

CITY OF PORTLAND 2019 Citywide Assets Report

Status and Best Practices



City Asset Managers Group
Sponsored by the Planning and
Development Directors

Bureau of Environmental Services
Bureau of Planning and Sustainability
Office of Management and Finance
Portland Bureau of Emergency Management

Portland Parks & Recreation
Portland Bureau of Transportation
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City of Portland

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2019 Citywide Assets Report

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1. Executive Summary

Purpose of the Report

This annual report provides information about the City of Portland's physical assets which include parks and community facilities, water, sewer, and stormwater systems, buildings, bridges, roads, sidewalks, emergency response equipment and technology, and other infrastructure. The report assembles key data and provides a summary of the City's asset inventory, replacement value, condition and unmet funding needs; also included are high-level details as to how the City approaches its responsibility of managing Portland's infrastructure.

This report is produced by the City Asset Managers Group (CAMG), which is comprised of asset managers from the Bureau of Environmental Services, the Bureau of Transportation, the Office of Management and Finance, Portland Parks & Recreation, and the Portland Water Bureau, Portland Fire & Rescue as well as members from the City Budget Office and the Bureau of Emergency Management. The bureaus follow internationally-recognized asset management principles and use best practices to advance the City's asset management work; these include whole lifecycle planning, value realization, and data management and reporting.

The CAMG is sponsored by the Planning and Development Directors' group, which represents infrastructure, development permitting, financial, and planning bureaus. Among the duties of the CAMG is to review findings of the annual assets report and makes recommendations to City Council in support of major policy decisions affecting assets.

This report contains information to guide decision-making about asset renewals, reinvestment, and risks. This information is assembled to support data-driven investments and delivery of sustainable service levels for Portlanders today and into the future.

Key Findings

Asset Value, Condition, and Funding Varies by Bureau

Current Replacement Value

The City of Portland manages assets worth \$46 Billion. These assets include streets, sidewalks, traffic signals, bridges; wastewater treatment and stormwater systems, sanitary and combined sewers; water supply, storage, transmission, and distribution systems; parks buildings, pools, community centers, and gardens; and spectator facilities such as those at Rose Quarter and Providence Park, facilities for police, fire and rescue, and office buildings and technology for City workers.

Condition of Assets

Absent adequate maintenance, asset condition declines with age and the cost of rehabilitation and repair grows. The condition of the City's physical assets vary: overall, 67% of assets are in fair or better condition and 24% are in poor or very poor condition.¹ One reason for the variability in asset condition across bureaus is the resource availability for infrastructure repair and rehabilitation; for example, BES and Water, both rate-funded bureaus with robust asset management programs, have a high proportion of assets in very good/good condition (BES 61%; Water 66%) and low proportion in poor/very poor condition (BES 10%; Water 9%). Conversely Transportation, funded by the General Fund, with an asset base similar in replacement value to BES and Water, has a lower proportion of its assets in very good/good condition (26 %) and higher proportion of assets in in poor/very poor condition (49%). Similar trends are present in other "General Fund Infrastructure" funded asset groups including Parks (26% good/very good; 29% poor/very poor) and "Civic" (64% good/very good; 24% poor/very poor). The City also has assets whose value or condition is unknown. In total, 9% of the City's assets have a condition that is marked as "To Be Determined" ("TBD").

Funding Gap

The City's funding gap for infrastructure is quantified by looking at the overall asset need less the City's actual investment in infrastructure repair, rehabilitation, and replacement ("R/R/R"). Each year the City underinvests in maintaining its assets, the cost of repair grows due to increased deterioration; for example, \$475 million more per year is needed to maintain existing assets to meet current levels of service (2019) compared to a \$428 million gap last year (2018) and \$345 million funding gap the year before (2017).²

The consequence of continuing to underinvest in infrastructure is not only a growing financial obligation, it also presents increased legal liability and risk to the City, declining service levels, and mounting costs to future Portlanders to take care of infrastructure neglected by Portland today.

Challenges and Opportunities Continue

There are several challenges to advancing citywide asset management. One area CAMG focuses on is recommending discussions to define sustainable levels of service that can balance reinvestment in assets with the service levels the City

¹ The condition of approximately 9% of the City's assets are unknown or "to be determined" (TBD). By value, Unknown/TBD condition assets are roughly 72% in BES, 21% in Transportation, and 7% in Parks

² R/R/R funding gap numbers used (capacity and mandate left out) because of "current levels of service language" - in reality these gaps are even higher considering the needs generated from new legal mandates ("mandate gap") and the needs of a growing city ("capacity gap"). The total "all in funding gap" is \$708 million.

provides. The current trend of increasing service levels over time with relatively flat reinvestment in our assets will result in lower levels of service for future generations. Thus, the financial health and resilience of the City is dependent on balancing our delivery of services with long-term reinvestment in our assets.

Asset management provides a strategic road map to achieve sustainable levels of service, but it must be supported by a reinvestment strategy. In recent years, City Council and Portland voters have made strides in addressing some of the funding gaps that exist for major systems. For example, in 2014, voters approved Measure 26-159, allowing the sale of \$68 million in bonds to address some of the parks, playgrounds, pools, and other recreational facilities in disrepair. In 2015, City Resolution 37107 required that 50% of one-time General Fund resources be set aside for major maintenance and asset replacement projects. Further, in May 2016, Portland voters passed Measure 26-173, approving a four-year motor vehicle fuel tax to fund key projects to repair and enhance the safety of Portland streets. In fall 2017, Mayor Wheeler launched Build Portland, a city-issued bond initiative to be financed by property taxes that will be realized by the General Fund as the City's Urban Renewal Areas (URAs) expire and pay off debt over the next 20 years. The plan began with a \$49 million initial infrastructure investment in FY 2018-19 for Parks and Transportation.

Despite this progress, work remains to be done to ensure we are making the appropriate and ongoing investments in our infrastructure. The decisions we make now will have long-term impacts on the quality of life in Portland.

2. Asset Management Fundamentals

The City owns and manages over \$4.6 billion in assets across Water, Transportation, Environmental Services, Parks, and the Office of Management and Finance (OMF) Bureaus, representing generations of investment by Portlanders. These assets are the foundation of the valuable services the City provides to residents, and they are essential to Portland's economic vitality. They include, among others:

- the roads we take to and from work,
- the sidewalks our kids take to school,
- the water that supports everyday life and our famous beer industry,
- the treatment systems that clean our sewage,
- the parks where children develop,
- the precincts that support our police officers,
- the fire stations that respond to our emergencies, and
- the natural areas and trees that clean our water, soil, and air

These systems are critical in meeting residents' expectations for City services, livability, economy, and safety. The health of these assets is foundational to the Portland quality of life that is valued by both long-standing residents and is attractive to new Portlanders.

Asset managers balance the triple constraint of risk, service level, and cost. Taking this balance into account, asset managers look at the whole life cycle of infrastructure, e.g. from planning, design and daily operations, to maintenance and repair; from renovations accommodating new expectations, regulations, or policies, to decommissioning and disposal at the end of the asset's life. These assets fit together in complex and overlapping systems that depend on one another to deliver services to hundreds of thousands of people at all hours of the day. The desired level of service from these systems must be maintained collectively from scarce resources in the most cost-effective manner possible.

Bureaus have limited resources and must balance competing demands of executing maintenance/repair/replacement projects, managing risks, meeting regulatory requirements, and expanding the capacity of systems to fill service gaps and deliver services as Portland grows. This scarcity also affects the quality of management processes including data analysis, project prioritization, and long-term decision-making.



Figure 1. The goal of asset management is to balance levels of service, risks, and costs.

Level of Service

Service levels are defined by community expectations, bureau experts, industry trends, and elected officials. Service levels are also informed by regulations such as the federal Clean Water and American with Disabilities Acts, and state and local laws and codes. Planning efforts, such as the Portland Plan and the 2035 Comprehensive Plan also set direction for City levels of service. Together, expert assessments, stakeholder needs, regulations, and plans articulate the service expectations for the City of Portland.

Delivery of a service level is a function of both assets and staff. Depending on the asset, service levels can be as straightforward as functional community centers or as complex as maintaining 80% of major roads in fair or better condition to avoid increased costs. As assets decline without sufficient reinvestment and inevitably lead to a lower service level over time, it is imperative to reinvest in them.

Risk

Risk is a combination of two factors: the consequence of asset failure, and the likelihood that the asset will fail.

The consequences of asset failure can vary. For example, a large water pipe that serves a hospital is considered more critical than a smaller pipe that serves a neighborhood. Critical pipes require more inspection, maintenance, and intervention than pipes with lower consequences of failure. Pipes with lower consequences of failure may be allowed to serve without intervention until the

number of leaks or a break warrants replacement—a process called “run to failure.”

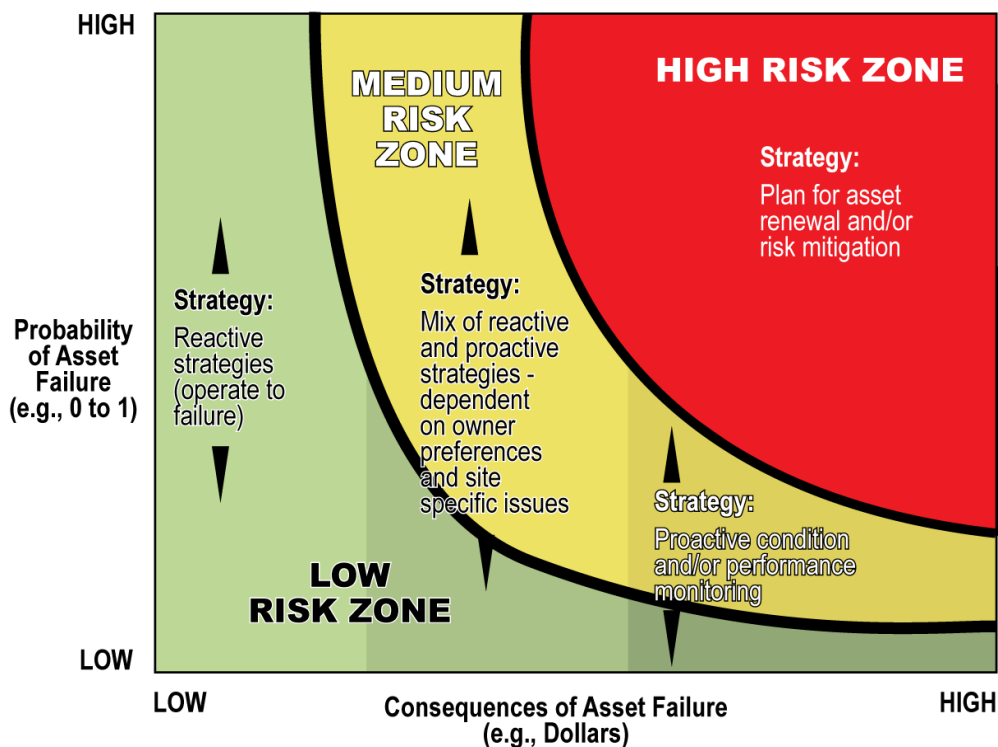


Figure 2: Management Strategies Depend on Probability and Consequence of Asset Failure

Estimates of the likelihood of asset failure are based on asset condition (for example good/fair/poor). An asset in good condition has a lot of service life left; an asset in poor condition is predicted to fail in the near future. Knowledge of asset failure often comes from personnel with deep experience and expertise. Information technology assists with the process of predicting likelihood of failure with ever-more-detailed information coming from data collection and analytics. This includes sensors, field data collection, and big data analysis of historical and industry databases. The estimation process is impaired by the loss of institutional knowledge in staff turnover, unavailability of data, and underinvestment in analysis.

Active risk management enables asset managers to minimize service interruptions in the near term as well as to address the potential impacts of high consequence asset failures over a longer time horizon. For example, the City is taking steps to improve the resilience of assets to withstand, recover from, and adapt to changes from natural hazards, severe weather, human-made disasters, climate change, economic shifts, population shifts, and reduced public confidence in City systems.

All City agencies must manage the natural deterioration of assets that comes with age. Where the cost is prohibitive and the loss of service level (“impact”) is acceptable, risk management of poor assets may include removing the asset from service, for example - shutting down a fountain. In other cases, where a loss of service is unacceptable – such as with a primary bridge, water mains, or wastewater treatment plant - divestment with replacement is not an option. For example, the Water Bureau must meet all drinking water regulations in order to be in compliance with its wholesale water sales agreement, which constitutes approximately a third of the City’s water revenues. Further, City agencies must comply with state and local building codes as well as the City’s plans which include overlapping and inter-related policies and goals for which compliance must be coordinated.

Cost

As assets age, their condition declines and the cost of restoring them to good or better condition grows. Typically, this decline in condition is non-linear; many assets degrade slowly at first, reach an inflection point, and then degrade much more rapidly. An important goal of asset management is to lower life-cycle costs by restoring assets before or shortly after that inflection point.

The most common example of this is the pavement life cycle. The cost to maintain a busy street in Portland in good condition is far less than repairing or repaving a road in very poor condition. In practice, this means that Transportation work crews focus on maintenance work to prevent a road from falling into poor condition. However, the challenge of limited resources makes reinvestment in road maintenance difficult despite its cost effectiveness.

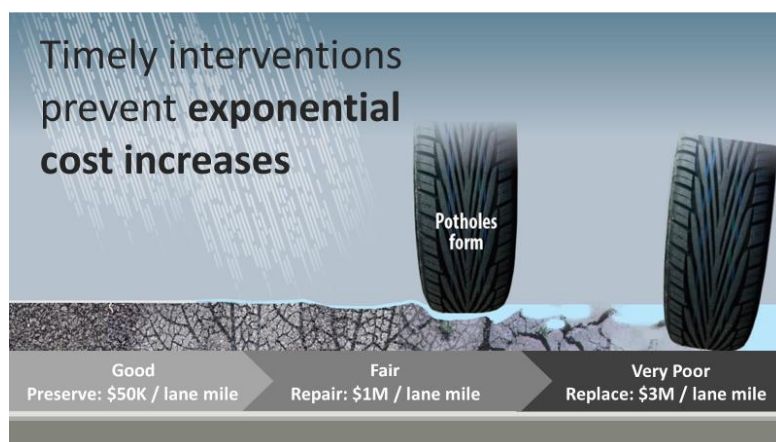


Figure 3: Repairing a street that is in good or fair condition is less expensive than repairing a street in poor condition. Road surface treatments, such as crack sealing, extend the useful life of pavement in good or fair condition. The cost of repairing a road that has fallen into poor or very poor condition is significantly more than the cost to maintain a street that is in fair or good condition.

3. The City Asset Managers Group

Collaboration and Coordination

Asset management requires expertise in multiple disciplines—including engineering, economics, finance, maintenance, and data science. Asset managers collaborate with bureau leaders, strategic planners, operations staff, and customers. Applying asset-management principles and practices can—

- 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;
- promote the effective use of resources; and
- improve support and accountability.

For more than a decade, the City Asset Managers Group (CAMG) has met regularly to share best practices; policy; and approaches to plan, manage and maintain city assets. This cross-functional group includes representatives from Transportation, Environmental Services, Water, Parks & Recreation, Planning and Sustainability, Emergency Management, and Fire and Rescue as well as City Budget Office and Office of Management and Finance. The group shares tools and practices for condition assessment, asset valuation, maintenance and replacement prioritization, reinvestment forecasting, and funding strategies. The exchanges provide for learning across disciplines and bureaus, supporting the development of asset management programs, and delivering a citywide approach to asset management.

The CAMG is sponsored by the Planning and Development Directors' group, and reports annually to City Council as part of their budget work session each spring. The CAMG represents infrastructure, development permitting, financial, and planning bureaus. Findings of the annual assets reports are reviewed, and the Directors' group makes recommendations to City Council during the budget process and in support of major policy decisions affecting built assets. The CAMG makes these findings publicly available on an annual basis through this report.

Supporting City Resilience

Resilience is the ability to prevent, withstand, or recover from catastrophic change and includes both built and natural assets. Resilience of City assets and systems is a consideration of bureau asset managers. Bureaus have taken steps to build greater resilience into systems and facilities, especially by considering asset condition and needs. Further, each bureau has a Continuity of Operations Plan. The Portland Bureau of Emergency Management's (PBEM) Mitigation Action Plan identifies the threats from natural hazards and maps out actions the City can take to protect essential systems, reduce risk and minimize damage. The Water Bureau, Bureau of Environmental Services, and Bureau of Transportation are taking steps to address the possibility of a major earthquake and the effects of climate change. Parks and the City Facilities Division has begun preparing for major code changes for buildings constructed of unreinforced masonry. In 2017, members of CAMG participated in the Resilient Infrastructure Planning Exercise (RIPE) in an effort to better understand the risks posed by major natural disasters to the City of Portland's major infrastructure, asset interdependencies, and solutions to build resilience within and among those systems.

Supporting the City's Equity Goals

Asset Management promotes equity by taking a systematic approach to detect, elevate, and correct disparities related to infrastructure. It also enables viewing investment decisions through an intergenerational lens toward a future more diverse, more equitable Portland.

Infrastructure bureaus support the City's equity goals through changes to programs, practices, and assets that will result in greater accessibility for diverse communities in Portland. All City bureaus have begun implementing Equity Plans—roadmaps to improving equity and access for low-income communities, communities of color, and Portlanders living with a disability. Bureau efforts include improving access to information and materials for Portlanders, making infrastructure changes to improve physical access to facilities, and using equity-based criteria to prioritize projects.

Refining a Business Case Evaluation Approach

In recent years, with the onset of new infrastructure investment sources, such as the Capital Set-Aside and Build Portland, CAMG is developing a business-case evaluation (BCE) approach to assist in project prioritization and budgeting decisions. A BCE, sometimes also referred to as a "benefit-cost analysis", helps the Budget Office and City Council evaluate competing project proposals from different bureaus by quantifying project benefits against project costs.

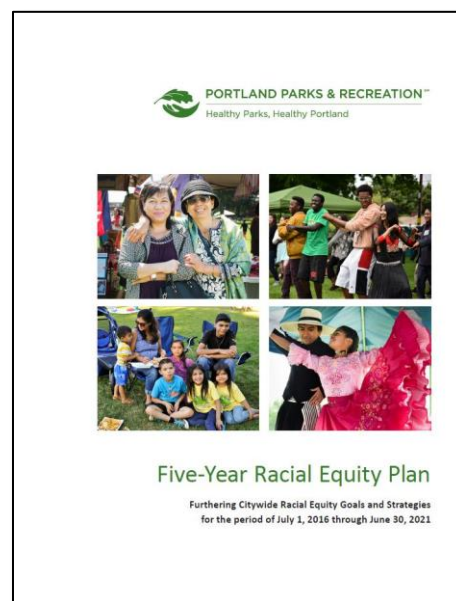


Figure 4: All CAMG member bureaus are implementing Racial Equity Plans.

Generating quality BCEs demands high resolution data collection (both around assets and the public's use / perspectives of them), modeling tools, and data management systems, as well as time and skill resources from asset managers and bureau analysts. Maintaining City-wide consensus and parity amid this evolving approach is a growing demand and opportunity for the CAMG.

4. Budget Implications

The goal of asset management is to deliver desired service levels at least cost. Asset Management provides information that supports investment decision-making to reduce risks, maintain or increase service levels for the public, and manage assets at the lowest life-cycle cost with the goal of making the best use of resources.

In Water, for example, this is tracked via budget program performance measures at the high level and via business cases and project validation reports for more tactical decisions. In Transportation, the areas of greatest exposure and risk are examined and addressed first, then investments that minimize long term future costs through early treatments and preventative maintenance are made.

When these investment decisions involve dedicated resources, the decision-making is largely internal to the bureau with direction from the Commissioner-in-Charge; stakeholders, including oversight groups (such as the Portland Utility Board and the Oregon Citizens' Utility Board) also weigh into and guide this process. Decisions must also comply with Council guidance, City ordinances, resolutions, and state or federal mandates.

Ideally, investment decisions are made to consistently intervene and invest in assets at or before the inflection point, when making repairs, rehabilitating, or replacing the asset requires more resources. However, as presented in this report, funding gaps exist that make optimizing asset reinvestment (or early intervention) difficult.

Where funding gaps exist, solutions and opportunities are typically pursued through the citywide budget or an alternative process. Examples include ballot initiatives, Council actions, rate increases requested by utility bureaus, requests for discretionary funding from the General Fund, interagency charge increases for internal service bureaus, or construction bonds. Some of these funding mechanisms are ongoing, such as changes to rates or internal charges. Funding sources such as bonds or ballot initiatives provide a limited-duration influx of funds to address one event or issue, but do not represent a sustainable answer to perpetually underfunded programs. During the budget process, bureaus present specific funding options and investment opportunities as part of their requested budgets. The City Budget Office makes recommendations to Council, and, if adopted, those new resources and projects are budgeted.

When new General Fund resources become available in the forecast, historically, there has been tension between adding new services or enhancing existing ones. Each year, as part of the budget process, the findings of this report are brought to Council as part of the first budget work session with the goal of highlighting that, in order to provide service to the public sustainably, reinvestment in the assets is just as critical as ideas for new programs. As of 2019, City Financial Policy requires Bureaus to invest in maintaining and managing existing services before investing in new ones.

A sustainable level of service requires ongoing reinvestment that at least addresses the decline in asset condition. To defer these costs is to increase life-cycle costs, potentially increasing risk, reducing service levels, and burdening future generations with additional financial obligations in order to maintain, rehabilitate, or replace these assets.

Establishing new policies, regulations, or expectations around service level, risk, and investment requires without additional resources in order to maintain sustainability of the system. Indeed, when funding falls short, asset managers and bureau leaders must make choices: not to meet the existing (or new expectations around) level of service, meet the level of service in one geographic area but reduce it in another, defer maintenance or disinvest in another asset, or cut programs and personnel. However, when a level of service is expected of assets, without commensurate investment in maintenance and repair risks increase in the current asset base, and the deferred costs and increased risk are also inevitably passed on to future users of the assets. Long-term deferred maintenance pushes the burden of repair or replacement to future generations, who will have to pay not only for their own services, but for our failure to pay the full cost of the services we enjoy today. The deference of responsibility and accumulation of risks may leave catastrophic, un-mitigatable, and unaffordable legacy liabilities. Collectively, this can viewed as an intergenerational equity issue.

Sustainable levels of service, in contrast, ensure that those who are enjoying the benefits of the assets today are also paying for their use; it also creates reasonable expectations around the delivery of services, including planning for a decline of services, should reinvestment prove untenable.

5. Asset Status, Condition, and Funding

This section includes profiles on each bureau's mission, approach to asset management, summary estimates on the current asset value, condition, and funding gap, approach to funding and strategies, status of replacement forecasting, and priorities for improving asset management. Bureaus profiled include Transportation, Environmental Services, Water, Parks, Civic Infrastructure and Portland Fire & Rescue.



Figure 5: Examples of Diverse Assets maintained by the City of Portland's Bureaus

Transportation

Profile

The Portland Bureau of Transportation (PBOT) manages transportation assets with a replacement value of around \$15.4 billion. The assets that make up the transportation environment—including Portland's 4,850 lane miles of pavement, over 9 million square yards of sidewalks, 152 bridges, 931 signalized intersections, and 59,175 street lights—account for 90% (\$14 billion) of the total replacement value. Assets that support safety and the operation of the transportation environment—including traffic-calming devices, guardrails, traffic signal controllers, signs, parking meters, parking garages, pavement markings, bikeways, retaining walls, the Harbor Wall, stairways, the streetcar, and aerial tram—have a replacement value of nearly \$1.5 billion. Through data-driven management of Portland's assets, the City maintains an effective and safe transportation system that provides people and businesses access and mobility; PBOT keeps Portland moving.

Asset Management Approach

PBOT has a "preservation first" strategy for management of its assets, which is realized through their efforts to strategically time interventions that extend asset useful life at least financial cost. The Bureau prolongs asset performance through regular preventative maintenance and preservation investments that help to keep assets in good condition. PBOT's goal in this work is to deliver excellent outcomes through data-driven decision-making and well-defined objectives.

Asset Management Highlights / Achievements

New Funding Sources

In May 2016, voters approved a ten-cent gas tax to fund pavement and safety improvements. **Fixing Our Streets** (FOS) represents the City's first dedicated funding stream for asset maintenance and safety investments. To date, FOS has delivered more than 40 lane-miles of pavement improvements and 200 base repair projects throughout the city. PBOT will attempt to renew this gas tax in 2020 to continue to provide needed asset and safety improvements.

In 2017, PBOT received additional state gas tax funds through **House Bill 2017** (HB 2017), which provides ongoing resources towards asset improvements. In service to its asset goals, PBOT has invested these resources on an annual basis as follows:

- \$2M for preventative pavement maintenance, including the introduction of new preservation techniques: microsurfacing and slurry seal
- \$1M to grade and gravel 20 miles of unimproved streets (and revisiting each segment every 3 years)
- \$1.3M for traffic operations (street signs and pavement markings)

About \$500K each for the Bridge, and Signals and Street Lights programs in support of preventative maintenance and asset management work

Current Asset Value and Condition

The Bureau of Transportation manages assets valued of around \$15.4 billion. The majority of PBOT's pavement (improved streets; does not include unpaved streets) are in poor or very poor condition (65%, these are broken out by arterial/collector and local streets in Appendix 2b). The condition of sidewalks is evenly split between those in good and very good condition, and those in poor or very poor condition (35% each). Bridge assets are primarily in fair or better condition (97%). Signal hardware and street lights are primarily in good to very good condition at 44% and 95%, respectively. Street light poles, a new category reported this year, are primarily in fair or better condition (75%). Value and condition data for PBOT's other asset classes are included in Appendix 2a and 2b.

Annual Funding Gap

PBOT's funding gap, or unmet need, is the amount of additional resources needed to improve assets to a target condition, as identified by the Bureau; in general, the Bureau's goal for asset condition is Fair or better. The **asset repair, rehabilitation, and replacement (R/R/R) gap** to reach this goal is \$366.3 million per year over 10 years. To address the Bureau's **mandate gap**, which is the funding required to bring assets up to meet federal standards such as the Americans with Disabilities Act (ADA) requirements around sidewalk corners, the Bureau requires an additional \$21.4 million per year over 10 years.

Finally, the Bureau's commitment to Vision Zero, Equity, and creating a complete system (i.e. connected transportation network) requires consideration not just of the current condition of existing infrastructure, but also the desired condition. The funding required for PBOT to ensure the transportation system is complete and safe, what is known as the **capacity gap**, is \$60.0 million per year over 10 years.

Funding Approach and Strategies

Discretionary revenue to operate and maintain the transportation system has been limited at the same time as the inventory of assets grows to meet the expanding needs of the system. Evaluation of asset condition, level of service targets, and unmet need indicates that PBOT does not have adequate revenue to maintain existing infrastructure nor provide expected service levels. Generating new revenue to address unmet needs has been a priority that helped lead to the passage of the Fixing Our Streets and Heavy Vehicle Use taxes, described above. Other new funding sources approved will support the Bureau in meeting its asset management goals. These include:

Oregon House Bill 2017. The Oregon Legislature passed a transportation investment funding package in 2017 to provide funding for infrastructure

improvements including road preservation and rehabilitation, as well as safety improvements projects.

Build Portland. In March 2018, the Portland City Council passed this transformative funding package that will make available \$600M over 20 years to target asset improvements across the City. These investments are intended to address the City's asset R/R/R gap by delivering critical major maintenance projects (asset repair, rehabilitation, and replacement) for some of the City's key facilities.

With new resources added to the budget this fiscal year and next, PBOT expects to make progress in reducing the Bureau's unmet need, particularly in underserved areas, along the high crash network, and on critical and regulated facilities.

Additional opportunities for addressing the Bureau's asset needs are summarized below:

- *Clarify PBOT's discretionary funding*

Resources available to manage PBOT's \$15.4 billion asset portfolio is limited by restrictions on available funding, particularly on revenue, fees, and grants that are either not applicable or appropriate for asset reinvestment, such as transportation system development charges (TSDC). Local funding sources typically have dedicated restrictions for their expenditures, such as project purpose, scale, timing, or location. External sources such as grants tend to focus on programmatic goals (e.g., traffic safety), target specific types of investments (e.g., streetcar) or specific geographies. Identifying and ensuring dedicated resource for asset investment and maintenance continues to be a challenge considering the many demands on PBOT's budget.

- *Identify new sources of revenue*

As Portland grows, demands on the City's already encumbered transportation system will increase. Absent new revenue sources, PBOT will need to prioritize potential trade-offs considering factors like level of service and risk. A safe, reliable, and accessible transportation system is a priority and expectation for many Portlanders; delivering on these service levels will continue to be a challenge amid the city's growth and development. Consequently, PBOT needs to identify revenue sources that can keep pace: accommodate system expansion and its associated infrastructure maintenance needs, and ensure the system is safe for all users.

Identifying new funding opportunities is an ongoing priority for the bureau as gas tax revenue becomes increasingly scarce as the country moves towards higher-efficiency and electric vehicles.³ PBOT continues to evaluate general revenue,

³ PBOT is a proponent of these changes to the vehicle industry; nevertheless, it requires transportation agencies to rethink their funding strategies

value capture, cost savings, and other solutions to address its funding needs. These efforts will continue to develop and evolve in coordination with Bureau and City staff as well as members of Council.

- *Leverage savings from other programs*

As programs across the Bureau realize savings from efficiencies, such as the introduction of LED street lighting, PBOT should be able to direct these resources to other asset classes or programs requiring additional funds.

- *Regional investment strategies*

The Portland metro region is a considerable driver of the state economy and like the City, also faces significant capital and maintenance needs. A regional approach to funding transportation infrastructure needs would ensure that Portland builds a coalition and provides a united voice on these issues. Some regional agencies are discussing a potential transportation bond measure. Efforts like these may become increasingly necessary as state and federal resources diminish.

- *Increase inter-bureau coordination*

Infrastructure bureaus and external utilities benefit from increased coordination as they maintain and replace their assets in the right-of-way. Enhancing communication and coordination of project schedules and planned work helps ensure that infrastructure is improved with the deepest asset first, ending ultimately with paving. Leveraging project opportunities, the City is able to realize efficiencies and cost savings which are passed on to Portlanders in the form of reduced service disruptions and dollars saved.

Replacement Forecasting

PBOT's asset replacement costs are based on the available estimates by type; actual replacement costs vary by location. PBOT's total asset replacement cost of \$15.4 billion does not include the right-of-way. Specific replacement values are details are included in Appendix 1a.

Bureau of Environmental Services

The Bureau of Environmental Services (BES) Environmental Services protects public health, water quality and the environment by providing sewage and stormwater collection and treatment services to accommodate Portland's current and future needs. BES protects the quality of surface and ground waters and conducts activities that plan and promote healthy ecosystems in our watersheds.

Asset Management Approach

BES has a long history of utilizing asset management strategies to plan, prioritize and implement asset maintenance, repair and rehabilitation – for the sanitary and combined collections system. BES Systems Plans incorporate asset management principles to prioritize projects to address the highest risks. The bureau's performance measures include levels of service (LOS).

In 2016, BES developed an Infrastructure Reinvestment Strategy to guide future asset management work. One of the goals of the strategy is to move more asset classes from the "yellow zone" and "red zone" to the "green zone" of Proactive and Reliability-Focused maintenance and rehabilitation (see Table 1). The more of our assets that are managed proactively, the more accurately we can predict the financial resources required to maintain assets in functional condition in the future. Moving more assets to the green zone requires an investment in improved asset condition assessment, tracking, planning, maintenance, and repair. Below is a summary table showing how each of the major asset classes is currently managed for maintenance and reliability.

Table 1. 2016 Status of BES Asset Management Approaches for Maintenance and Rehabilitation for Major Asset Classes

Primarily Proactive & Reliability-Focused	Mixed Reactive / Proactive & Reliability-Focused	Primarily Reactive
Sanitary and combined sewer collection system	Treatment plants and outfalls	Pump stations and force mains
Green Streets stormwater systems, sump systems	Stormwater collection, conveyance and natural areas	Service lateral collection system

Current Asset Value and Condition

The overall replacement value of BES assets is estimated at \$15.2 billion in 2019. This includes the following replacement values for major asset classes:

Table 2. Environmental Services Replacement Values for Major Asset Classes

Asset Class	Value (in billions)	Description
Combined sewers	\$4.9	900 miles combined sewer that carry both stormwater and sanitary waste, 667 miles of sewer laterals (owned in the right of way)
Combined sewer tunnels	\$1.2	13 miles of large-diameter combined sewer tunnels
Sanitary sewers	\$3.9	1,006 miles separated sanitary sewers
Wastewater treatment systems	\$2.0	2 wastewater treatment plants with over 8,820 major assets 99 pump stations (including 82 owned by BES, 17 maintained by BES) with over 6,134 assets
Stormwater system – grey assets	\$3.0	446 miles of storm pipes, 75 miles of culverts, 327 trash racks, 8,624 sumps, 6,839 sedimentation manholes, and 150 manufactured stormwater treatment devices
Stormwater system – green assets	\$0.2	2,064 green street planters, 118 treatment ponds, 140 swales, 9 wetlands, 127 ecoroofs, 183 parcels of natural areas, and 3,874 ditches wetlands, etc.

The 2019 overall replacement value estimate represents a -0.3% difference (-\$47 million) from the 2018 estimate. Multiple factors contributed to the increase in the system value estimate, with the primary factor being that the system value is estimated based on replacement costs. BES refined the estimation methodology to improve accuracy of the system cost by updating construction methodology assumptions and unit costs.

The condition of BES assets and knowledge of condition status varies considerably by asset type. BES has an advanced and robust asset management approach in place for regularly assessing condition of the sanitary and combined sewers and the stormwater green street facilities.

Stormwater system and wastewater treatment systems assessments are ongoing to address the existing data gaps. Asset rehabilitation is a CIP (Capital Improvement Program) focus – as poor and very poor assets are repaired, additional assets are identified in those categories.

Annual Funding Gap

BES' current revenue requirements largely revolve around the need to repair and maintain the collection and wastewater treatment systems, address upcoming and deferred maintenance needs, address deficiencies in the stormwater system,

continue to improve watershed health, and meet applicable regulatory requirements.

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 extent of stormwater system and wastewater treatment systems needs are still being studied. The estimated gap makes assumptions about rehabilitation and capacity needs for the entire system.
- Capacity/Combined Projects: Projects recommended in the Systems Plan with positive benefit/cost ratios that are not included in the financial plan.
- The stormwater system valuation does not include natural systems, such as the streams upon which our stormwater system relies.

In FY 2018-2019, BES began a process of organizational change centered around integrated planning and portfolio management. The change hopes to address two challenges that BES has been dealing with in recent history: how to increase capital throughput by addressing operational inefficiencies (which are often related to delays in addressing capital asset needs and requirements) and how to increase our level of service delivery to community members by delivering more integrated projects at a lower cost, on schedule, and within scope. This transition has required a shift in analyzing the capital needs in R/R/R and capacity projects.

BES estimates an average annual funding gap for FY21 – FY25 of \$22.2M. A future estimate will change the value once our transition is further along and when estimation methodologies, business processes, and portfolios have been refined.

Funding Approach and Strategies

BES is an enterprise bureau funded through sewer and stormwater charges, System Development Charges (SDCs), wholesale contract revenues from other jurisdictions, and reimbursements for services provided to other bureaus.

Since the completion of the CSO program in 2012, the bureau has begun to shift its capital program toward smaller, more rehabilitation focused projects. To catch up maintenance and replacement projects to improve system reliability, the bureau plans to double its capital throughput in the next five years. BES began a multiphase, multiyear effort to better understand and improve how the bureau delivers CIP (Capital Improvement Program) work. BES completed phase 1 of the Capital Improvement Program Process Review and Enhancement Project (CIP PREP) in August 2017 and had the following initial recommendations:

- 1) Implement task-focused suggestions that would not be affected by restructuring;

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- 2) Reorganize to create concept-to-closeout project management and technical teams;
 - 3) Restructure to create an integrated planning and prioritization process.

The move to integrated planning and project management approach to capital project delivery will require significant reorganization. BES established a preliminary transition plan in 2019, but significant improvements in delivery are not expected to be realized for several years.

Replacement Forecasting

BES is anticipating increasing infrastructure replacement and repair needs; and has committed to providing funds in the CIP (Capital Improvement Program) for repair of structurally deficient portions of the sewer collection system, to address capacity issues, and to repair or replace failing wastewater treatment and pumping assets. The long-term financial forecast anticipates significant capital maintenance and asset rehabilitation expenditures, and projected rates address these needs.

Asset Management Improvement Priorities

BES's asset management priorities include:

1. Improving condition assessment for asset classes lacking adequate data and implementing the Infrastructure Reinvestment Strategy through the expanded CIP.
2. Investing in seismic and climate resilient infrastructure for backbone assets critical to community services, as summarized in the Resiliency Master Plan (RMP) to reduce BES systems' vulnerability to risks from earthquakes and climate change.
3. Implementing the bureau's 10-year strategic plan⁴ and identifying levels of service and performance measures to track and measure bureau performance.

⁴ Bureau of Environmental Services 10-Year Strategic Plan (2018-2027): <https://www.portlandoregon.gov/bes/article/675925>

Portland Water Bureau

Profile

The Portland Water Bureau (bureau) delivers clean, safe, and reliable drinking water to almost one million people in the region, or one-quarter of the people in Oregon. About 58% of the water delivered serves retail customers in the city; the remaining 42% is provided on a wholesale contract basis to 19 cities, special districts, and private water company customers surrounding Portland.

The Water Bureau's major assets include two water sources, 36 pump stations, 52 standpipes, tanks, and reservoirs, nearly 2,300 miles of pipe, more than 14,000 hydrants, 130 drinking fountains, and more than 186,000 customer service pipes, as well as facilities, vehicles, and equipment.

Asset Management Approach

The Water Bureau's Asset Management Program continues to develop industry best practices. In a 2015 nationwide review of utilities, sponsored by the American Water Works Association, the Water Bureau scored in the top 10% in managing risk, developing strategies through asset management plans, evaluating benefits and costs in business cases, and using service levels to measure progress. The Water Bureau is planning to participate in a global benchmarking workshop under the WSAA (Water Services Association of Australia) in 2020.

A focus of the bureau's risk management program is addressing the bureau's high-risk assets. Asset managers have led several projects to identify and assess assets with high consequences of failure. Asset managers also collaborate with field staff to improve data-collection processes and the quality of the data, which are used for failure modes analyses and forecasting asset life. The bureau maintains a risk register that includes more than 900 risks.

In 2017, the Water Bureau finalized a major study to assess the seismic performance of the water system in a magnitude 9.0 Cascadia Subduction earthquake and provided recommendations for projects to achieve the recovery goals of the Oregon Resilience Plan. A plan providing a prioritized implementation schedule to complete all recommended seismic mitigation work was developed in early 2018. Some of the identified seismic mitigation projects are currently under construction.

The bureau is continuing its condition assessment of the major water supply conduits that bring water from the Bull Run watershed into the service area. Condition assessment of assets at high consequence crossings (freeways, bridges, river crossings) continues to be implemented including a program to test critical valves for both high consequence areas and on the seismic backbone.

Bureau engineering staff have completed 22 asset management plans (AMPs), covering the entire water system. AMPs provide detailed assessments of asset condition and risk as well as recommended strategies for maintenance, repair, and asset replacement. Two of the AMPs were updated in 2019 and five AMP updates are currently underway. Updating the AMPs will ensure that the inventory, condition and risks are current as well as ensuring asset strategies remain appropriate and are being implemented. Strategies from the AMPs are evaluated and selected by a cross-functional committee of staff and managers for consideration for further study and implementation. Key capital projects that have been implemented from AMP strategies have reduced risk of asset failures and minimized life-cycle costs.

Since 2014, asset management and engineering planning have developed business-case evaluations (BCE). The process includes analyses of total life-cycle costs, considerations of the triple bottom line, and monetizing benefits to derive dollar valuations for both benefits and costs. Staff have been trained on developing BCEs for capital projects and maintenance practices and the implementation has become widespread and common practice within the bureau.

In 2016, the Water Bureau surveyed customers on its Key Service Levels as well as conducted an extensive environmental scan of the service levels of 16 water and wastewater utilities around the globe cataloging more than 500 measures in 19 areas.

The Reliability Centered Maintenance (RCM) program improved data collection starting in 2010 allowing the bureau to better answer questions such as how assets fail, and which maintenance strategies are most effective in minimizing reactive maintenance (emergency failures). In 2019, the bureau continued to work on developing predictive/preventive maintenance strategies including an RCM strategy, and completing an asset register for all maintenance-managed items.

Future funding needs assessment is focusing on the forecasting of infrastructure maintenance and replacement needs for the water system. Long range forecasting for asset replacement and rehabilitation forecasting has been done for over six asset classes and is being expanded to include nearly all the 22 asset types included in the AMPs. The bureau selected a vendor specializing in future funding needs assessment software in January 2019 and is currently preparing to contract with them for the software program that will implement asset life-cycle maintenance, rehabilitation and replacement cost projections across the entire asset portfolio. This program will require implementation and development over a several year period to reach full implementation status. The use of the program will allow managers to have improved asset strategies and plan the impact of present-day and future investment decisions to achieve financially sustainable business results.

Current Asset Value and Condition

The Water Bureau manages assets valued at \$11.5 billion, with mostly moderate levels of confidence in the condition assessments. The 2019 overall replacement value estimate represents an increase of almost 16.0% (\$1.6 billion) from the 2018 estimate. The net increase in replacement value is primarily due to an increase in both supply and transmission assets, and secondarily due to the inflation rate increase in the Construction Cost Index from the Engineering News-Record. Other significant contributions to this increase were the increased valuation of the distribution mains and Bull Run Management Unit roads.

Potable water pipes are difficult and costly to inspect directly because the majority are buried underground, operated full of water and under pressure, and require sanitary inspection equipment. The Water Bureau assesses the distribution system pipes condition by checking for leaks on a seven-year recurring cycle (covering approximately 15% annually) and performs more in-depth inspections on critical assets when economically justified. For pipes that do not have a strong business case to inspect, condition is estimated using parameters such as pipe age and material, leak or break history of the actual pipe or similar pipes, and environmental conditions. Condition assessment for other assets—such as tanks, pump stations, and electronic equipment—are conducted as part of scheduled maintenance.

66% of water system assets in terms of replacement value are in good to very good condition; almost 9% are in poor or very poor condition.

Annual Funding Gap

The Water Bureau's annual funding gap is \$8.0 million, with the greatest gap occurring in the distribution system (estimated at \$3.8 million) and the gap in the supply system not far behind (\$3.5 million). The funding gap is based on projects that have been identified through long-term studies, asset management plans, regulatory compliance planning, or other planning efforts. The identified projects include multiple projects to harden essential elements of the water system in the event of an earthquake or other catastrophic event; projects to accommodate improvements to roads, sewers, and other systems by local agencies; and other projects to address risk or improve water service for customers. Funding gap has declined by nearly half since the 2018 assessment.

Funding Approach and Strategies

Water Bureau projects are funded from a combination of net proceeds from revenue bond sales, water sales revenue, interagency and other construction fund revenues such as system development charges and interest earnings. Capital program planning at the Water Bureau is a collaborative effort among CIP (Capital Improvement Program) Planning, Asset Management, and Engineering Management teams. The asset management process also helps guide budget

decisions on an effective mix of maintenance, repair, and replacement for water system components.

The primary drivers of the bureau's capital work have been ensuring the reliable functioning of the drinking water system, replacing assets that are at or near the end of their useful lives, and achieving compliance with federal and state drinking water regulations. The current focus is strengthening the system to withstand a catastrophic event, such as an earthquake, inspecting and strengthening critical pipes and associated systems, and continuing to meet all drinking water regulations.

Replacement Forecasting

The Water Bureau has replacement and rehabilitation forecasts in some of the completed AMPs. These forecasts are being updated in the AMP revisions and the Bureau is currently looking for a software solution that will systemize the replacement funding forecast for all the AMPs. Once the new future funding needs software is implemented, the more advanced forecasting model will combine long-range forecasts for the major asset classes as identified in the AMPs.

The long-range replacement forecasts for pipes was recently revised with better statistical analyses and indicate a substantial projected increase in failures over the next 20 to 40 years. The bureau has developed a pipe replacement strategy, that will include projected physical pipe failure and seismic hardening strategies, in order to better plan organizational strategies to manage this increased potential failure rate in the future. The strategy calls for an increase in bureau's renewal of pipes to about 30,000 feet per year in order to curb the future expected increase break rates under the current replacement levels.

Asset Management Improvement Priorities

A two-year Asset Management Tactical Plan, approved by bureau leadership, guides the work of PWB's asset management program. Current improvement priorities include:

- *Completing Updates to Older AMPs*

Some AMPs are more than five years old and need updating. These updates will capture recent work and review and refine management strategies. Updated AMPs will include metrics that will measure progress on the AMP strategy implementation. An Enterprise Asset Management Plan, that provides an integrated framework across all assets, will be developed over the next few years. The Enterprise Asset Management Plan will document the relationship between the organizational objectives and the asset management objectives.

- *Forecasting Replacement Needs and Funding Requirements*

The Water Bureau is developing replacement forecasts for the major assets in the distribution, supply, support, terminal storage, and transmission.

- *Improving Management of High-Risk Assets*

In addition to recording and assessing more than 900 risks, the bureau has implemented improvements in gathering, recording, and analyzing risk data. Asset managers work with field staff that assess pipe condition to improve the quality and reliability of the data and have estimated pipe age using data for more than 300 miles of pipe where no previous information was available.

Systematic inspection of critical pipes and related appurtenances, such as valves, have been standardized and opportunistic data collection from main breaks has yielded important failure data. The methods developed for large pipe inspection will be used in a multi-year contract to inspect the system's largest pipes—the conduits from the Bull Run Watershed.

- *Incorporating Analyses of Organizational Risk*

The bureau's Asset Management Steering Committee recently determined that addressing organizational risk is a high priority for the bureau to tackle. A process to integrate organizational risks into the Bureau's Strategic Business plan is underway.

- *Supporting Seismic Resilience Projects*

The bureau conducted a customer survey in 2016 to investigate attitudes and opinions about the bureau's service levels. The survey included two questions related to seismic resilience. The majority of customers (81 %) reported being somewhat, moderately, or very concerned about a major earthquake affecting the City. A larger percentage (88.5%) said it was moderately or very important to invest customer dollars in water-system improvements to prepare for a major earthquake. The bureau will be using the feedback from this and other questions as it reviews and improves its service-level goals.

- *Implementing Life-Cycle Planning*

The bureau has developed a mobile interface for the its computerized maintenance and management system (CMMS) for work orders. Development of a time and resources module for the mobile work system has been completed in 2018. With this module, field staff are able to record costs, asset managers are able to use accounting data to make more reliable estimates for asset life cycle costs.

- *Improving Maintenance, Repair, and Replacement Strategies*

In addition to implementing the mobile CMMS system, the bureau has implemented standardized processes for developing facility drawings, gathering

field failure data, performing leak tests, and analyzing the mix of proactive and reactive maintenance actions.

In 2019, the bureau has contracted with a firm for recommendations for a new CMMS as the current CMMS will not be supported past July 2021 by the current vendor.

- *Improving Performance Measurement and Management*

The bureau completed a 2016 survey of bureau customers on its Key Service Levels. The results of the survey will be used, along with an audit of service levels from best-practice leaders and a review of bureau service levels and performance measurement, to improve performance measurement and management.

Specific accomplishments and the details of asset management progress are documented in an annual report, published each spring.

- *Asset Strategy Implementation*

The Bureau is reexamining the implementation process of maintenance, rehabilitation and replacement strategies developed in the Asset Management Plans. Assign strategies to “owners” who will be responsible for implementing and reporting on asset strategies. Create metrics to measure progress of the AMP strategy implementation. Develop a register to track asset strategies and outcomes. Review and then prioritize strategies and eliminate unnecessary or outdated strategies.

- *Improving Management of High-Risk Assets*

The Bureau is refining the consequence of failure table to align better with customer and bureau valuations while standardizing tiers across categories using impact cost estimates. The Bureau will update entries in the risk register once the consequence of failure table is revised.

Portland Parks & Recreation

Profile

Portland Parks & Recreation (PP&R) helps Portlanders play —providing the safe places, facilities, and programs that promote physical, mental, and social activity. We get people, especially kids, outside, active, and connected to the community. As we do this, there will be an increase in the wellness of our residents and the livability of our city.

PP&R is the steward of a diverse portfolio of parks, natural areas, urban forest and recreation facilities used extensively by the city's residents and visitors. The total parkland managed by the bureau is 11,712 acres and represents about 14% of the geographic area within the City of Portland. Additionally, PP&R staff care for 238,000 street trees. The bureau operates 13 swimming pools, 11 community centers, three music/dance centers, five golf courses and one motor raceway, and owns a steam locomotive.

Asset Management Approach

In November 2019, PP&R's City Council Work Session: *Sustainable Future*, highlighted strategic-level cost-risk-service trajectory alternatives, including the results of an asset management analysis which revealed that 1 in 5 assets will close on the current funding level trajectory.

Also in 2019, Parks completed a systemwide pathways, trails, and sidewalks assessment, completing the inventory and supporting the analysis for a budget request to improve compliance and condition.

In the coming years, asset management efforts will focus processes and business cases to help close the funding gap and to further implement asset management best practices and city policies.

Current Asset Value and Condition

Current replacement value is estimated at \$1.5 billion. An estimated 26% of assets are in Good or Very Good Condition.

Annual Funding Gap

PP&R's Major Maintenance Funding Gap is estimated at \$63 million per year for the next ten years (R/R/R gap). An estimated \$131 million is also needed to close level-of-service gaps citywide (capacity gap).

Funding Approach and Strategies

Bureau funding sources include City of Portland taxes, bonds, System Development Fees, Build Portland, user fees, and donor funds for services totaling almost \$150 million:

Replacement Forecasting

Estimates place over one-third of PP&R assets as aged beyond a normally expected service-life, with half of that portion well beyond service life. Based on industry-standard lifecycle models, an additional one-fifth of the portfolio is near the tipping-point in optimal investment: ***excessive risk and even more increased O&M costs can be avoided with targeted investments in the next five years.*** The Asset Management program seeks to specify and prioritize these high-return investments.

Asset Management Improvement Priorities

PP&R intends to expand and evolve the Asset Condition Assessment program in the coming year by completing more building systems in detail, and completing retaining walls, dog-off-leash-areas, as well as documenting the library of assessment standards..

PP&R has also initiated more activities in natural asset management, including progress standardizing an approach to natural area ecosystem health and function evaluation.

Civic Profile

The Civic Assets asset management program includes three asset groups: Facilities, Vehicles, and Technology. The Facilities group includes facilities managed by the Office of Management and Finance (Police facilities, office buildings, other buildings, Union Station, and spectator facilities) and facilities other organizations manage (Portland Fire & Rescue [PF&R] facilities and Portland Center for the Performing Arts). The Vehicles group includes City vehicles that the Office of Management and Finance (OMF) owns and manages through its Bureau of Internal Business Services Fleet Services Division and PF&R apparatus. The Technology group includes the technology assets that OMF owns and manages through its Bureau of Technology Services (BTS) and the Enterprise Business System owned and managed by Enterprise Business Solution division.

OMF takes the lead for the Civic Assets group and coordinates with Fire and Rescue on the report.

Asset Management Approach

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 asset 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.

OMF uses asset management 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.

A key component of the OMF asset management program for Facilities is the preparation of five-year maintenance plans. These plans are developed with input from internal and external customers, as well as staff who maintain the infrastructure, and are influenced by City Council's established goals, objectives, and policies. A final step is balancing needs with resources. OMF works closely with its customers to understand their businesses and how their facilities support and serve their work objectives.

Historically, OMF's Spectator Venues Program relied on the contracted venue operators to develop, maintain, and implement asset management efforts. Program staff has begun to work more closely with the operators to enhance these efforts within the constraints of the operating agreements.

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.

Current Asset Value and Condition

The current replacement value of Civic assets is \$2.1 billion. Conditions of Technology assets are in fair to good condition. Facilities assets are in poor to good condition. Vehicles assets are in fair to very good condition.

Annual Funding Gap

The annual funding gap for Facilities services is \$27.5 million. OMF is requested a budget note in the FY 2017-18 that called for OMF work with CBO to phase in rental rate increases for Facilities Services-owned buildings over a five-year period to a level that annually funds major maintenance at 3% of replacement value. This increases overall funding from approximately \$5.8 million per year to \$12.2 million per year at the end of five years.

The Spectator Venues Program does not currently project a funding gap in the Spectator Venues and Visitor Activities Fund for repair and replacement needs at the portfolio properties (which do not include the performing arts assets). Funds for a needed major renovation at the Veterans Memorial Coliseum (currently estimated at \$80–\$100 million) are not included in the projections.

The annual funding gap for BTS is \$4.6 million for bureau-owned equipment and software.

The annual funding gap for PF&R facilities is roughly \$3.1 million. PF&R does not have a major maintenance reserve funding mechanism for future major repair and maintenance costs.

Vehicle replacement for Fleet Services and Fire & Rescue apparatus is fully funded. For certain other Civic assets, the annual gap is not meaningful because the condition of the facility is such that major renovations are needed to first get the facility in adequate condition so that it could then be on a program of regular investment. Facilities in this category are Union Station and Veterans Memorial Coliseum.

Funding Approach and Strategies

Civic asset management projects are funded from a variety of sources:

- Vehicle replacement rates charged to bureaus through CityFleet interagency service agreements fund vehicle replacement projects.

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- BTS rates and reserves fund a number of projects. Reserves are used because interagency agreement rates do not provide sufficient resources to fund all projects.
 - A major maintenance component in Facilities Services building rental rates fund a number of major maintenance projects.
 - The various agreements, through which the City owned spectator and performing arts venues are operated by non-City entities, include a variety of funding mechanisms and requirements for both the City and the operator regarding repairs and capital replacement.
 - A combination of the Bureau of Internal Business Services-Facilities Services major maintenance money, General Fund cash, interagency revenues, and debt will be used to fund the Portland Building Reconstruction project.
 - Cash funding from City funds a BTS project to relocate the City's data center.
 - Net revenues in the Spectator Venues Fund provide funding for VMC and Providence Park projects.
 - Resources for large one-time needs can include debt financing, General Fund discretionary appropriation, and one-time charges to customers.

Civic assets reside in different City funds and are funded from a variety of sources, therefore there is no ability to have funds from one program fund projects in another program. Capital planning and project prioritization are at the program level.

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 asset management data allow 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.

OMF uses asset management 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.

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 bonds approved by voters in November 2010 fully funds the Public Safety Systems Revitalization Project that replaced Computer Aided Dispatch, the Portland Police Data System, and the 800 MHz radio system.

Asset Management Improvement Priorities

The priority of Facilities Services is to implement an asset management team to identify building issues, prioritize issues according to risk, develop cost-benefit analyses of project alternatives, and scope and complete projects. The team will develop measurable objectives for each type of asset and the strategies required to meet those objectives. Those strategies will inform life-cycle (e.g., 30-year) plans for each major asset. The asset management team will develop and refine the asset listing and hierarchy, develop an inspection and preventive maintenance and component replacement regimen to turn the lifecycle plans and strategies into actions, and develop communication strategies for communicating with tenants and constituents.

Fire

Profile

Portland Fire & Rescue (PF&R) manages five categories of assets to support the bureau's mission of protecting life, property, and the environment:

- **Facilities:** PF&R operates and maintains 31 fire stations, a training center, a logistics facility for apparatus and facility maintenance, and administrative offices for management and fire inspectors.
- **Apparatus:** PF&R operates and maintains about 80 apparatus including engines, trucks, fire and rescue boats, brush units, water tenders, and other specialized vehicles.
- **Personnel Protective Equipment:** Firefighters wear personal protective equipment to maintain safety while entering hazardous conditions. Examples of personal protective equipment include self-contained breathing apparatus, turnouts, helmets, boots, and gloves.
- **Firefighting Equipment:** the tools carried on engines and trucks to support firefighting, medical responses, and technical responses such as car crashes or trench rescue. The largest assets in this category are rescue tool sets, thermal imaging cameras, and defibrillators.
- **Technology:** PF&R is responsible for hardware and software systems that support operations such as the Fire Information System and internal software that records all response data.

Asset Management Approach

PF&R's Logistics section manages most PF&R assets, focusing on regular scheduled maintenance as well as reacting to asset failures and breakdowns. PF&R maintains a work order system for scheduling and tracking regular maintenance on most asset classes.

Historically, PF&R has relied on the expertise and judgment of the managers responsible for each asset class in determining the timing and level of investment in repair, rehabilitation, and replacement. Program staff has begun working with asset managers to develop more formal plans for condition assessment, planning and budgeting for replacement, and developing maintenance and capital improvement plans.

Current Asset Value and Condition

The current replacement value of PF&R assets is \$170 million. Most asset conditions range from excellent to fair depending upon the age of the asset and where that asset is in its current replacement cycle. PF&R has identified some assets in fair and poor condition that require replacement such as the Logistics, Training, and Code Enforcement facilities. In the last year, PF&R has begun

replacement of its Code Enforcement Software (\$350,000) and SCBAs (\$3.5 million).

Annual Funding Gap

The breakdown of the funding gap by asset category is as follows:

- Apparatus: Due to the 2010 general obligation bond and the bureau's established reserve for this asset type, PF&R does not currently project a funding gap for its apparatus category of assets.
- Facilities: PF&R estimates an annual funding gap of \$3.1 million for facilities, however, the gap does not include the replacement needs of PF&R's Code Enforcement, Logistics, and Training Center (currently estimated at \$100 million)
- Technology: PF&R does not have a confident estimate of the funding gap for technology.

Funding Approach and Strategies

PF&R relies on a combination of general obligation bonds, ongoing General Fund discretionary resources, and one-time General Fund appropriations to fund asset repair and replacement. Currently, PF&R's is researching a potential general obligation bond to fund the replacement of PF&R's Code Enforcement, Logistics, and Training facilities.

In PF&R's ongoing budget, there is approximately \$375,000 for major maintenance and replacement projects for facilities. However, without identifying additional major maintenance funding, Fire does 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, the City will struggle to maintain current and future service levels.

PF&R has a similar issue in the funding of personal protective equipment, where the annual operating budget of \$400,000 is insufficient for the ongoing replacement needs. PF&R relied on the General Fund Capital Set Aside and federal grant funds for the \$3.5 million replacement of SCBAs in the FY 2018-19 budget.

PF&R has created reserve accounts for its major asset categories. The apparatus reserve is currently fully funded due funds set aside while utilizing GO bond funds to purchase apparatus. PF&R has contributed small one-time savings into its equipment reserve, but has not identified ongoing funding sources for the reserves.

Asset Management Improvement Priorities

PF&R is committed to identifying feasible replacement plans for its Training, Logistics, and Prevention facilities, including a funding source. PF&R will continue to build out its capabilities in regards to capital planning and tracking condition and repairs and major maintenance plans for each station.

6. Trends and Outlook

For over a decade, CAMG has been sharing best practices and issuing this report annually on the status and condition of assets. This effort has helped to educate City Council and the public by transparently providing information on the city's assets and by characterizing the successes, opportunities for improvement, and challenges the City faces. In recent years, CAMG has worked with City Council to proactively address the concerns raised in the report.

In the FY 2014-15 Adopted Budget, a budget note was passed directing the CAMG to work with the City Budget Office to develop options for funding and allocating resources to address recurring major maintenance and replacement needs of infrastructure assets.

The resulting report, Closing the Major Maintenance and Asset Replacement Funding Gap, was delivered to Council the fall of 2014. Many of these recommendations have since been implemented. Recent progress in addressing this funding gap includes the following:

- Parks Replacement Bond (\$68 million, passed in 2014)
- Fixing Our Streets Gas Tax & Heavy Vehicle Use Tax (estimated \$74 million over four years, passed in 2016)
- Cash and debt financing for the reconstruction of the Portland Building (\$195 million)
- Funding of a General Fund Capital Set-Aside with 50% of all one-time resources (\$48.4 million since FY 2017-18, including the \$16.0 million anticipated in the FY 2018-19 budget process).
- Restoration of collections for electronic equipment replacement (\$1.2 million annually)
- Increases in utility rates for significant infrastructure repair, rehabilitation, and replacement
- Increasing targeted capital project construction in BES by ~30% (Requested CIP in FY 2017-18)
- Phased in increased rent charges to bureaus in order to increase major maintenance collections to 3% of replacement value (Requested in the FY 2017-18 budget)

These efforts notwithstanding, considerable resource commitments are still required to maintain sustainable level of City services the public has come to expect and to sustain these services for generations to come.

An additional recommendation made in the 2014 report was to develop ongoing General Fund current appropriation levels target options. According to the report: "Beyond operations and maintenance requirements and before major renewal or replacement, there are known and predictable recurring major maintenance requirements for many assets. Rather than having these known and predictable requirements compete with other major capital needs in order to keep facilities

open and operating, consider funding these through increased Current Appropriation Levels. Council should direct infrastructure bureaus to identify and quantify these requirements.”

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. Current Condition of Capital Assets, All Bureaus
- b. Current Condition of Capital Assets, Transportation
- c. Current Condition of Capital Assets, Environmental Services
- d. Current Condition of Capital Assets, Water
- e. Current Condition of Capital Assets, Parks & Recreation
- f. Current Condition of Capital Assets, Civic
- g. Current Condition Data Sheet

3. Annual Funding Gap

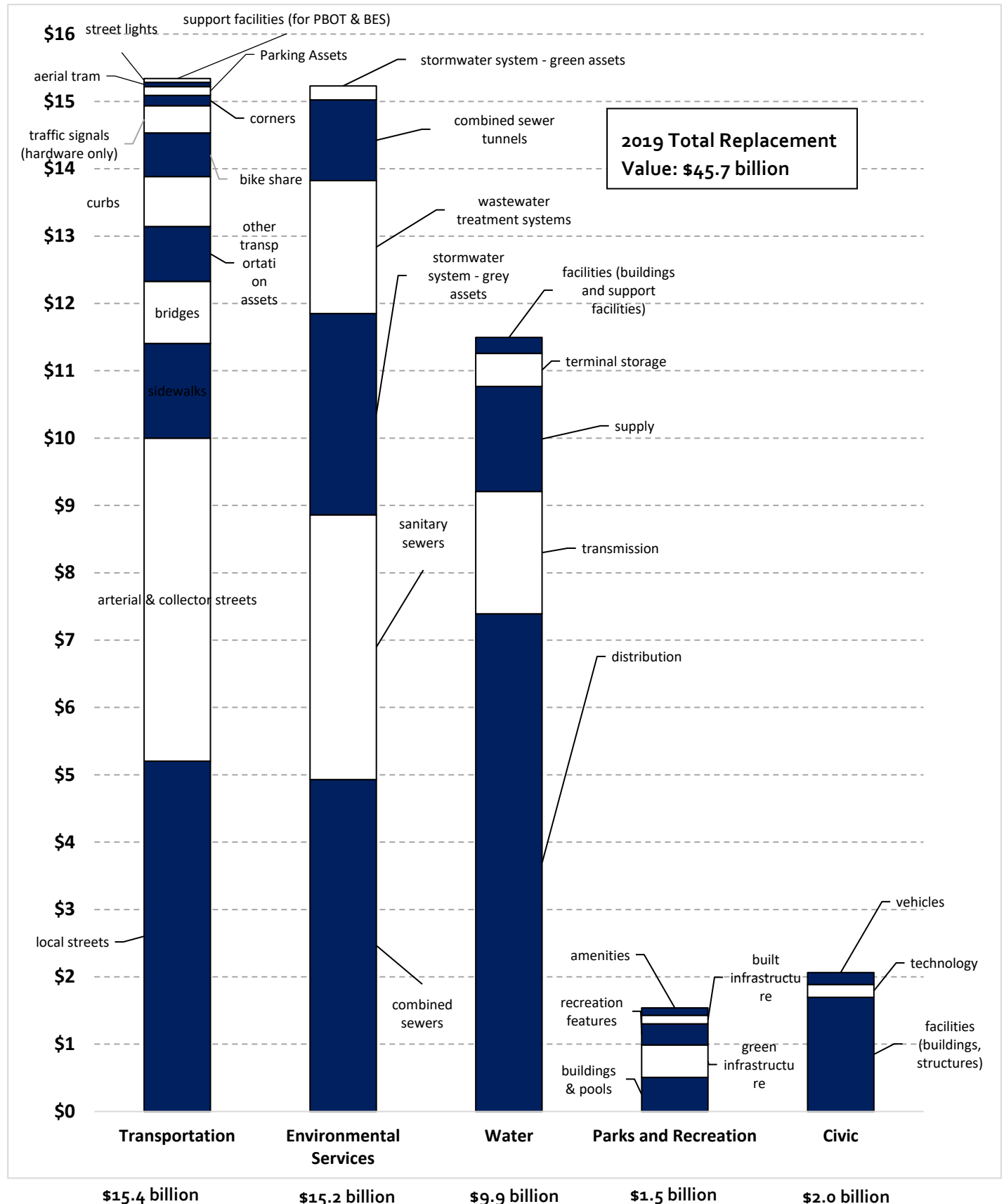
- a. Annual Funding Gap, by Asset Group
- b. Annual Funding Gap, by Type of Gap
- c. Annual Non-Capacity Funding Gap, by Bureau
- d. Capacity-Related Annual Funding Gap, by Bureau
- e. Annual Funding Gap Compared to Bureau Expenditures
- f. Annual Funding Gap in Millions per Year Data Sheet

4. Data Confidence Level Summary

5. Definitions

6. Asset Management Program Core Elements

Appendix 1a: Current Replacement Value by Asset Type



Appendix 1b: Current Replacement Value Data Sheet

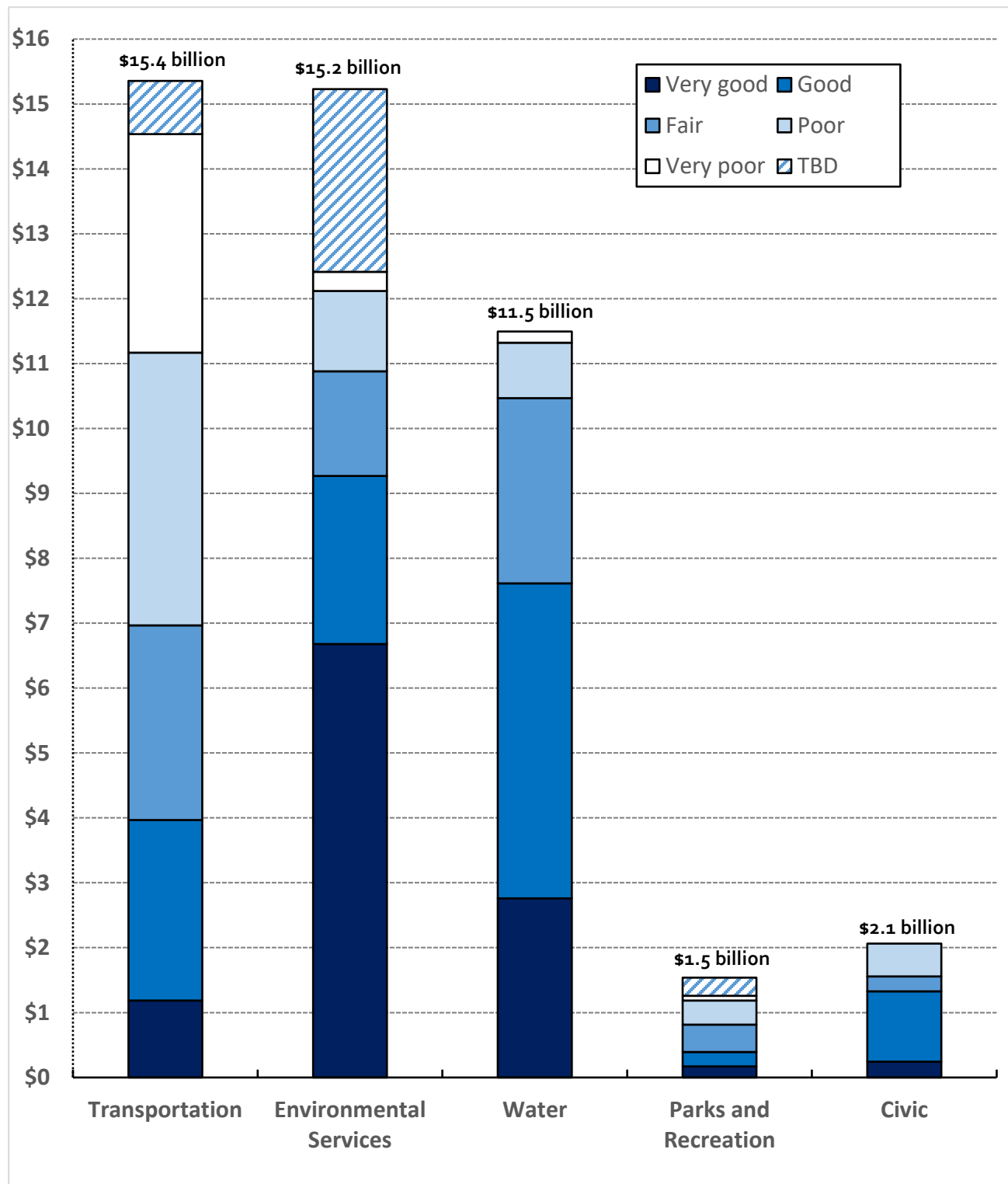
Capital Asset Class	Description	Value (in millions)	Confidence level	Notes
Transportation				
arterial & collector streets	1,861 lane miles	\$4,795.1	4 - High	
local streets	2,993 lane miles	\$5,204.5	4 - High	
sidewalks	9,204,310 square yards	\$1,405.8	2 - Low	Replacement Value is for information only, adjacent property owners are responsible for repairing sidewalks.
curbs	3,299 centerline miles	\$739.3	2 - Low	
corners (no. of improved corners)	38774	\$403.0	2 - Low	Low confidence level pending Citywide Curb Ramp inventory.
bridges	152 bridges	\$922.7	4 - High	
traffic signals (hardware only)	931; Hardware only	\$649.3	2 - Low	
street lights	Light units only, 59,175	\$55.4	2 - Low	
support facilities (for PBOT & BES)	17 various buildings	\$18.0	2 - Low	
other transportation assets	Signs and Pavement Markings; Street Light Poles; Traffic Calming Devices; Non-Bridge Structures; Non-Hardware Signals	\$814.4	1 - Low	
bike share	No Longer a City Asset	\$0.0	-	
Parking Assets	6 Parking Garages; 1,952 Parking Pay Stations	\$131.4	2 - Low	
aerial tram	Tramway and structures; equipment - Upper Station, Tower, Lower Station, and rolling stock including cables.	\$63.0	4 - High	
streetcar	17 streetcars; 15 centerline miles of track; 17,871 square feet of maintenance facilities	\$154.9	4 - High	
Total Transportation		\$15,356.8		
Environmental Services				
combined sewers	900 mi. of pipe & access structures	\$4,930.0	4 - High	BES completed a Pump Station System Plan with updated replacement costs for the majority of our system pump stations. The current replacement costs were lower than the historical estimates; BES expects the stations are still undervalued and will refine estimates as new information is obtained.
combined sewer tunnels	13 mi. of combined sewer tunnels	\$1,196.0	3 - Moderate	
sanitary sewers	1,006 mi. of pipe & access structures	\$3,931.0	4 - High	
wastewater treatment systems	2 treatment plants; 99 pump stations	\$1,976.0	3 - Moderate	
stormwater system - grey assets	446 mi. of pipe; manholes, drywells, trash racks, etc.	\$2,988.0	2 - Low	
stormwater system - green assets	Various counts of wetlands, ponds, green streets, swales, etc.	\$209.0	2 - Low	
Total Environmental Services		\$15,230.0		

Appendix 1b: Current Replacement Value Data Sheet

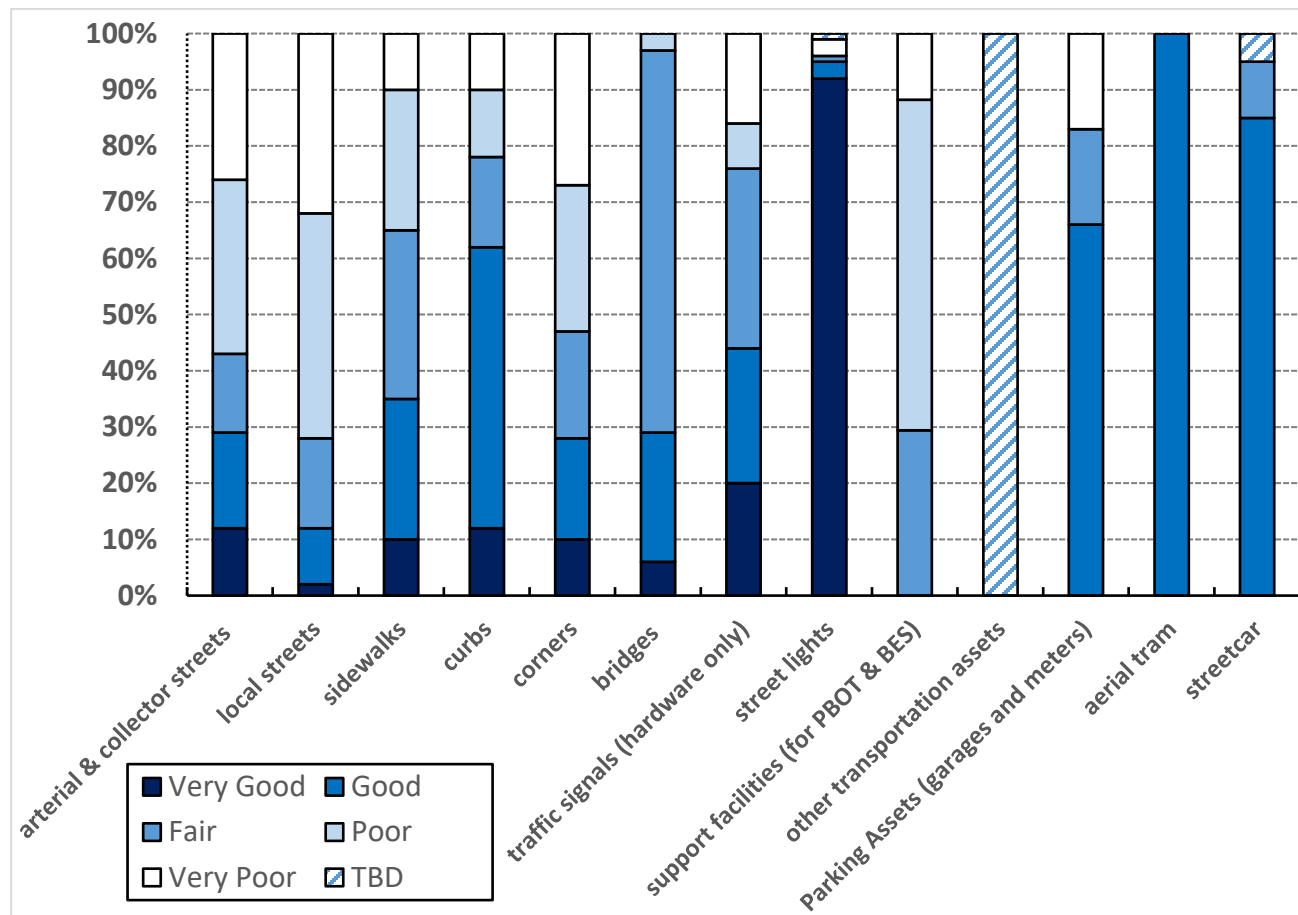
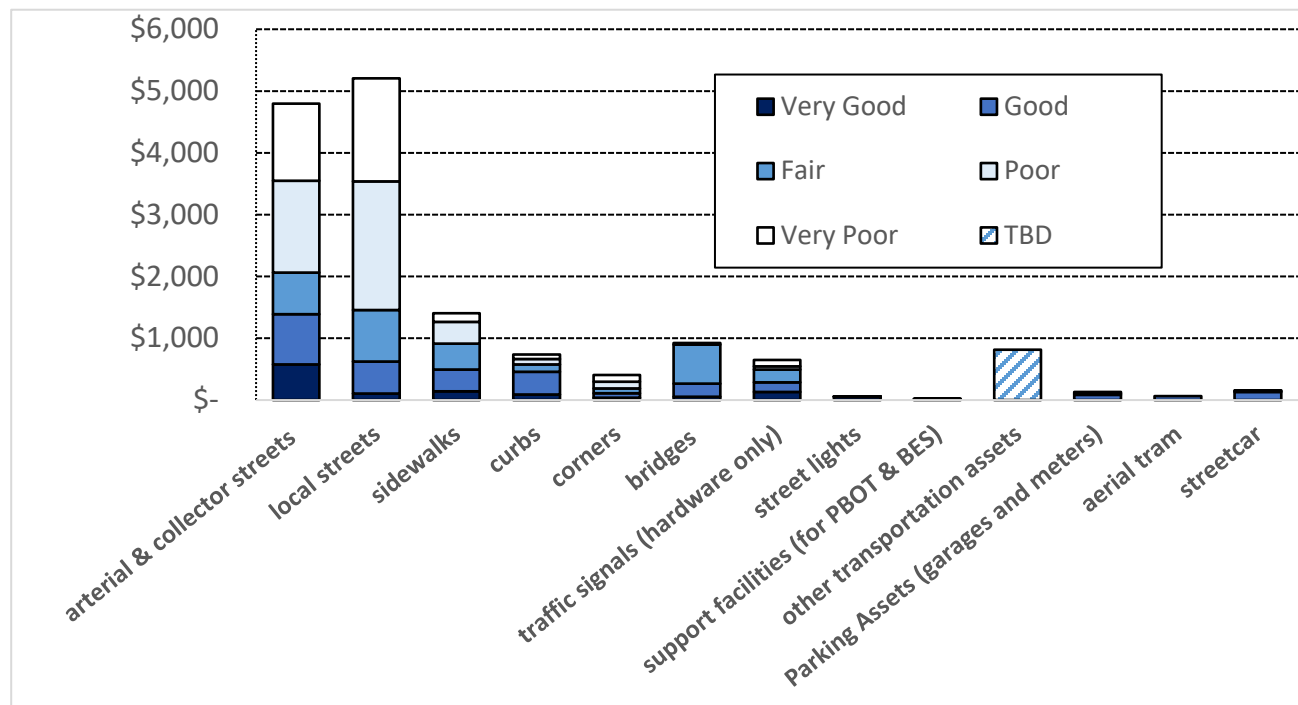
Capital Asset Class	Description	Value (in millions)	Confidence level	Notes
Water				
supply	158 miles of roads, 1841 culverts, 11 bridges, 1 195-ft high concrete dam, 1 145-ft high earth dam, 27 active production wells, 1 groundwater pump station (including treatment facility and storage tank), and 11 miles of groundwater collection mains	\$1,561.7	3 - Moderate	
transmission	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	\$1,814.5	3 - Moderate	
terminal storage	Five terminal storage reservoirs with a capacity of 134.6 MG (as of December 2018), interconnecting piping, post-storage treatment facilities, and microhydro facility.	\$488.5	4 - High	
distribution	2100 miles of distribution pipes, 186,000 service lines, 48,900 valves, 178,000 meters, 14,400 hydrants, 257 active pressure regulating station, 36 pump stations, 48 active storage tanks (including Groundwater storage) with a total of 56.7 MG	\$7,392.1	3 - Moderate	
facilities (buildings and support facilities)	Buildings, SCADA, vehicles, construction equipment, lab equipment, computers, and infrastructure components in inventory	\$238.1	3 - Moderate	
Total Water		\$11,494.9		
Capital Asset Class	Description	Value (in millions)	Confidence level	Notes
Parks & Recreation				
amenities	decorative elements & furnishings	\$110.1	3 - Moderate	
buildings and pools	community and arts centers, pools, restrooms, maintenance facilities	\$507.6	3 - Moderate	
recreation features	sports fields, courts, playgrounds, water play areas, community gardens, skate parks, etc.	\$314.5	3 - Moderate	
built infrastructure	roads, major trails, utilities	\$125.9	3 - Moderate	
green infrastructure	urban forest, turf, shrub beds, botanic gardens	\$479.6	2 - Low	
Total Parks		\$1,537.5		
Capital Asset Class	Description	Value (in millions)	Confidence level	Notes
Civic				
facilities (buildings, structures)				
police facilities	Four precincts, Justice Center, property warehouse, and vehicle storage lot	\$291.3	3 - Moderate	
office buildings	Portland Building, 1900 Building, City Hall	\$341.9	3 - Moderate	
other buildings	Archives and Records Center, Kerby Garage, and Portland Communications Center	\$106.7	3 - Moderate	
PDC facilities	Train station and related buildings	\$50.3	2 - Low	

spectator facilities	Veterans Memorial Coliseum, Rose Quarter parking garages, and Providence Park	\$636.6	3 - Moderate	
Portland Center for the Performing Arts	Portland's Centers for the Performing Arts (Keller Auditorium, Arlene Schnitzer Concert Hall, Antoinette Hatfield Hall)	\$130.0	2 - Low	
fueling stations	Fueling stations for use by City vehicles in various locations around city.	\$13.3	3 - Moderate	
fire facilities	30 stations, administration building and support facility	\$126.9	3 - Moderate	
vehicles		-		
City vehicles	All City vehicles except Fire apparatus	\$133.6	3 - Moderate	
fire apparatus	Engines, trucks, other major apparatus	\$42.9	3 - Moderate	
technology		-		
communications--BTS	Data networks, WiFi network, 800 MHz radio system	\$74.1	3 - Moderate	
production services--BTS	Storage area network, core servers, and email system, and support center	\$5.4	3 - Moderate	
strategic technology--BTS	Large corporate applications owned and managed by BTS such as GIS	\$5.0	3 - Moderate	
electronic equipment and software--other bureaus	Video systems, electronic equipment, Office Suite software, bureaus' PC's and laptops	\$94.8	3 - Moderate	
strategic technology--other bureaus	Large corporate applications such as TRACS, CAD, RegJIN, CIS and EBS	\$11.6	3 - Moderate	
Total Civic		\$2,064.3		
Total Capital Assets		\$45,683.5		

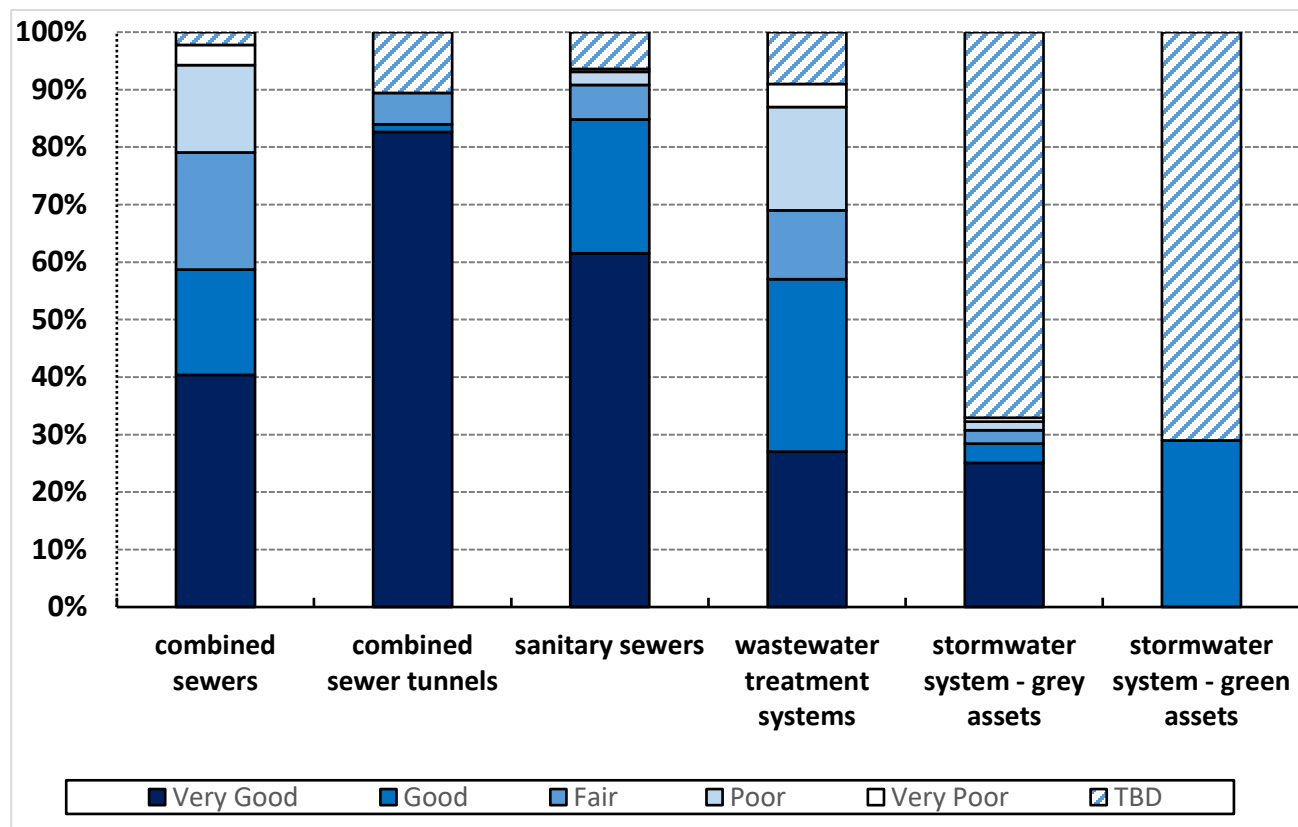
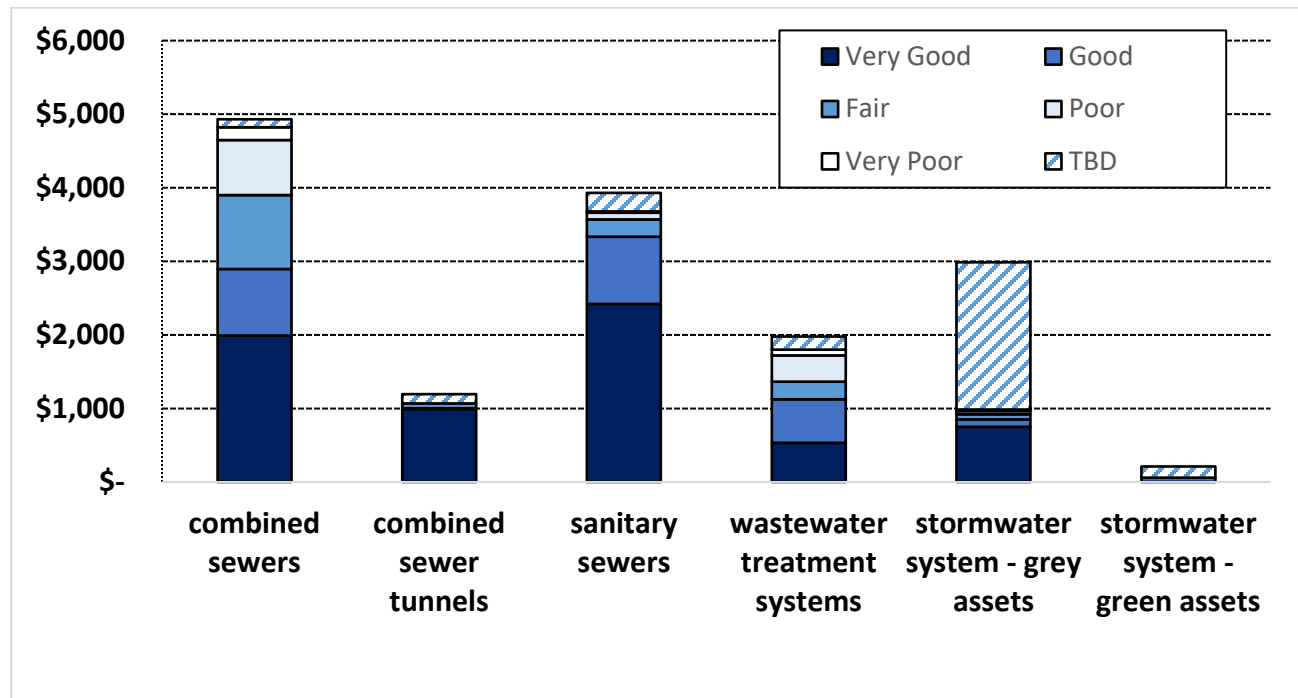
Appendix 2a: Current Condition of Capital Assets, All Bureaus



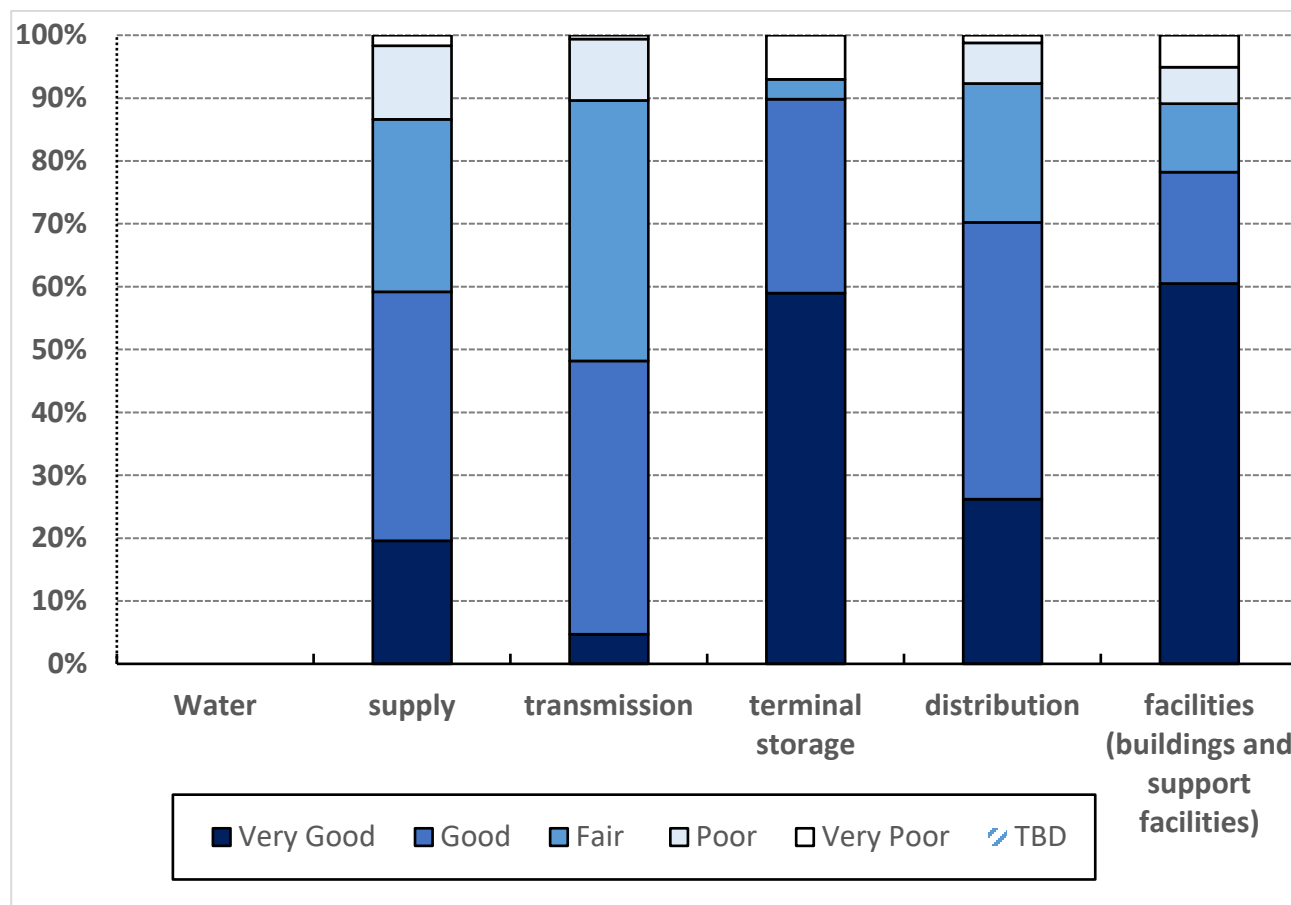
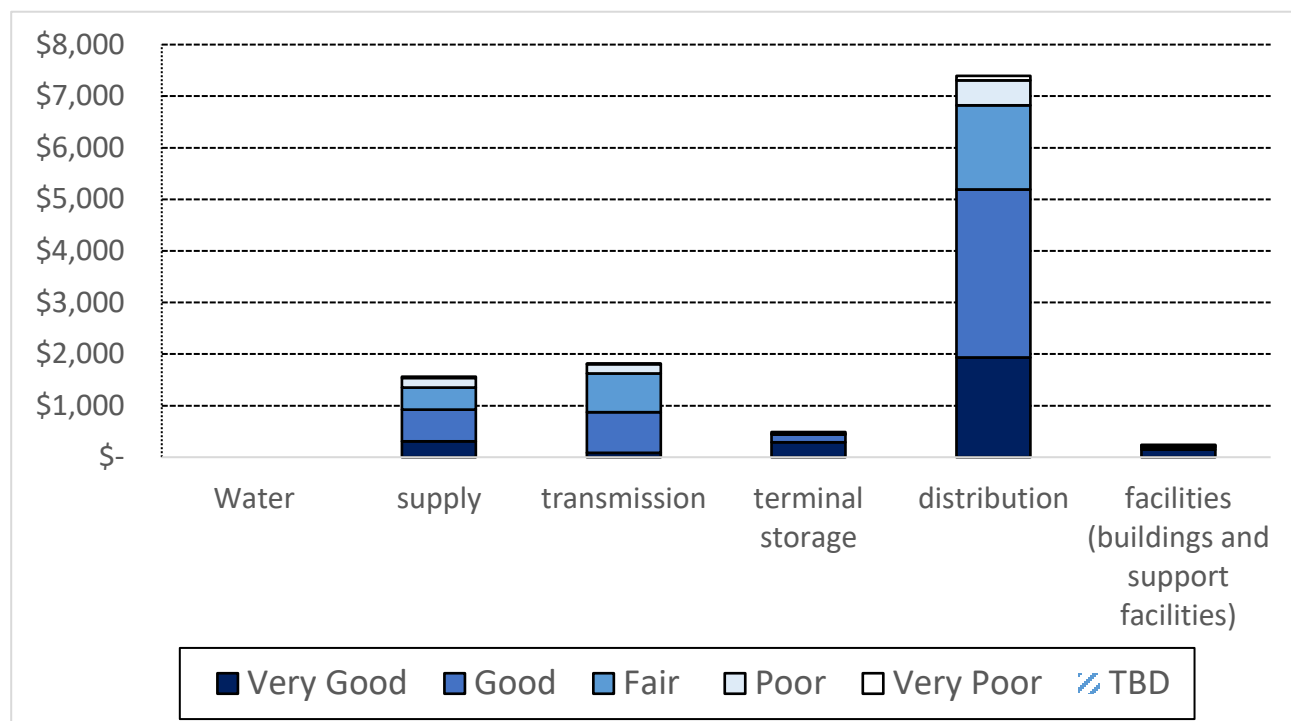
Appendix 2b: Current Condition of Capital Assets, Transportation



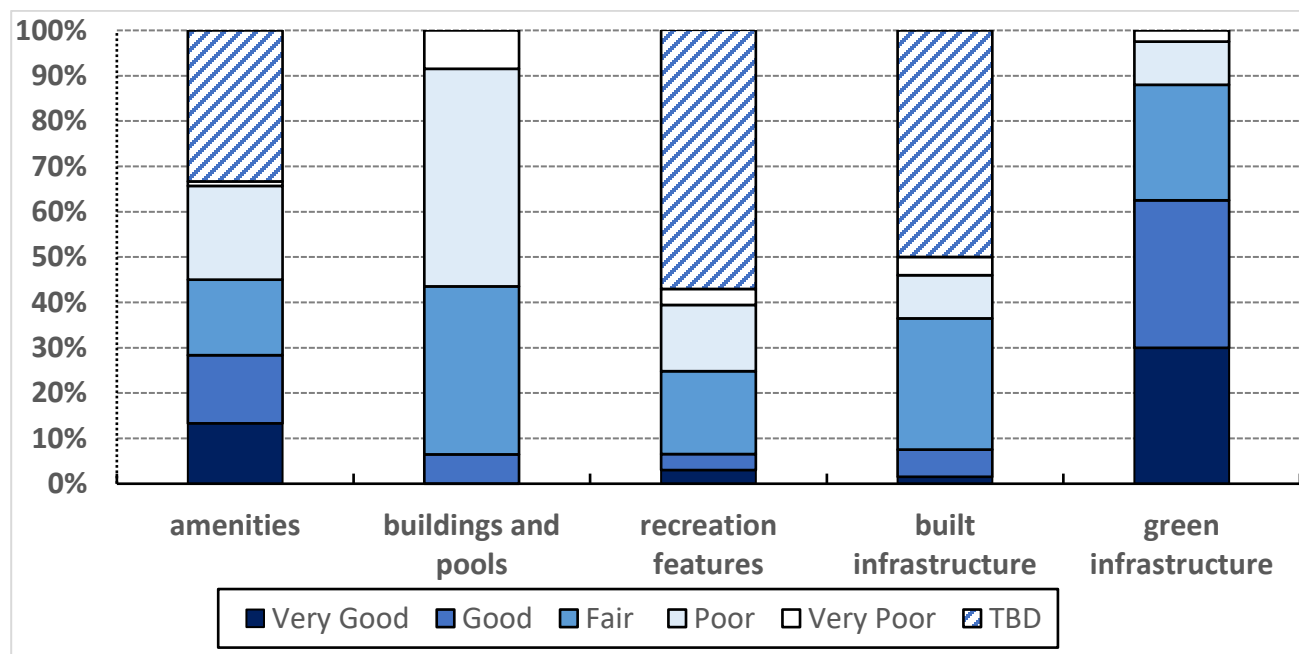
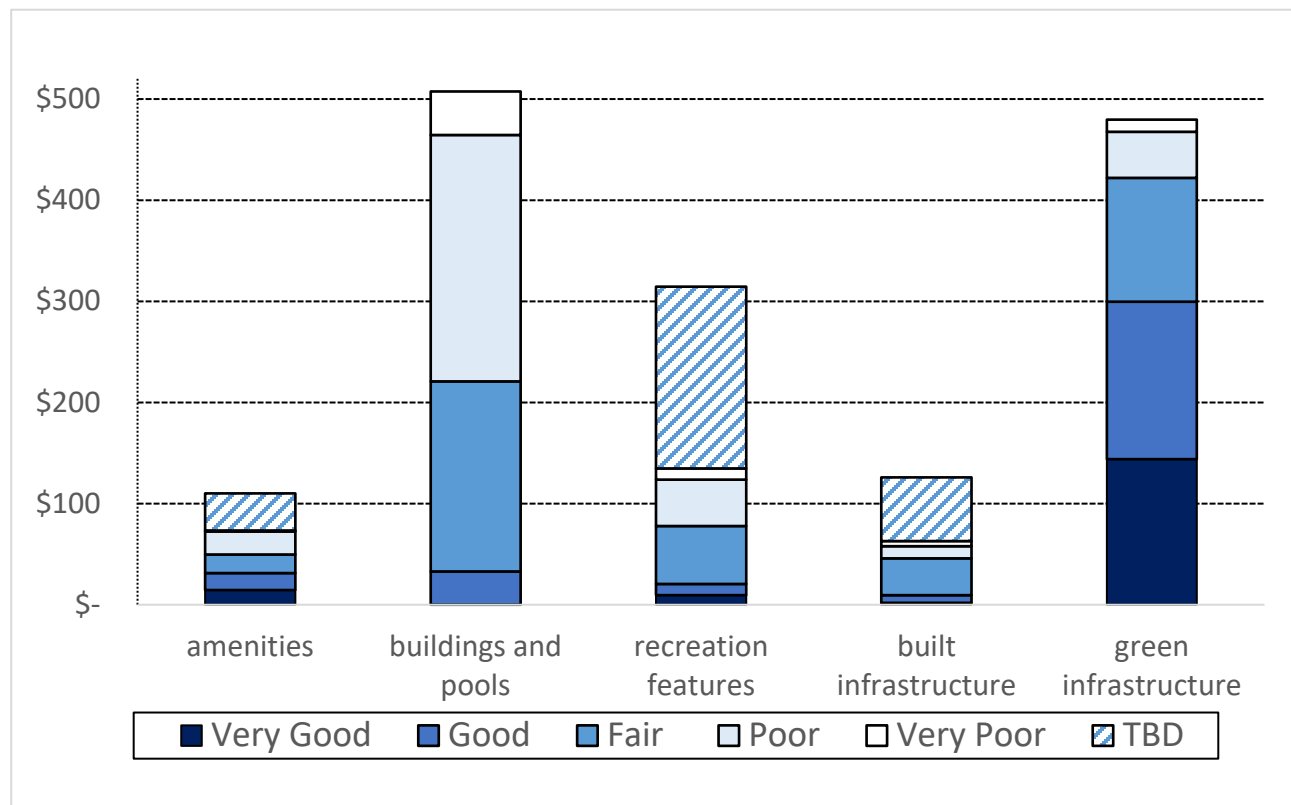
Appendix 2c: Current Condition of Capital Assets, Environmental Services



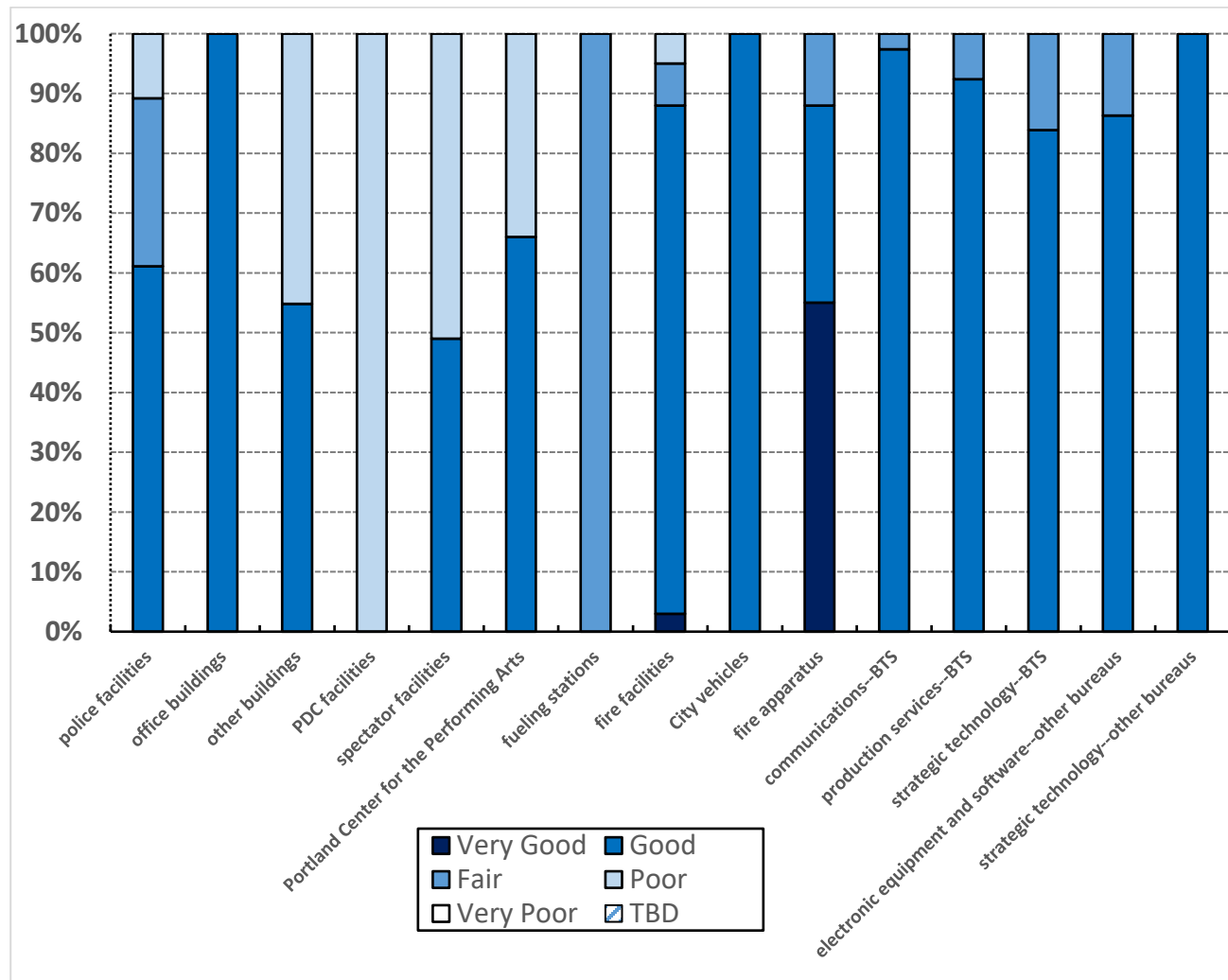
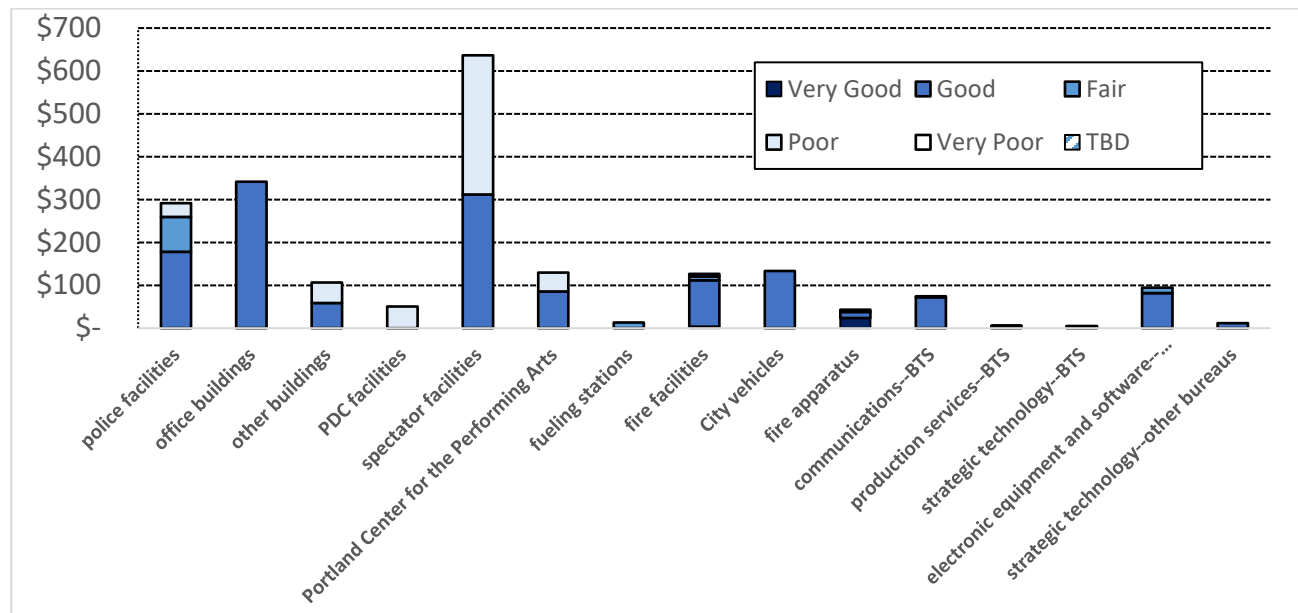
Appendix 2d: Current Condition of Capital Assets, Water



Appendix 2e: Current Condition of Capital Assets, Parks & Recreation



Appendix 2f: Current Condition of Capital Assets, Civic



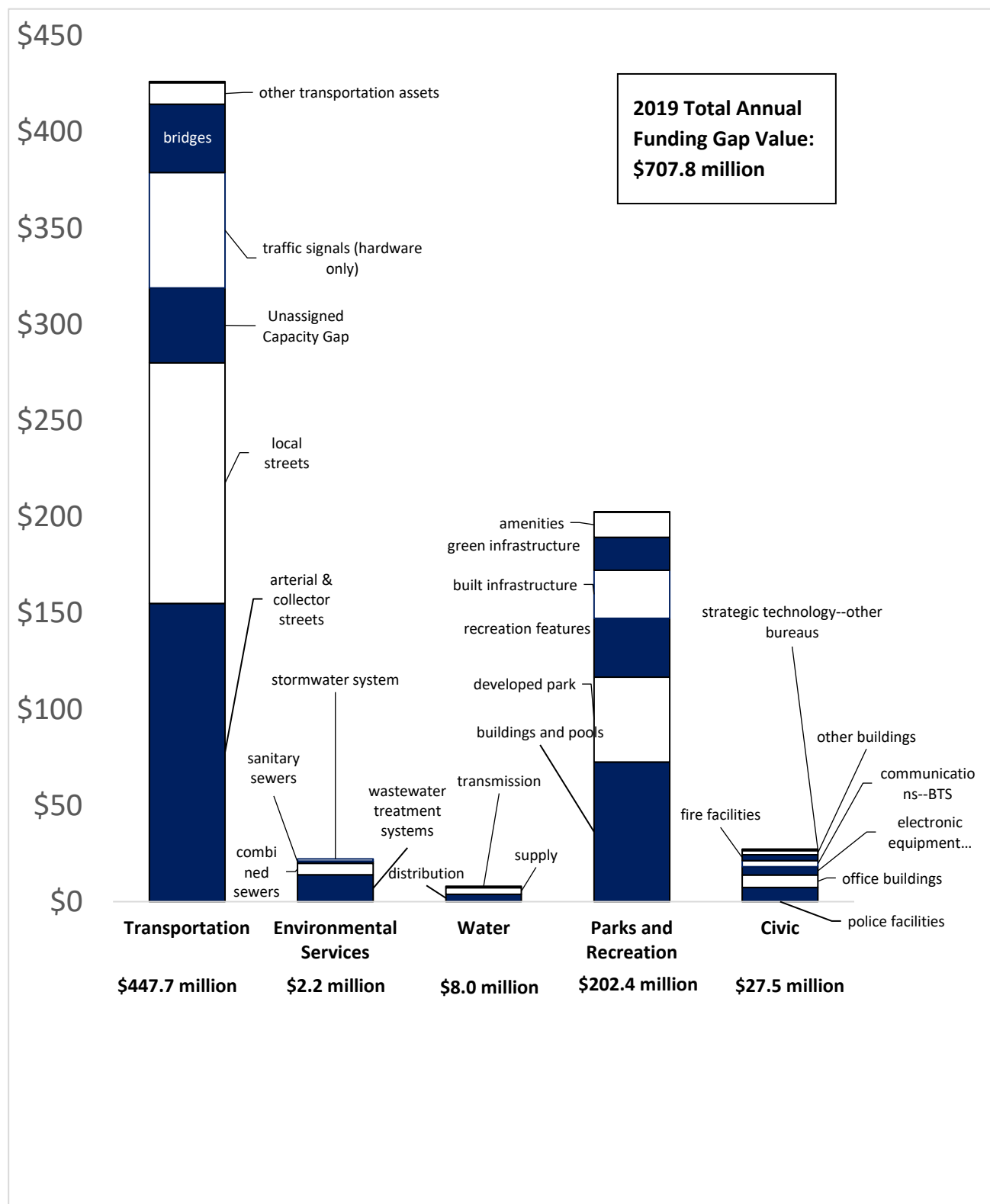
Appendix 2g: Condition Table

Capital Asset Class	Very Good	Good	Fair	Poor	Very Poor	TBD	Confidence Level	Notes
Transportation								
Arterial & Collector Streets	12%	17%	14%	31%	26%		4-High	
Local Streets	2%	10%	16%	40%	32%		4-High	
Sidewalks	10%	25%	30%	25%	10%		2-Low	
Curbs	12%	50%	16%	12%	10%		2-Low	
Corners	10%	18%	19%	26%	27%		2-Low	Undergoing ramp inventory to document compliant, non-compliant, and needed ramps.
Bridges	6%	23%	68%	3%	0%		4-High	
Traffic Signals (Hardware Only)	20%	24%	32%	8%	16%		2-Low	
Street Lights	92%	3%	1%	0%	3%	1%	2-Low	
Support facilities (for PBOT&BES)	0%	0%	29%	59%	12%		2-Low	Currently PBOT is working on a better/more accurate way to evaluate condition and needs at the facilities.
Other transportation assets						100%	1-TBD	
Parking Assets- Garage Conditions Only		66%	17%		17%		2-Low	
Aerial tram		100%					4-High	
Streetcar		85%	10%			5%	4-High	
Environmental Services								
Combined Sewers	40%	18%	20%	15%	4%	2%	4-High	
Combined Sewer Tunnels	83%	1%	5%	0%	0%	11%	4-High	
Sanitary Sewers	62%	23%	6%	2%	1%	6%	4-High	
Wastewater Treatment Systems	27%	30%	12%	18%	4%	9%	3-Moderate	
Stormwater System, Grey Assets	25%	3%	2%	2%	1%	67%	2-Low	Stormwater condition data low in availability
Stormwater System, Green Assets	0%	29%	0%	0%	0%	71%	2-Low	Green asset condition data low in availability
Water								
Supply	20%	40%	27%	12%	2%	0%	3-Moderate	
Transmission	5%	44%	41%	10%	1%	0%	3-Moderate	
Terminal Storage	59%	31%	3%	0%	7%	0%	4-High	
Distribution	26%	44%	22%	7%	1%	0%	3-Moderate	
Facilities	61%	18%	11%	6%	5%	0%	4-High	

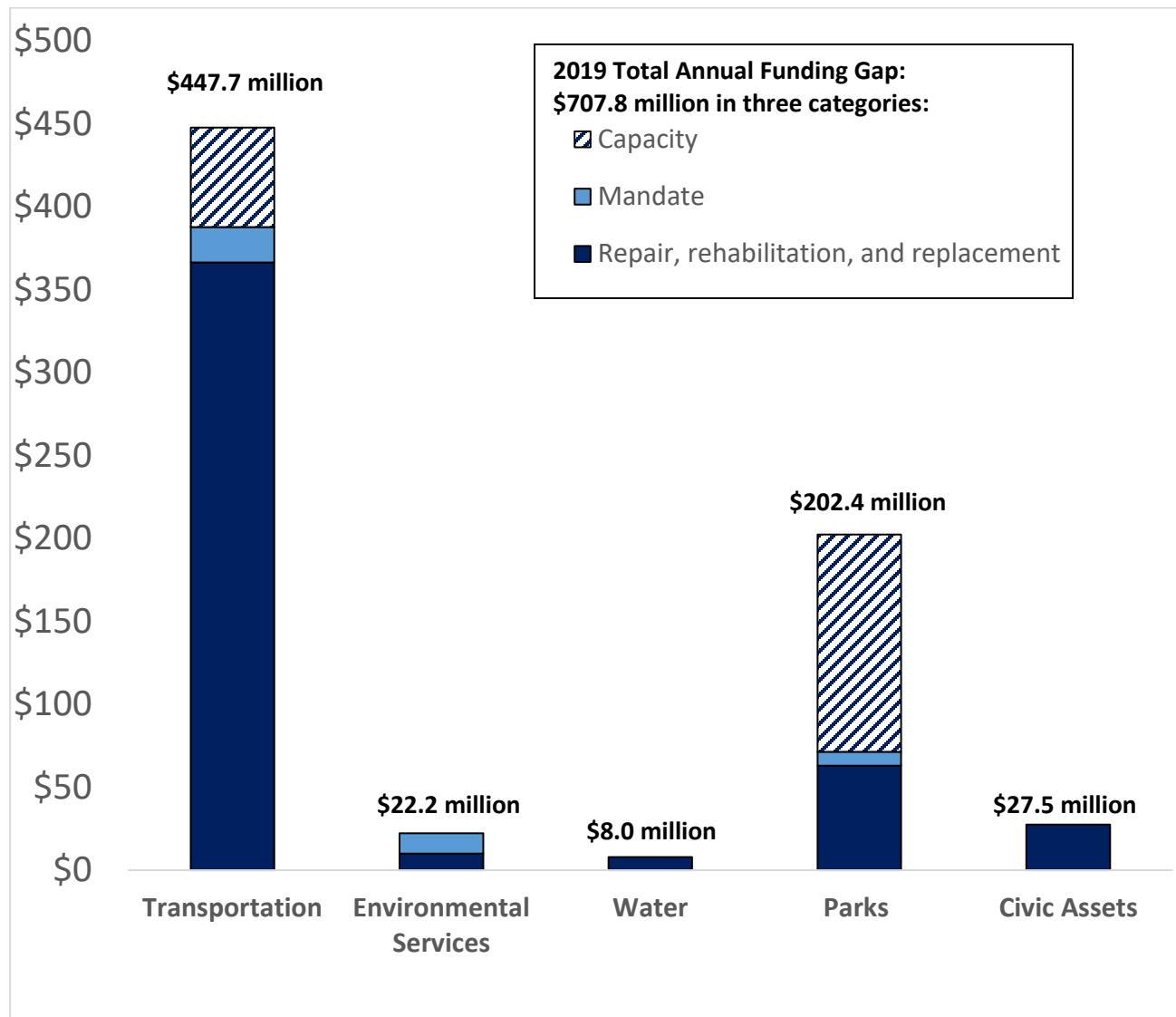
Appendix 2g: Condition Table

Capital Asset Class	Current Condition (in%)*						Confidence Level	Notes
	Very Good	Good	Fair	Poor	Very Poor	TBD		
Parks & Recreation								
Amenities	13%	15%	17%	21%	1%	33%	1 to 2- TBD to Low	Asset Risk Profiles 2013
Buildings & Pools	0%	7%	37%	48%	9%	0%	4-High	High-level systemwide assessment completed in 2018
Recreation Features	3%	4%	18%	15%	4%	57%	1 to 4- TBD to High	2013 Asset Risk Profiles; Comprehensive Condition Assessment in 2016; update for Replacement Bond progress and deterioration; Outdoor Sport Court Assessment Complete in 2017
Built Infrastructure	2%	6%	29%	10%	4%	50%	1 to 4- TBD to High	Pathways assessment Completed 2019
Green Infrastructure	30%	33%	26%	10%	3%	0%	2-Low	Based on new methodology from Natural Areas Restoration Plan (October 2010)
Civic								
Facilities (Buildings, Structures)								
Police Facilities	0%	39%	50%	11%	0%	0%	3-Moderate	
Office Buildings	64%	24%	13%	0%	0%	0%	3-Moderate	
Other Buildings	0%	55%	0%	45%	0%	0%	3-Moderate	
PDC Facilities	0%	0%	0%	100%	0%	0%	3-Moderate	
Spectator Facilities	0%	49%	0%	51%	0%	0%	3-Moderate	
Portland Center for the Performing Arts	0%	66%	0%	34%	0%	0%	2-Low	
Fueling Stations	0%	0%	100%	0%	0%	0%	3-Moderate	
Fire Facilities	3%	85%	7%	5%	0%	0%	3-Moderate	
Vehicles								
City Vehicles	0%	100%	0%	0%	0%	0%	3-Moderate	
Fire Apparatus	55%	33%	12%	0%	0%	0%	4-High	
Technology								
Communications--BTS	0%	97%	3%	0%	0%	0%	3-Moderate	
Production Services--BTS	0%	92%	8%	0%	0%	0%	3-Moderate	
Strategic Technology--BTS	0%	84%	16%	0%	0%	0%	3-Moderate	
Electronic Equipment & Software--Other Bureaus	0%	86%	14%	0%	0%	0%	3-Moderate	
Strategic Technology--Other Bureaus	0%	100%	0%	0%	0%	0%	3-Moderate	

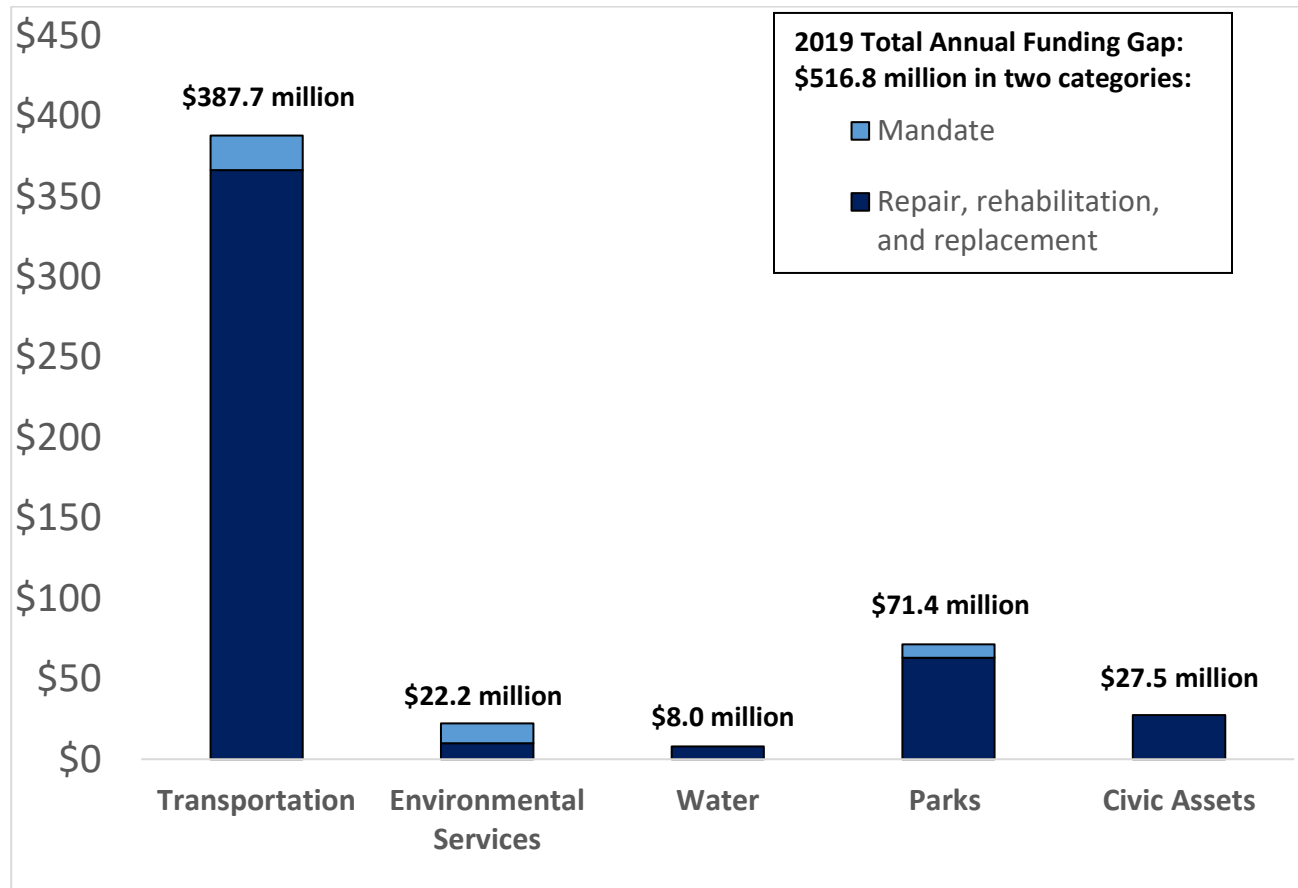
Appendix 3a: Annual Funding Gap, by Asset Group



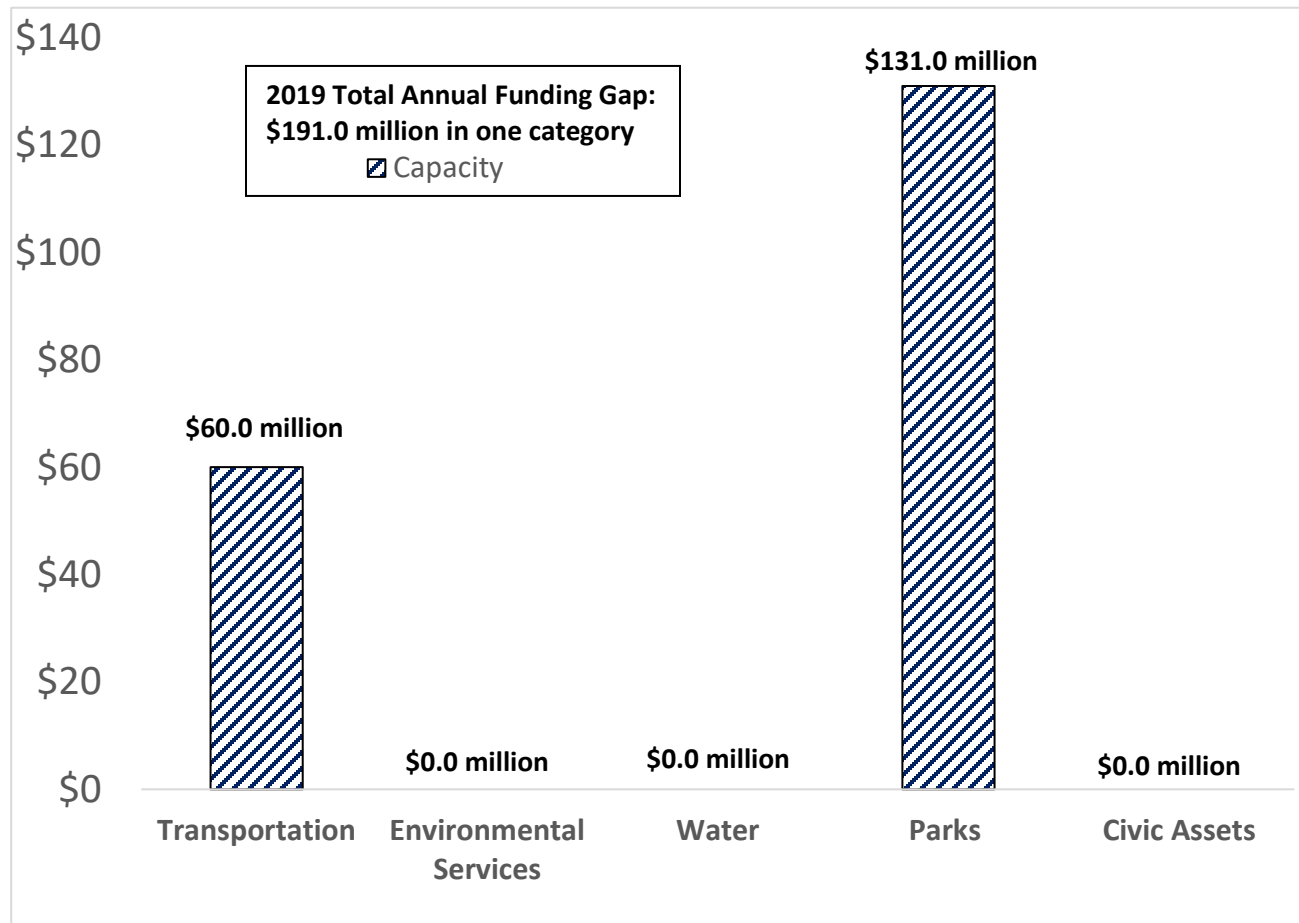
Appendix 3b: Annual Funding Gap, by Type of Gap



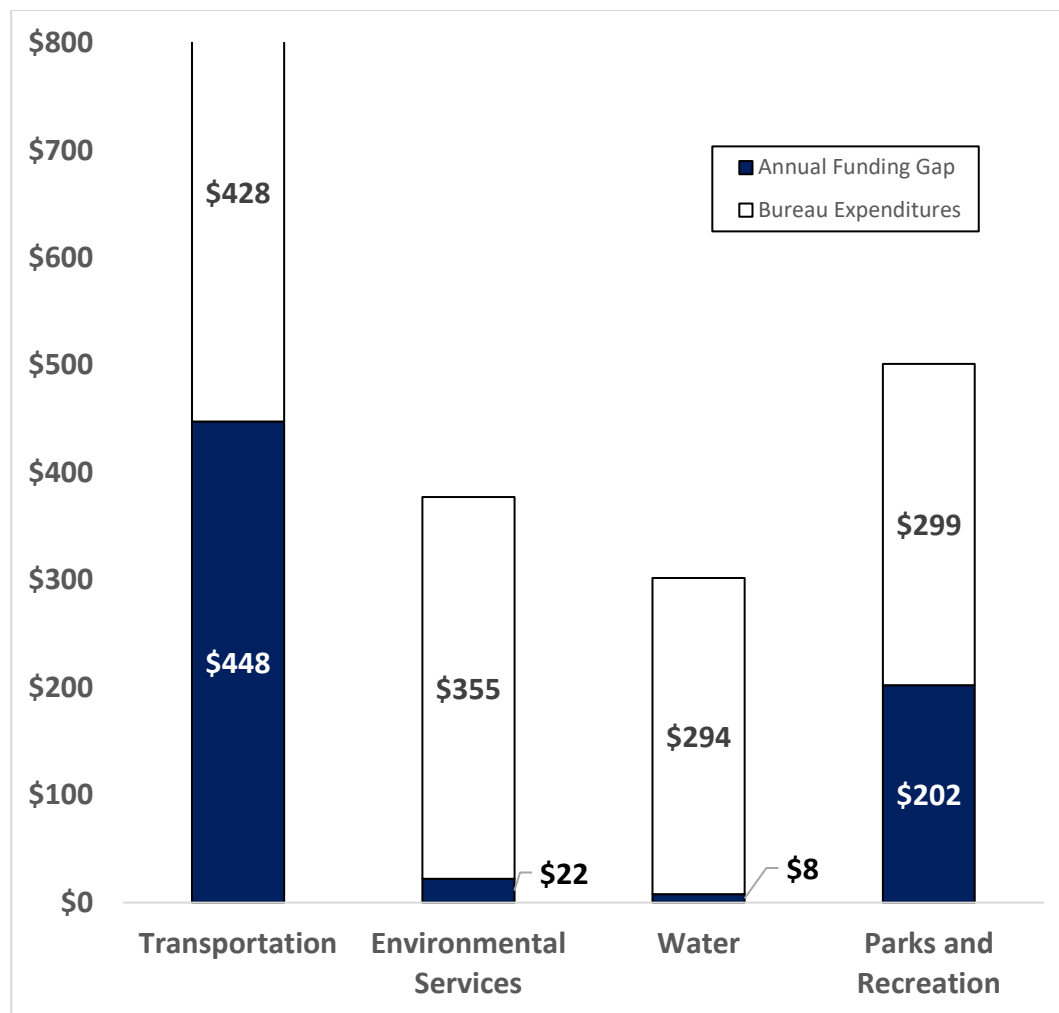
Appendix 3c: Annual Non-Capacity Funding Gap by Bureau



Appendix 3d: Capacity-Related Annual Funding Gap, by Bureau



Appendix 3e: Annual Funding Gap Compared to Bureau Expenditures

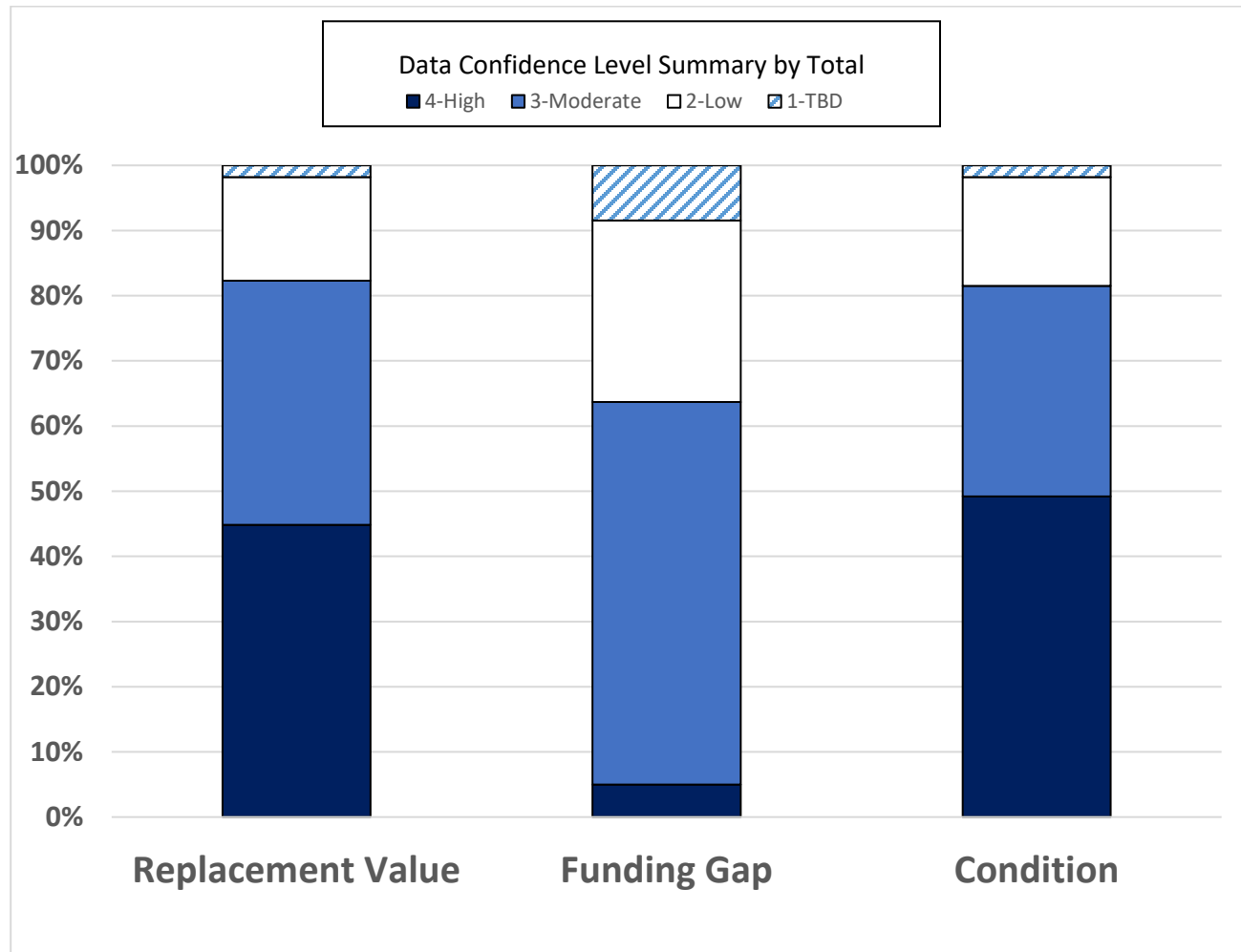


Appendix 3f: Annual Funding Gap in Millions Per Year Data Sheet

Capital Asset Class	Value (in millions)				Confidence Level	Notes
	R/R/R	Mandate	Capacity	Total		
Transportation						
Arterial & Collector Streets	\$155.0		Capacity gap not broken out by asset type; see Transportation System Plan for details. Total estimated capacity gap for 20-year-horizon is \$1.4 billion	\$155.0	3-Moderate	Annual amount for 10 years
Local Streets	\$125.0			\$125.0	3-Moderate	
Sidewalks	TBD			\$0.0	N/A	Adjacent property owners are financially responsible for repairing sidewalks. However, with ADA requirements, there are unknowns about how to adequately address unpassable sidewalks.
Curbs	TBD			0	2-Low	
Corners		\$21.4		21.4	2-Low	Annual amount for 10 years, based on early estimates
Bridges	\$35.4			35.4	4-High	
Traffic Signals (Hardware Only)	\$39.0			39	2-Low	
Street Lights	\$0.1			0.14	2-Low	
support facilities (for PBOT & BES)	\$0.6			0.6	2-Low	
Other Transportation Assets	\$11.2			11.2	2-Low	
bikeshare	\$0.0				N/A	No longer City owned
aerial tram	\$0.0				4-High	Future funding needs accounted for in Transit Asset Management Plan using predicted costs.
streetcar	TBD				3-Moderate	There are still some TBD costs
Total Transportation	\$366.3	\$21.4	\$60.0	\$447.7		
Environmental Services						
Combined Sewers	\$6.0	\$0.0		\$6.0	2-Low	
Sanitary Sewers	\$1.1	\$0.0		\$1.1	2-Low	
Stormwater System	\$1.1	\$0.0		\$1.1	2-Low	
Wastewater Treatment Systems	\$1.8	\$12.2		\$14.0	2-Low	
Total Environment Services	\$10.0	\$12.2	\$0.0	\$22.2		Detailed distribution of gap between categories not readily available for report deadline.
Water						
Supply	\$3.5			\$3.5	3-Moderate	
Transmission	\$0.7			\$0.7	3-Moderate	
Terminal Storage	\$0.0			\$0.0	3-Moderate	
Distribution	\$3.8			\$3.8	3-Moderate	
Facilities	\$0.0			\$0.0	3-Moderate	
Total Water	\$8.0	\$0.0	\$0.0	\$8.0		

Capital Asset Class	Value (in millions)				Confidence Level	Notes
	R/R/R	Mandate	Capacity	Total		
Parks & Recreation						
Amenities	\$3.0	\$0.0	\$10.0	\$13.0	2-Low	
Buildings & Pools	\$25.0	\$3.6	\$44.0	\$72.6	3-Moderate	Added \$1M for HSE
Built Infrastructure	\$12.0	\$2.5	\$16.0	\$30.5	3-Moderate	Added Pathways Assessment Results
Developed Park	\$2.0	\$0.1	\$42.0	\$44.1	2-Low	
Green Infrastructure	\$12.0	\$1.2	\$4.0	\$17.2	2-Low	
Recreation Features	\$9.0	\$1.0	\$15.0	\$25.0	2-Low	
Total Parks & Recreation	\$63.0	\$8.4	\$131.0	\$202.4		
Civic						
Facilities (Buildings, Structures)						
Police Facilities	\$7.3	\$0.0	\$0.0	\$7.3	3-Moderate	
Office Buildings	\$6.6	\$0.0	\$0.0	\$6.6	3-Moderate	
Other Buildings	\$2.1	\$0.0	\$0.0	\$2.1	3-Moderate	
PDC Facilities	NA	NA	NA	\$0.0	3-Moderate	
Spectator Facilities	NA	NA	NA	\$0.0		
Portland Center for the Performing Arts	NA	NA	NA	\$0.0		
Fueling Stations	\$0.0	\$0.0	\$0.0	\$0.0	3-Moderate	
Fire Facilities	\$3.1	\$0.0	\$0.0	\$3.1	2-Low	
Vehicles				\$0.0		
City Vehicles	\$0.0	\$0.0	\$0.0	\$0.0	3-Moderate	
Fire Apparatus	\$0.0	\$0.0	\$0.0	\$0.0	4-High	
Technology				\$0.0		
Communications--BTS	\$3.2	\$0.0	\$0.0	\$3.2	3-Moderate	
Production Services--BTS	\$0.7	\$0.0	\$0.0	\$0.7	3-Moderate	
Strategic Technology--BTS	\$0.1	\$0.0	\$0.0	\$0.1	3-Moderate	
Electronic Equipment & Software--Other Bureaus	\$4.3	\$0.0	\$0.0	\$4.3	3-Moderate	
Strategic Technology--Other Bureaus	\$0.3	\$0.0	\$0.0	\$0.3	3-Moderate	
Total Civic	\$27.5	\$0.0	\$0.0	\$27.5		

Appendix 4: Data Confidence Level Summary



Appendix 5: Definitions

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

Asset	A physical component of infrastructure or a facility that has value and 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.)
Capacity	See Funding Gap
Capital Expansion	Projects or facilities that create new assets, increase the capacity of existing assets beyond their original design capacity or service potential, or increase the size and service capability of a current service area, including service to newly annexed, undeveloped, or under-served areas. Generally increases the total maintenance requirements because it is increasing the total asset base.
Civic	A collection of City-owned assets, including facilities (office, police, fire, parking garages, spectator facilities, Portland Center for the Performing Arts) and technology services (800 MHz radio system, telecommunications, IT operations, strategic technology). Bureau maintenance facilities are assets of the operating bureau.
Condition Assessment	The method used to quantify the deterioration rate and remaining useful life of an asset. Methods of condition assessment vary by asset classification and range from use of industry estimates for deterioration rates up to documented physical inspection regimens on established cycles that ensure optimum economic life of an asset.
Condition Measure/Rating	A means of classification using information from periodic inspections or measurements to indicate the ability of an asset to deliver a particular level of service.
Confidence Levels	The expression of accuracy and reliability in the areas of information (source and (in data/information) reliability), process (ad hoc or repeatable) and documentation (documented or not documented).

Confidence Levels in Data and Information

Confidence Level	Label	Inventory completeness	Condition assessment method and frequency	Process and documentation
No confidence	1-TBD	No inventory	No assessment method (to be determined)	No process (to be determined)
Low confidence	2-Low	Partially complete inventory	Estimates used to assess condition	Process not well documented
Moderate confidence	3-Moderate	Inventory complete	Subjective process to estimate condition estimated followed on a regular schedule	Some documentation in place
High confidence	4-High	Inventory complete	Condition surveys conducted on a regular schedule by well-trained personnel	Well-documented process followed
Optimal confidence	5-Optimal	Inventory complete	Condition survey on a regular schedule	Objective process followed; Accuracy of data verified and well documented

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 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 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 (e
Green Infrastructure I	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.
High-risk Infrastructure	Infrastructure assets that have a high risk of failure, based on the likelihood and consequence of that failure.
Infrastructure	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.
Inventory	A list of assets and their principal components.
Level of Service	A defined standard against which the quality and quantity of service can be measured. A level of service can include reliability, responsiveness, environmental acceptability, customer values and cost.
Life-Cycle Cost	The sum of all costs throughout the life of an asset, including planning, design, acquisition, construction, operation, maintenance, rehabilitation/renewal and disposal costs.
Likelihood of Failure	The probability or possibility of an event that will cause the asset to fail.
Mandate	See Funding Gap

Maintenance	Activities that keep an asset operating as designed or prevent it from deteriorating prematurely, excluding rehabilitation or renewal which may extend asset life. Maintenance can be planned or unplanned. Planned maintenance is: Preventive maintenance conducted at regular scheduled intervals based on average statistical/anticipated lifetime. Condition-based maintenance based on objective evidence of need from tests, measurements and observations. Deferred — the shortfall created by postponing prudent but nonessential repairs to save money or materials. Generally, a policy of continuing deferred maintenance results in higher costs when repairs are eventually made, or failure that occurs sooner than if normal maintenance had been performed. Unplanned maintenance is: Reactive or Emergency-corrective actions taken upon failure or obvious threat of failure, usually at a higher cost than planned or preventive maintenance.
Operations	The ongoing activities that allow the use of an asset for its intended function.
Performance Indicator	A qualitative or quantitative measure used to compare actual performance against a defined standard. Indicators are commonly used to measure cost, performance, or customer satisfaction.
Performance Monitoring	The periodic assessments of actual performance compared to specific objectives, targets, or standards.
Rehabilitation/Renewal	Maintenance performed on an asset to restore it to its original level of service or capacity and achieve its useful life, which may result in an extension of the asset's service life.
Repair, Rehabilitation, Renewal	See Funding Gap.
Retirement/Removal	Decommissioning or removal of an asset through disposal, abandonment, demolition, or sale that may involve retiring deteriorated assets and recovering salvage value. Risk The chance of something happening that will have an impact upon objectives. Risk is measured in terms of likelihood and consequences.
Risk Analysis	A systematic use of available information to determine how often specified events may occur and the magnitude of their consequences.
Risk Management Strategy	The systematic application of management policies, procedures and practices to the tasks of establishing the context, identifying, analyzing, evaluating, treating, monitoring and communicating risk.
Triple Bottom Line	A method to categorize the benefits and impacts an organization can expect from investing in its assets. The benefits are categorized into Social, Economic, and Environmental benefits to ensure a comprehensive evaluation in the decision-making process (measure, manage and report).
Useful Life	The period of time over which an asset is expected to deliver efficient service with normal or appropriate maintenance (defined as accepted industry standard or documented local experience).

Appendix 6: Asset Management Program Core Elements

Goals and Strategies

- An asset management policy has been promulgated or updated within the last five years.
- Levels-of-service targets are published and communicated to internal and external stakeholders.
- Levels of service are financially, socially, and environmentally sustainable and aligned with customer expectations.
- The asset portfolio is continually adjusted to match these sustainable levels of service.
- The asset management program is leveraged to support goals for equity, resilience, and sustainability.
- The bureau has a clearly defined tactical plan for achieving asset management goals and objectives.
- Asset management principles and practices are widely understood and documented in the organization.

Critical Processes

- Asset data are current, accurate, and complete.
- A condition assessment program exists in which the life cycle position of the majority of assets are updated every 5 – 10 years.
- Decisions are made based on asset condition, performance, utilization, location, and configuration.
- Investment decisions are transparently prioritized using risk ratings as well as objectively defined and evaluated metrics.
- Project validation and decision-making includes consideration of non-asset solutions.
- The vast majority of maintenance activities are proactive, planned, preventive, and predictive, and assure reliability at the least lifecycle cost and in a manner that is least disruptive to users of the assets.
- Resources are assigned to develop and carry out an asset management program at a reasonable rate of progress.

Financial Sustainability

- The bureau forecasts major maintenance investment requirements.
- The bureau forecasts realistic resource scenarios.
- Forecasted resources and requirements are projected to be at equilibrium within 10 years.
- Life-cycle cost is factored into acquisition, design, construction, operation, and disposal decisions.