Total Capital Assets</strong></td>
<td></td>
<td>$34,716.6</td>
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<td></td>
</tr>
</tbody>
</table>
Appendix 2a: Current Condition of Capital Assets

Summary of all Bureaus, December 2015

<table>
<thead>
<tr>
<th>Bureau</th>
<th>Dollars in Billions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transportation</td>
<td>$9.9 billion</td>
</tr>
<tr>
<td>Environmental Services</td>
<td>$13.5 billion</td>
</tr>
<tr>
<td>Water</td>
<td>$8.2 billion</td>
</tr>
<tr>
<td>Parks &amp; Recreation</td>
<td>$1.4 billion</td>
</tr>
<tr>
<td>Civic</td>
<td>$1.8 billion</td>
</tr>
</tbody>
</table>

Condition Ratings:
- **Very good**
- **Good**
- **Fair**
- **Poor**
- **Very poor**
- **TBD** (To Be Determined)
## Appendix 2b: Current Condition of Capital Assets

*Bureau of Transportation, December 2015*

### Data Confidence Level

<table>
<thead>
<tr>
<th>Optimal</th>
<th>High</th>
<th>Moderate</th>
<th>Low</th>
</tr>
</thead>
<tbody>
<tr>
<td>100%</td>
<td>90%</td>
<td>80%</td>
<td>70%</td>
</tr>
<tr>
<td>60%</td>
<td>50%</td>
<td>40%</td>
<td>30%</td>
</tr>
<tr>
<td>20%</td>
<td>10%</td>
<td>0%</td>
<td></td>
</tr>
</tbody>
</table>

### Legend: Condition Ratings

- Very Good
- Good
- Fair
- Poor
- Very Poor
- TBD

---

<table>
<thead>
<tr>
<th>Percent of Total Number of Assets</th>
<th>Data Confidence Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>0%</td>
<td>Bridges</td>
</tr>
<tr>
<td>10%</td>
<td>Arterial &amp; collector streets</td>
</tr>
<tr>
<td>20%</td>
<td>Local streets</td>
</tr>
<tr>
<td>30%</td>
<td>Traffic signals (hardware only)</td>
</tr>
<tr>
<td>40%</td>
<td>Sidewalks</td>
</tr>
<tr>
<td>50%</td>
<td>Curbs</td>
</tr>
<tr>
<td>60%</td>
<td>Corners</td>
</tr>
<tr>
<td>70%</td>
<td>Street lights</td>
</tr>
<tr>
<td>80%</td>
<td>Support, facilities, other assets</td>
</tr>
</tbody>
</table>

---

*2015 Citywide Assets Report — Status and Best Practices*
Appendix 2c: Current Condition of Capital Assets

Environmental Services, December 2015

Legend: Condition Ratings
- Very Good
- Good
- Fair
- Poor
- Very Poor
- TBD
Appendix 2d: Current Condition of Capital Assets

Water Bureau, December 2015

Legend: Condition Ratings
- Very Good
- Good
- Fair
- Poor
- Very Poor
- TBD

Data Confidence Level

<table>
<thead>
<tr>
<th>High</th>
<th>Moderate</th>
</tr>
</thead>
<tbody>
<tr>
<td>100%</td>
<td>90%</td>
</tr>
<tr>
<td>80%</td>
<td>80%</td>
</tr>
<tr>
<td>70%</td>
<td>70%</td>
</tr>
<tr>
<td>60%</td>
<td>60%</td>
</tr>
<tr>
<td>50%</td>
<td>50%</td>
</tr>
<tr>
<td>40%</td>
<td>40%</td>
</tr>
<tr>
<td>30%</td>
<td>30%</td>
</tr>
<tr>
<td>20%</td>
<td>20%</td>
</tr>
<tr>
<td>10%</td>
<td>10%</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>
Appendix 2e: Current Condition of Capital Assets

* Other includes: furnishings in natural areas, gathering places, off-leash areas, water play and utilities

Legend: Condition Ratings
- Very Good
- Good
- Fair
- Poor
- Very Poor
- TBD
Appendix 2f: Current Condition of Capital Assets

*Civic (OMF, Police, Fire & Rescue), December 2015*

[Diagram showing the current condition of capital assets with data confidence levels and condition ratings for various categories.]

**Legend: Condition Ratings**
- Very Good
- Good
- Fair
- Poor
- Very Poor
- TBD
## Appendix 2g: Current Condition Data Sheet

*December 2015*

<table>
<thead>
<tr>
<th>Bureau and capital asset type</th>
<th>Current Condition (in %)</th>
<th>Confidence level</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Very Good</td>
<td>Good</td>
<td>Fair</td>
</tr>
<tr>
<td>Transportation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>arterial &amp; collector streets</td>
<td>20</td>
<td>17</td>
<td>18</td>
</tr>
<tr>
<td>local streets</td>
<td>7</td>
<td>17</td>
<td>19</td>
</tr>
<tr>
<td>sidewalks</td>
<td>10</td>
<td>25</td>
<td>30</td>
</tr>
<tr>
<td>curbs</td>
<td>12</td>
<td>50</td>
<td>16</td>
</tr>
<tr>
<td>corners</td>
<td>10</td>
<td>18</td>
<td>17</td>
</tr>
<tr>
<td>structures (bridges only)</td>
<td>8</td>
<td>30</td>
<td>60</td>
</tr>
<tr>
<td>traffic signals (hardware only)</td>
<td>33</td>
<td>17</td>
<td>19</td>
</tr>
<tr>
<td>street lights</td>
<td>47</td>
<td>7</td>
<td>22</td>
</tr>
<tr>
<td>support facilities (for PBOT &amp; BES)</td>
<td>condition ranges from very poor to good</td>
<td>Low to Moderate</td>
<td></td>
</tr>
<tr>
<td>other transportation assets</td>
<td>condition range from very poor to very good or TBD</td>
<td>Low to Optimal</td>
<td></td>
</tr>
<tr>
<td>Environmental Services</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>combined sewers</td>
<td>49</td>
<td>21</td>
<td>11</td>
</tr>
<tr>
<td>sanitary sewers</td>
<td>71</td>
<td>23</td>
<td>3</td>
</tr>
<tr>
<td>wastewater treatment systems</td>
<td>27</td>
<td>29</td>
<td>12</td>
</tr>
<tr>
<td>stormwater system</td>
<td>24</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Water</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>supply</td>
<td>13.6</td>
<td>47.3</td>
<td>28.5</td>
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<tr>
<td>transmission</td>
<td>5.4</td>
<td>42.5</td>
<td>43.0</td>
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<tr>
<td>terminal storage</td>
<td>48.0</td>
<td>29.4</td>
<td>4.0</td>
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<tr>
<td>distribution</td>
<td>24.7</td>
<td>51.0</td>
<td>18.9</td>
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<tr>
<td>facilities (buildings and support facilities)</td>
<td>55.4</td>
<td>17.6</td>
<td>11.0</td>
</tr>
</tbody>
</table>

*Table continued on next page.*
<table>
<thead>
<tr>
<th>Bureau and capital asset type</th>
<th>Current Condition (in %)</th>
<th>Confidence level</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Very Good</td>
<td>Good</td>
<td>Fair</td>
</tr>
<tr>
<td>Parks &amp; Recreation amenities</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>furnishings in developed parks</td>
<td>12</td>
<td>14</td>
<td>31</td>
</tr>
<tr>
<td>furnishings in natural areas</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>decorative elements</td>
<td>28</td>
<td>31</td>
<td>19</td>
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<tr>
<td>buildings and pools</td>
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<td></td>
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</tr>
<tr>
<td>major buildings</td>
<td>59</td>
<td>9</td>
<td>27</td>
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<td>minor buildings</td>
<td>41</td>
<td>16</td>
<td>32</td>
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<td>recreation features</td>
<td></td>
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<tr>
<td>gathering places</td>
<td>0</td>
<td>0</td>
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<tr>
<td>marine</td>
<td>71</td>
<td>0</td>
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<td>off-leash areas</td>
<td>0</td>
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<td>0</td>
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<tr>
<td>play areas</td>
<td>20</td>
<td>31</td>
<td>24</td>
</tr>
<tr>
<td>sports courts and fields</td>
<td>33</td>
<td>22</td>
<td>21</td>
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<tr>
<td>water play</td>
<td>0</td>
<td>0</td>
<td>0</td>
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<tr>
<td>community gardens</td>
<td>19</td>
<td>17</td>
<td>45</td>
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<tr>
<td>built infrastructure</td>
<td></td>
<td></td>
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<tr>
<td>circulation</td>
<td>0</td>
<td>61</td>
<td>27</td>
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<tr>
<td>utilities</td>
<td>0</td>
<td>0</td>
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<tr>
<td>green infrastructure</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>natural areas</td>
<td>50</td>
<td>31</td>
<td>6</td>
</tr>
<tr>
<td>developed areas</td>
<td>10</td>
<td>34</td>
<td>45</td>
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</tbody>
</table>

*Table continued on next page.*
<table>
<thead>
<tr>
<th>Bureau and capital asset type</th>
<th>Current Condition (in %)</th>
<th>Confidence level</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Very Good</td>
<td>Good</td>
<td>Fair</td>
</tr>
<tr>
<td>Civic</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>buildings, structures</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>police facilities</td>
<td>0</td>
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<tr>
<td>office buildings</td>
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<tr>
<td>other buildings</td>
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<td>67</td>
<td>28</td>
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<tr>
<td>PDC facilities</td>
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<td>spectator facilities</td>
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<td>Portland Center for Performing Arts</td>
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<tr>
<td>fueling stations</td>
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<td>vehicles</td>
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<td>fire facilities</td>
<td>6</td>
<td>80</td>
<td>11</td>
</tr>
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<td>fire apparatus</td>
<td>54</td>
<td>30</td>
<td>16</td>
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<tr>
<td>technology</td>
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<tr>
<td>communications-BTS</td>
<td>0</td>
<td>97</td>
<td>3</td>
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<td>production services-BTS</td>
<td>0</td>
<td>86</td>
<td>14</td>
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<tr>
<td>strategic technology-BTS</td>
<td>0</td>
<td>84</td>
<td>16</td>
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<tr>
<td>electronic equipment and software — other bureaus</td>
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<tr>
<td>strategic technology — other bureaus</td>
<td>0</td>
<td>88</td>
<td>12</td>
</tr>
</tbody>
</table>
Appendix 3a: Annual Funding Gap, by Asset Group

in millions per year, December 2015

* PBOT capacity gap is not broken out by asset type. See Transportation System Plan for additional details.
Appendix 3b: Annual Funding Gap, by Type of Gap

* in millions per year, December 2015

2015 Total Gap:
$411.7 million in these types*:
- Repair, rehabilitation and replacement
- Mandate
- Capacity

* The three types of Funding Gap are defined in Appendix 5 of this report.
Appendix 3c: Annual Funding Gap (Mandates, Repair, Rehabilitate, Replace), by Bureau

in millions per year, December 2015

2015 Non-capacity Gap $278.5 million*:
- Repair, rehabilitation and replacement
- Mandate

* The three types of Funding Gap are defined in Appendix 5 of this report.
Appendix 3d: Capacity Related Annual Funding Gap, by Bureau

*The three types of Funding Gap are defined in Appendix 5 of this report.*
Appendix 3e: Annual Funding Gap Compared to Bureau Expenditures

* Bureau expenditures are defined as Adopted Budget FY2015-16 Personnel Services, External Materials and Services, Internal Materials and Services, and Capital Outlay. Civic Bureau expenditures are inclusive of FF&R, Police, Bureau of Technology Service and relevant Bureau of Internal Business Services expenditures.
## Appendix 3f: Annual Funding Gap Data Sheet

### in millions per year, December 2015

<table>
<thead>
<tr>
<th>Bureau and capital asset type</th>
<th>Value* (in millions)</th>
<th>Confidence level</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Transportation</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>arterial &amp; collector streets</td>
<td>$73.8</td>
<td>$0.0</td>
<td></td>
</tr>
<tr>
<td>local streets</td>
<td>$57.7</td>
<td>$0.0</td>
<td></td>
</tr>
<tr>
<td>sidewalks</td>
<td>n/a</td>
<td>n/a</td>
<td></td>
</tr>
<tr>
<td>curbs</td>
<td>$13.2</td>
<td>$0.0</td>
<td></td>
</tr>
<tr>
<td>corners</td>
<td>$9.1</td>
<td>$0.0</td>
<td></td>
</tr>
<tr>
<td>structures (bridges only)</td>
<td>$23.1</td>
<td>$0.0</td>
<td></td>
</tr>
<tr>
<td>traffic signals (hardware only)</td>
<td>$12.9</td>
<td>$0.0</td>
<td></td>
</tr>
<tr>
<td>street lights</td>
<td>$4.2</td>
<td>$0.0</td>
<td></td>
</tr>
<tr>
<td>support facilities (for PDOT &amp; BES)</td>
<td>$0.5</td>
<td>$0.0</td>
<td></td>
</tr>
<tr>
<td>other transportation assets</td>
<td>$2.9</td>
<td>$0.0</td>
<td></td>
</tr>
<tr>
<td>Total Transportation</td>
<td>$197.4</td>
<td>$0.0</td>
<td>$75.0</td>
</tr>
</tbody>
</table>

| **Environmental Services**   |                      |                  |       |
| combined sewers             | $2.0                 | $0.0             | $3.0  | $5.0  | 3 - Moderate | Recent condition assessments have identified greater funding gaps due to aging infrastructure and capacity needs. Stormwater system needs are in the midst of ongoing assessment. |
| sanitary sewers             | $1.0                 | $0.0             | $0.0  | $1.0  | 3 - Moderate |
| stormwater system           | $5.0                 | $0.0             | $8.0  | $13.0 | 2 - Low     |
| wastewater treatment systems | $2.0                 | $0.0             | $0.0  | $2.0  | 3 - Moderate |
| Total Environmental Services | $10.0                | $0.0             | $11.0 | $21.0 |           |

| **Water**                   |                      |                  |       |
| supply                      | $3.5                 | $0.0             | $0.0  | $3.5  | 3 - Moderate |
| transmission                | $5.0                 | $0.0             | $0.0  | $5.0  | 3 - Moderate |
| terminal storage            | $1.2                 | $0.0             | $0.0  | $1.2  | 3 - Moderate |
| distribution                | $9.8                 | $0.0             | $0.0  | $9.8  | 3 - Moderate |
| Facilities (buildings, structures) | $1.5                 | $0.0             | $0.0  | $1.5  | 3 - Moderate |
| Total Water                 | $21.0                | $0.0             | $0.0  | $21.0 |           |

<p>| <strong>Parks &amp; Recreation</strong>      |                      |                  |       |
| amenities                   | $0.1                 | $0.0             | $0.0  | $0.1  | 3 - Moderate |
| buildings and pools         | $6.2                 | $4.1             | $20.0 | $30.3 | 3 - Moderate |
| built infrastructure        | $2.5                 | $2.9             | $10.5 | $15.9 | 3 - Moderate |
| developed park              | $2.0                 | $0.1             | $13.5 | $15.6 | 3 - Moderate |
| green infrastructure        | $1.5                 | $0.0             | $0.4  | $1.9  | 2 - Low     |
| recreation features         | $1.8                 | $3.6             | $2.8  | $8.2  | 3 - Moderate |
| PP&amp;R Subtotal               | $14.1                | $10.7            | $47.2 | 72.0  |           |
| PP&amp;R Subtotal Current Assets|                      |                  |       | $24.8 |           |
| Total PP&amp;R                  |                      |                  |       | $72.0 |           |</p>
<table>
<thead>
<tr>
<th>Bureau and capital asset type</th>
<th>Value* (in millions)</th>
<th>Confidence level</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>R/R/R</td>
<td>Mandate</td>
<td>Capacity</td>
</tr>
<tr>
<td><strong>Civic</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Facilities (buildings, structures)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Police facilities</td>
<td>$2.9</td>
<td>$0.0</td>
<td>$0.0</td>
</tr>
<tr>
<td>Office buildings</td>
<td>$6.0</td>
<td>$0.0</td>
<td>$0.0</td>
</tr>
<tr>
<td>Other buildings</td>
<td>$1.4</td>
<td>$0.0</td>
<td>$0.0</td>
</tr>
<tr>
<td>PDC facilities</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Spectator facilities</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Portland Center for the Performing Arts</td>
<td>tbd</td>
<td>tbd</td>
<td>tbd</td>
</tr>
<tr>
<td>Fueling stations</td>
<td>$0.4</td>
<td>$0.0</td>
<td>$0.0</td>
</tr>
<tr>
<td>Vehicles</td>
<td>$0.0</td>
<td>$0.0</td>
<td>$0.0</td>
</tr>
<tr>
<td>Fire &amp; Rescue facilities</td>
<td>$3.2</td>
<td>$0.0</td>
<td>$0.0</td>
</tr>
<tr>
<td>Fire &amp; Rescue apparatus</td>
<td>$0.0</td>
<td>$0.0</td>
<td>$0.0</td>
</tr>
<tr>
<td><strong>Technology</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Communications-BTS</td>
<td>$5.0</td>
<td>$0.0</td>
<td>$0.0</td>
</tr>
<tr>
<td>Production Services-BTS</td>
<td>$0.2</td>
<td>$0.0</td>
<td>$0.0</td>
</tr>
<tr>
<td>Strategic technology-BTS</td>
<td>$0.5</td>
<td>$0.0</td>
<td>$0.0</td>
</tr>
<tr>
<td>Electronic equipment and software — other bureaus</td>
<td>$0.7</td>
<td>$0.0</td>
<td>$0.0</td>
</tr>
<tr>
<td>Strategic technology — other bureaus</td>
<td>$5.0</td>
<td>$0.0</td>
<td>$0.0</td>
</tr>
<tr>
<td><strong>Total for Civic Assets</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>$25.3</td>
<td>$0.0</td>
<td>$0.0</td>
</tr>
<tr>
<td><strong>Total Capital Assets</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>$267.8</td>
<td>$10.7</td>
<td>$133.2</td>
</tr>
</tbody>
</table>

**R/R/R (Repair, Rehabilitation, Replacement):** Additional funding necessary to repair, rehabilitate and replace existing assets to bring them up to established service levels, or replace assets considered functionally obsolete (not meeting those service levels).

**Mandate:** Additional funding necessary to improve existing assets to meet regulatory requirements, exclusive of improvements that fall under R/R/R or Capacity.

**Capacity:** Additional funding necessary to address existing inequities and deficiencies in levels of service for current customers and citizens.
Appendix 4: Data Confidence Level Summary

*Citywide, December 2015*

![Data Confidence Level Summary by Asset Value](chart.png)
Appendix 5: Definitions

The following definitions and confidence levels draw on several AM sources, including GHD Consultants (used by the Water Bureau and PBOT), trained bureau staff, and literature searches.

**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 regimes 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**
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).

<table>
<thead>
<tr>
<th>Confidence levels</th>
<th>Label</th>
<th>Inventory completeness</th>
<th>Condition assessment method and frequency</th>
<th>Process and documentation</th>
</tr>
</thead>
<tbody>
<tr>
<td>No confidence</td>
<td>1-TBD</td>
<td>No inventory</td>
<td>No assessment method (to be determined)</td>
<td>No process (to be determined)</td>
</tr>
<tr>
<td>Low confidence</td>
<td>2-Low</td>
<td>Partially complete inventory</td>
<td>Estimates used to assess condition</td>
<td>Process not well documented</td>
</tr>
<tr>
<td>Moderate confidence</td>
<td>3-Moderate</td>
<td>Inventory complete</td>
<td>Subjective process to estimate condition estimated followed on a regular schedule</td>
<td>Some documentation in place</td>
</tr>
<tr>
<td>High confidence</td>
<td>4-High</td>
<td>Inventory complete</td>
<td>Condition surveys conducted on a regular schedule by well-trained personnel</td>
<td>Well documented process followed</td>
</tr>
<tr>
<td>Optimal confidence</td>
<td>5-Optimal</td>
<td>Inventory complete</td>
<td>Condition surveyed on a regular schedule</td>
<td>Objective process followed; Accuracy of data verified and well documented</td>
</tr>
</tbody>
</table>
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. There may be economic, social and/or environmental consequences of asset failure.

Critical Infrastructure  Infrastructure assets that are essential for the functioning of society and the economy, including energy generation, transmission and distribution; telecommunications; water supply and wastewater; transportation systems; public health; and security and emergency response services.

Current Replacement Value (CRV)  The CRV is the total cost to replace the entire asset to meet current accepted standards and codes. For this report, the CRV excludes land value. The CRV does not match financial book value or market value.

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. There are three types of funding gap:

- **Repair, Rehabilitation, Replacement**: Additional funding necessary to repair or rehabilitate existing assets to bring them up to current service levels, or replace assets considered obsolete.

- **Mandate**: Additional funding necessary to improve existing assets to meet regulatory requirements, exclusive of improvements that fall under Repair, Rehabilitation, Replacement or Capacity.

- **Capacity**: Additional funding necessary to address existing inequities and deficiencies in levels of service for current customers and citizens.

Funding Types  Over the life of an infrastructure asset, one-time and recurring investments are needed.

- One-time investments include initial land acquisition and master planning (neither are included in Current Replacement Value, Condition or Annual Funding Gap) and asset design, development and enhancements (both are included in the key assets data).

- Recurring investments can be timed to extend the useful life of assets and deliver agreed service levels at total life-cycle costs. Examples of recurring investments are roofing (every 20-30 years), rooftop HVAC systems (every 12-15 years), road resurfacing (every 30 years or so), and replastering swimming pools (12-15 years).

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

- 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

- Engineered facilities, such as green street treatments or eco-roofs, which use natural processes in an infrastructure setting.
<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>High-risk Infrastructure</td>
<td>Infrastructure assets that have a high risk of failure, based on the likelihood and consequence of that failure.</td>
</tr>
<tr>
<td>Infrastructure</td>
<td>Consists of assets in three general networks that serve whole communities — transportation modalities (roads, rail, etc.), utilities and parks. 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, drainage systems, water and sewer lines, pump stations and treatment plants, community centers and pools, and police and fire stations. Beyond transportation and utility networks, Portland includes parks, buildings, green infrastructure, communications, and information technology as necessary infrastructure investments that serve the community.</td>
</tr>
<tr>
<td>Inventory</td>
<td>A list of assets and their principal components.</td>
</tr>
<tr>
<td>Level of Service</td>
<td>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.</td>
</tr>
<tr>
<td>Life-Cycle Cost</td>
<td>The sum of all costs throughout the life of an asset, including planning, design, acquisition, construction, operation, maintenance, rehabilitation/renewal and disposal costs.</td>
</tr>
<tr>
<td>Likelihood of Failure</td>
<td>The probability or possibility of an event that will cause the asset to fail.</td>
</tr>
<tr>
<td>Maintenance</td>
<td>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:</td>
</tr>
<tr>
<td></td>
<td>- Preventive maintenance conducted at regular scheduled intervals based on average statistical/anticipated lifetime.</td>
</tr>
<tr>
<td></td>
<td>- Condition-based maintenance based on objective evidence of need from tests, measurements and observations.</td>
</tr>
<tr>
<td></td>
<td>- 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.</td>
</tr>
<tr>
<td>Unplanned maintenance</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Reactive or Emergency-corrective actions taken upon failure or obvious threat of failure, usually at a higher cost than planned or preventive maintenance.</td>
</tr>
<tr>
<td>Operations</td>
<td>The ongoing activities that allow the use of an asset for its intended function.</td>
</tr>
<tr>
<td>Performance Indicator</td>
<td>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.</td>
</tr>
<tr>
<td>Performance Monitoring</td>
<td>The periodic assessments of actual performance compared to specific objectives, targets, or standards.</td>
</tr>
<tr>
<td>Rehabilitation/Renewal</td>
<td>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.</td>
</tr>
<tr>
<td>Retirement/Removal</td>
<td>Decommissioning or removal of an asset through disposal, abandonment, demolition, or sale that may involve retiring deteriorated assets and recovering salvage value.</td>
</tr>
<tr>
<td>Term</td>
<td>Definition</td>
</tr>
<tr>
<td>--------------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Risk</td>
<td>The chance of something happening that will have an impact upon objectives. Risk is measured in terms of likelihood and consequences.</td>
</tr>
<tr>
<td>Risk Analysis</td>
<td>A systematic use of available information to determine how often specified events may occur and the magnitude of their consequences.</td>
</tr>
<tr>
<td>Risk Management Strategy</td>
<td>The systematic application of management policies, procedures and practices to the tasks of establishing the context, identifying, analyzing, evaluating, treating, monitoring and communicating risk.</td>
</tr>
<tr>
<td>Triple Bottom Line</td>
<td>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).</td>
</tr>
<tr>
<td>Useful Life</td>
<td>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).</td>
</tr>
</tbody>
</table>
Appendix 6: Best Practices Survey Questions

I. General Asset Management
   - Is AM terminology understood throughout the organization?
   - Does the organization have a clearly defined AM Plan?
   - Is AM fully embraced by the elected officials or governing body of the organization?
   - Does the organization have a strategy for communicating the AM strategy throughout the organization?
   - Does the organization have an overarching goal or mission statement for AM?

II. Current State of the Assets
    - Does the organization have an asset inventory?
    - Does the organization have a map of asset locations?
    - Does the organization have a process for condition assessment?
    - Does the organization have a means of estimating useful life?
    - Has the organization determined asset replacement values?

III. Level of Service
     - Does the organization have a means of communicating to the customers, including communicating the goals of the Level of Service?
     - Does the organization have clearly defined Level of Service goals and are they aligned with customer expectations/desires?
     - Does the organization meet current regulatory requirements and, if not, does it have a plan to meet these requirements in the future? Does the organization anticipate future regulatory requirements and their impact on operations and infrastructure needs?
     - Does the organization measure progress towards meeting the goals of the Level of Service?
     - Does the organization analyze current and anticipated customer demands, including planning for future growth or population decline?

IV. Assets Critical to Sustained Performance
    - Does the organization have a process to assess the probability of failure of assets?
    - Does the organization have a process to assess the consequence of asset failure?
    - Does the organization have a process to rank assets according to the likelihood and consequences of asset failure (i.e., according to overall risk)?
    - Do the likelihood and consequences of asset failure (i.e., the overall risk) drive asset investment decisions?
    - Does overall risk drive asset operation and maintenance (O&M) decisions?
V. Life Cycle Cost

- Is the organization moving from reactive maintenance to planned or proactive maintenance?
- Does the organization have a program to fully consider all aspects of Life Cycle Costing when making infrastructure investment decisions, including initial capital cost, operation and maintenance, repair, and disposal?
- Does the organization have a long-term Capital Improvement Plan?
- Does the organization have a validation process for its capital projects that include consideration of non-asset solutions as well as non-traditional approaches (i.e., green infrastructure, decentralized treatment, water conservation to reduce need for new sources)?
- Does the organization have a program to analyze the use of operation and maintenance processes to extend the life of the existing assets?

VI. Financing

- Does the organization maintain reserve funds/accounts?
- Does the organization target its rates and other revenue streams to adequately fund all long term costs, including both operations and maintenance (O&M) and capital investment/capital debt needs?
- Does the organization have a plan to fund capital improvements for the long term?
- Is investment in assets prioritized based on overall business risk?
- Does the organization provide a program for disadvantaged customers so that adequate rates are possible?