CITY OF PORTLAND

Citywide Systems Plan

Working Draft

PART 2
OCTOBER 2013

Bureau of Planning and Sustainability
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For more information, to submit written comments, or to obtain a printed copy of the Working Draft Part 2, please contact the Bureau of Planning and Sustainability:

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Comments are appreciated by December 31, 2013.

The Bureau of Planning and Sustainability is committed to providing equal access to information and hearings. If you need special accommodation, please call 503-823-7700, the City's TTY at 503-823-6868, or the Oregon Relay Service at 1-800-735-2900.

ACKNOWLEDGEMENTS

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Reader's Guide

The Comprehensive Plan guides the location of population and job growth as well as public investments in infrastructure (such as streets, sidewalks, parks and stormwater systems) over the next 20 years. It sets guidelines for community involvement and influences private development and public facilities — all to ensure that Portland is a more prosperous, healthy, educated, equitable and resilient city.

The Citywide Systems Plan is a support document to the Comprehensive Plan and guides infrastructure investments to meet the needs of current and future Portlanders.

Purpose of the Citywide Systems Plan

The Citywide Systems Plan (CSP) is a 20-year (2014-2024), coordinated infrastructure plan for areas within the City of Portland's urban service boundary.

The State of Oregon's Growth Management Act requires cities and counties to develop and implement public facilities plans. At a minimum, the public facilities plan, or PFP, must describe transportation, water, and sewer facilities needed to support the land uses designated in the acknowledged Comprehensive Plan. Portions of the Citywide Systems Plan will serve as the City's state-mandated public facilities plan.

The Citywide Systems Plan includes inventory, condition, and future project information for transportation, water, sanitary sewer, and stormwater systems, as required by Oregon Planning Goal 11: Public Facilities and Oregon Revised Statute 197. It also includes similar information for parks, recreation, and civic facilities provided by the City of Portland.

Portland's Infrastructure Assets

Infrastructure assets include physical systems that provide services to, and are maintained by, a community. The City of Portland's infrastructure assets include transportation networks, water storage and distribution, sewer and stormwater collection and treatment facilities, parks and recreation facilities, and other civic facilities such as fire and police stations.

Plan Overview

The Citywide Systems Plan includes the following chapters:

- **Chapter 1. Infrastructure Planning and Coordination**, provides an overview of the regional and local planning context for the Citywide Systems Plan and the process for developing the Plan.
- **Chapter 2. Asset Management**, describes the City's asset management approach and details key trends and needs.
- **Chapter 3. Integrated Goals**, includes a discussion of how the Plan relates to and supports the Integrated Goals and key directions included in the Working Draft Part 1 of the Comprehensive Plan Update.

- **Chapter 4. Summary of Infrastructure and Service Delivery**, provides an overview of the City's infrastructure systems and the investment strategy outlined in the Plan.
- **Chapter 5. Key Infrastructure Policies**, includes draft goals and policies included in Chapter 6: Public Facilities and Services, of the Comprehensive Plan Update Working Draft Part 1.
- **Chapters 6. Bureau of Environmental Services** through **Chapter 10. Civic Facilities** include more detailed inventories of existing systems, discussions of infrastructure needs, and investment strategies for each of the City's major infrastructure systems – water, sewer and stormwater, transportation, and parks and recreation.

Process

This Working Draft of the Citywide Systems Plan was developed by the Citywide Systems Team, a cross-bureau coordination group with representatives from the Portland Bureau of Planning and Sustainability, Bureau of Transportation, Bureau of Environmental Services, Portland Water Bureau, Portland Parks & Recreation and Office of Management and Finance. The document is, in many cases, based on other plans and projects, including the Portland Plan, Working Draft Part 1 of the Comprehensive Plan Update, and a wide variety of bureau and agency plans.

This Working Draft is available for public and agency review and comment until December 31, 2013, along with the other components of the Working Draft Part 2 of the Comprehensive Plan Update. There will be additional opportunities for public review of the proposed and recommended drafts of this document in the future.

Chapter 1
Infrastructure Planning and Coordination

The Citywide Systems Plan

The Citywide Systems Plan (CSP) is a coordinated 20-year plan (2014-2024) for the City of Portland's municipal infrastructure systems, including transportation, water, stormwater, sewer, parks and natural areas, and publicly owned buildings and facilities.

The Citywide Systems Plan represents the most significant update to the 1989 Public Facilities Plan to date, to reflect updated regional and local planning and practices. It serves as a long-range, coordinated plan to guide future public infrastructure investments. Portions of the plan serve as the City's state-mandated public facilities plan, as required by Oregon Planning Goal 11: Public Facilities and Oregon Revised Statute 197. However, the CSP goes beyond the state planning requirements to incorporate a more coordinated and comprehensive look at the City's infrastructure based on community values and best practices.

The 1989 Public Facilities Plan and the list of significant projects intended to implement the plan are outdated. City infrastructure bureaus have completed a number of facilities plans that have not been included in a citywide public facilities plan. The Citywide Systems Plan incorporates these updated plans, improves coordination between infrastructure planning efforts, and considers the community's infrastructure priorities in a consistent and applied fashion.

There is a critical need to update the 1989 Public Facilities Plan, as there have been a number of significant changes in the internal and external conditions surrounding local capital planning, such as:

- The City of Portland has grown significantly, adding over 155,000 residents between 1990 and 2011. By 2035, the city is expected to grow by approximately 280,000 people (132,000 households) and 147,000 new jobs.
- The planning area for the City of Portland has also changed significantly with the annexation of the Pleasant Valley area. A public facilities plan for Pleasant Valley was completed but was not integrated into a citywide public facilities plan.
- Metro completed the Region 2040 Growth Concept and the Urban Growth Management Functional Plan, which provide long-term guidance for future growth and development.
- City priorities have shifted and now include the need to:
    - address aging infrastructure;
    - improve equity and address service deficiencies;
    - incorporate sustainable development, protection of natural systems, and green infrastructure;
    - focus growth in centers and corridors;

- build resiliency in the face of a changing climate; and
- foster inter-bureau collaboration.

The Portland Plan, adopted in 2012, provides a strategic framework for both the City's short-term actions and long-range goals and policies, focused around priorities of prosperity, equity, health and education.

- The City has advanced its asset management practices, providing more comprehensive and detailed information about the investments needed to provide and maintain infrastructure services.
- The City recognizes the value of green infrastructure and natural system approaches that can improve infrastructure performance and reduce costs while also improving neighborhood livability and watershed health.
- Analytical tools and technology are vastly different - Metro now provides a centralized data resource; the City has a demographer on staff; and GIS, computer modeling, and other technologies allow analysis and exploration of data in new ways.

Purpose and Objectives

The Citywide Systems Plan has been developed to meet a number of objectives. It is intended to:

- Guide and coordinate future public infrastructure investments to maintain existing systems, resolve existing deficiencies, serve new growth, and meet long-term infrastructure needs.
- Reflect current practices and policies, as reflected in the comprehensive plan and system-specific plans.
- Meet state planning requirements under the growth management act.
- Incorporate and respond to community vision and goals highlighted in visionPDX and the Portland Plan.
- Provide policy recommendations and a list of significant projects for the comprehensive plan.

Meeting Growth Management Planning Requirements

The Citywide Systems Plan responds to state, regional, and local growth management and infrastructure planning requirements as well as community objectives. An update of the 1989 Public Facilities Plan is necessary to meet these planning requirements and accurately reflect community values and goals.

State Planning Requirements

Comprehensive Planning

In 1973, Oregon residents adopted Senate Bill 100, establishing a statewide land-use planning program to "provide for the protection of farm and forest lands, conservation of natural resources, orderly and efficient development, coordination among local governments, and citizen involvement". "The program affords all Oregonians predictability and sustainability to the development process by allocating land for industrial, commercial, and housing development, as well as transportation and agriculture." Oregon's land use program is administered at the state level by the Department of Land Conservation and Development (DLCD) and is guided by the Land Conservation and Development Commission (LCDC), a volunteer citizen board.

Under the program, all cities and counties in Oregon are required to create, adopt, and implement local Comprehensive Plans to guide growth and development, and protect resources within their jurisdictions. These plans must meet mandatory state standards included in the nineteen Statewide Planning Goals, which address land use, development, housing, transportation, and conservation of natural resources.

The City of Portland adopted its first Comprehensive Plan in October 1980, after significant public input and planning. The Comprehensive Plan has been amended many times since its adoption. Portland's Comprehensive Plan includes three primary elements: a set of goals, policies, and objectives that apply to the entire city; a list of significant public works projects; and a set of mapped features. These features include land use designations, street classifications, the city limits, and the urban service boundary.

Since the Comprehensive Plan's adoption in October 1980, all of City Goal 6 (Transportation) and parts of City Goal 11 (Public Facilities) have been amended. The Transportation Goal received major revisions in 1992, 1996 and 2002. In October 2004, the Transportation System Plan received a technical update. The Public Facilities Goal was amended with an urban services study (1983) and transportation policy updates (1996 and 2002).

The City's List of Significant Projects, was adopted with the completion of the City's first Citywide Systems Plan in 1989. It has been amended by subsequent updates of the Transportation System Plan and by updates to the sanitary sewer element in 2011.

In 2009, the City began the first major update to the Comprehensive Plan since it was adopted in 1980. The Working Draft Part 1, released in January 2013 for public review, included draft goals and policies for public facilities and transportation.

Public Facilities Planning

The State of Oregon's Growth Management Act requires cities and counties develop and implement public facilities plans. At a minimum, the public facilities plan, or PFP, must describe transportation, water, sewer and stormwater facilities needed to support the land uses designated in the acknowledged Comprehensive Plan. Public facilities plans typically have a 20-year time horizon, and help to identify capital improvement projects (5-year horizon) and capital budgets (1-year horizon).

State requirements for public facilities plans are found in Oregon Statute 197 and Oregon Administrative Rule 660. To meet these state requirements, the Citywide Systems Plan, which will serve as the City of Portland's public facilities plan, includes:

- An inventory and general assessment of the conditions of all of the significant public facility systems which support the land uses in the acknowledged comprehensive plan;
- A list of significant public facilities to support the land uses designated in the acknowledged comprehensive plan;

- Rough cost estimates of each public facility project;
- A map or written description of each public facility project's general location or service area;
- Policy statements or urban growth management agreements identifying the provider of each public facility system;
- An estimate of when each facility will be needed; and
- An assessment of the financial capacity of the City to complete needed infrastructure improvements and a discussion of existing and potential funding mechanisms. '

The Department of Land Conservation and Development evaluates public facilities plans for inclusion of required elements; whether the plan contains all agreements (urban growth management, any special districts, or state agency coordination); and whether the public facilities plan is consistent with the acknowledged comprehensive plan, the Metro Functional Plan, and statewide planning goals.

The Public Facilities Plan (PFP) is also a support document to a Comprehensive Plan. Some elements of a PFP must be adopted as part of the City's Comprehensive Plan. These elements are: a) a list of significant projects; b) a map or written description of the project locations or service areas; and c) policies or urban growth management agreement(s) designating the provider of each public facility system.

The Citywide Systems Plan as Portland's Public Facilities Plan

For this update, the City of Portland has chosen to develop this Citywide Systems Plan, which serves the same long-range purpose as a Public Facilities Plan (PFP). The term "public facilities plan" is found in state administrative rules, Portland's previous plans, and planning literature generally. This Citywide Systems Plan represents a more comprehensive and holistic view of the City's infrastructure service delivery. While it has been developed to meet the state requirements for public facility plans as described in the previous section, it also includes system planning that extends beyond this mandate.

For example, the Citywide Systems Plan includes facility plans for parks, recreation and civic facilities; addresses maintenance needs; and includes programmatic investments that are key to meeting service demands. It is also designed to respond to regional planning frameworks, community needs, desired urban form, economic development goals, and financial and resource realities.

The City has included these additional components in the interest of comprehensive infrastructure planning, and does not intend for these components to be reviewed for compliance with Oregon Statute 197 or Oregon Administrative Rule 660. Future drafts of the Citywide Systems Plan will identify required components, intended for review against public facility planning rules.

Regional Plans and Requirements

In addition to complying with state planning requirements, many infrastructure systems also look to Metro, the area's regional government, for planning guidance. The following plans have major impacts on planning for the City's infrastructure:

2040 Growth Concept and the Urban Growth Management Functional Plan

The 2040 Growth Concept, adopted by the Metro Council, provides a long-range plan for the future growth and development of the Portland metropolitan region. It is based on a set of shared regional values, including: thriving neighborhoods and communities, abundant economic opportunity, clean air and water, protecting streams and rivers, preserving farms and forestland, access to nature, and a sense of place. The functional plan provides tools that help meet goals in the 2040 Growth Concept.

Regional Transportation Plan

In January 2013, Metro adopted an updated Regional Transportation Plan (RTP) to shape future planning to protect the livability of the region's communities and sustain the region's well-being and economic prosperity. A goal of this update was to better advance regional policies, public priorities and local efforts to implement the 2040 Growth Concept to keep the region a great place to live and work for everyone.[1] Chapter 7. of this report, as well as the City of Portland's Transportation System Plan, will be updated as part of this Comprehensive Plan Update process to be consistent with the RTP.

Community Investment Strategy

Metro's Community Investment Strategy (2010) recommends both public and private investments necessary to maintain prosperity, sustainability and equity in the Portland metropolitan region. It is based on an assessment of the region's urban growth boundary. The Community Investment Strategy supports investments within existing communities to promote economic development, protect natural areas, and improve livability. More specifically, it recommends continued investments in the region's centers and corridors and regional collaboration to identify and address critical infrastructure gaps.

Connecting Green

Connecting Green, an update to Metro's Greenspaces Master Plan, provides a vision, objectives, and plan for an "exceptional, multi-jurisdictional, interconnected system of neighborhood, community and regional parks, natural areas, trails, open spaces and recreation opportunities" in the Portland metropolitan region. Chapter 8. Parks and Recreation includes information and investments related to the City of Portland's park, natural area, and trail components of this regional network.

Local Plans

The Portland Plan

The Portland Plan, adopted in 2012, set four shared priorities – prosperity, education, health and equity - to guide the actions of the City and other government agencies in Portland over the next 25 years. The Comprehensive Plan is one of a set of important tools for implementing the Portland Plan priorities and guiding policies.

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[1] Metro. "2035 Regional Transportation System Plan Update". http://www.metro-region.org/index.cfm/go/by.web/id=25038

According to The Portland Plan, “For Portland to be prosperous, educated, healthy and equitable, quality, reliable basic services must be provided for all.” The Citywide System Plan supports this goal and continues the integration of the Portland Plan’s strategic priorities and guiding policies. The four shared priorities, and their implications for infrastructure planning and future investment are discussed in Chapter 3: Planning Framework. The legacy of these priorities and policies can also be seen in the draft goals and policies included in Chapter 4: Key Infrastructure Policies.

City of Portland and Multnomah County Climate Action Plan and Climate Change Preparation Strategy

Portland’s Climate Action Plan is a strategy to put Portland and Multnomah County on a path to achieve a 40 percent reduction in carbon emissions by 2030 and an 80 percent reduction by 2050 (compared to 1990 levels). The plan builds upon a legacy of forward-thinking climate protection initiatives that have resulted in significant total and per person reductions in local carbon emissions. The Climate Action Plan identifies several 2030 objectives and near-term carbon reducing actions in a variety of areas that are relevant to the Citywide Systems Plan, including energy, land use, transportation, and natural systems. The Climate Change Preparation Strategy focuses on understanding how climate affects the community today and how those impacts are expected to change in the coming century. In addition to indentifying vulnerabilities and risks, the strategy outlines key objectives and actions to build resiliency to heat, drought, wildfire, floods and landslides into the City’s everyday operations, services and infrastructure.

Transportation System Plan

The Transportation System Plan (TSP) is Portland’s long-range plan to guide transportation investments. The TSP meets State and regional planning requirements and addresses local transportation needs for cost-effective street, transit, freight, bicycle, and pedestrian improvements. The plan provides transportation choices for residents, employees, visitors, and firms doing business in Portland, making it more convenient to walk, bicycle, take transit, and drive less to meet their daily needs. The TSP provides a balanced transportation system to support neighborhood livability and economic development.

The Transportation System Plan was last updated in 2011 and is currently undergoing a new update to reflect the Comprehensive Plan Update and the update of the Regional Transportation Plan. The Working Draft Citywide Systems Plan includes a draft Transportation chapter. This chapter will be updated in future versions of this Plan to reflect new Transportation policies, investment priorities and funding strategies developed during the ongoing Transportation System Plan update.

Portland Watershed Management Plan

In 2006, Portland City Council adopted the Portland Watershed Management Plan (PWMP) in order to focus efforts to protect and restore Portland’s natural systems while also addressing relevant environmental regulations. The PWMP is a citywide plan that lays out an integrated, system-wide approach to improving watershed health. Although Environmental Services is the lead implementation bureau, the plan relies on and informs projects and programs of other bureaus, and relates to many infrastructure investments.

Other Bureau and Agency Plans

The Citywide Systems Plan draws from other plans and policies created and adopted by the City's planning and infrastructure bureaus and by agency partners. Individual bureau or asset plans form the foundation of the Citywide Systems Plan. In many cases, these plans provide more detailed information regarding infrastructure needs and investment strategies.

With the exception of the Transportation System Plan, discussed above, referenced Bureau and agency plans are not adopted as part of the CSP or the Comprehensive Plan. A list of supporting plans and reports can be found in Appendix C.

Process and Public Involvement

Periodic Review Work Program

Portland is updating its Comprehensive Plan, as required by the State of Oregon, through a process called 'periodic review'. According to the state, the fundamental purpose of Periodic Review is to ensure that local comprehensive plans are:

- Updated to respond to changes in local, regional and state conditions,
- Coordinated with other comprehensive plans and investments; and
- In compliance with the statewide planning goals, statutes and rules.

The Bureau of Planning and Sustainability developed a work plan for this update that has been approved by City Council and the Oregon Department of Land Conservation and Development (DLCD). The work plan includes the following tasks:

- Task 1: Community Engagement: Providing open and meaningful opportunities for individuals and organizations to effectively influence the Comprehensive Plan update.
- Task 2: Inventory and Analysis: Conducting research and analysis necessary to provide a solid factual base for the Comprehensive Plan update.
- Task 3: Consideration of Alternatives: Exploring the social, economic, environmental, and energy implications of alternative patterns of development.
- Task 4: Policy Choices: Considering and making a variety of policy choices.
- Task 5: Implementation: Identifying and developing implementation measures necessary to carry out the policy choices.

The Working Draft Citywide Systems Plan is a component of Task 4 and builds on the work completed in Tasks 2 and 3. As the Comprehensive Plan Update progresses, this document will be updated to more completely reflect preferred growth patterns and policy choices.

Interagency Coordination

This Working Draft of the Citywide Systems Plan was developed by the Citywide Systems Team. The Citywide Systems Team is an interbureau working group comprised of representatives from the Bureau of Environmental Services, Bureau of Transportation, Water Bureau, Portland Parks & Recreation, Office of

Management and Finance, and Bureau of Planning and Sustainability. The group is overseen by the Planning and Development Directors and convened by the Bureau of Planning and Sustainability.

Community Involvement

This Working Draft of the Citywide Systems Plan represents the first public opportunity for complete review of the Plan. However, the Plan draws on multiple planning processes developed in coordination with the community including:

- The Working Draft Part 1 of the Comprehensive Plan Update, which focused extensively on the draft Goals and Policies that shape this Plan. These draft Goals and Policies are included in Chapter 5. Key Infrastructure Policies.
- The Portland Plan, which set strategic priorities and guiding policies that provide a framework for the investments included in this Plan. The Portland Plan was developed in partnership with Portland agencies and institutions, community members, and businesses.
- The various bureau and agency plans on which this Plan draws. Many of these plans, ranging from Parks 2020 to the Bicycle Master Plan for 2030 and the Transportation System Plan, were developed in consultation with the community.
- The City's annual budget process and Budget Advisory Committees, which involve community members in shaping the City's capital improvement plan, which is reflected in this Plan's investment strategy.

Community opportunities to review and comment on the draft Citywide Systems Plan include online and mail comment options, and public workshops in the fall of 2014. The investment strategies outlined in this Plan are also included as map layers in the Comprehensive Plan Update's online Working Maps series. The Working Maps allow community members, businesses and other interested groups to compare infrastructure needs and investments with potential areas of growth, demographic information, and other policy choices to help identify and prioritize investment needs.

The Working Draft Citywide Systems Plan will also be updated to reflect ongoing community conversations occurring as part of the Comprehensive Plan Update, including Policy Expert Group discussions, public workshops and comments from individuals, associations, businesses and agencies.

Chapter 2
Asset Management

Effectively managing the City's infrastructure systems

The 2012 replacement value of the City's built infrastructure is estimated at $30 billion.[2] Providing, operating, and maintaining the City's infrastructure has become increasingly important as current systems age and the City's population grows.

Asset management is a tool to identify the most cost-effective way to protect assets, provide community services, and safeguard public health, environmental quality, and economic security. Asset Management is commonly defined as meeting agreed upon customer service levels, while minimizing life cycle costs at an acceptable level of risk. It focuses on delivering value to the customer – both in terms of the services provided and the rates charged – in an efficient and transparent manner.

The goal of asset management is to make better decisions about infrastructure acquisition, planning, design, construction, operation and maintenance, and renewal or replacement. There are "Five Core Questions of Asset Management" that help to achieve this goal:

- What is the current state of my assets?
- What is my required sustained level of service?
- Given my system, which assets are critical (based on risk) to sustained performance?
- What are the best "minimum life-cycle cost," Capital Improvement Program (CIP), and Operation and Maintenance (O&M) strategies?
- Given the above, what is my best financing strategy?

Asset management involves continuous improvement. City bureaus are committed to improving asset management practices to accurately inform strategic decision making and effective infrastructure management.

Maintaining existing assets

Because the city limits cannot expand significantly, the majority of new growth will be accommodated within the City's current boundaries. This means existing transportation, parks, water, sewer and stormwater systems will serve the majority of current and new residents' needs over the coming decades, resulting in additional demands on existing infrastructure. These systems also will be used more heavily, as new residents of Portland's suburbs come into the city to work, shop or play.

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[2] City of Portland, "Citywide Assets Report", 2012, Available at: http://www.portlandoregon.gov/bps/article/441932.

The City has a large infrastructure maintenance deficit, due largely to the age of many systems, chronic underinvestment in preventative maintenance and capital repair, increasing maintenance costs, and the lack of revenue to allow more sustainable investment.

At current funding levels, some of Portland's infrastructure will continue to deteriorate. This will increase the risk of asset failures, reduce levels of service, and perpetuate longstanding inequities. The City continues to develop more sophisticated methods for assessing and tracking the condition of its infrastructure. Currently it is estimated that significant numbers of bridges, traffic signals, street lights, water reservoirs, sewer pipes, natural resources and civic buildings currently are in poor condition or will be in 10 years.

Managing risk

Asset management looks comprehensively at the risks of infrastructure failure. Infrastructure can fail due to poor condition or impacts from a natural or manmade event, failure to provide the intended service, failure to meet regulatory goals, or failure to be cost effective. The City's infrastructure bureaus are undertaking risk management analyses, to help identify strategic investments that will cost-effectively reduce the likelihood of asset failure. These actions should increase the City's ability to meet community needs and protect human and environmental health. However, new funding strategies or sources will also be needed.

Complying with regulatory mandates

In addition to meeting maintenance and repair needs, the City also must comply with a variety of federal and state regulations, primarily related to service provision, public health and environmental quality. At the federal level, many of these mandates are related to the Clean Water Act, Clean Air Act, Safe Drinking Water Act, Endangered Species Act or Americans with Disabilities Act. Complying with these mandates has a significant impact on the City's capital priorities and represents a large component of infrastructure spending. These regulations often require involved and costly changes to the City's infrastructure but generally do not bring associated funding; this can mean that other maintenance, repair and improvement projects must be put on hold, or additional funding must be allocated. Although the City can estimate the cost to comply with existing mandates, potential future regulations could require additional funding and/or further restrict the City's infrastructure priorities. More detailed information on regulatory mandates can be found in the system-specific chapters of this plan.

Accommodating growth

The ability of the City's infrastructure to accommodate growth depends primarily on the City's ability to resolve current deficiencies—to serve underserved areas and to maintain the condition of existing infrastructure.

To better accommodate growth and reduce system loads, bureaus are actively researching and using a variety of demand management strategies. The ability of bureaus to innovate, reduce demand or increase efficiency through new technologies and practices will be instrumental in their ability to serve the city in the future.

Major redevelopment efforts can have significant implications on existing assets, and the type and extent of new infrastructure needed to serve an area. Without careful planning, such projects can overstretch the ability of existing built and natural infrastructure to meet community needs, particularly in underserved areas. As redevelopment is planned, it will be important to consider the full implications of such efforts on infrastructure needs and financial resources and to coordinate planning with other bureaus whose infrastructure might be impacted.

Addressing asset management needs

Conservatively, infrastructure bureaus estimate that the City needs to invest approximately $266 million more than current funding levels per year for each of the next 10 years to replace existing aging assets, maintain existing facilities, address regulatory requirements and/or meet service levels. This gap will likely grow for each of the next ten years. That level of reinvestment would require spending at least 25 to 40 percent more than the City currently spends on major maintenance and capital projects. New assets often add to ongoing operations and maintenance needs, potentially adding to the funding gap. Some new assets may also replace existing asset functions and add new functionality.

To maintain a high level of infrastructure services, the City will need to reassess service level standards, identify strategic investments, consider the full long-term costs of improvements, pursue innovative funding sources and partnerships and work with the community to make tough choices about funding priorities.

Growth forecasts and locations

Today, more than 584,000 people live in Portland. Over the last 30 years, Portland’s population has increased by more than 200,000 residents, primarily due to annexations in east and west Portland during the 1980s and 1990s. According to the Metro 2040 regional forecast, by 2035, Portland is expected to grow by nearly 280,000 people (132,000 households) and 147,000 new jobs, within its current boundaries.

Portland’s existing zoning has more than enough development capacity to accommodate anticipated future residential growth and most projected employment growth, except for industrial and institutional uses. This surplus capacity creates an opportunity to make choices about where to focus or prioritize that growth.

Buildable lands inventory

The Buildable Lands Inventory (BLI) is an assessment of the City’s capacity to accommodate projected changes in housing and employment. Possible physical and market constraints to achieving the forecasted increase in households and jobs were captured in a series of maps. The maps were used to identify land areas as either having full, diminished, or no capacity to accommodate additional housing units or additional jobs forecasted for the next 20 years.

A number of infrastructure related constraints were considered to pose physical or market constraints on new development and were accounted for in the inventory. These constraints included:

- Transportation Vehicular Level of Service
- Transportation Street Improvement
- Water Service
- Sewer Conveyance
- Stormwater Constraints
- Airport Flight Limitations

More information on the Buildable Lands Inventory is available at:
http://www.portlandoregon.gov/bps/59296

Growth scenarios

The Growth Scenarios report is a background report of the Comprehensive Plan and is a required element of Portland's Periodic Review work program (Task 3). The purpose of this report is to describe how and where Portland is expected to grow over the next 25 years, and to measure the performance of different alternate growth patterns and their ability to help meet Portland's goals and objectives. This analysis is rooted in the Measures of Success adopted in the Portland Plan.

The Growth Scenarios report offers a basis for making informed decisions about which investments and growth patterns will bring the greatest benefit to the most Portlanders, reduce disparities, increase opportunities and move the city closer to meeting performance goals, such as reducing carbon emissions, improving access to living-wage jobs, enhancing watershed health, reducing carbon emissions and providing safe and convenient access to goods and services within walking distance of where people live.

- Default – The Default Scenario is based on existing development patterns and development trends. This scenario distributes future growth in the same places Portland has seen growth over the past 15 years.
- Centers – The Centers Scenario focuses more growth in established centers like Lents, Hillsdale, and Gateway and less growth along the length of commercial and mixed-use streets.
- Corridors – The Corridors Scenario focuses more development along streets like SE Powell, SE Foster, SW Barbur and N Lombard and less growth in centers.
- Central City Focused – The Central City Focused Scenario concentrates nearly all growth in the Central City and the inner neighborhoods near the Central City, both east and west of the Willamette River.

More information on the Growth Scenarios is available at: http://www.portlandoregon.gov/bps/62384

Growth focus areas

Metro 2040, the Portland Plan, the Growth Scenarios Report, and the Working Draft Part 1 of the Comprehensive Plan Update all support and/or examine continued residential and mixed use growth in centers and along key corridors. This focus is intended to improve access to services and opportunities for active transportation, help the city achieve its climate adaptation and mitigation goals, and promote community and watershed health. Community conversations over the location, type, extent, and level of development in each center and corridor are underway as part of the Comprehensive Plan Update.

These same plans, along with the Economic Opportunities Analysis (EOA), expect high levels of growth and intensification in industrial sanctuaries, campus institutions, and dispersed industrial and employment areas throughout the city to accommodate future job growth.

Many of these centers, corridors, and employment areas will require additional public infrastructure investment over the next twenty years to resolve existing deficiencies and accomodate additional growth, encourage and support private investment, and develop complete communities. Future refinements to this Working Draft Citywide Systems Plan will be necessary to fully reflect infrastructure investment needs to support and accommodate growth in priority centers, corridors, and employment areas.

Preferred development scenario

The Growth Scenarios analysis and public input will be used to develop a Preferred Development Scenario, which will likely be an amalgam of the four growth scenarios. When complete, the Preferred Development Scenario will guide the development of the Comprehensive Plan Map, the Transportation System Plan, the Citywide Systems Plan, and the List of Significant Projects.

Land use changes in the Comprehensive Plan Update

The system-specific summaries below and chapters in this document assume no significant changes in land use designations or densities from the existing Comprehensive Plan. However, such changes may occur as part of the ongoing Comprehensive Plan Update. Changes to Comprehensive Plan land use designations may require reassessing facility needs, and would require updated needs assessments and investment plans in future drafts of this Citywide Systems Plan, to accommodate additional densities or different uses.

Summary of system capacity to accommodate growth

Environmental Services

The Bureau of Environmental Services (BES) plans for its facilities based on build-out densities allowed within existing City of Portland Comprehensive Plan land use densities, which are higher than current projections for the 2035 population. Additional investments in the sewer system will be necessary to address high risk assets and to provide stated levels of service. BES expects to be able to maintain and improve the sewer systems to handle growth needs as long as growth does not exceed densities designated in the current Comprehensive Plan and sewer rates are sufficient to finance system maintenance and capacity upgrades.

The city's stormwater system, composed of combined sewers (sanitary and storm), separated storm sewers, and drainage systems is constrained in some areas of the city. In these areas, existing and possible future development may exceed the natural and built systems' ability to manage stormwater. This could result in flooding, erosion, and damage to homes, business, roads, natural areas, and streams. Choices about how the city grows will have a substantial effect on the stormwater system.

Water

The Portland Water Bureau's primary distribution system can reliably deliver water through 2030, mostly using existing facilities. The Water Bureau is planning water infrastructure improvements to address increasing retail demands within the city limits; demand is expected to increase from 61.5 million gallons per day in 2005 to 79 million gallons per day in 2030. The Water Bureau also supplies water to regional wholesale customers. Population in areas served through these wholesale contracts is expected to increase significantly, resulting in potentially large increases in water demand.The Water Bureau, in collaboration with the Regional Water Providers Consortium, will also continue investing in water conservation programs that help manage demand and extend the life of the water supply system.

Transportation

The success of Portland's transportation system in meeting future local and regional mobility needs will depend on the City's—and its partners'—ability to maintain existing assets and make strategic investments. The City faces significant funding challenges, maintenance backlogs for existing assets; deficiencies in service provision; and challenges in providing complete, safe, and accessible pedestrian, bicycle, and transit systems.

Parks & Recreation

To maintain Portland's quality of life while accommodating growth, it will be necessary to preserve and enhance access to high-quality park and recreation experiences by acquiring and protecting parks and natural areas, maintaining existing facilities, and providing additional recreation facilities and services. The actual number of parks and facilities that will be needed will vary based on where and how growth occurs, the ability of existing facilities to serve additional users, and what opportunities arise to locate and build additional parks and facilities. Growth may also place additional pressure on heavily used facilities, such as pools, and it may exacerbate needs in currently underserved areas. These pressures may be particularly acute in centers that currently lack sufficient park amenities, where both existing facilities and acquisition opportunities are scarce.

Chapter 3
Integrated Goals

The Working Draft of the Comprehensive Plan Update includes a set of Integrated Goals – equity, prosperity, education, human health, watershed health, and resiliency – that integrate policy approaches across the Comprehensive Plan. These Integrated Goals, and the accompanying key directions, have direct implications for the City's infrastructure investment and management over the coming decades. The following sections address each of these goals and directions and highlight supportive infrastructure investments and approaches.

Equity

Portland is becoming an increasingly diverse city, and is home to people of many races, ethnicities, ages, abilities, and incomes. To serve the needs of a diverse city, the Portland Plan identifies equity as a key strategic priority and a frame for decision-making, investment, community engagement, and measurement of success. The Portland Plan defines equity as "…when everyone has access to the opportunities necessary to satisfy their essential needs, advance their well-being and achieve their full potential."

The Working Draft Part 1 of the Comprehensive Plan Update includes equity as an Integrated Goal, stating that "Portlanders of all cultures, ethnicities, abilities and economic backgrounds have access to the opportunities they need to advance their well-being and achieve their full potential. Communities equitably share the benefits of growth and change and no one community is over-burdened."

Portland's Demographics

Growing diversity and shifts in population and household makeup will bring corresponding changes in the values and needs of the community, and therefore changes in the types of transportation, water, park, and civic facilities needed. These changes may require the City to modify existing infrastructure practices or design systems that can anticipate and adapt to changing needs. For example, the City will need to improve transportation infrastructure so all Portlanders, including older residents, families with children, people with disabilities and residents with limited disposable income can walk, bike, or take transit in their neighborhoods and to destinations throughout the City. The City may also need to plan for improved or different parks and recreation facilities to accommodate diverse recreational needs and shifts in use patterns.

Race and Ethnicity

According to the US census, communities of color made up approximately 15% of Portland's population in 1980. In 2010 they represented 24% of the population, lower than the national average of 33 percent. In 2010, the City's population was approximately 7% Asian, 6% Black or African American, 1% American Indian and Alaskan Native, 1% Native Hawaiian and Pacific Islander, 5% two or more races, 76% white, and 4% some other race. Additionally, approximately 9% of Portlanders identify as Latino or Hispanic, an increase of over 50% from 2000.

Portland's youth, those 25 years old and younger, are more diverse than the city as a whole. In 2010, more than 36 percent of Portland youth are people of color —Black or African American, Native American, Native Hawaiian, Pacific Islander, Native Alaskan, Asian, or multiracial. In addition, more than 18 percent of all youth identify as Latino or Hispanic.

Age

The age of Portland's population has remained relatively constant over the past decade. In 2010, approximately 29% of Portlanders were 24 or younger, 36% were between 25 and 44 years of age, 25% were between 45 and 64, and 11% were 65 or older. In general areas further from the city's core, such as east Portland and near St. Johns, tend to have higher youth populations.

Disability

In 2000, approximately 19% of Portlanders over age 5 had a disability that impacted their daily activities. These disabilities included sensory, physical, and mental disabilities. Rates of disability are highest for those over 65, at 42.5%, and lowest for people between 5 and 20 years of age, at 8.9%. The Americans with Disabilities Act (ADA), enacted on July 26, 1990, provides protections to individuals with disabilities in the areas of employment, State and local government services, public accommodations, and telecommunications.

The Title II of the ADA prohibits all state and local governments from discriminating on the basis of disability, but moreover, its goal is to promote equal access and full participation. The City of Portland works to ensure that every program, service, benefit, activity and facility operated or funded by the City of Portland is accessible to people with disabilities. The City strives to eliminate barriers that may prevent persons with disabilities from accessing our facilities or participating in City programs, services and activities. The City is currently developing a Citywide transition plan to determine what physical barriers exist for persons with disabilities to access facilities owned or operated by the City.[3]

Income

In 2011, the median household income in Portland was $48,831. This is $7,023 less than the median household income in the Portland-Vancouver metropolitan region. The region's lowest median incomes can be found in north/northeast Portland, southeast Portland, and outer east Portland. Median household income has increased by approximately 21.6% since 2000, less than the rate of inflation. Approximately 28% of Portland households earn less than $25,000 annually, while 31% earn more than $100,000 annually.

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[3] City of Portland, Americans with Disabilities Title II Program. Online, available at http://www.portlandoregon.gov/bibs/62112

Fourteen percent of Portland's families were living below the poverty level[4] in 2011. Poverty affects over a quarter of youth under 18 (27%) and ten percent of people 65 and older. Similarly, 14% of local families access food stamp or SNAP benefits.

Investing to reduce disparities

To equitably serve Portlanders, the City must work to reduce existing disparities in infrastructure service. Providing basic infrastructure services in currently underserved areas is a challenge – particularly for transportation, parks and recreation, and stormwater services. Resolving these deficiencies and filling gaps in existing networks will aid the City in serving existing residents and accommodating new growth.

The Bureau of Transportation faces some significant deficiencies, based on existing levels of service and design standards. Issues include street connectivity, pedestrian and bike access and facilities, safety improvements and substandard streets.

Portland Parks & Recreation bases its service on sufficiency and access to park and recreation facilities. Unfortunately, many areas of Portland – especially outer east, southwest and central northeast – lack sufficient park and recreation facilities, such as developed parks, community centers and trails and natural areas. Some areas, including parts of outer east, southwest and central northeast Portland, face multiple park and recreation deficiencies. In addition, many areas lack the supporting pedestrian infrastructure to allow safe pedestrian access to parks and recreation facilities.

Environmental Services' investments in sewer and stormwater systems and wastewater treatment are prioritized by risk due to age, condition, capacity and regulatory mandates. Typically, high risk areas are located in Portland's inner neighborhoods, where infrastructure is the oldest. In East Portland, the sewer system is relatively new. There, and in other areas of the city, the bureau invests in other programs to address stormwater and natural system deficiencies and ensure the benefits of green infrastructure are equitably distributed. Examples include the Johnson Creek flood mitigation program, increased tree planting in canopy-deficient areas, and community watershed stewardship grants and education programs.

The Citywide Systems Plan represents a concerted effort to reduce these disparities through policies and investments.

Responding to local context

Each area of Portland has its own distinctive characteristics that are valued by community members. Different places are distinguished by their communities and their unique topographies, natural features, histories, assets, patterns of development and types of buildings.

Instead of following a one-size-fits-all approach, growth, investment and change can be harnessed to enhance positive and valued community characteristics by building on the strengths and assets of each area. The use of infrastructure service and design standards that reflect the unique physical and service

[4] In 2011, the poverty threshold was $22,350 for a family of four.

needs of different areas of the City will ensure infrastructure is context-sensitive and provides appropriate levels of service.

Promoting inclusive public process

The City supports appropriate and inclusive public process in investment decision-making – from project identification and prioritization to design and construction – for its various infrastructure systems. Comprehensive Plan Community Involvement policies (see Chapter 1. Community Involvement, of the Comprehensive Plan Working Draft Part 1) and guidance provided by the Community Involvement Program support inclusive, meaningful, and transparent public involvement throughout the City. Community involvement in decision-making should be tailored to respond to the unique needs of the project and the impacted community.

Using an equity lens

Putting equity into practice requires considering relevant data and questions and setting priorities to advance equity in decision-making. City infrastructure bureaus have been working both internally and with community members and partners to improve common understanding of infrastructure equity. Meeting the needs of a diverse and changing population will require addressing existing disparities while remaining mindful of, and adapting to, changes in community needs over time. There is, and will continue to be, a need for capacity-building, data refinement, risk assessment, community involvement, and the evolution of policies and practices to fully understand and address the equity impacts of infrastructure decisions.

The following questions can serve as an initial step to implementing an equity lens to ensure equitable outcomes in infrastructure investment decision-making. These questions can be asked at different phases of an infrastructure project, policy or program to begin to assess potential equity impacts:

- What is the existing level of service in the project area? How does it compare the the existing level of service across the City?
    - If the level of service in the area is less than other areas in the City, what are the economic, social and environmental impacts of that reduced level of service? Does the project remedy those impacts?
    - If the level of service in the area is equal to or greater than other areas of the City, what is the drivers, desired results or outcomes of the infrastructure project or program?
- What is the demographic make-up of the area?
- Are there current or historical disparities related to the infrastructure service? How does the service provided by the proposed asset maintenance, rehabilitation or renewal relate to those disparities? Could the project be improved to further reduce existing disparities?
- Who benefits most from the infrastructure project? Does the infrastructure project positively benefit racial, ethnic, or low-income communities, or people with disabilities?
- Are there potential negative consequences, impacts or burdens of the infrastructure project on racial, ethnic, or low-income communities, or people with disabilities? If so, what are the strategies to mitigate these negative impacts?

- How does the infrastructure project support inclusive, meaningful and transparent public involvement, particularly for those most impacted?
- Based on the information gathered and the answers to these questions, does the project or program support increased equity in the City?

Prosperity

Infrastructure can be an important component of a successful economic development strategy or a key barrier to competitiveness and sustainability. Planning efforts for economic development should consider the opportunities of existing infrastructure capacity, challenges of deficiencies, and strategies to finance priority improvements. Economic development also offers potential opportunities to fund infrastructure improvements through public/private partnerships and other financing mechanisms.

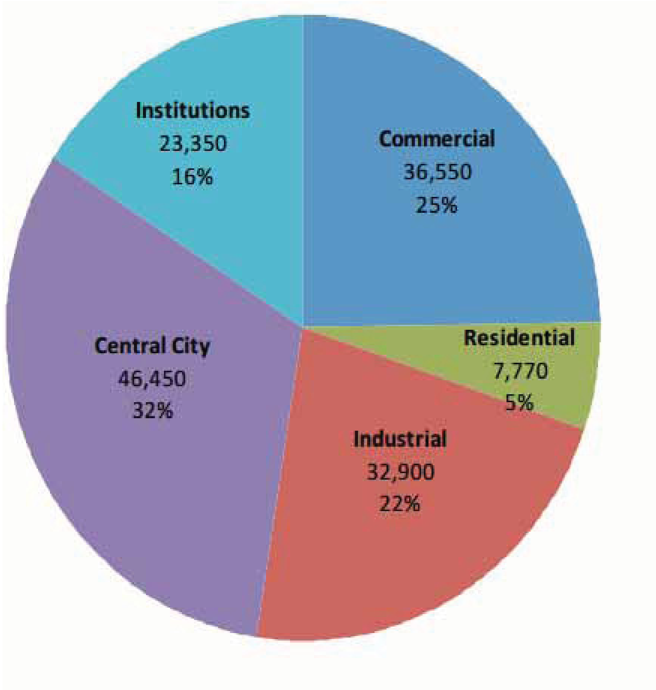
Economic Shifts and Employment Forecasts

Portland is the metropolitan area's regional job center and is home to 39% of the region's jobs, versus 26% of the population. While Portland's job growth has been nearly flat (5%) since 2010, Metro expects the city will see new job growth over the next 20 years. It expects 147,000 new jobs in Portland, representing about 27% of the region's expected job growth. This level of growth is comparable to the city's historic 'capture rate' of 25% of regional growth.

Manufacturing remains a key employment sector with above average wages and high employment multiplier effects – one manufacturing job supports 3.69 total jobs in the region. Manufacturing output (or GDP) has actually been growing faster than the service sectors. Institutional and office are leading sectors, with employment shifting from manufacturing to services.

Over the next twenty years, Portland will see growth in all five employment geographies, see Figure 3.1 – in the Central City, industrial areas, commercial areas, institutions like hospitals and universities, and in residential areas. Supporting employment growth and the success of existing businesses in each of these areas may result in different infrastructure needs and investment priorities.

Figure 3.1 2010-2035 Employment Growth by Geography



Building a resilient economy

Competitiveness

The growth of global markets means Portland must continue to provide sufficient, high quality employment land and necessary infrastructure to be competitive and attract and retain businesses. To accomplish this, the City strives to provide adequate industrial and employment lands, served by associated infrastructure services, and to keep utility and infrastructure costs competitive. In the coming decades, the City may see a continued shift in primary industries, as the importance of high-tech and creative industries grows. These businesses may require different types and degrees of infrastructure services. Quality of life improvements, such as multi-modal transportation options, parks and open spaces, and trails, will also be key to attracting and keeping a quality workforce.

Capacity and Viability

To maintain its economic competitiveness, the City must provide adequate employment capacity and protect the viability of its industrial areas and harbor, which may require infrastructure improvements geared toward the types of industries in these areas. Infrastructure improvements will also be needed to allow economic development of new areas or more intense development of existing commercial and industrial zones.

Portland's Economic Opportunities Analysis (EOA) (2012), recommends infrastructure investment as a strategy to help meet Portland's future industrial and institutional capacity needs. It recommends prioritizing infrastructure investments that will result in greater utilization of existing industrial properties as a strategy to meet capacity needs. Such infrastructure investments could include improvements to transportation and transit systems, sewer and water facilities, as well as telecommunications infrastructure. For institutional campuses, public transit infrastructure is the highest investment need.[5]

Transportation and Freight Movement

Many local industries and businesses rely on reliable and efficient transportation systems, particularly for freight. Portland's transportation system is critical to the regional economy, as it provides connections to major markets within the City, access to major rail and cargo routes, and is a key link in the interstate highway system.

Congestion can impede freight movement, cause delays to businesses and commuters, and increase the cost of doing business in Portland. In general, as roadways reach capacity, small increases in the number of vehicles result in large increases in delays.[6] Conversely, small decreases can also reduce congestion significantly. Successful travel reduction strategies, such as providing affordable, reliable, and connected alternative transportation systems can improve freight movement, reduce commute times, and help attract and keep a quality workforce in Portland.

Portland's Economic Opportunities Analysis recommends "strategic investments in the freight transportation systems and infrastructure needed to grow Portland's competitive position in the rapidly growing and changing international marketplace."[7] The EOA highlights the importance of continued investments in Portland's transportation infrastructure as outlined in the City's adopted Freight Master Plan (2006), which details policies, strategies, and desired improvements to freight management and movement in the City. Priority is given to the Freight Master Plan's program of strategic investments to encourage reinvestment and industrial expansion in Columbia Harbor as Oregon's international trade gateway, freight distribution hub, and international airport.

The Economic Opportunities Analysis also recommends prioritizing and better linking freight transportation improvements with other infrastructure investments in employment districts. To begin, it recommends working with regional partners to develop a regional freight rail strategy focused on enhancing rail access, travel time, and the efficiency of rail operations for competitive access to markets.

Funding investments

Portland, like many cities across the nation, faces infrastructure funding challenges. Although the City is implementing best management practices and working with public and private partners to improve the efficiency and effectiveness of its infrastructure systems, new ways to fund infrastructure will be needed in the future, either to replace currently outdated funding systems or supplement inadequate funding levels. Portland's Economic Opportunities Analysis (2012) recommends that the City, and the region, pursue alternative infrastructure investment and funding strategies to maintain a competitive and innovative

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[5] City of Portland (2012). *Economic Opportunities Analysis – Section 4 Alternative Choices*. p. 26. Retrieved from http://www.portlandonline.com/portlandplan/index.cfm?c=51427&a=392786
[6] Dill, 2007.
[7] City of Portland (2012). *Economic Opportunities Analysis – Section 4 Alternative Choices*. p. 19. Retrieved from http://www.portlandonline.com/portlandplan/index.cfm?c=51427&a=392786

business environment. The EOA lists maintenance and upgrades to the transportation system, particularly for freight mobility, and broadband investments to support high tech industry as key infrastructure investment areas in need of alternative funding strategies.[8]

Education

Creating an educated Portland requires ensuring that all youth have the necessary support and opportunities to thrive – both as individuals and as contributors to a healthy community and a prosperous, sustainable economy.[9]

Supporting youth success

The city's infrastructure, particularly its transportation systems, parks and recreation facilities, access to nature, and police and emergency services are critical to creating neighborhoods that support youth success. The Portland Plan sets a 2035 goal that all youth live in safe and supportive neighborhoods with safe and affordable transportation options, multiple opportunities for daily physical activity and healthy eating, public safety services, and quality schools that offer multiple community-serving functions.

The Citywide Systems Plan includes a variety of investments that help to create complete neighborhoods supportive of youth sucess. The Plan includes active transportation investments to create safe walking and biking routes throughout the city to key destinations like schools, centers, transit, parks and natural areas. It also includes programs and investments to maintain and improve parks, recreation facilities and school grounds to increase access to recreation. The Plan also supports investments and programs to bring nature into the city through enhanced habitat corridors, tree planting, and the use of vegetated stormwater faciltiies, like green streets and stormwater swales. Finally, the Citywide System Plan also continues and supports collaborations between the City and local school districts around safe routes to schools, recreational programs and neighborhood and police services.

Human and watershed health

A healthy city requires quality basic services to protect and promote human health and safety and watershed health. The City's transportation, water, sewer, stormwater, green infrastructure, park and recreation, and police and fire facilities and services are all critical to protecting and maintaining health and quality of life in Portland. The Citywide Systems Plan includes investments in projects and programs to manage and maintain these public infrastructure systems to provide these essential services.

Creating healthy, complete neighborhoods

Complete neighborhoods are neighborhoods where people have safe and convenient acess to the goods and services needed in daily life. They include housing options, grocery stores and other commercial services, quality public schools, public open spaces and recreational facilities, affordable active

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[8] City of Portland (2012). *Economic Opportunities Analysis – Section 4 Alternative Choices*. p. 11. Retrieved from http://www.portlandonline.com/portlandplan/index.cfm?c=51427&a=392786

[9] City of Portland (2012). The Portland Plan. p. 33.

transportation options, and civic amenities. A complete neighborhood must also meet the needs of people of all ages and abilities.

Complete neighborhoods can improve human and watershed health by protecting air and water quality through more trees and natural elements; creating safe and convenient options to walk, bike or take transit; and providing nearby access to parks and natural areas. These elements further promote human and environmental health by reducing auto emissions and other pollutants, and by supporting community resiliency and preparedness in an emergency or disaster. Maintaining existing built and natural infrastructure, as well as providing new infrastructure, is a critical part of creating complete neighborhoods.

Connecting people and places

Connecting Portlanders through active and low-carbon transportation options to their neighborhoods and to key destinations across the city and the region is integral to improving personal, public and environmental health. Such transportation choices reduce the need to drive, which can promote health by increasing physical activity, reducing household costs, increasing access to the outdoors, and reducing carbon and other air and water pollutants. Making active transportation a safe and convenient option requires creating a network of safe, accessible and attractive streets, trails, parks and open spaces that encourage active living, community interaction and integrate nature into neighborhoods. In addition to human and environmental health benefits, shifting travel to active transportation can increase capacity on roadways for freight movement – an important factor in economic prosperity. The Citywide Systems Plan includes projects and programs to improve active transportation networks and improve the safety of the city's roadways.

Protecting watershed health

Healthy watersheds provide a broad array of ecosystem services, including helping to keep the air and water cool and clean, storing and moving streamflow and stormwater,and reducing the risks and impacts of natural hazards and climate change. These services are critical to protect public health and safety and the City's infrastructure systems. They also help the City meet environmental regulations. The Portland Plan establishes objectives and actions to achieve by 2035 to protect and improve watershed health and associated benefits. The Natural Resource Inventory, adopted as part of the factual basis for the Comprehensive Plan, will inform programs to protect and restore the rivers, streams, wetlands, and vegetation that provide these services, and are also vital components of City's stormwater infrastructure system in many areas of the City. The Citywide Systems Plan identifies priority projects and program investments needed to sustain and improve key watershed functions relating to hydrology, water quality, habitat and biological communities, and to meet existing and emerging regulatory obligations.

Designing with nature

The Citywide Systems Plan and the Comprehensive Plan Update's draft goals and policies encourage infrastructure design that protects and enhances watershed health and ecosystem services and avoids the costs associated with degraded natural resources. The updated goals and policies call for treating stormwater as a resource, protecting existing green infrastructure such as trees and natural drainageways, and incorporating large canopy trees and landscaped stormwater facilities into the design of the street system in order to mimic the natural functions of a healthy watershed. The Citywide Systems Plan includes policies and investments intended to further integrate green infrastructure into the city's infrastructure planning, design, and implementation.

Resiliency

Adapting to and mitigating climate change

Portland's climate is changing. Temperatures have increased by an average 1.5 F over the past century in the Pacific Northwest and precipitation in the Pacific Northwest has generally increased, especially in the spring. The future impacts Portland experiences from climate change will depend largely on whether global carbon emissions decline quickly, plateau, or continue to rise.

In the Pacific Northwest, climate change projections indicate an increase in average annual temperature of 3.3 F to 9.7 F by the end of this century, with greater warming happening in the summers. These projections forecast decreases in summer precipitation (by as much as 30 percent) and increases in winter precipitation over the coming century. In the future, Portland will likely experience hotter, drier summers, and warmer, wetter winters; with more heat waves during the summers.

Portland's infrastructure is vulnerable to several climate change risks, including increased flooding and landslides in the winter, and high temperatures, drought and wildfire in the summer. Portland's infrastructure has been built to withstand the historic climatic record. Events outside of that past experience, or an increased number of damaging events, can significantly impact important infrastructure services such as water, sewer, stormwater, and transportation. Climate change impacts can result in some infrastructure systems becoming more frequently stressed, overloaded, or at times, partially or totally unavailable.

Portland's green infrastructure, including tress, ecoroofs, green street facilities, wetlands, and natural waterways, could also be affected by climate change. For example, hotter summers can stress vegetation and make it more succeptible to diseases, pests and invasive species. Increased flooding onto developed lands is likely to result in increased pollution and sediment entering streams, reducing water quality. However, with investment, green infrastructure could also mitigate stress on other assets. For example, increased tree canopy can reduce the severity of heat waves in the city, and green streets can reduce urban flooding.

Considering the impacts of climate change and identifying vulnerabilities and risks of those impacts, enables the City to make more informed infrastructure investment decisions to better prepare and adapt for climate change and improve the resiliency of critical infrastructure. Climate change vulnerabilities must be incorporated into the risks of failure of the City's infrastructure so assets can be appropriately maintained, designed, and replaced to improve the resiliency of systems to hotter drier summers, wetter winters, and storms of increased intensity.

Preparing for and responding to natural hazards[10]

The City of Portland faces potential impacts from a wide variety of natural hazards including earthquakes, severe weather, floods, landslides, wildland urban interface fires, and volcanic activity. The city's infrastructure facilities and services are vulnerable to natural hazards and are also key to recovering from such events. The City's Natural Hazard Mitigation Plan identifies natural hazards, assesses the related threat and vulnerability to the city's facilities, and recommends mitigation strategies to address high risk assets. The following types of infrastructure are important to hazard preparedness, response, and recovery:

- **Essential facilities** are necessary for continuation of operations and include police and fire stations, City Hall, the 1900 Building, the City's Emergency Coordination Center, the 911 Call Center, and the Justice Center.
- **Critical facilities and infrastructure** include "systems and assets necessary to ensure continuity of security, safety, health and sanitation services, support the area's economy and/or maintain public confidence. Incapacitation or destruction of any of these systems or assets would have a debilitating impact on the area either directly, through interdependencies and/or through cascading effects."[11] Critical infrastructure includes public services that have a direct impact on quality of life such as communication technology (phone lines or Internet access), vital services such as public water supply, sewage treatment, and transportation facilities, such as airports, heliports, highways, bridges, tunnels, roadbeds, overpasses, railways, bridges, rail yards, depots and waterways, harbors and dry docks.
- **Lifelines** include utility systems (potable water, wastewater, oil, natural gas, electric power facilities and communication systems) and transportation systems (airways, bridges, roads, tunnels and waterways). Communications facilities are also important lifelines.
- **High Potential Loss Facilities** include facilities that would have a high loss associated with their failure, such as nuclear power plants, dams and military installations. In Portland, such facilities would include the inner city dams operated by the Portland Water Bureau, such as those at Mount Tabor and Washington Park, and the Linnton tank farms.

Adapting to social and economic changes

Resilient infrastructure must be adaptable to social and economic shifts as well as natural and climactic changes. Many types of infrastructure built today – including roads, pipes, and parks – are expected to last for many decades. Planning, managing and investing in the City's infrastructure in ways that reflect changing demographics and economic needs, as discussed earlier in this chapter, will be integral to meeting the needs of the community over coming decades.

[10] Adapted from City of Portland, Natural Hazard Mitigation Plan, 2010.
[11] Portland/Vancouver Urban Area Critical Infrastructure Protection Plan, 2009.

Chapter 4
Infrastructure and Service Delivery

Urban Service Provision

Urban Service Area

The City of Portland is the primary provider of infrastructure facilities and services, including transportation, water, sanitary sewer, stormwater, civic, and park and recreation, within the Portland urban services boundary (USB). The urban service area largely corresponds to areas within the city limits of Portland, but also includes additional unincorporated areas, see Figure 4.1.

The City of Portland partners with a variety of agencies and organizations to provide infrastructure services within the Portland urban service boundary, see below. While generally not explicitly discussed in this report, the capacity of these partner agencies to provide necessary services affects the City of Portland's service capabilities and demands. As part of the Citywide Systems Plan project, the City of Portland has or should establish intergovernmental service agreements with agency partners that provide urban services within the Portland Urban Service Boundary, in accordance with Oregon Revised Statute 195 and 197. These service partners are noted with an asterisk (*) below; accompanying agreements can be found in Appendix B. Urban Service Agreements.

In some cases, the City of Portland provides infrastructure services to areas outside of the City of Portland urban services boundary, through service contracts with neighboring jurisdictions.

Service Responsibilities

The City of Portland provides the following public facilities and services within Portland:

Transportation

The City of Portland manages and/or regulates public rights-of-way and manages and maintains a variety of transportation facilities. Transportation facilities and services are also provided by a variety of other public agencies:

- Multnomah County* manages and maintains six Willamette River bridges.
- The Oregon State Department of Transportation* manages the state highway system.
- TriMet* provides and operates the regional transit system, with the exception of the Portland Streetcar which is owned by the City of Portland, operated by Portland Streetcar Inc, and funded in partnership with TriMet.
- The Port of Portland*, a regional agency, operates several marine terminals and the Portland International Airport.
- The BNSF Railway, Union Pacific Railroad, Portland and Western Railroad, Portland Terminal

Railroad, Peninsula Terminal Railroad, and Amtrak move goods and people by rail.

Sanitary and stormwater

The City of Portland is the primary provider of sanitary sewers, wastewater treatment, stormwater management and conveyance, and flood control except as follows:

- Washington County's Clean Water Services* provides stormwater management and conveyance to some areas of west Portland, under agreement with the City.
- The Multnomah County Drainage District* provides stormwater management and conveyance services and flood mitigation and control in much of the Columbia Corridor.
- Management of stormwater on private property has an impact on the amount and quality of stormwater entering public stormwater systems.

Water supply and distribution

The City of Portland is the primary provider of water supply and distribution, except in areas where service is provided under agreement with water districts, see below. Except as noted below, these water districts are wholesale customers of the Portland Water Bureau and therefore rely, to some degree, on the water supply, transmission, and storage infrastructure of the City of Portland.

- The Rockwood People's Utility District* provides water infrastructure and services to some areas of east Portland.
- The Burlington*, Tualatin Valley*, Valley View*, West Slope*, Palatine Hill*, and Alto Park* Water Districts and the Lorna Water Company provide water service to primarily unincorporated areas within the Portland urban service boundary to the west, southwest, and northwest of Portland.
- The Clackamas River Water District* and Sunrise Water Authority* provide water services to unincorporated areas within Portland's urban service boundary to the south of Portland. These water districts operate in partnership with each other through a cooperative agreement and use the Clackamas River as their main water supply source.

Parks and recreation

The City of Portland is the primary provider of public parks, recreation and natural areas. The City also manages Portland's urban forest, including regulation of street trees, public trees, and some private trees, and development and implementation of strategies, education programs, and best management practices. Partners include:

- Oregon State Parks, which owns and operates Tryon Creek State Natural Area.
- Metro, the regional government, manages regional parks and natural areas as well as the Oregon Zoo.

Public safety

Public safety and emergency services, including police, fire, and emergency management, are provided primarily by the City of Portland.

Solid waste, composting and recycling

The City of Portland regulates the collection and hauling of solid waste, compost, and recycling. Metro is the regional solid waste authority, charged with ensuring that the region's solid waste is managed in a manner that protects public health and safety and safeguards the environment. The City partners with Metro and supports Metro's work to ensure sound landfill management.

- Metro regulates facilities and operates transfer stations; private companies collect, transfer, process, and dispose of solid waste, compost, and recycling.

Public education

The City partners with school districts on school facility planning and siting.

- Portland Public Schools and the David Douglas, Parkrose, Reynolds, Centennial, and Riverdale School Districts, as well as public colleges and universities provide public education.

Energy and communications

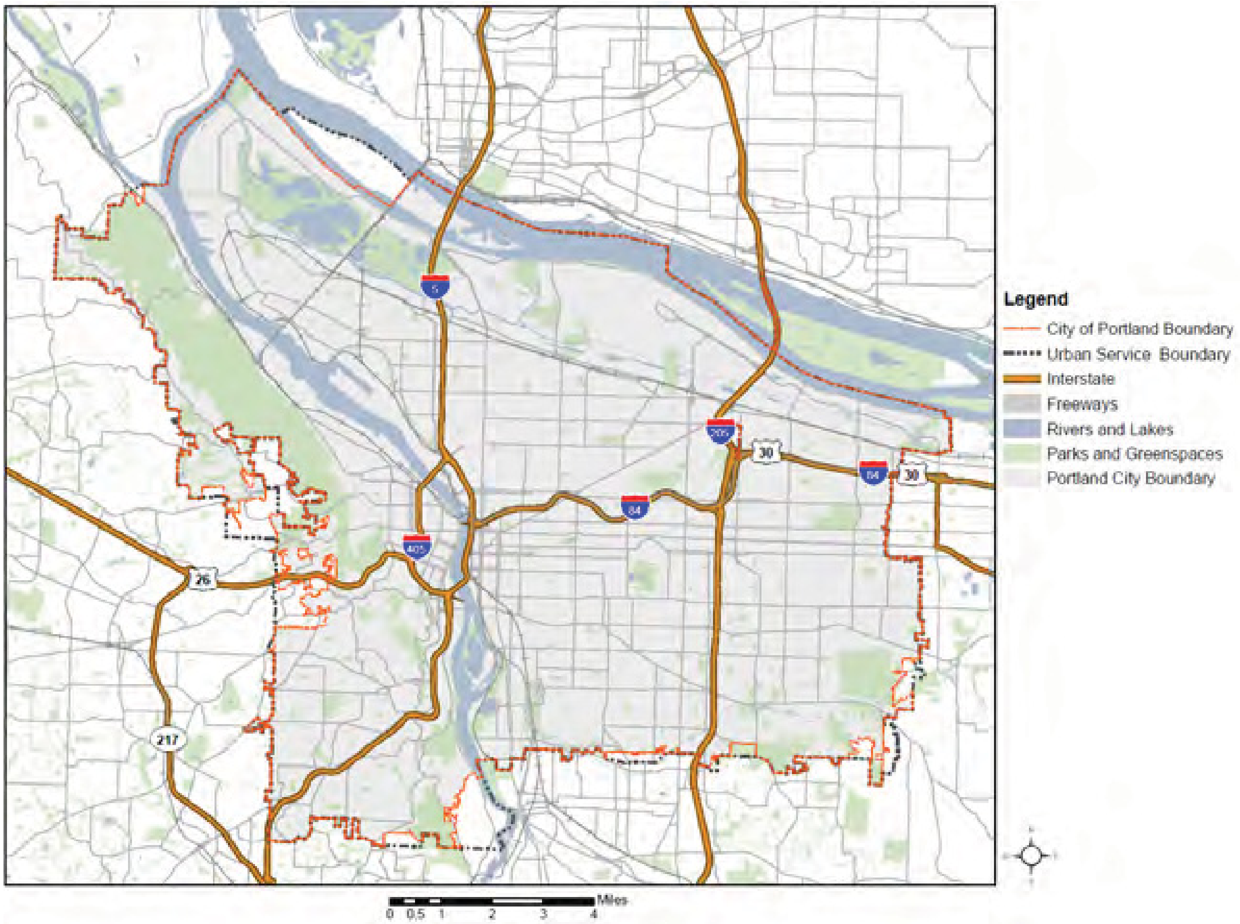
The City of Portland regulates energy and communications services within the urban services boundary. Energy and communications infrastructure and services are provided by private utilities and companies.

- Northwest Natural, Pacific Power, Portland General Electric provide electric and natural gas to Portland residents and businesses.
- Telephone and communications service is provided by Century Link, Comcast, Verizon, and various wireless providers.

Health and human services

- Multnomah County provides libraries, health and human services and justice services.

Figure 4.1. Portland's Urban Service Boundary and City Limits



Citywide inventory

The City of Portland provides and maintains infrastructure systems that supply water, sewer, transportation, parks and civic services. These infrastructure systems represent a significant investment in the City and have a current replacement value of more than $30 billion.[12]

Table 4.1 Summary of Portland's Infrastructure Systems

Transportation	Environmental Services	Parks	Water
			
- 4,842 lane miles of roads - 160 bridges - 1,072 traffic signals - 8.8 million square yards of sidewalks - 37,813 improved corners - 55,389 street lights	- 1,454 miles of separated storm and sanitary sewer pipes - 885 miles of combined sewer pipes - 97 pumping stations - 2 wastewater treatment plants - 47,779 storm and sanitary sewer access structures - 1,6701,900 green stormwater facilities (green streets and swales) - 7,036 other water quality facilities (green streets, swales, ponds) - 885,312 feet of culverts and ditches - 8,58715,367 underground injection control facilities (UICs) and sedimentation manholes	- 11,195 acres of parkland - 5 golf courses - 8 botanical gardens - motorsports raceway - 4 stadiums - 13 pools - 18 community and arts centers - 152 miles of regional trails - 125 playgrounds - over 300 sports fields - 47 community gardens - 124 tennis courts - 5 skateparks - 32 dog off leash areas	- Bull Run watershed - Columbia South Shore wellfield - 238 million gallons finished storage - 75 miles of conduits - 49 miles of transmission mains - 2,200 miles of pipes - 1,600 culverts - 2 dams - 33 wells - 184,000 service lines - 44,000 valves - 184,800 meters - 14,200 hydrants - 38 pump stations - 70 storage tanks

[12] City of Portland, "2012 City Assets Report". Accessed at: http://www.portlandoregon.gov/bps/article/441932

Table 4.2 Portland's Infrastructure: Inventory, Value, and Condition (2012)

Capital		Replacement Value		Current Condition (in %)						
Asset Class	Description	$ million	Confidence	Very Good	Good	Fair	Poor	Very Poor	TBD	Confidence
Transportation		**$8,066.8**								
Arterial & collector streets	1,871 lane miles	$2,451.0	Moderate	18	21	21	32	8	0	High
Local streets	2,971 lane miles	$2,304.8	Moderate	12	19	22	36	11	0	High
Sidewalk system										
sidewalks	8,833,812 sq yds	$1,113.1	High	10	25	30	25	10	0	Moderate
curbs	3,260 centerline miles	$533.6	Moderate	12	50	16	12	10	0	Moderate
corners	37,813 corners	$158.5	High	10	18	17	28	27	0	High
Structures (bridges only)	160 bridges	$378.5	Optimal	6	42	33	18	1	0	Optimal
Traffic signals (hardware only)	1,072 traffic signals	$275.3	Moderate	15	16	23	23	23	0	Moderate
Street lights	55,389 street lights	$194.3	Low	4	12	39	30	15	0	Low
Support facilities	various buildings	$6.9	None to Low	condition ranges from poor to very good						None to Moderate
Other transportation assets	Streetcar, aerial tram, signal controllers, traffic calming devices, street signs, pavement markings, meters, retaining walls, stairways, guardrails, harbor wall.	$650.8	Low to Optimal	condition range from poor to very good or tbd						Low to Optimal
Environmental Services		**$12,517.1**								
Combined sewers	883 mi. of pipe & access	$4,745.5	High	52	18	12	12	6	0	High
Sanitary sewers	1012 mi. of pipe & access	$3,880.9	High	72	20	6	2	0	0	High
Stormwater system	458 mi. of pipe; 1530 pollution reduction facilities	$1,840.7	Moderate	27	29	15	22	7	0	High
Wastewater treatment	2 treatment plants & 97 pump stations	$2,050.0	Moderate	20	20	30	20	10	0	Low

		Replacement Value		Current Condition (in %)						
Capital Asset Class	Description	$ million	Confidence	Very Good	Good	Fair	Poor	Very Poor	TBD	Confidence
Water		**$5,472.0**[13]								
Supply	126 miles of roads, 1609 culverts, 12 bridges, 1 200-ft high concrete dam, 1 110-ft high earth dam, ASR wells, 33 well sites with drilled wells, pumps and motors, monitoring wells, 1 groundwater pump station, treatment facility, tank, and collection mains to bring water from wells to pump station	$826.1	Moderate	4	54	39	3	0	0	Moderate
Transmission	75 miles of large diameter conduits, with various supports, 9 conduit trestles 7 river crossings, 49 miles of large diameter transmission mains	$1,202.4	Moderate	6	43	44	8	0	0	Moderate
Terminal storage	238 million gallons finished water storage, interconnecting piping, post-storage treatment facilities, and microhydro facility.	$786.9	Moderate	0	2	24	74	0	0	High
Distribution	2200 miles of distribution pipes, 184,000 service lines, 44,000 system valves, 6800 large meters, 178,000 small meters, 14,200 hydrants, 24,000 backflow devices, 38 pump stations, 70 storage tanks	$4,176.3	High	14	47	31	6	2	0	High
Support facilities	13 support buildings, SCADA, vehicles, construction equipment, lab equipment, computers, and infrastructure components in inventory	$105.0	High	24	17	10	16	32	0	Moderate

[13] 2008 values increased from 2007 values by using the ENR-CCI increase of 4.2%

Capital Asset Class	Description	Replacement Value $ million	Replacement Value Confidence	Current Condition (in %) Very Good	Good	Fair	Poor	Very Poor	TBD	Confidence
Parks and Recreation		**$984.3**[14]								
amenities				--	--	--	--	--	--	--
furnishings in developed parks	decorative elements and furnishings: memorials, plaques, display fountains, benches, tables, drinking fountains in developed parks and natural areas	$17.60	Low	10	38	37	9	2	4	Moderate
furnishings in natural areas				0	0	0	0	0	100	TBD
decorative elements				0	0	0	0	0	100	TBD
buildings and pools	community and arts centers, pools indoors and outdoors, restrooms, maintenance and utility buildings	$268.50	High	--	--	--	--	--	--	--
major buildings				61	9	26	0	4	0	High
minor buildings				42	19	29	6	3	0	High
recreation features	gathering places, play areas, sports fields and courts, water play areas, docks and boat ramps	$228.60	Low	--	--	--	--	--	--	--
gathering places				0	0	0	0	0	100	TBD
marine				71	0	6	23	0	0	High
off-leash areas				0	0	0	0	0	100	TBD
play areas				3	38	52	5	2	0	High
sports courts and fields				39	24	15	19	3	0	Low
water play				0	0	0	0	0	100	TBD
built infrastructure	circulation systems such as trails, walks, roads and parking lots; utilities	$63.80	Low	--	--	--	--	--	--	--
circulation				0	41	40	18	0	0	Moderate
utilities				0	0	0	0	0	100	TBD
green infrastructure	natural areas, gardens, turf, flower and shrub beds, trees	$405.8	Low	--	--	--	--	--	--	--
natural areas				50	31	6	12	1	0	Moderate
developed areas				10	34	45	7	4	0	Low

[14] Parks used a 4.2% inflation factor, based on ENR-CCI data.

Capital Asset Class	Description	Replacement Value $ million	Replacement Value Confidence	Current Condition (in %) Very Good	Good	Fair	Poor	Very Poor	TBD	Confidence
Civic		**$1,016.9**								
Facilities (buildings, structures)										
Police facilities	Four precincts, Justice Center, property warehouse, equestrian division, and vehicle storage lot	$93.3	High	0	100	0	0	0	0	High
Office buildings	Portland Building, 1900 Building, City Hall	$159.7	High	0	38	62	0	0	0	High
Other buildings	Archives and Records Center, Kerby Garage, and Portland Communications Center	$52.6	High	0	61	0	39	0	0	High
PDC facilities	Train station and related buildings and Centennial Mills	$45.1	Moderate	0	0	80	20	0	0	High
Spectator facilities	Memorial Coliseum, Rose Quarter parking garages, and PGE Park	$490.3	Moderate	0	37	63	0	0	0	High
Portland Center for the Performing Arts	Portland Center for the Performing Arts	$103.3	Moderate	tbd	tbd	tbd	tbd	tbd	0	TBD
Fire facilities	30 stations, administration building and support facility	$87.5	High	0	98	0	2	0	0	High
Police facilities	Four precincts, Justice Center, property warehouse, equestrian division, and vehicle storage lot	$93.3	High	0	100	0	0	0	0	High
Technology Services										
Communications-BTS	Data networks, WiFi network, 800 MHz radio system	$70.9	Moderate	0	100	0	0	0	0	High
Production Services-BTS	Storage area network, core servers, and email system	$3.0	Moderate	0	100	0	0	0	0	High
Strategic technology-BTS	Large corporate applications owned and managed by BTS such as GIS	$8.2	Moderate	0	100	0	0	0	0	High
Electronic equipment and software-other bureaus	Video systems, electronic equipment, Office Suite software, bureaus' PC's and laptops	$7.5	Moderate	0	100	0	0	0	0	High

Infrastructure Coordination

Asset management

The City of Portland has asset management programs in the five major infrastructure bureaus – the Bureau of Transportation, Bureau of Environmental Services, Portland Water Bureau, Portland Parks & Recreation, and the Office of Management and Finance. While each Bureau's asset management activities differ, based on the needs of their unique systems, they coordinate with each other on an individual basis and through the City Asset Managers Group (CAMG). The CAMG is a cross-bureau effort to establish best practices and continually improve performance-based information available to the public, bureaus, and city leaders as they make choices in the types and levels of service desired. The Group produces an annual City Assets Report that provides information on the value, condition and funding needs for the City's assets. The information contained in this report helps decision-makers make more informed decisions in the annual budget process.

Annual City Budget[15]

Each year, all City bureaus participate in the annual budget process, which sets appropriation levels for operations and capital projects for the following fiscal year. The budget process is governed by Oregon's Local Budget Law, Chapter 294 of the Oregon Revised Statutes, which provides standard procedures for preparing, presenting, and administering local budgets; and ensures citizen involvement in budget preparation.

Budgeting in Oregon is an effort shared by citizens and elected and appointed officials. Citizens involved in the budget process work to ensure the services they require and want are adequately funded. City officials are responsible for building a budget that reflects the public interest and is structurally correct.

Budget Process

There are four primary steps in the creation of each year's budget – preparation of a proposed budget, approval, adoption, and amendment.

- **Preparing the Proposed Budget**: Acting as the Budget Officer, the Budget Director is responsible for overseeing the preparation of the Mayor's Proposed Budget for presentation to the City Council, sitting as the Budget Committee. The Proposed Budget is the culmination of an extensive process of budget development, analysis, and revision. Bureaus prepare Requested Budgets in accordance with direction given by the Mayor. These are submitted to the City Budget Office, which then analyzes the requests.
- **Approving the Budget**: In accordance with Local Budget Law, the City Council will convene to consider the Proposed Budget. The public is encouraged to attend and provide testimony on the Proposed Budget. The City Budget Office then summarizes the changes from the Mayor's Proposed Budget to the Approved Budget. This information and copies of the Proposed Budget

[15] This section was adapted from the 2013-2014 City of Portland Annual Budget. The full description of the budget process can be found in Volume 1: Citywide Summaries and Bureau Budgets, pages 34-37.

are sent to the Tax Supervising & Conservation Commission for review, analysis, and certification.

- **Adopting the Budget:** City Council votes to officially adopt the budget before the start of the new fiscal year. Changes between the time the budget is approved and final adoption are limited to technical adjustments and other amendments defined by Local Budget Law.
- **Amending the Budget:** Changes after budget adoption are completed through the budget monitoring process (BMP), which also includes a supplemental budget. During the BMP, bureaus can request to transfer appropriation. In supplemental budgets, bureaus may ask to increase appropriation. The BMP and supplemental budgets provide Council the opportunity to change the budget three times a year.

Public Involvement Process

The City engages in a proactive public outreach effort as part of the budget process through:

Bureau Budget Advisory Committees: Bureau-specific Budget Advisory Committees, made up of City staff, community members and technical experts, review the bureau’s draft budget request, weigh in on the program and service rankings, and provide input on proposed reductions.

Community Hearings: In advance of the Adopted Budget, the City holds community hearings where specific input is gathered from Portland residents. The feedback Portlanders provide helped Council prioritize services.

Portland Utility Review Board (PURB): The PURB is an appointed body of nine community members who provide independent and representative review of water, sewer, stormwater, and solid waste financial plans, budgets, and rates. PURB operates in an advisory capacity to the City Council. Council expects the PURB to provide common ground between the rate makers and the ratepayers through analysis of financial plans and budgets. The board meets monthly to ensure a comprehensive understanding and assessment of the workings of the City's utilities.

Direct Public Testimony: Community members may directly contact the Mayor and Commissioners with input for the budget. In addition to participating in the budget advisory committees, the PURB, and community budget forums described above, community members can also personally testify on bureau budget requests at annual budget hearings, at the Tax Supervising and Conservation Commission hearing, and at the adopted budget hearing.

Development review

Building permits are reviewed by multiple City bureaus, including the infrastructure bureaus discussed in this report. The bureaus consider potential impacts of proposed development on infrastructure levels of service, and may require improvements to infrastructure before a land use permit is issued. Bureaus also review requests for most land use adjustments, such as conditional uses and land divisions. In these instances, they may require improvements – such as building streets, sidewalks, sewer and water lines – as a condition of approval. In some instances, system development charges (SDCs) are assessed instead of or in addition to requiring improvements to infrastructure. The SDCs are assessed based on the potential impact of the proposed development.

Annexation[16]

The City of Portland is the primary infrastructure provider for areas within the City limits of incorporation. Annexation is the process of changing municipal boundaries to bring in adjacent unincorporated areas into an existing city, typically to provide urban services not presently available. Either a city or property owner may initiate such action.

The City of Portland has adopted a boundary for the area that it intends to provide urban services at some point in the future as its urban area builds out. This is Portland's urban service boundary (USB) that was adopted in cooperation with surrounding jurisdictions. Property owners within Portland's urban services boundary may apply to annex to the City of Portland to receive urban level services, such as connection to City sewer and water systems. In these areas, the City plans for eventual service provision to urban service standards upon annexation of these properties into the City of Portland.

The Cities of Portland and Gresham annexed virtually all the unincorporated areas of Multnomah County between them in the late 1980s and early 1990s in order to provide sewers and other urban services to this rapidly developing area. Currently, the City of Portland is considering annexing West Hayden Island. If this annexation occurs, future refinements to the Citywide Systems Plan may be necessary to plan for eventual service delivery to this area. The City is not pursuing any other large-scale annexations of nearby unincorporated areas; property owners initiate most small-scale annexations.

Citywide Investment Strategy Summary

This draft Citywide Systems Plan contains a draft Investment Strategy for the Bureau of Environmental Services, Portland Water Bureau, Bureau of Transportation and Portland Parks & Recreation. For full information, see Chapters 6 through 10 and Appendix A. The projects and programs included in the Investment Strategy are intended to maintain existing assets, comply with regulatory mandates, and provide key levels of service to existing and future residents and businesses.

Future drafts of the Citywide Systems Plan will include more refined investment strategies that reflect priority projects for funding within constrained resources. Future refinements will also include the state-required List of Significant Projects – those new facilities necessary to accommodate the residential and employment growth anticipated in the Comprehensive Plan Update.

Table 4.3 Investment Strategy Summary

Bureau	Estimated Investment Strategy Total (2013-2033)
Environmental Services	$2,000,251,000
Water	$1,567,070,000

[16] Adapted from City of Portland, “Annexation”, accessed on July 15, 2013 at http://www.portlandoregon.gov/bps/article/363163.

Transportation	$2,835,935,344
Parks & Recreation	not applicable
TOTAL	$6,403,256,344

System Summaries

Bureau of Environmental Services

The Bureau focuses efforts on comprehensive, multi-purpose solutions across four program areas of the Investment Strategy – wastewater treatment, collection system maintenance and reliability, system development, and surface water (stormwater and watershed) management. These investments are driven by regulatory mandates, system risk (condition and capacity), and system plans including watershed planning and monitoring. The Bureau anticipates over $2 billion in investment in these programs over the next twenty years, see Table 4.4, Chapter 6 and Appendix A for more information on anticipated investments. Additional investment in ongoing operations and maintenance, green infrastructure programs, and other non-capital investments to meet stormwater, sewer and watershed health system needs are not included here.

Table 4.4 Environmental Services Investment Strategy Summary

Program	FY 2013-2018	FY 2018-33
Wastewater Treatment	$90.388,000	$300,000,000
Collection System Maintenance & Reliability	$343,179,000	$900,000,000
System Development	$26,687,000	$60,000,000
Surface Water Management	$79,997,000	$200,000,000
TOTAL	**$540,251,000**	**$1,460,000,000**

Portland Water Bureau

The Portland Water Bureau's Investment Strategy for the Citywide System Plan is divided into seven (7) primary programs: Supply, Transmission and Terminal Storage, Distribution, Treatment, Regulatory Compliance, Customer Service, and Support. The Water Bureau anticipates over $1.5 billion in new investment in these programs over the next twenty years, see Table 4.5, Chapter 7 and Appendix A. Investment Strategy provides greater detail on anticipated water projects and investments.

Table 4.5 Portland Water Bureau Investment Strategy Summary

Program	FY 2013-2018	FY 2018-33
Supply	$14,291,000	$88,500,000
Transmission and Terminal Storage	$191,170,000	$242,000,000
Distribution	$244,197,288	$461,650,000
Treatment	$2,500,000	$150,000,000
Regulatory Compliance	$25,504,000	$30,000,000
Customer Service	$3,057,000	$53,700,000
Support	$10,000,000	$50,500,000
TOTAL	**$490,719,288**	**$1,076,350,000**

Bureau of Transportation

(This summary will be added in Proposed Draft. Appendix A includes the draft Investment Strategy for Transportation, based on the current Transportation System Plan. The Transportation System Plan, including this list of projects is being updated as part of the Comprehensive Plan Update.)

Portland Parks & Recreation

Portland Parks & Recreation has identified many infrastructure needs over the next 20 years to meet the level of service goals outlined in the Parks 2020 Vision, including:

- Acquisition for developed parks, natural areas, trails, recreation and maintenance facilities.
- Maintenance of Existing Parks, Natural Areas, Trails, and Facilities
- Development of New Community Centers
- Development of New Parks
- Improvements at Existing Developed Parks
- New Trails / Improvements to Existing Trails
- Natural Area Parks

The Portland Parks & Recreation 20-year capital improvement plan (CIP) list includes projects that have been identified at this time. The CIP list does not yet include projects for locations where Portland Parks & Recreation has not yet acquired property or developed a master plan for a site, or projects for tree maintenance and canopy expansion investments.

Chapter 5
Key Infrastructure Policies

The Working Draft Part 1 of the Comprehensive Plan Update, available at http://www.portlandoregon.gov/bps/pdxcompplan/, includes draft goals and policies reglated to infrastructure facilities and service provision. The draft goals and policies will be updated to reflect public and agency feedback in the Proposed Draft of the Comprehensive Plan Update, available in 2014. The Proposed Draft of the Citywide Systems Plan will also include relevant policies.

While all chapters of the Working Draft Part 1 contain language that may be relevant to infrastructure and service provision, Chapter 6: Public Facilities and Services and Chapter 7: Transportation contain goals and policies for service delivery and system management for public rights of way, sanitary and stormwater systems, water, parks and recreation, and transportation.

Chapter 6
Bureau of Environmental Services

Overview

The work of the Bureau of Environmental Services (BES) has changed significantly since the adoption of the 1980 Comprehensive Plan. For example, the annexation of large areas of east Portland and the mid-county sewer project, both during the 1980s, greatly expanded the city and added new residents and businesses to the bureau's customer base. In addition, completion of the 20-year Combined Sewer Overflow (CSO) control program in 2011 means untreated sewage no longer routinely overflows into the Willamette River or the Columbia Slough. The decisions made during the design of the CSO control program included an ongoing commitment to manage new impervious area drainage at, or as close to, the source as practical. Another major change was the passage of the 1987 Amendment to the Clean Water Act which recognized the importance of regulating stormwater runoff. BES is continuing to improve its scientific and engineering approaches to managing wastewater, stormwater, and overall watershed health. The Bureau has evolved from simply a sewer and stormwater utility to a complex entity with broad responsibilities related to human and environmental health and stewardship responsibilities for an extensive network of aging infrastructure.

Mission and Values

BES's mission is to serve the Portland community by protecting public health, water quality and the environment. The Bureau provides sewage and stormwater collection and treatment services to accommodate Portland's current and future needs. The Bureau protects the quality of surface and ground waters and conducts activities that promote healthy ecosystems in our watersheds.

The Bureau is "*Working for Clean Rivers*" and its vision is to be recognized as a trusted service provider and innovative environmental leader through a demonstrated commitment to clean rivers, healthy watersheds and our community.

In the 2011 Strategic Plan, the Bureau identified five priorities for the next five years:

- Responsibly manage ratepayer funds to provide services that address community needs now and in the future.
- Invest in new natural and built systems to protect public health and improve watershed health.
- Protect, rehabilitate, and maintain our existing infrastructure for long-term reliability.
- Build and expand partnerships to better meet our Mission and Vision.
- Cultivate leadership and excellence in our workforce.

System Services

BES provides sewage and stormwater management services in its service area. BES is also the responsible bureau for compliance with several state and federal regulatory requirements for groundwater, and surface water resources, as well as the Endangered Species Act. BES is the lead bureau for planning, implementating, monitoring, and reporting on watershed health improvement projects and programs. BES also administers the City's brownfield remediation program.

The Bureau provides wastewater collection and treatment services within the city limits and to areas outside the city limits within the City's established urban services boundary (USB). BES provides sewer service to specific areas outside the USB via contract agreements with neighboring jurisdictions where sanitary sewers from outside the USB flow to a BES sewer or treatment facility (Clean Water Services and Lake Oswego in the southwest, Water Environment Services of Clackamas County in the southeast, and city of Gresham in the east). Similarly, some neighboring jurisdictions treat sewage from the BES system.

The Bureau operates and maintains the stormwater collection system and has an oversight and regulatory role for stormwater management within the City's USB. The City's municipal stormwater permit (MS4 NPDES Discharge Permit) covers stormwater from approximately 15,500 acres within Portland's USB that drain to the MS4 system. The City also manages stormwater with sumps or drywells primarily on the east side of the city, under the Water Pollution Control Facilities (WPCF) for Class V Stormwater Underground Injection Controls (UICs) permit.

The Bureau is the city's lead agency for watershed protection and restoration for Portland's five watersheds (Johnson Creek, Fanno Creek, Tryon Creek, Columbia Slough, and the Willamette River) within the USB. All of the watersheds extend beyond the city limits, requiring extensive collaboration with other local, regional, state, and federal agencies.

Service Agreements

The City of Portland has service agreements with other jurisdictions which allow for treatment of each other's wastewater flows:

- Lake Oswego, for cost sharing of the Tryon Creek Wastewater Treatment Plant.
- Gresham, Milwaukie, Clackamas County Service District #1, and Clean Water Services, for treatment of sewer flows.
- Dunthorpe-Riverdale Service District, for which Portland provides operations and maintenance, engineering, permitting, and treatment services.
- The City also maintains agreements with the Port of Portland and other private entities for maintenance of private pump stations.

The City is negotiating and expects to have in place for Fiscal Year 2013-14 an agreement with Multnomah County Drainage District #1 covering District provision of stormwater management services.

Inventory Summary

The Bureau of Environmental Services is responsible for facilities associated with sanitary sewage and stormwater service. The sanitary and combined sewage systems include both collection and treatment facilities. Two municipal wastewater treatment plants serve the city: the Columbia Boulevard Wastewater Treatment Plant (CBWTP) and the Tryon Creek Wastewater Treatment Plant (TCWTP). Separated stormwater system assets include collection, conveyance, and treatment and detention facilities.

In 2012, the city’s wastewater and stormwater systems combined had an estimated replacement value of $12.5 billion. In addition, the Bureau invests in and relies upon the city’s natural infrastructure (such as natural areas, tree canopy, wetlands, and streams) for managing rainfall and stormwater runoff. The value of these assets is not included in the $12.5 billion.

Table 6.1 Estimated Replacement Value

System	Inventory	Estimated Replacement Value
Combined Sewers	885 miles of pipe & access structures	$4.7 billion
Sanitary Sewers	1,000 miles of pipe & access structures	$3.9 billion
Stormwater system*	1,900 water quality facilities & 454 miles of pipe	$1.8 billion
Wastewater Treatment	2 plants & 97 pump stations	$2.1 billion
Total		$12.5 billion

* Estimated replacement value does not include the value of the nearly 9,000 Underground Injection Controls (UICs).

The city’s combined sewer system provides sanitary and stormwater service to approximately one-third of the city’s area, and the majority of its population, through over 885 miles of pipes. Separate sanitary and storm sewer systems serve the remaining two-thirds (by area) of the city, primarily in the western and outer eastern areas. The separated sanitary sewer system includes a network of 1,000 miles of sanitary lines and associated access structures.

In addition to gravity sewer pipes and service connections, the wastewater system includes more than ninety pump stations and 57 miles of force main which move wastewater uphill as needed to two wastewater treatment plants, where a series of processes clean wastewater through removal of solids and organic materials and disinfects the effluent before discharging to the Columbia or the Willamette River.

The separated stormwater system collects and conveys stormwater for discharge to local receiving waters and includes pipes, culverts, ponds, sumps, detention facilities, ditches, and drainageways, some of which are neither owned nor controlled by the city.

Condition and Capacity Summary

The Bureau has recent condition inspections for all but a small percentage of the sanitary sewer collection system. Comprehensive condition data is not available for the stormwater system.

Based on recent inspections or condition assessment, over 80% of the combined and sanitary only pipes are in good or very good condition. Although the completion of the CSO program allows capital resources to shift to rehabilitation and system improvements, projected investments are not keeping pace with the rapidly aging collection system. While age is a good predictor of pipe failure, materials must also be considered. Unfortunately, a significant percentage of the pipe system is concrete pipe that was installed in the early 1940s. Because much of the concrete in that era was poor quality, these pipes are failing more rapidly than might be expected from age alone.

Based on recent inspection data, most (69%) combined sewer system pipes are in good to very good condition, but approximately 10% of pipes are at high risk of failure and in need of repair or upgrading. The sanitary sewer pipes are generally much newer than the combined system pipes and over 90% are in good to very good condition. An estimated $225 million is needed to address the highest risk pipe segments. Projects to address this backlog are included in the proposed Investment Strategy, see Appendix A.

BES has established levels of service consistent with our regulatory permits for both the combined and separated sewer systems. In the combined system, the benchmark is to convey the 25-year storm at full land use build-out (i.e., consistent with the zoning and the Comprehensive Plan) without risk of basement sewer backup or surcharging of trunk sewers. In the separated sanitary system, the benchmark is to convey the 5-year storm.

In the combined system, the areas most affected by hydraulic capacity are concentrated close in on the east side with scattered areas in other parts of the system. A number of projects to address this hydraulic deficiency are included in the proposed Investment Strategy.

In the separated sanitary system, capacity is impacted by stormwater entering the sanitary system. Because the source of the stormwater inflow and infiltration can be difficult to identify, engineering solutions are challenging to design. Funds are included in the Investment Strategy to address this issue in the basins most impacted. These basins are concentrated in southwest Portland.

The pumping and treatment systems require regular and more frequent capital investment. While pipes have an estimated 100-year useful life, mechanical and electrical components have a useful life that ranges from 20 to 50 years. In general, all of the pump stations and Columbia Boulevard Wastewater Treatment Plant have sufficient capacity. However, Tryon Creek Wastewater Treatment Plant requires capacity upgrades to serve future growth projections and meet expected regulatory requirements. Projects to address both condition and capacity are included in the proposed Investment Strategy, see Appendix A.

Capacity issues for stormwater vary by watershed. Unique challenges exist in the west hills, in the outer east buttes, and along the Columbia Slough--all of these locations have underserved areas. A number of projects to address stormwater conveyance and/or water quality are included in the proposed Investment Strategy.

Key Issues and Concerns

Serving Existing Residents: Wastewater

Both Portland's combined sewer system and its sanitary sewer system have hydraulic and condition deficiencies that impact the ability of these systems to serve existing properties at designated service levels. These deficiencies can result in higher risks for sewer backups, surcharging, and/or overflows. The greatest concentration of combined sewer pipe segments with capacity problems is located in the older central neighborhoods. The majority of the sanitary sewer system pipes have adequate capacity. Deficiencies are concentrated in the southwest (Fanno and Burlingame basins) where the system is impacted by stormwater entering the sanitary sewers.

Pipe segments that are in poor structural condition are widely distributed throughout the service area with the exception of outer east Portland where the collection system is relatively new.

Small geographic areas within the service area continue to treat sanitary sewage using some type of onsite system such as a cesspool or septic tank and drainfield. Development of new onsite systems is discouraged by the state and the county (the permitting authority) because of the high risk of bacterial contamination to surface and ground water. A program to extend sewers to some of the unsewered areas is included in the proposed Investment Strategy. However, it is important to note that it may not be technically or financially feasible to provide sewer service to all properties within the USB.

Serving Existing Residents: Stormwater

In areas not served by the combined sewer system, stormwater is conveyed through pipes, ditches, or drainageways to streams and rivers or filtered into the ground through sumps (UICs). In some cases, stormwater is managed in detention facilities, other vegetated facilities, or allowed to infiltrate in natural areas. Safe conveyance of stormwater is an issue in some areas, particularly in the hilly areas of west Portland and some parts of outer southeast which lack comprehensive conveyance systems and where infiltration is limited by geology or high groundwater. In some cases, solutions may not be technically or financially feasible.

Nuisance flooding also continues to be an issue in the Johnson Creek area. The City is working with partners to restore more natural stream and floodplain conditions to manage 10-year storm events.

Maintenance of Existing Infrastructure

For 2012, sanitary and stormwater systems have an estimated annual capital maintenance funding gap of $12.4 million, including $2.4 million in combined sewers and $10 million for stormwater. The long-term financial forecast anticipates significant increases in the capital maintenance budget as the system continues to age. BES is applying new technologies and collecting improved data on its assets allowing for enhanced analysis, planning, and implementation of corrective action.

In addition to capital maintenance, the bureau's operating resources for operational maintenance needs is strained across all asset types. As of July 2012, the city's stormwater system included more than 1,900 water quality facilities including green streets, vegetated swales, constructed wetlands, and ponds. In addition, the City owns nearly 9,000 UICs and thousands of storm inlets, trash racks and sedimentation manholes. Although green infrastructure such as green streets and swales can have lower overall life cycle costs (capital and operating combined) than a piped solution, these facilities require more regular maintenance to be effective. As the Bureau's portfolio of stormwater infrastructure assets increases, additional operating resources are needed for maintenance. Increases to the operating budget have not been supported in recent years.

Meeting Regulatory Requirements

Bureau projects and programs address a wide range of regulations that focus on protecting human and environmental health. Major mandates stem from five federal acts: the Federal Clean Water Act, Safe Drinking Water Act, Water Resources Development Act, the Endangered Species Act, and Comprehensive Environmental Response, Compensation and Liability Act. Whenever possible, the Bureau's approach to addessing regulatory requirements is to take a comprehensive "watershed approach" to achieve broader environmental health and other city goals. Looking ahead, potential changes in regulatory mandates or permit conditions could present additional financial challenges for the Bureau. More information on regulatory requirements and the watershed approach can be found later in this chapter.

Accommodating Growth

The Bureau of Environmental Services plans for its facilities based on build-out densities allowed within existing comprehensive plan land use densities, which are higher than current 2035 population projections as provided by Metro. The Bureau expects to be able to maintain and improve the sewer systems to accommodate growth as long as densities do not exceed those designated in the 1980 Comprehensive Plan as amended, and as long as sewer and stormwater rates are sufficient to meet capital investment needs. Increased densities may require modifications to existing infrastructure including upsizing pipe and/or green infrastructure.

The geographic distribution of new growth is potentially a concern for all BES services – sanitary sewer, stormwater management, and protection and improvement of watershed health. In parts of the city, it is difficult to provide traditional constructed sanitary and/or stormwater systems, both from a cost and engineering perspective. Coordinating growth and density in areas with good infiltration or where constructed stormwater management is technically and economically feasible will help address these concerns. Development of some currently underdeveloped areas may be limited by options for sanitary sewer service and/or stormwater management.

Climate Change

Climate change is expected to influence local hydrology, habitat, and water quality. Preliminary analysis regarding anticipated local impacts suggests that changing weather patterns and temperatures may affect local stormwater management, wastewater treatment, and watershed health. It is not possible to accurately predict the degree of change in climate variables, therefore an adaptive management approach is necessary. The climate variable with the most potential to cause problems for the stormwater system is changes to winter rainfall patterns.

Most of the stormwater pipes and sumps (UICs) in Portland have been in place for decades and were sized with assumptions about climate and land use that were appropriate at the time they were built. Some of these systems are already experiencing problems with the increased runoff caused by increased impervious area. Changing rainfall patterns during the winter months could exacerbate this problem. It could also cause increased erosion and sediment in stormwater. Sediment can clog pipes, make greenstreet facilities less effective, and deteriorate water quality of receiving streams.

The combined sewers could also be impacted by changing rainfall patterns with the added concern of the potential for more frequent combined sewer overflows (CSOs). During very heavy rain storms, runoff from buildings, streets, and other impervious surfaces impacts combined sewer capacity potentially causing overflows.

Climate change predictions and include higher summer air temperatures and resultant increases in water temperatures. When wastewater temperatures increase, the dissolved oxygen content decreases and the biological activity of wastewater treatment processes tend to increase. Higher temperatures could result in increased odor production in the collection system and increased oxygen requirements for some biological treatment processes.

Increased temperatures and shifts in the timing and amounts of precipitation could also affect the region's natural systems. These changes are likely to stress and change vegetation, including vegetated facilities (such as green streets, ecoroofs, and raingardens), and natural areas, particularly wetlands and streams, that we depend on to manage stormwater naturally. Risk of wildfires, floods, and invasive plants and animals are expected to increase. These changes may lead to increasing or more restrictive regulations especially as more fish and wildlife species are listed as threatened or endangered due to changes in habitat, and may lead to higher operations and maintenance costs for infrastructure.

Sanitary Sewer and Stormwater Rates

Construction of the recently completed combined sewer overflow control facilities has increased sewer and stormwater rates significantly over the past decade. Portland's rates are high by regional and national standards, however, this is expected to change as other cities begin to undertake combined sewer overflow control capital projects. Planned operations and maintenance of, and capital improvements to, the sewer and stormwater systems will depend on continued predictable increases in sewer and stormwater rates. Continued public acceptance of rate increases is essential to meeting level of service standards and will require open and clear communication with the public and decision makers.

Investment Strategy Summary

The work of the Bureau is focused on strategic and comprehensive project and program delivery to protect public health and restore the environment. The Bureau anticipates nearly $2 billion in capital investment over the next twenty years. Using a risk-based asset management approach, the Bureau budgets to maintain infrastructure and protect or enhance natural systems to meet regulatory requirements and enhance the health of watersheds. Asset management addresses life-cycle costs, trade-offs between capital and operating expenditures, and prioritization of projects based on consequence and likelihood of failure, to achieve long-term system sustainability and acceptable levels of service. This approach is reflected in the Bureau's operating budget as well.

Regulatory Compliance

Environmental Services' projects and programs are largely guided by, or in response to, several federal regulatory mandates related to wastewater, stormwater, and natural resources. These regulations are focused on protecting human health and the environment, in line with the bureau's mission. Integrated planning efforts, including a comprehensive view of watershed health, guide the Bureau's response to many of these regulatory mandates. The watershed approach provides a framework to coordinate and integrate regulatory response to achieve efficiencies and address the larger goals of clean and healthy rivers, rather than separately addressing single issues or regulatory drivers (such as flooding, contaminated sediments, or water quality in streams). Key regulatory mandates are described below.

Clean Water Act

National Pollutant Discharge Elimination System Permits

The National Pollutant Discharge Elimination System (NPDES) permitting program was developed to control the discharge of point and certain non-point sources of pollution to the nation's waters. The NPDES program is administered in Oregon by the Department of Environmental Quality (DEQ). Several different types of NPDES permits apply to BES:

- **Wastewater Program**
  Portland has NPDES Waste Discharge permits for treated municipal wastewater discharges from the Columbia Boulevard Wastewater Treatment Plant (CBWTP) and the Tryon Creek Plant (TCWTP). The permits include water quality-based effluent limits, a pre-treatment program, and a requirement to establish a 'Fats, Oils, and Grease' program and an illicit discharge response. The newly completed CSO facilities also are regulated under this permit.
- **Stormwater Program**
  Portland has a Phase I NPDES permit for stormwater discharges from the municipal separate storm sewer system (MS4). The City's compliance approach is outlined in the Stormwater Management Plan (2011) which includes the following elements: development standards; industrial and commercial controls; illicit discharge detection and elimination; structural controls; operations and maintenance; preservation and restoration of natural areas; and public involvement.
- **Industrial Stormwater Program**
  Portland is the agent for DEQ for administration of 1200-Z and 1200-COLS industrial stormwater permits within its jurisdiction. Some types of industrial permits, such as 1200-C permits for large construction sites, are administered directly by DEQ.

Capacity, Management, Operations, and Maintenance (CMOM) Regulations

CMOM is a requirement of the CBWTP permit. It requires the bureau to improve the performance and reliability of the sanitary and combined sewer systems. Consistent with the 2011 NPDES Permit for CBWTP, BES submitted a Draft CMOM Program Report to DEQ in June 2013. The CMOM program is intended to reduce the likelihood of sewer releases by improving the overall reliability of the sanitary and combined sewer collection system. The strategies and activities defined align with the asset management approach to managing, operating, and maintaining the wastewater collection system. The approach uses risk-based strategies for the development, reinvestment, operations, and maintenance of the system.

Water Quality Standards and Total Maximum Daily Load Programs

Section 303 of the Clean Water Act established programs to develop and implement water quality standards and limits for pollutants received by water bodies. DEQ is responsible for developing water quality standards and total maximum daily loads (TMDLs) in Oregon. TMDLs specify the maximum amounts of certain pollutants (including heat) that a particular body of water is allowed to receive without exceeding water quality standards. The goal is to protect beneficial uses such as recreation, cold water fisheries, municipal and industrial water supplies.

The City is responsible for addressing Environmental Protection Agency (EPA)-approved TMDLs in the Lower Willamette mainstem and its tributaries, as well as in Tryon, Fanno, and Johnson Creeks; and the Columbia Slough.

Amended Stipulated Final Order (CSO Program)

In 1991, BES entered into a legal agreement with DEQ concerning the city of Portland's CSO-abatement program. Overflows from Portland's Combined Sewer Overflow (CSO) system violated water quality standards for the Willamette River and the Columbia Slough, subject to the Clean Water Act. Completion of the CSO controls program in 2011 was a major milestone. Of relevance to this CSP, the agreement requires Portland to continue to further reduce CSO discharges using cost-effective methods that achieve other mission-based objectives such as watershed health, stormwater management, and wastewater operations and treatment. The Post-2011 CSO Facilities Plan was submitted on September 2010 and approved by DEQ in February 2011. Projects to meet this Plan are included in the Bureau's proposed Investment Strategy.

Safe Drinking Water Act

Underground Injection Control (UIC) Program

The National UIC Program was enacted in 1974 under the Safe Drinking Water Act. In Oregon, the program is administered by DEQ. In 2005, DEQ issued the City a Water Pollution Control Facility (WPCF) permit for stormwater discharges to approximately 9,000 city-owned UICs. The ten-year WPCF permit regulates the construction, operation, and maintenance of all City-owned UICs. The permit required the development and implementation of a UIC Management Plan, describing the measures the City will implement to control pollutants prior to discharge to a UIC to protect groundwater as a drinking water resource. The UIC Management Plan (2008, revised 2012) includes the following elements:

- Systemwide inventory, assessment and evaluation to determine compliance, prioritization and response actions.
- System management to prevent, minimize and control stormwater prior to discharge, including operations and maintenance, spill prevention and pollution control.

- Stormwater Discharge Monitoring Plan (2006, revised 2012) for data collection and evaluation to demonstrate public UICs are operated in a manner that protects groundwater as a drinking water resource.
- Corrective Action Plan (2006) to evaluate, select, and implement actions to address UICs that do not meet permit conditions.

The City has completed a signifcant amount of work to ensure compliance with the permit. Additional projects are included in the proposed Investment Strategy.

Endangered Species Act (ESA)

Eight species of salmon and five species of steelhead spawn, rear and migrate through watercourses in the Portland area, including the Columbia River, Columbia Slough, Willamette River, Johnson Creek, Tryon Creek, Fanno Creek, and several other smaller westside streams. All 13 species are listed as threatened or endangered under the Endangered Species Act (ESA). In addition, ESA-protected Pacific eulachon (smelt), bull trout, and green sturgeon are present in the Columbia and Willamette Rivers and some local tributaries, and streaked horned lark (a bird found primarily in the Columbia Slough) is proposed for listing as a threatened species. Pacific lamprey are an ESA candidate species as well.

Portland's waterways are designated as protected critical habitat. This triggers specific requirements for any project, including city infrastructure projects, that involve federal actions such as funding or permitting. The City worked with the State of Oregon to develop a regional recovery plan that was approved by NOAA Fisheries in July 2013. Based in part on the City's Framework for Watershed Health and the Portland Watershed Management Plan, the recovery plan identifies limiting factors for listed fish, establishes delisting and broader recovery goals, and identifies actions to move towards these joint goals. At this time, there are no approved recovery plans for eulachon, bull trout, green sturgeon, or streaked horned lark. The City has signed a multi-part memorandum of understanding with US Fish and Wildlife Service to improve conditions for Pacific lamprey.

The City has a multi-pronged approach to comply with the ESA and advance the recovery plan. BES leads the City's ESA program and a streamlining team for city projects requiring ESA permits. Plans and projects that help achieve other City objectives, such as culvert replacement, stream bank restoration and riparian protections, erosion control and revegetation, watershed monitoring, zoning, and climate change planning are part of the City's ESA response and critical to species recovery.

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA – Superfund) and Portland Harbor Cleanup

In December 2000, the USEPA listed a portion of the Lower Willamette River, known as Portland Harbor, as a Superfund site under the federal National Priorities Listing process. The Portland Harbor Superfund investigation is currently focused on a stretch of the Willamette River from River Mile 2 to River Mile 11.8. The City operates stormwater and combined sewer overflow outfalls within the Portland Harbor area. The outfalls drain City-owned rights-of-way,industrial, commercial, residential, and vacant lands.

Under an intergovernmental agreement, the City and Oregon DEQ are working to identify sources that discharge significant contamination to the municipal conveyance system and to control these sources to reduce contaminant loads. The City is working closely with DEQ and EPA to develop a comprehensive plan to address future stormwater discharges under state and municipal programs to prevent recontamination of the harbor after clean up.

Goals & Policies

Draft Goals and Policies related to Sanitary and Stormwater Facilities and services can be found in Chapter 5. Key Infrastructure Policies.

Wastewater and Stormwater Systems

Systems Overview

Environmental Services provides sanitary sewage and stormwater collection through a complex set of infrastructure systems that are closely intertwined with the natural systems of Portland's watersheds and the historical development of the city. Wastewater and stormwater are conveyed through either combined pipes (wastewater and stormwater in a single pipe) or separated pipes (sanitary only or stormwater only). In the separated area, stormwater is also conveyed via ditches, swales, and natural drainageways, or simply flows overland. The combined and sanitary sewage pipes convey flows to one of the city's two wastewater treatment plants. In the separated stormwater area, stormwater is discharged to surface water (streams or rivers) or underground sumps (UICs). See Figure 6.1, System Overview.

BES uses both "green" and "gray" infrastructure investment. Green infrastructure is a part of stormwater management in both the combined and separated stormwater areas. Green infrastructure solutions (such as trees, ecoroofs, natural areas, and green streets) capture and filter precipitation and urban runoff that may otherwise drain into the sewer system or directly into rivers and streams without benefit of pollution reduction or flow attentuation. Green infrastructure can sometimes be the most cost-effective solution to protecting the piped infrastructure system. It can also contribute to other goals, such as climate change adaptation and mitigation.

Portland's Watersheds

BES's sewer and stormwater systems are managed to protect or enhance human and environmental health and Portland's watersheds, see Figure 6.2. Each watershed has unique characteristics and conditions, described below, which are relevant to existing and future infrastructure system planning and investments. All of Portland's watersheds include critical habitat for ESA-listed salmonids.

In 2006, Portland City Council adopted the Portland Watershed Management Plan (PWMP) in order to focus the City's efforts to protect and restore Portland's natural systems. The PWMP lays out an integrated set of strategies to improve watershed health, and provides a framework to coordinate and integrate responses to some of the City's regulatory requirements. The City's and BES's goals under the PWMP are to achieve improvements in hydrology, water and sediment quality, habitat and biological communities. Both the Portland Plan and the updated PWMP Implementation Plan (2012) reinforce the importance of improving watershed health through repair and maintenance of existing infrastructure, investment in built and natural stormwater infrastructure, environmentally friendly development and the protection, enhancement and restoration of natural resources.

To inform future investments, the bureau conducts comprehensive watershed monitoring to track changes in watershed health over time—including water quality trends. Now in the fourth year of monitoring, the Portland Area Watershed Monitoring and Assessment Program (PAWMAP) is establishing consistent citywide data through an efficient sampling approach modeled after EPA protocols. Every year BES samples a subset of the 298 inventoried miles of streams in Portland. Of the stream reaches

Figure 6.1 Systems Overview

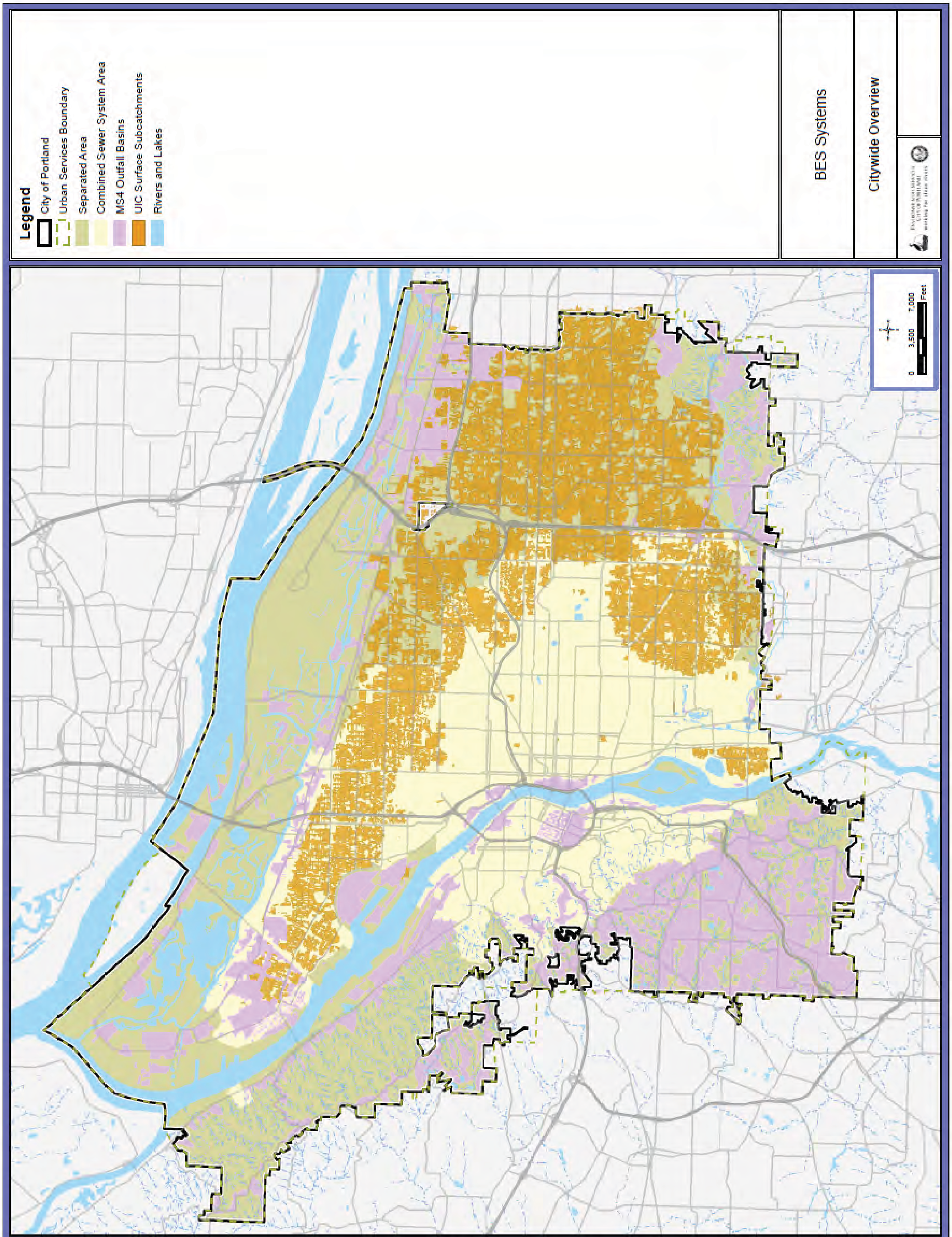
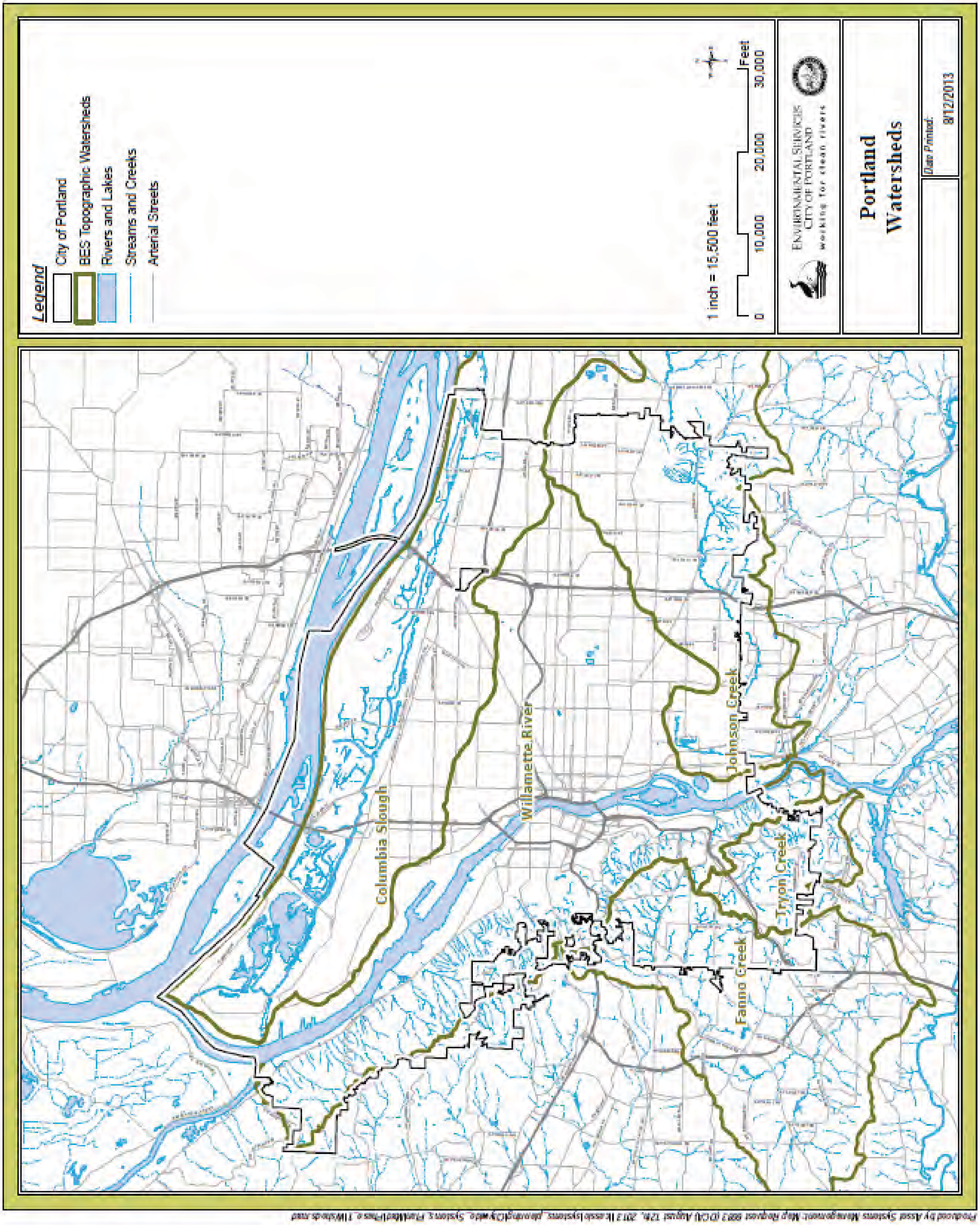


Figure 6.2 Portland Watersheds



sampled and analyzed so far, none meet Portland water quality benchmarks, in large part because of mercury and total suspended solids. Targets for large wood, an indicator of in-stream habitat function and complexity, have been achieved in only 13% of the sampled reaches, and only 2.5% of sampled stream reaches meet the standard for a healthy macro-invertebrate population (which is an indicator of overall environmental health). In sum, Portland's streams are generally below what is considered functional for water quality, habitat and biological communities, even in an urban environment. Impervious area (roads, parking lots and rooftops) covers between 22% and 40% of Portland’s watersheds, generating stormwater runoff and disrupting the natural water cycle. Due to implementation of public and private stormwater management approaches, including surface water quality facilities like green streets and rain gardens, some of this impervious area is managed. However, effective impervious area—the runoff that remains unmanaged--ranges from 12% in the Johnson Creek watershed to 28% for the mainstem Willamette watershed.

Portland Willamette River Watershed

The Willamette River Watershed in Portland is only 0.5 percent of the Willamette River’s total drainage basin, which covers more than 11,000 square miles in western Oregon. Within the City of Portland, the watershed encompasses 69 square miles. The river flows north through the downtown core to the Columbia River and serves industrial, residential, commercial, and recreational uses. The highly altered stretch of the river through Portland is the gateway to the entire Willamette Basin for salmon, steelhead, lamprey, and other native fish and wildlife. Despite heavy urbanization, valuable habitat for feeding refuge, rearing, and mating still exists in this portion of the watershed. The river is also a significant place for people to encounter nature through active or passive recreation.

The watershed includes the central city and much of inner southeast and northeast Portland, which is highly developed and impervious, although relatively flat and generally with good infiltration. The watershed also contains Forest Park and several other large parks and open space areas, and includes areas smaller tributary streams on the west side of the river that are not part of the Fanno or Tryon Creek basins.

The Willamette River has water quality limitations, including established TMDLs for temperature, bacteria, and mercury. Completion of the Combined Sewer Overflow (CSO) Program in 2011 significantly reduced CSO discharge events to the Willamette River, which has resulted in a major improvement to water quality in the river, but more work remains. In addition to water quality challenges, in the west side tributaries stormwater causes high flows in natural channels that lead to degradation of the physical and biological characteristics of these tributary systems. Nine miles of the main stem Willamette River in Portland are designated as a federal Superfund site.

Columbia Slough and Columbia River Watersheds

The Columbia Slough Watershed extends along the Columbia River shoreline and through north and northeast Portland to Alameda Ridge. The watershed drains approximately 51 square miles of land and is defined by the 19-mile long main channel (the slough) as well as approximately 30 miles of secondary waterways. The Upper Columbia Slough is a highly managed system, with piped stormwater, dikes and levees, and a system of pumps that provide area drainage and flood control. The lower nine miles of the slough—from NE 18th Avenue to Kelley Point Park—are tidal and directly connected to the Willamette River. The lower slough provides valuable habitat for migrating juvenile Columbia River and Willamette Basin salmon. The slough provides recreation and access to nature for the metro region, particularly underserved neighborhoods in north and northeast Portland. The Columbia South Shore Well Field, part of Portland's drinking water supply, is located in this watershed.

The watershed is an important economic and transportation hub, the location of thousand of jobs as well as 170,000 residents. Much of the northern section of the watershed has industrial land uses on large parcels. More information on the slough's unique stormwater management considerations is in the stormwater system section. Completion of the CSO program greatly reduced sewage overflows to the Columbia Slough which has improved water quality.

However, the slough remains water quality limited, with established TMDLs for temperature, bacteria, nutrients and toxics. Low levels of contamination in the sediment are also widespread. In 1994, the City of Portland established a Consent Order with DEQ related to sediment. The City entered the Voluntary Clean Up Program in 2006. The City and DEQ have adopted an approach that includes reducing pollutant sources, cleaning up specific sites, and long-term monitoring to track how the slough is responding to watershed management actions. Work is underway to identify possible deficiencies at stormwater outfalls of concern.

Protection of valuable natural resources like Smith and Bybee Wetlands and Big Four Corners Natural Area, ongoing work to revegetate the banks of the slough, construction of green street facilities, and stormwater pollution controls by businesses along the slough are improving conditions in the watershed, but significant challenges remain.

The Columbia River watershed in Portland is a fraction of the river's overall drainage basin in North America and covers just over one square mile of the City of Portland along the river's south shorline and Hayden Island. The City provides stormwater and sewer services to the residents and businesses in this area, and the Columbia Boulevard Wastewater Treatment Plant discharges Portland's wastewater effluent to the Columbia River. While development on Hayden Island is concentrated on the eastern side, the western portion is outside the City's service area and remains undeveloped. The island provides rare shallow water habitat and riverine woodlands. The Columbia River south shoreline is leveed for approximately 11 miles and the drainage districts are responsible for flood control in this area.

Johnson Creek Watershed

The Johnson Creek Watershed encompasses approximately 54 square miles, over half of which lies outside the City of Portland. Johnson Creek originates in Clackamas County east of Boring, Oregon, and flows west approximately 25 miles to its confluence with the Willamette River. The watershed has a mix of land uses: agricultural, commercial, light industrial, and residential. Salmon, steelhead, and other native fish are found in significant portions of the watershed. Johnson Creek provides good opportunities for native species recovery.

Fifteen miles of the creek channel is lined with concrete and rock from Works Progress Administration (WPA) attempts to control flooding in the 1930s, which has exacerbated storm-related flooding, particularly in the Lents neighborhood. In addition, development in the East Buttes area has disturbed natural drainageways, seeps and springs that are an important part of the hydrologic cycle.

Agricultural runoff, particularly in the headwaters, and legacy pollutants such as DDT are a significant challenge to stream health. Remediation efforts require collaboration among multiple jurisdictions. The creek has established TMDLs for bacteria, temperature, and toxics.

Through the implementation of the Johnson Creek Restoration Plan (JCRP), the City and partners have purchased more than 260 acres of frequently flooded property and are removing WPA alterations and restoring the natural stream channel. The goal of the JCRP is to curb impacts from nuisance flooding while improving water quality and habitat, reversing the damage from earlier attempts to control flooding that altered the natural channel of the creek. Several floodplain restoration projects completed in the past ten years are making cumulative improvements in the natural resource functions of the watershed.

Fanno Creek and Tryon Creek Watersheds

The Fanno Creek Watershed covers approximately seven square miles in southwest Portland. The balance of the watershed's 32 square miles is mainly in Washington County. Several of the tributaries to Fanno Creek provide cool water and habitat for native fish, and Fanno Creek itself is a tributary to the Tualatin River.

Stormwater flows into stream channels and into Fanno Creek or is managed by the storm sewer system and surface water facilities. Impervious area from development, combined with local geology and steep slopes, results in highly variable flows that impact streams. Fanno Creek has water quality challenges, including established TMDLs for temperature, bacteria, and nutrients.

The Tryon Creek Watershed covers approximately six square miles of southwest Portland. About 21 percent of the watershed is outside the City of Portland's boundary in the jurisdictions of Multnomah County, Clackamas County, and the City of Lake Oswego. Most of the development is concentrated in the upper part of the watershed where impervious surfaces cover significant area. Tryon Creek State Natural Area and other parks and natural areas provide valuable, but fragmented, habitat for salmon and other fish and wildlife. Native resident fish are found in the creek, but salmon and other migratory fish are largely excluded by the culvert under Highway 43 near the mouth of the creek.

Stormwater in this watershed flows quickly across soils that are slow to infiltrate and down steep slopes into stream channels that flow into Tryon Creek. Runoff from major transportation corridors including I-5 and Barbur Boulevard discharges to Tryon Creek. The creek has water quality challenges, including established TMDLs for temperature and bacteria. Stream bank erosion, channel incision and simplification, and fine sediment deposition are issues in both the Tryon and Fanno Creek watersheds.

Asset Management Approach

Although BES began incorporating asset management into its business practices more than 20 years ago, in 2010 the Bureau launched an Asset Management Improvement Program to better define asset management principles and practices as they should be applied to BES assets, identify opportunities for improvement, and establish a framework for implementing improvements. This helps the bureau prioritize investments within and across the different systems (sewage conveyance, treatment, and stormwater management). Asset management is a dynamic process, and the bureau's implementation of asset management varies by system and asset types.

The focus of the asset management approach is assessment and mitigation of business risk. Business risk is calculated as the product of consequences of failure to meet levels of service and likelihood of failure. In determining the consequences of failure to meet levels of service, the following triple bottom line risk factors were used:

- economic, including impacts on operations, maintenance, and/or replacement and emergency costs,
- environmental, including impacts on physical habitat, biological communities, and/or compliance with regulations, and
- social, including impacts on public inconvenience and perception and/or public health and safety.

Starting with these triple-bottom-line asset management factors, staff identified specific risks and associated dollar values for individual consequences of capacity and structural failures. The potential consequences of pipe failure include sewage backing up into private property, sewage overflows to the surface, and/or sinkholes opening to the surface.

Likelihood of failure is the probability an asset will fail. For structural deficiency risk, likelihood of failure was determined from condition assessment data and literature curves that relate pipe condition grades to remaining useful life for different pipe materials. For capacity deficiency risk, likelihood of failure was estimated by computer model simulation of flows for design storms with different frequencies and under existing and future development conditions.

Sewer pipe segments were evaluated using a geographical information system (GIS) database tool to prioritize and map potential spot repairs and whole pipe rehabilitation/replacement. The database includes information from pipe inspection regarding condition, grade, and defects of the pipe as well as data concerning consequence of failure, likelihood of failure, estimated cost, and prioritization. This pipe rehabilitation tool was utilized to identify rehabilitation/ replacement needs for the sanitary and combined sewer collection systems.

Pipe assets were evaluated to determine the existing and potential future capacity risk. Alternatives were developed to address capacity and structural risks and were evaluated for cost-effectiveness in addressing level of service goals including reducing sewage backups into basements in the combined system. In the sanitary system, rainfall dependent infiltration and inflow (RDII) is the biggest cause of capacity deficiencies. The effects of RDII were evaluated for the pipelines and pump stations using flow monitoring data and/or modeling assumptions based on pipes of similar age and location.

Wastewater Collection System

Wastewater is collected and conveyed via either combined sewers or separated sanitary sewers. Sewage is collected and transported through a combination of gravity pipes, pump stations, and forcemains to major interceptors that convey the sewage to one of two wastewater treatment plants.

Wastewater Collection System Inventory

The collection system consists of a network of approximately 1,900 miles of collection system piping (1,000 miles of sanitary sewer, 885 miles of combined sewer, and 13 miles of sewers Portland maintains by agreements with other agencies), ranging from six inches to 22 feet in diameter. The system includes 39,760 access structures, 57 miles of force mains, and 25 outfalls. The City is responsible for operation and maintenance of 97 pump stations (80 that are owned by the City; six owned by other public agencies and 11 privately-owned septic tank effluent pumping (STEP) systems). The total wastewater service area is approximately 92,500 acres.

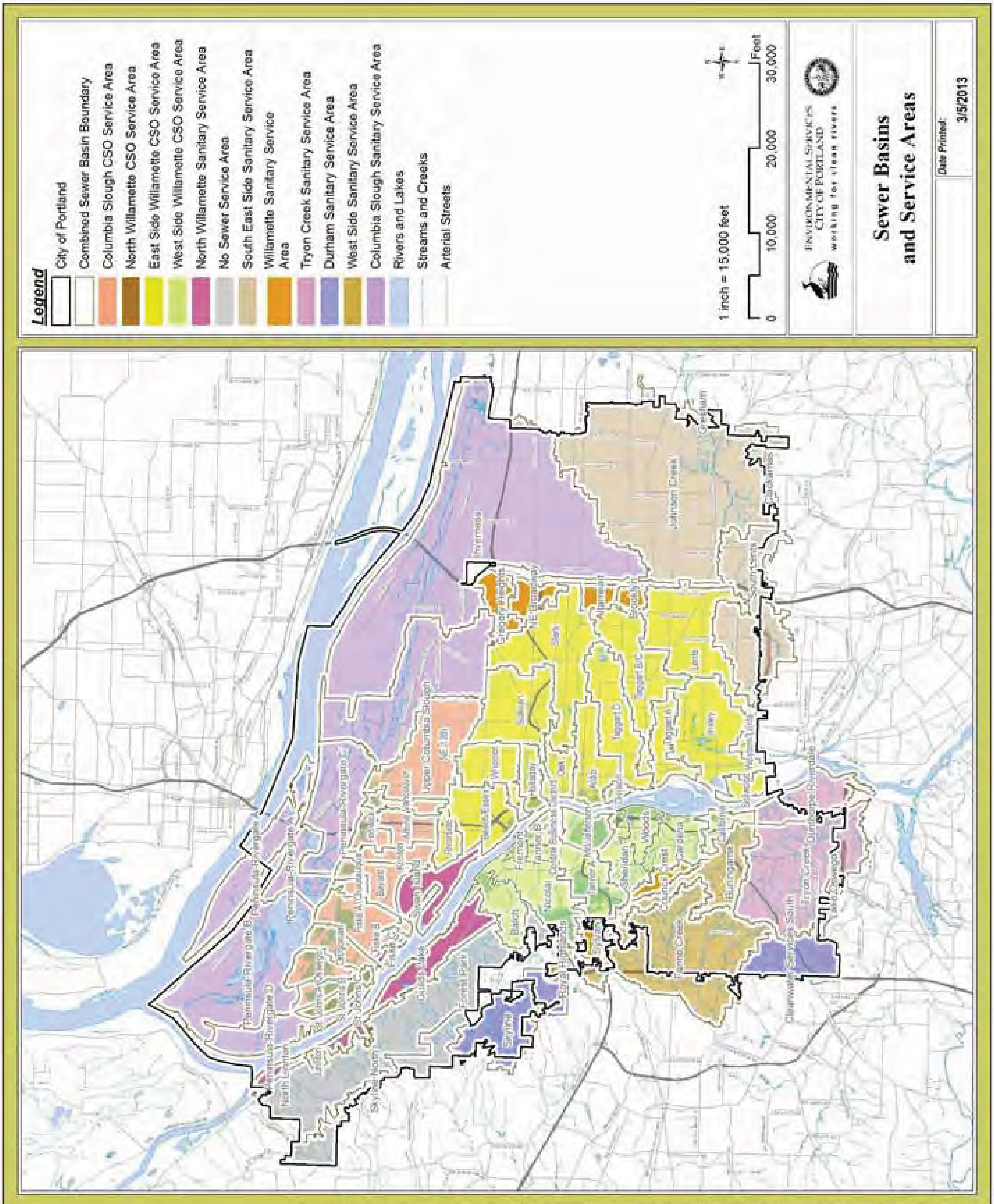
The combined sewer system collects and transports sewage and stormwater flow in a single pipe network to the CBWTP for treatment. It is divided into 41 basins[1] which are grouped into four major CSO service areas: West Side Willamette, East Side Willamette, North Willamette, and the Columbia Slough, see Figure 6.3. This area is approximately 31,700 acres in size and is bounded on the north by the Columbia Slough, on the south by Johnson Creek, on the west by the Portland West Hills, and on the east by 82nd Avenue (approximately). It includes most of downtown Portland and many older residential areas.

In the combined system, raw sewage is collected from local properties and stormwater runoff is collected from the public right-of-way, rooftops, parking areas, and other impervious surfaces. The system includes approximately 650 publicly-owned stormwater control facilities that divert stormwater from the pipe system and 14 pumps stations. Combined sewage is conveyed through a series of collector sewers and trunk sewers to diversion structures located at the downstream ends of the basins. The diversion structures route the combined sewage from the basins into the interceptor system that conveys the flow to the CBWTP. When capacity is not available in the interceptors, the diversion structures overflow to the CSO control facilities (storage tunnels and pumping systems) to deliver captured CSOs to the CBWTP for treatment. During large, infrequent storms when the tunnels fill, the excess combined sewage spills over the control dams in the tunnel shafts and discharges to the river or the slough.

The sanitary sewer system includes the network of pipelines and pump stations that collect and convey wastewater only. The area served by sanitary sewers is divided into 29 basins, totaling 60,800 acres, and covering most of outer east and southwest Portland, see Figure 6.3. The basins are defined by the network of sanitary sewers that collect wastewater and convey it to either a major sanitary trunk sewer or a combined interceptor sewer. Seventy-four of the City's pump stations pump separated sanitary flow of which 55 are located in the Columbia Slough Service Area. The sanitary flow from the Tryon Creek

[1] BES has defined multiple basins for the combined sewer, sanitary sewer, and stormwater systems. Basin boundaries are based on the routing of flows to downstream discharge locations. The basins are delineated separately for each type of sewer – combined, sanitary, and stormwater. Within one watershed, there may be combined sewer basins, sanitary sewer basins, stormwater basins, or a combination of each.

Figure 6.3 Sanitary and Combined Sewer Basins and Service Areas



Service Area (Tryon Creek and Dunthorpe-Riverdale basins) is treated at the Tryon Creek Wastewater Treatment Plant.

Flow from the Durham Service Area (Skyline and Clean Water Service South basins) flows to the Durham Advanced Wastewater Treatment Facility, owned and operated by Clean Water Services of Washington County. Aside from the few customers served by Gresham, the remaining flow is treated at CBWTP.

Wastewater Collection System Levels of Service

Levels of service for the wastewater sewer system establish a framework for characterization of system deficiencies, development and evaluation of alternative solutions, and selection of recommended improvements. The following levels of service are specific to the collection system:

- Provide sewage service to support development consistent with the Comprehensive Plan where feasible.
- Customers properly connect and maintain sewer connections per City standards.
- In the combined sewer area, convey combined sewage to prevent releases to buildings or streets up to a 25-year storm frequency.
- Prevent combined sewer overflows to frequencies established by the NPDES permit.
- Public sanitary/combined conveyance facilities are maintained in accordance with standards.
- In the separated sewer area, sewage releases to surface waters are prevented for storm events up to a 5-year frequency.

The Bureau has evaluated the sanitary and combined sewer pipe systems for structural integrity and the capacity to convey design flows. Pump station capacities have been evaluated to determine whether they could adequately pump the collection system design flows. Characterization of these systems is presented in terms of the risk of not meeting the technical levels of service. The estimated total sewer system capacity and structural deficiency risk is shown in Figure 6.4. In this figure, risk is expressed in dollars per acre and summarized in 25-acre grid cells color coded to signify a risk range. This figure illustrates the areas of the system where total sewer risk is currently highest. The Bureau has included a number of projects in its Investment Strategy to reduce this risk.

Wastewater Collection System Current and Projected Condition

Sewer pipes are inspected to determine both structural and operational condition. Over the past 40 years, most of the collection system has been inspected. Approximately three-quarters of the pipe segments have been inspected over the last ten years. Of the remainder, approximately 65% were constructed within the past 20 years and are therefore assumed to be in excellent condition.

Figure 6.4 Sanitary and Combined Sewer System Risk

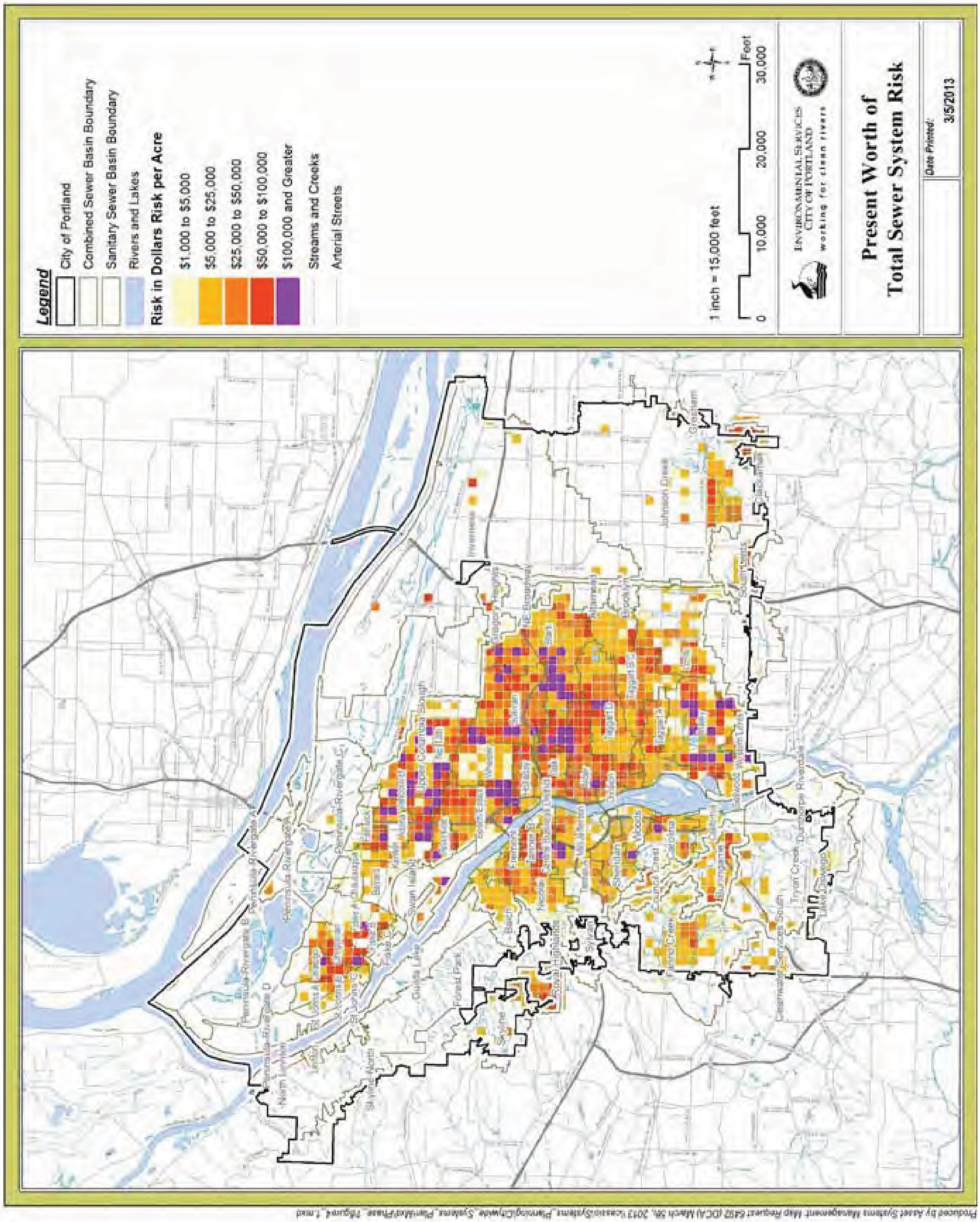


Table 6.2 Pipe Condition

Combined Sewer System	Miles	Very Good	Good	Fair	Poor	Very Poor	TBD
Pipes Total	878	51%	18%	11%	12%	6%	0.57%
Pipes 8" or less	321	45%	22%	8%	16%	8%	0.93%
> 8 and < 24"	401	54%	18%	14%	10%	4%	0.25%
>= 24 and < 36"	68	66%	13%	7%	9%	4%	0.03%
36" and larger	88	65%	8%	8%	15%	3%	1.14%
Sanitary Sewer System	**Miles**	**Very Good**	**Good**	**Fair**	**Poor**	**Very Poor**	**TBD**
Pipes Total	1,012	71%	20%	5%	2%	0%	0.40%
Pipes 8" or less	770	78%	18%	2%	2%	1%	0.13%
> 8 and < 24"	142	54%	31%	12%	2%	0%	1.41%
>= 24 and < 36"	50	46%	32%	16%	4%	0%	2.00%
36" and larger	50	52%	16%	26%	6%	0%	0.00%

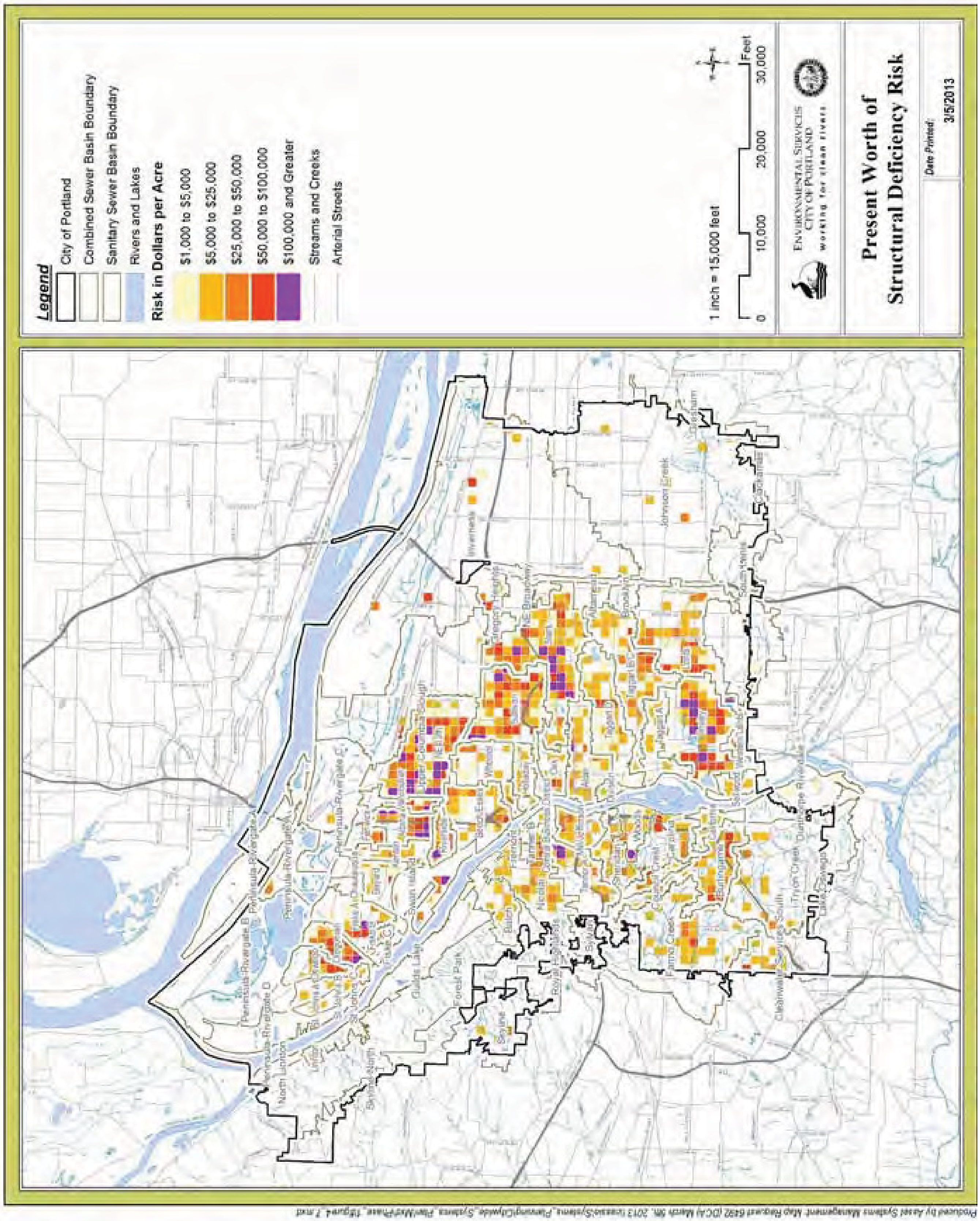
As inspections are conducted, structural defects are noted and scored. The condition scoring method for sewer mains uses five grade ranges as shown below:

Table 6.3 Structural Condition Rating System

Grade	Condition	Description	Structural Score Range
1	Excellent	No defects or few minor defects	0 - 9
2	Good	Minor defects or few moderate defects	10 - 99
3	Fair	Moderate defects that will continue to deteriorate	100 - 999
4	Poor	Moderately severe defects that will become Grade 5 defects in the foreseeable future	1,000 - 9,999
5	Very poor/ immediate attention required	Defects requiring immediate attention. (Failed or failure imminent.)	10,000+

All pipes are at risk of structural failure at some point in time. Pipes in poor condition are at risk to fail sooner than pipes in good condition. In accordance with the asset management approach, the business risk of a structural failure for any given pipe is estimated by calculating the potential cost of consequence of failure, estimating the likelihood of failure, and developing a risk distribution as a function of time. To assess structural deficiency risk for the entire sewer system, this process was applied to every pipe in the city's inventory for the service area. Figure 6.5 shows the 100-year present worth value of structural deficiency risk for all condition Grade 4 and 5 pipes summed by 25-acre grid cells. Only Grade 4 and 5 pipes are shown in this figure because they represent pipe rehabilitation needs within the 20-year planning horizon. The Bureau is in the third year of a multi-year $123 million rehabilitation program to address the highest risk pipes. Assuming adequate funding, the Bureau anticipates reducing its highest risk. Unfortunately, the collection system is degrading more rapidly than investment projections.

Figure 6.5 Structural Deficiency Risk (Sanitary and Combined Sewer Pipes)



A significant percentage of the pipe system is concrete pipe installed in the early 1940s. Because much of the concrete in that era was poor quality, these pipes are failing more rapidly than might be expected from age alone.

Pump stations and their components and force mains require more frequent renewal than the gravity pipe system. The Pump Station Improvement Program was established to keep pump stations in good working order to maintain reliability and efficiency within the conveyance system. The program addresses capacity, mortality, reliability, and code compliance. Funding for this program is proposed to increase in future years to allow for timely capital renewal at each of the 97 pump stations. In general, pump stations are assumed to have a 50-year useful life, however, major components require renewal after about 25 years.

Wastewater Collection System Current and Projected Capacity

To support the capacity and performance analyses of the sewer system, BES developed a highly detailed simulation technique called explicit modeling. The technique is explicit in that it models public and private facilities (manholes, pipes, green streets, onsite vegetated facilities, etc.) and impervious surfaces at the property level. Explicit modeling enables BES to more clearly define the sources of basement sewer backup risk and capacity problems throughout the basins, to efficiently calibrate flow monitoring data with more certainly than traditional models, and to evaluate the cumulative benefits of green infrastructure stormwater controls for streets, parking areas, and roofs.

The models are specific to each sewer basin and three of the interceptors. The basin model calibrations were performed by comparing basin model results against flows measured by temporary flow monitors installed within the basins. For the interceptors, flow data is available from more permanent monitors. The good correlation between the model predictions and the physical measurements at the monitors gives BES confidence in the model’s ability to predict hydrologic and hydraulic response from rainfall events.

The hydraulic capacity characteristics of the combined sewer system are evaluated for five different design storm scenarios: three storms (2-year, 5-year, and 25-year) for existing conditions, one storm (25-year) for future conditions (build out of the Comprehensive Plan), and the 3-year summer storm (CSO criteria). Each of the existing-condition design storms represents a different level of risk. The combined sewer system performance measures focus on providing sufficient capacity to eliminate or significantly reduce street flooding risk and basement sewer backup risk for the 25-year design storm under future (2050) conditions. An additional performance measure is to eliminate untreated CSO discharges to the Willamette River from May 1 to October 31 of each year except during storms greater than or equal to a summer storm with a 3-year return frequency under future conditions. Typically, this performance measure impacts only the stormwater control facilities and the CSO tunnels and not the balance of the collection system capacity.

The greatest concentration of pipe segments with capacity problems is located in the older central neighborhoods. These capacity problems lead to the risk of the combined sewer backing up into basements during intense storm events. The highest risk of basement sewer backups on the east side of the Willamette River are in an area roughly bounded by NE Prescott Street to the north, SE Holgate Blvd to the south and SE 45th Avenue to the east. On the west side of the river, the highest predicted risk of basement sewer backups is in NW Portland in an area roughly bounded by NW Yeon Avenue to the north, West Burnside Street to the south and NW 23rd Avenue to the west.

The performance measure for identifying locations of potential capacity deficiency is basement sewer backup. Individual tax lots are determined to be at risk for basement sewer backups when the maximum water surface elevation in the sewer pipe is within eight feet of the estimated main floor elevation of the property. The estimated main floor elevation is three feet above the estimated ground elevation. The accuracy of the basement sewer backup risk is limited by the estimated main floor and ground level elevations which were determined with a digital terrain model. In the absence of reliable and systematic data, it was assumed that each tax lot has a basement. In additional to basement sewer backup risk, there is the risk of CSOs and the risk of surcharging of trunk sewers to degradation of pipe material.

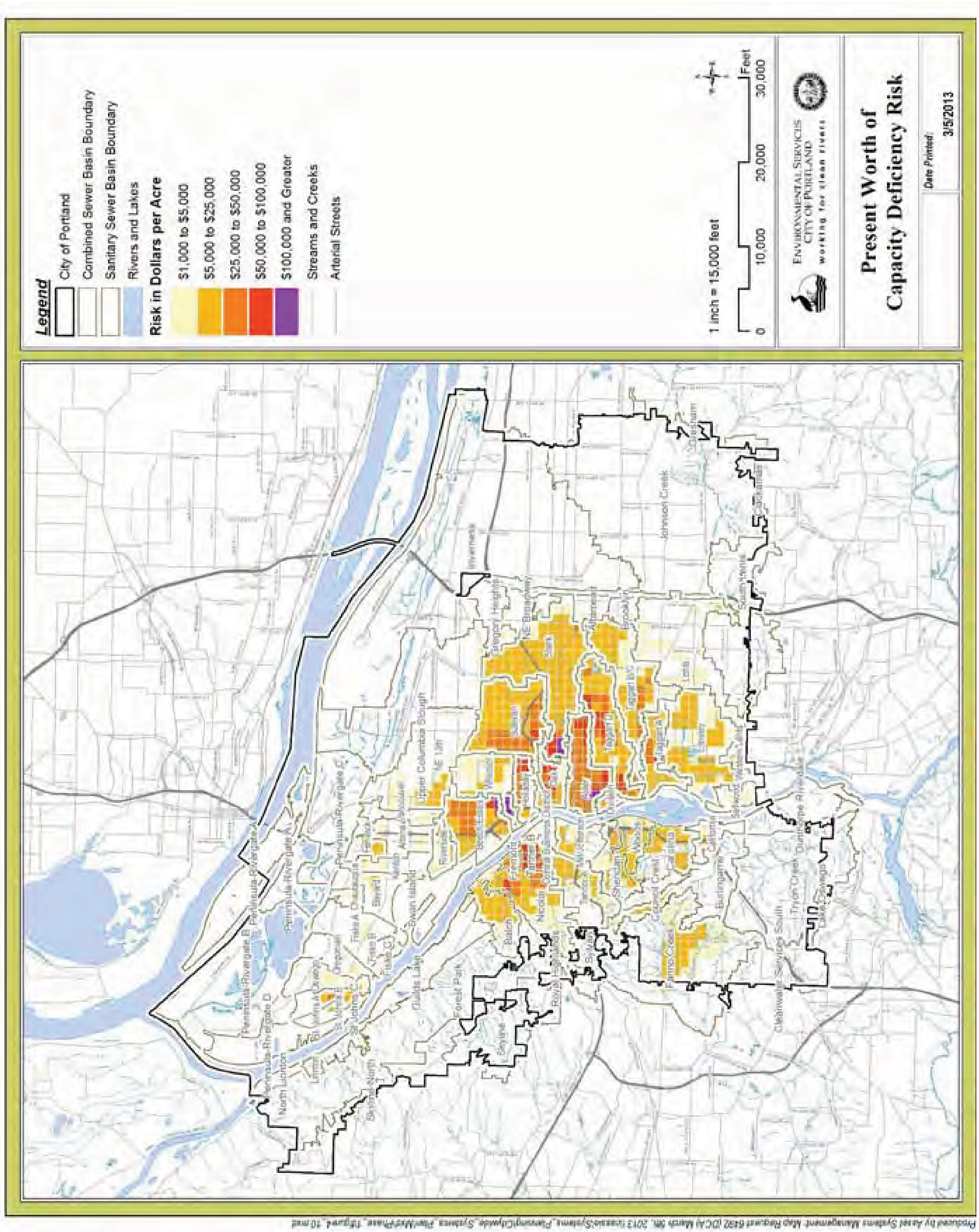
The capacity-related sanitary sewer system technical levels of service are for storm events up to a 5-year frequency to convey sewage to prevent releases to buildings or streets and to prevent releases to surface waters. The performance measures for these are the same as for the combined system for basement backups, street flooding, surcharging in pipe constructed of brick, and pipe surcharge for a duration greater than 30 minutes. There is an additional performance measure related to pump stations: Separated sanitary pump stations should have adequate firm capacity to pump the peak hourly and peak instantaneous flows associated with the 5-year, 24-hour storm intensity of its tributary area, without overflows. Firm capacity is defined as the capacity of the pump station with the largest pump out of service.

Most of the sanitary sewer basins meet the service levels for conveyance. Exceptions are the Fanno Creek and Burlingame basins where street flooding and basement sewer backups may occur during storms smaller than the service level design storms. During rain events, stormwater enters the sanitary pipes either through inappropriate connections or through cracks in the pipe material. This Rainfall Derived Inflow and Infiltration (RDII) is impacting the capacity of the sanitary pipe system. During intense storms, the Fanno Basin Pump Station is unable to keep up with the additional flow. A capital improvement project is underway to address this issue. The capacity of the Tryon Creek Wastewater Treatment Plant is also impacted by RDII. Capacity upgrades to the plant are discussed below. Note that in this same geographic area, there are other stormwater management issues such as incomplete conveyance systems. These are discussed below as part of the stormwater system.

Figure 6.6 illustrates the present worth of pipe capacity deficiency risk associated with the piped system.

The capacity assessments of city pump stations were performed using basin-wide hydrologic and hydraulic models that estimate the base and peak design storm flows coming to the pump stations from the sanitary and combined sewer systems. The models are based on EPA-SWMM, which simulates the upstream hydrologic inputs including direct storm runoff and hydraulic routing of both the sanitary and wet weather flow components. For the separated sewer areas, the modeling system relies on a site-specific set of regression equations to create generate the RDII flows. The regression equations were developed using the city's HYDRA rain gauge system data and actual flow monitoring data to define the hydrologic response of the collection system to the rainfall inputs. A calibration assessment was performed to evaluate the quality of the monitoring flow data and the "goodness of fit" for models.

Figure 6.6 Capacity Deficiency Risk (Sanitary and Combined Sewer Pipes)



Using this integrated method of EPA-SWMM and regression equations, the full wet weather flow rates from the collection system to each pump station were developed for the appropriate design storm. The estimated flows were then routed in the model through each pump station to determine whether or not the installed station capacity was able to fully convey the design storm. This capacity assessment was performed for both the existing collection system conditions as well as the future (2040-2050) system conditions.

- **No Capacity Deficiencies:** Pump station "Firm Capacity" is able to safely convey the peak design storm flows, which means the station is able to keep one pump in reserve for emergency conditions
- **Insufficient Firm Capacity:** Pump station must use "Full Capacity" (all available pumps) in order to safely convey the peak design storm flows.
- **Insufficient Full Capacity:** Pump station is not able to fully convey the peak design storms even using all available pumps.

The 14 pump stations in the combined area have sufficient capacity to convey flows. Three pump stations in the separate area have insufficient firm capacity and two have insufficient full capacity. Projects to address these capacity issues are included in the proposed Investment Strategy.

Providing Sanitary Sewer Service to Unserved Areas

The City's level of service for wastewater collection is to provide sewage service to support development consistent with the Comprehensive Plan where feasible. In order to identify system needs and serve unconnected areas, properties that are currently not connected to the sanitary sewer system were reviewed to determine whether tax lots met the conditions required for sewer service connection:

- No gravity sewer exists close enough to allow for a lateral to connect to the sewer.
- It must be feasible to provide service to the lot. Pump stations are not considered feasible for fewer than five properties.

There are significant areas currently unserved by sanitary sewers within the USB, primarily in the Johnson Creek and Skyline basins. It is estimated that 1,500 developed properties have some type of on-site sewage system and are not connected to the piped sewer system. Some of these properties are zoned for development; others are already developed with on-site systems such as cesspools and/or drainfields. In some cases, with current technology, it may not be technically or financially feasible to connect these properties to the sewer system. Estimates to serve individual properties range as high as over $1 million. Lack of sanitary sewer service may cause existing developed properties to become uninhabitable and may deem some undeveloped lots to be undevelopable.

Recommended Wastewater Collection System Improvements

BES developed and evaluated alternatives to address the structural and capacity pipe deficiencies that were identified during the characterization of the system and to meet the levels of service summarized above.

For pipes with structural deficiencies, the alternatives include whole pipe replacement (which may include lining) or a spot repair. Ongoing monitoring is recommended when the defects do not warrant rehabilitation at this time. The preferred alternative is illustrated in Figure 6.7. Given the age of the collection system, pipe rehabilitation is expected to be an ongoing need.

There are two primary alternatives for providing capacity in the combined system – conveyance or stormwater control. The conveyance alternative is a traditional pipe upsizing approach. The stormwater control alternative uses green infrastructure to detain and/or infiltrate stormwater through vegetated facilities. In the sanitary system, the capacity alternatives include pipe upsizing, pump station expansion, RDII (rainfall dependent infiltration and inflow) removal, and wastewater treatment plant expansion. In areas currently unserved by any sanitary sewer system, alternatives have been developed and evaluated to provide new sanitary sewer service where technically and financially feasible. The preferred alternative is illustrated in Figure 6.8.

The recommended plan for the combined sewer system includes projects that reduce basement sewer backup risk, replace structurally deficient pipes, reduce surcharging in major trunk lines, and contribute to CSO reduction through the incorporation of stormwater control facilities. The primary focus of these projects is to provide adequate capacity in the combined sewer system to convey the design flow and resolve basement sewer backup risk. For the most part, this is completed by either increasing pipe capacity through upsizing of pipe diameter or by routing stormwater runoff to stormwater control facilities to reduce the runoff that enters the system. In a few basins the resolution of basement sewer backup risk is achieved through stormwater separation, redirection of flow, or underground pipe storage facilities.

Based on asset management principles, only cost-beneficial projects – projects for which the cost of doing them now is less than the amount of risk from failure as expressed in dollars - (either as stand-alone projects or when combined with hydraulically dependent projects) are recommended as they will cost-beneficially reduce the risk within the combined sewer system. Of the estimated $930 million in capacity-related risk in the combined sewer system, only $200 million in projects were recommended to move forward in the March 2012 plan. One key assumption in the recommendation is development of some private stormwater management facilities.

In the long-term, capacity improvement projects will be drawn from the list of projects that are currently not considered cost-beneficial. It is expected that some will become cost-beneficial in the future due to one or more of the following factors:

- The sewer system is aging so pipe segments proposed for upsizing will have a higher risk of having a structural failure. Because the risk is greater, the project will resolve more risk.
- The dollar value of basement sewer backup risk might increase to be more than the current estimate of $5,000 per basement sewer backup.
- Other risk reduction (such as operations and maintenance efficiencies) may be quantified and included in the risk calculation.
- More stormwater control facilities might be implemented on private property through a stormwater retrofit program and reduce the maintenance costs assumed in the system plan because maintaining the facilities will be the responsibility of the property owners.

Figure 6.7 Recommended Sanitary and Combined Pipe Rehabilitation Projects

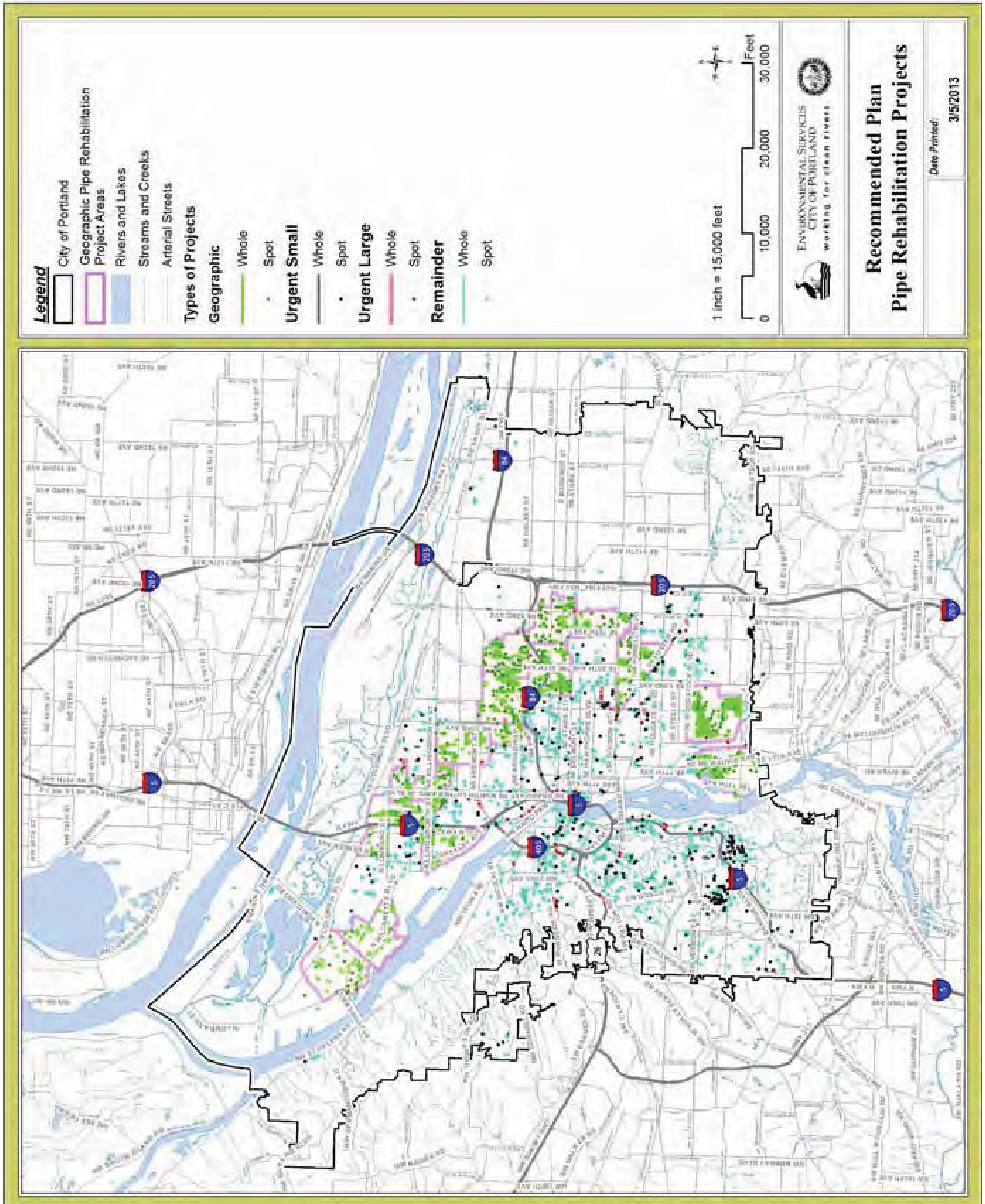
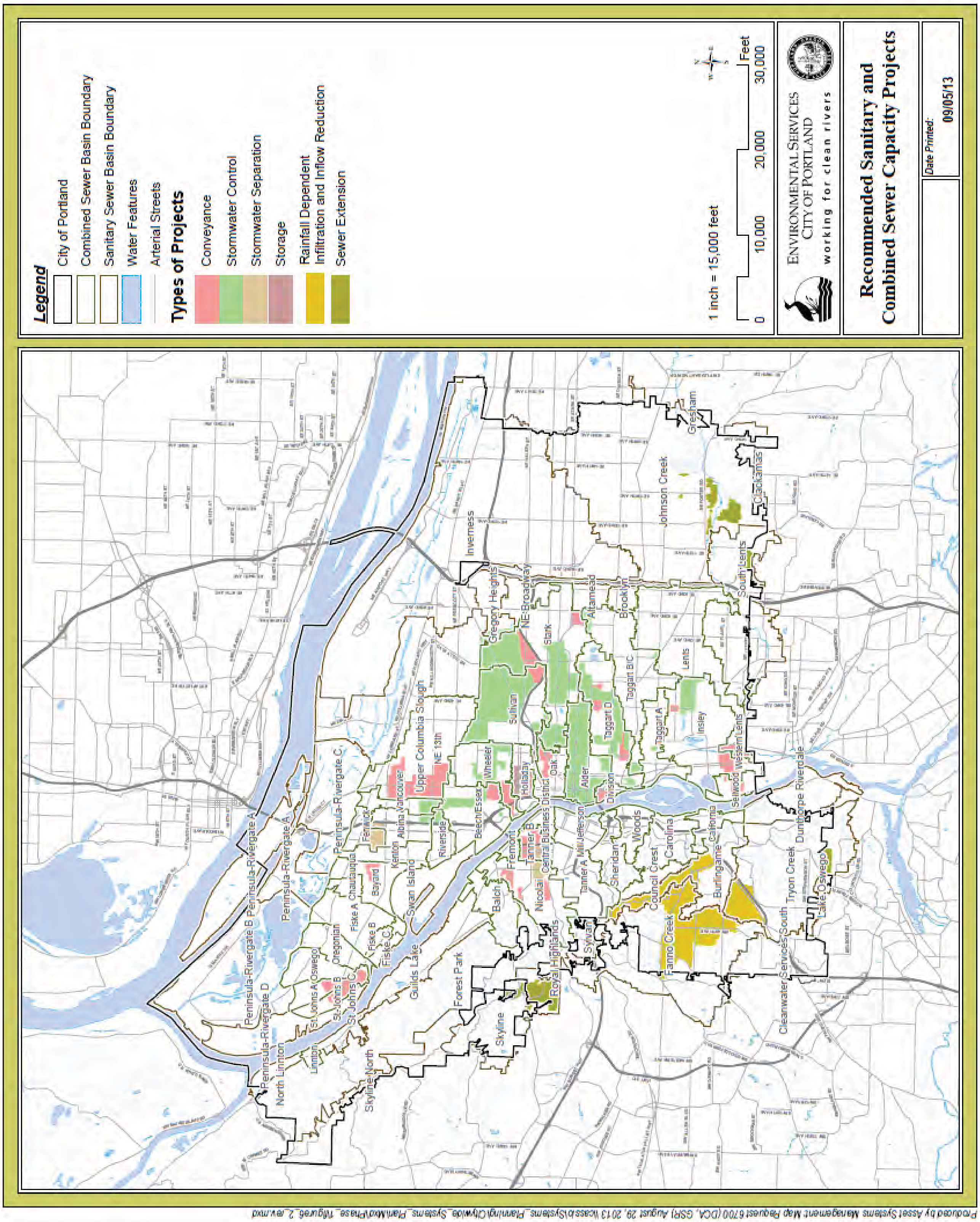


Figure 6.8 Recommended Sanitary and Combined Sewer Capacity Projects



Changes to the zoning might alter the future base assumptions changing the number of properties predicted to be at risk of basement sewer backups.

In the sanitary sewer system, the most critical capacity issues are the deficiencies in the Fanno Creek and Burlingame Basins. Significant wet weather flow and capacity problems in this area require a system-based solution that combines capacity upgrades with RDII reduction. Major elements of the recommended plan include increasing the capacity of Fanno Basin Pump Station, constructing a surge tank facility to protect recently completed force mains, near-term RDII reduction and pipe upsizing to resolve local capacity issues, long-term RDII reduction to reduce the risk of flows exceeding the capacity of the Fanno Creek Interceptor and the Fanno Basin Pump Station, and increasing the capacity of a short section of the Southwest Parallel Interceptor.

The recommended plan for the sanitary sewer system includes projects to extend sewer service to unserved areas that are both technically and financial feasible,

Collection System Investment Strategy

The Investment Strategy (Appendix A) includes the following projects and programs for the collection system:

- **Pump Station Improvement Program**: Program to refurbish or upgrade pump stations not in compliance with current codes, not operating reliably, need improvements because of growth in the receiving sewage basin, and/or are over 20 years old with out-of-date equipment. The Pump Station Improvement Plan guides the selection of projects. This program was developed to ensure the 97 pump stations are maintained in accordance with a scheduled plan to increase pump station reliability.
- **Sewage Pipe Rehabilitation Program**: Based on regular inspection, this program rehabilitates the highest risk pipes.
- **Capacity Upgrades**: Based on the Systems Plan, these programs add capacity by upsizing pipes and/or adding surface infiltration facilities. Projects are prioritized based on risk and benefit/cost. Work also includes cost-effective pipe rehabilitation, if located within the project area. Capacity upgrade projects are anticipated in the following basins: Holladay/Stark/ Sullivan, Beech/Essex, Oak, Taggart/Insley, Wheeler, Alder, NE 13th Ave, Northwest Neighborhoods, and North Portland.
- **Sanitary Sewer Collection System Capacity**: A series of projects is proposed to address infiltration and inflow (RDII) in the sanitary sewer system in SW Portland. Projects typically involve rehabilitation of main lines and laterals and disconnecting storm inlets from the sanitary sewer.
- **Sewer Extension Program**: Where technically and financially feasible, sewer extensions are proposed to relieve septic systems at risk of failure, to correct party sewer situations, and to provide service where development will be occurring soon and service is currently not available.

Wastewater Treatment System

Wastewater Treatment System Inventory

The City of Portland owns and operates two municipal wastewater treatments plants, where wastewater is processed through removal of solids and organic materials and the addition of disinfection. The Columbia Boulevard Wastewater Treatment Plant (CBWTP), located in north Portland, serves as the city's main sewage treatment facility, cleaning and discharging most of Portland's wastewater. The plant provides service to nearly all of Portland's 583,000 residents. The service area for the wastewater collection and treatment system totals 94,000 acres, including 9,000 acres outside the city limits. The Tryon Creek Wastewater Treatment Plant (TCWTP), located south of Portland in the city of Lake Oswego, serves Lake Oswego and a small portion of southwest Portland, see Figure 6.9.

The CBWTP campus is generally bound by N. Columbia Boulevard on the south, N. Portland Road on the west, the Columbia Slough on the north, and Union Pacific rail lines on the east and southeast. Two other parcels are part of the 147-acre campus: a 36-acre site known as Triangle Lake is located just north of the slough and a 24-acre future expansion site is located west of N. Portland Road on the south bank of the slough. Site zoning is Heavy Industrial (IH) and General Industrial (IG). A narrow strip along the Columbia Slough has environmental overlays for conservation (c) and protection (p). The northern tip of the site has an aircraft landing overlay (h). The entire campus is designated as a conditional use.

As currently configured, the CBWTP includes nearly 350,000 square feet of buildings and over 700,000 square feet of tanks, pumps, and other structures. In October 2011, an updated Master Plan was approved for the campus, see Figure 6.10. The Master Plan allows for development of an additional 122,000 square feet within the campus boundaries without conditional use review, as long as Master Plan standards are met. As part of the land use approval, mitigation activities are proposed to protect the community in the areas of transportation, facilities design, landscaping and screening, open space, neighborhood livability, safety, physical services such as waste disposal and water supply, protection of designated resources, and enhancement of environmental and recreational resources. Odor monitoring and control systems include retrofits to existing facilities and installation of odor controls in all new facilities. The odor monitoring and control systems were developed in collaboration with the CBWTP Citizen Advisory Committee and treatment plant neighbors and are intended to assure compliance with City Council Resolution 35453.

In addition to process facilities, maintenance facilities, storage, and office areas, the campus also provides space for Multnomah County Vector and Nuisance Control (four buildings totaling 10,500 square feet) and is one of five fueling stations for public vehicles. The site is also designated as one of the City's incident command centers to handle emergencies such as floods or earthquakes.

The TCWTP is a 13.5-acre plant located in the City of Lake Oswego with a rated treatment capacity of 8.3 million gallons per day. It is bounded by the Willamette River to the east, Tryon Creek to the north, and privately owned Industrial zoned properties to the west and south. Development on the plant site includes 80,000 square feet of tanks and 13,000 square feet of building structures. The plant's service area includes part of southwest Portland, unincorporated Multnomah County, and the City of Lake Oswego.

Figure 6.9 Columbia Boulevard and Tryon Creek Wastewater Treatment Plants Service Areas

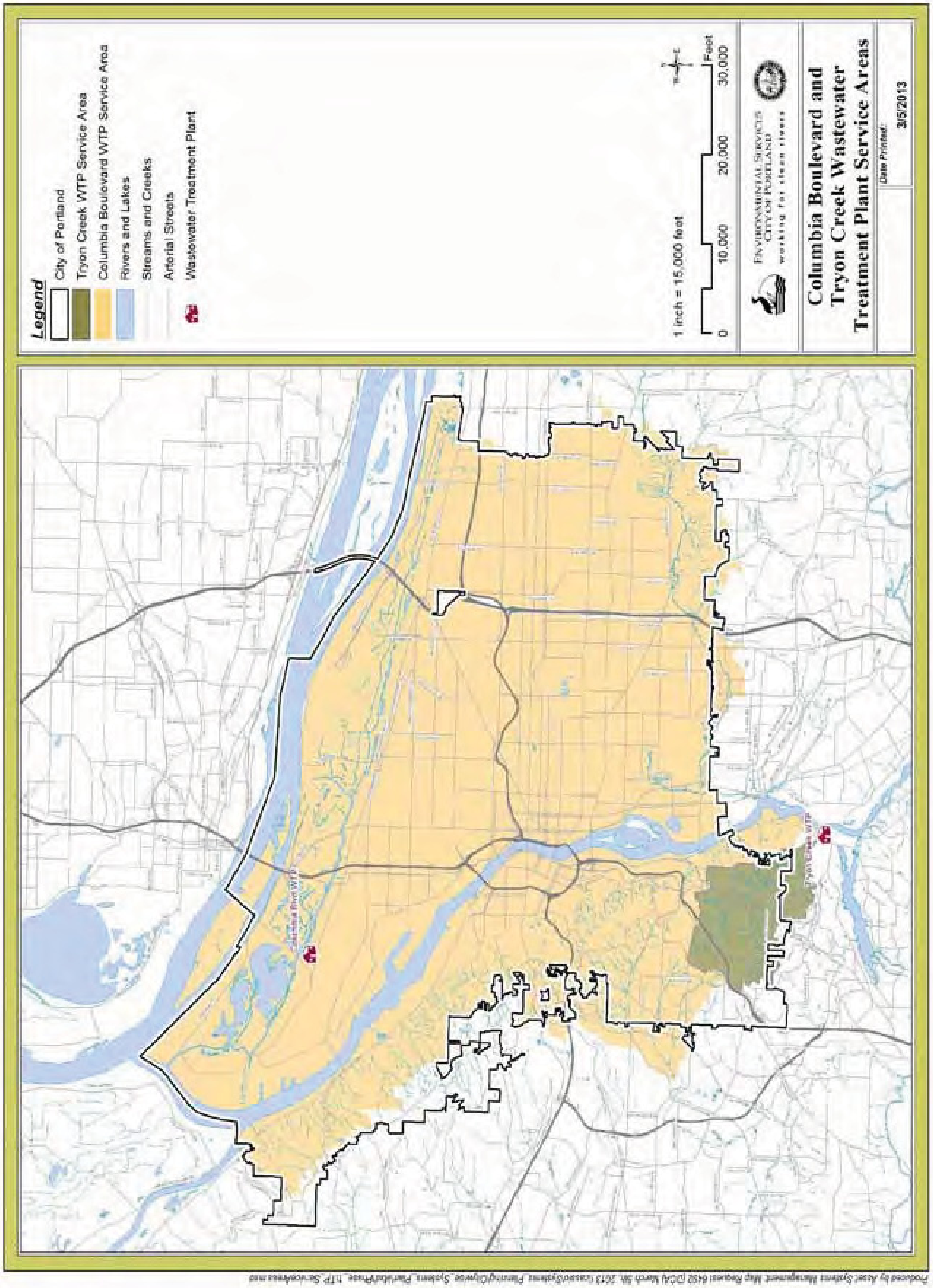
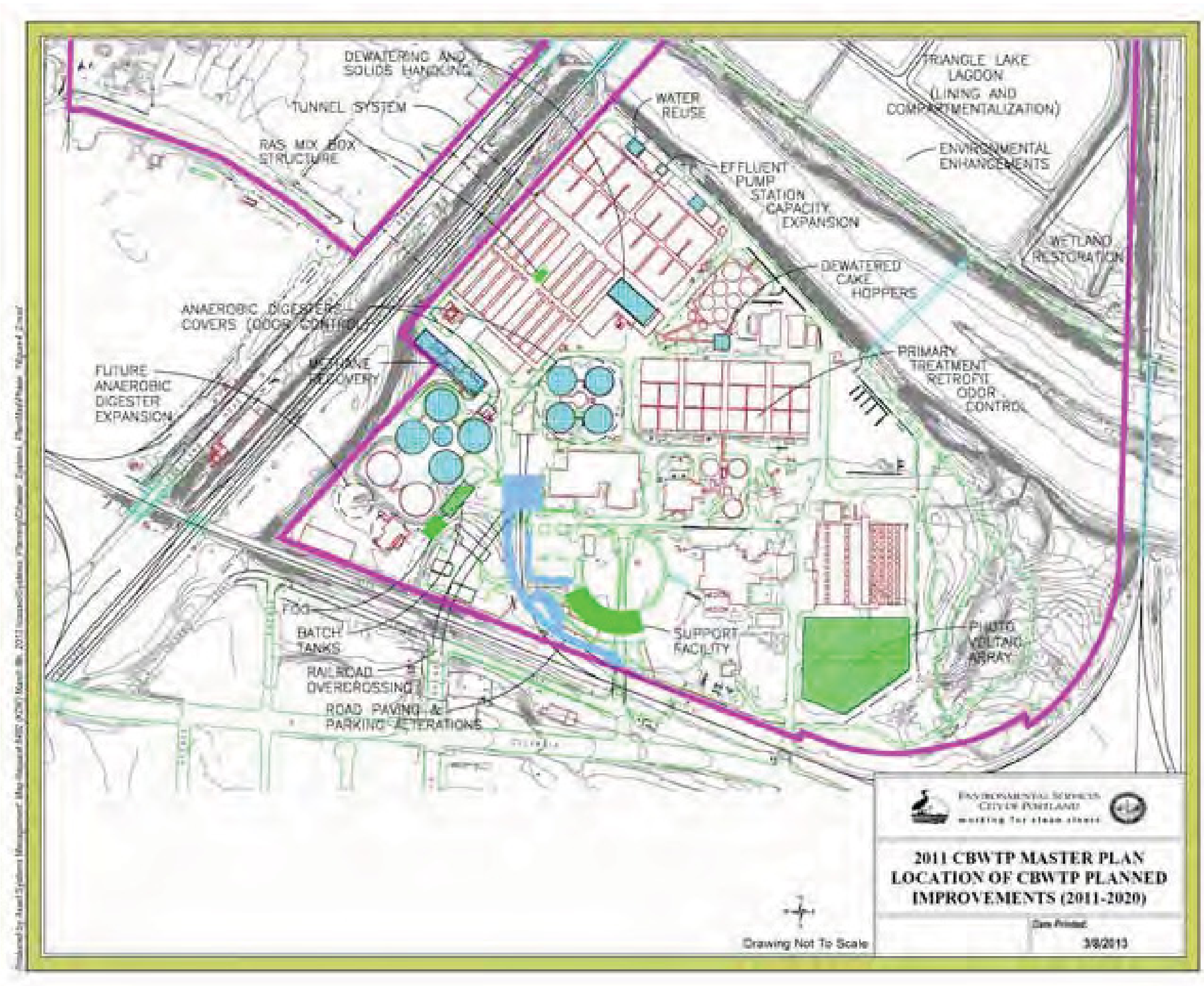


Figure 6.10 Columbia Boulevard Wastewater Treatment Plant Master Plan



Wastewater Treatment System Levels of Service

The following levels of service are specific to the wastewater treatment plants:

- Treatment plants are in compliance with NPDES effluent limits.
- 100% of biosolids are beneficially re-used.
- 90% of methane is beneficially re-used.

Wastewater Treatment System Current and Projected Condition and Capacity

Columbia Boulevard Wastewater Treatment Plant

The Columbia Boulevard Wastewater Treatment Plant is an activated-sludge, secondary treatment plant with a designed capacity (average dry weather flow (ADWF)) of 100 million gallons per day (mgd) for secondary treatment. The headworks and the primary treatment process have a design capacity of 450 mgd. In 2009, the plant received an ADWF of approximately 60 mgd. The major processes at the plant are liquids handling (pretreatment, primary treatment, secondary treatment, disinfection, and discharge), solids handling, methane utilization, and water re-use.

Liquid processes include:

- Influent pumping;
- Preliminary treatment: bar screens with screen presses, grit basins with grit washer-separators and grit disposal facilities, septage receiving and testing station, and an emergency bypass to the primary clarifiers;
- Flow monitoring and controls;
- Dry Weather Primary treatment: standard physical clarification for 120 MGD minimum;
- Wet Weather Primary treatment: fine screening, chemically enhanced primary treatment (CEPT), standard clarifiers and bypass to route excess flows to disinfection and outfalls;
- Secondary treatment: aeration basins, secondary clarifiers, and sludge collectors;
- Chlorine disinfection with dechlorination;
- Effluent pumping: to a 72-inch line that carries flows to the dechlorination facility at Hayden Island, then to an alternative dry weather outfall/diffuser in the Columbia River, and to a 102-inch diameter pipeline that carries treated effluent to the dechlorination facility, then to an alternative wet weather discharge outfall and diffuser in the Columbia River.

Solids handling includes:

- Degritting;
- Transport, storage, handling, processing grit and sewer cleanings;
- Gravity thickening of primary sludge;
- Gravity belt thickening of the waste activated sludge;
- Two-stage anaerobic digestion of primary and secondary sludge;
- Gas collection and storage;
- Seasonal lagoon storage for secondary sludge; and
- Belt press dewatering of anaerobically digested biosolids.

The plant generates approximately 13,000 dry tons of biosolids annually. The solids, in the form of dewatered cake, are transported in trucks to farms in central and eastern Oregon for direct land application, providing for beneficial reuse.

As the anaerobic digesters at CBWTP stabilize wastewater solids, they produce a gas that contains methane. Methane is a primary constituent of natural gas. The CBWTP currently collects and uses a portion of its digester gas to fuel boilers, for heating the digesters, and for space heating. The plant also produces electricity by using digester gas to fuel two 850 KW generators. The on-site generated electricity offsets demand for 40 – 50% of previously purchased power. Some gas is sold to a nearby industrial customer. Excess gas is burned in flares on site. A study is looking at alternative uses for the excess gas including expanded electrical generation or conversion to vehicle fuel.

The current hydraulic capacity of the Columbia Boulevard Wastewater Treatment Plant is sufficient to accommodate future twenty-year growth. However, many of the existing process facilities are aging and in need of rehabilitation to ensure maximum efficiency. Projects to address capital maintenance are proposed in the 20-year planning horizon. In addition, changing regulatory requirements impact operations. A number of projects are proposed to maintain the plant and to continue to address regulatory requirements.

Tryon Creek Wastewater Treatment Plant

The Tryon Creek Wastewater Treatment Plant is located in north Lake Oswego and receives sanitary flow from sanitary basins in southwest Portland and the city of Lake Oswego. It has an ADWF design capacity of 8.3 mgd and a peak wet weather flow capacity of 35 mgd. The plant currently has an ADWF of 4-6 mgd, with Lake Oswego contributing approximately half the flow volume. Treated wastewater is discharged to the Willamette River via an outfall system. Solids are trucked to CBWTP for processing.

The Tryon Creek Wastewater Treatment Plant Facilities Plan Update was completed in 1999. An update is in process and is scheduled to be complete by Spring 2014. Preliminary analysis indicates that the plant will require significant improvements to continue to meet system needs.

Recommended Wastewater Treatment System Improvements and Investment Strategy

Significant improvements were made at CBWTP to accommodate the increased wet weather flows resulting from the completion of the CSO controls. A limited number of future improvements to accommodate growth and anticipated regulatory requirements are recommended in the March 2010 Facilities Plan Update:

- Completion of the phased reconstruction of the lagoon
- Secondary Process Improvements (anticipated to meet changing permit requirements)
- On-site disinfection
- Solids dewatering
- 2 additional digesters
- Thermophillic equipment, blend and batch tanks (for Class A biosolids)
- 2 potential waste re-use projects: expansion of co-generation and removal of phosphorus and ammonia to be processed for commercial fertilizer.

In addition to the above projects from the Facilities Plan, a series of capital maintenance projects are planned in the 20-year planning horizon. The Investment Strategy includes three investment categoriess related to wastewater treatment:

- **Columbia Boulevard Wastewater Treatment Plant (CBWTP) Improvements**: This program includes a number of mid-size improvements at the Columbia Boulevard Wastewater Treatment Plant. CBWTP such as: Seismic Improvements, Outfall Diffuser Extension, Access / Egress Improvements, Bio-Solids Dryer, Dewatered Sludge Hopper, TWAS Piping Upgrade, Centrifuge.

Also included is an expansion to Secondary Treatment, if required. All are consistent with the Facilities Plan and the Conditional Use Master Plan.

- **Tryon Creek Wastewater Treatment Plant (TCWTP) Improvements**: This program includes improvements identified in TCWTP Facilities Plan, which is expected to be updated by Spring 2014. Anticipated projects include upgrade to the headworks/screenhouse, upgrades to the primary clarifier, and construction of an additional secondary clarifier. Draft recommendations include the acquisition of an adjacent parcel to facilitate gravity flow through updated processing facilities.
- **Rehabilitation, Repair, and Modification Program**: This program provides for annual reinvestment in the treatment facilities to protect capital investment and enhance system reliability. It provides best management practice to prevent probable violations of the NPDES permit. The aging Columbia and Tryon Creek plants require regular investment. Projects include equipment replacement, minor capacity upgrades, restoration of a facility to its original condition and renewal of useful life for more than 10 years, and regulatory mandates.

Stormwater System

The sanitary sewer system and the stormwater system are managed very differently. In the sanitary system, sewage is collected and conveyed to wastewater treatment plants and finally discharged to the Columbia or Willamette River. Conversely, the city's goal for stormwater is first on-site management for pollution reduction and flow control. Any overflow is then routed to the nearest conveyance system which includes pipes and natural drainages. BES distinguishes two primary stormwater management systems in the USB: the combined sewer system and the "separated" stormwater area. The latter includes both the UIC area and the MS4 area, see Figure 6.11. Stormwater management is approached slightly differently in each of these systems.

In the combined sewer area, stormwater is managed to reduce peak flows to avoid combined sewer overflows and/or releases to streets or private properties. Surface facilities – green street facilities, raingardens, ecoroofs, and other vegetation – detain stormwater flows, reducing peak flow to the combined sewer and allowing the system time to accommodate the increased flow from rain events. Once stormwater enters the combined sewer, it becomes part of the wastewater flow and is treated at the treatment plant.

Outside the combined sewer system area, sanitary sewage and stormwater are managed separately. Stormwater is managed through either pipes or a combination of interconnected natural and constructed systems with both privately and publicly owned components, including the street drainage system. In many locations, streets and their drainage systems have replaced the small natural drainage channels that preceded urbanization. In many areas, the stream systems serve as the major "collection system" for conveyance of stormwater flows.

The separated stormwater area is approximately two-thirds of the city's land area and includes the MS4 system and sumps (UICs), both of which are managed under regulatory permits. Flow enters the system from overland runoff and impervious surfaces, including roadways, parking lots, and rooftops. Unlike the combined sewer area where stormwater is conveyed to the wastewater treatment plants, stormwater in these areas is conveyed through swales, drainage ditches, pipes, and stormwater inlets/catchbasins and discharged to receiving waters (streams and rivers) or to sumps (UICs) for subsurface infiltration. In some areas, the stormwater system includes facilities that detain peak stormwater runoff and control flow release, and treatment facilities that remove or reduce pollutants.

As development occurs, impervious surfaces create increased amounts of stormwater runoff during rainfall events, disrupting the natural hydrologic cycle. Without stormwater management, these conditions erode stream channels and prevent groundwater recharge. Parking lots, roadways, rooftops, and other impervious surfaces increase the pollution levels and temperature of stormwater that is transported to streams, rivers, and groundwater resources.

The city's stormwater management requirements for all areas are defined in the Stormwater Management Manual (SWMM). The SWMM applies to all development and redevelopment projects within the City of Portland on both private and public property.

The City of Portland's approach to stormwater management emphasizes the use of vegetated surface facilities to treat and infiltrate stormwater on the property where the stormwater runoff is created. Infiltrating stormwater onsite with vegetated surface facilities is a multi-objective strategy that provides a number of benefits, including but not limited to pollution reduction, volume and peak flow reduction, and groundwater recharge. These benefits play a critical role in protecting stormwater infrastructure and protecting Portland's water resources, which in turn benefits human health, fish and wildlife habitat, recreational resources, and drinking water. The SWMM complements and supports the Portland Watershed Management Plan and other City standards and practices.

Not all stormwater is managed by the City's systems. Some of it simply flows over land via private property and/or public right-of-way directly to a receiving waterbody. Stormwater management is further complicated by ownership. In the sanitary system, once sewage enters the system, it is the responsibility of BES. The stormwater system is not a closed system. Stormwater from public property may flow across private property and the reverse which blurs lines of responsibility.

Stormwater System Inventory

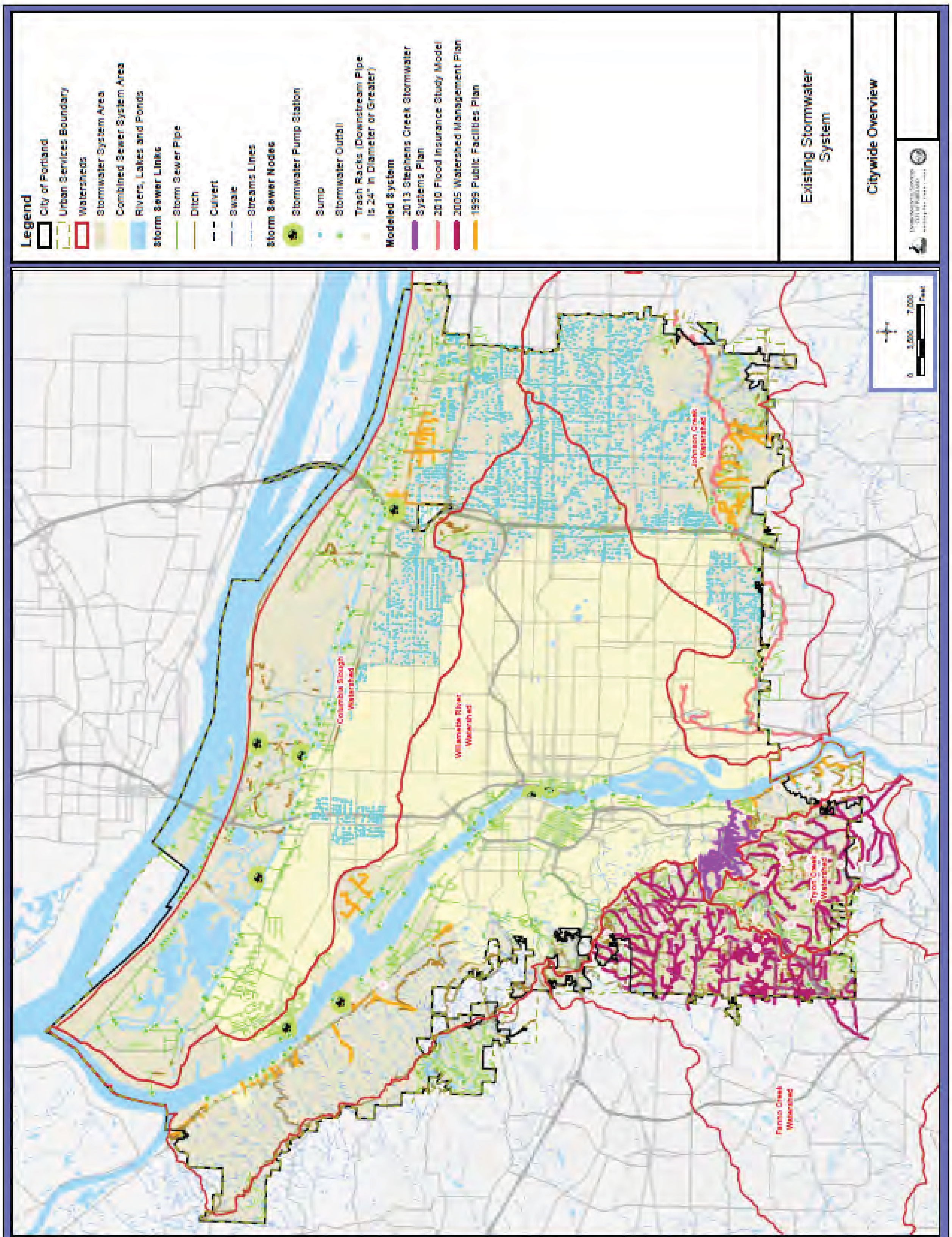
The City's storm sewer and drainage system consists of a 458 miles of pipe and approximately 144 miles of drainage channels that discharge to surface water. In addition, nearly 9,000 stormwater infiltration sumps (UICs) discharge stormwater underground. The storm sewer and drainage system service area is shown in Figure 6.11. Citywide (in both the combined and separated sewer basins), the Bureau owns and/or maintains nearly 1,700 surface water quality facilities including detention ponds, swales, constructed wetlands and green street facilities, and approximately 8,000 sedimentation manholes (typically located upstream of a UIC) that provide some level of detention and pollution reduction.

The City's MS4 area includes stormwater conveyance infrastructure such as pipes, ditches, roads, catch basins, curbs, gutters, and manmade channels that discharge to waters of the State. Portland's MS4 area is approximately 15,500 acres. The City's MS4 permit does not cover:

- Stormwater that flows to sumps (WPCF permit applies),
- Stormwater that flows to the combined sewer system,
- Natural drainageways and stream systems,
- Direct stormwater discharges from private property to natural stream systems (without entering the MS4),
- Areas with no public stormwater infrastructure,
- Areas with individual, general, or industrial stormwater permits.

The NPDES stormwater regulations do not prescribe specific pollutant discharge limits rather, they allow for the implementation of Best Management Practices (BMPs) to improve water quality to the "maximum extent practicable" based on local conditions, resources, and priorities. In accordance with the permit, the City has developed and implemented a Stormwater Management Plan (SWMP) that describes measures the City will implement throughout the five-year (2011-2016) permit term to reduce pollutant discharges in the MS4 storm sewer system.

Figure 6.11 Existing Stormwater System



The City's UIC system includes nearly 9,000 UICs that collect stormwater from the public right-of-way and City-owned properties and discharge it to the subsurface. Approximately 90 percent of the the UICs include a sedimentation manhole prior to the sump. UICs are most prevalent east of the Willamette River where subsurface soils support greater infiltration rates. The City's WPCF permit regulates the construction, operation, and maintenance of all City-owned and operated UICs. Unlike the MS4 permit, the WPCF permit includes numerical standards, based on national drinking water standards, for stormwater discharges to a UIC. The permit also establishes the requirements the City must implement throughout the ten-year (2005-2015) permit term to control pollutants prior to discharge to a UIC to protect groundwater as a drinking water resource.

Stormwater System Levels of Service

Levels of service for the stormwater system are under development as part of the Stormwater System planning. The Bureau has established service categories and related performance indicators which will help frame the characterization of system deficiencies, development and evaluation of alternatives, and selection of recommended improvements:

- Protect public health and safety and property:
  - Sanitary sewage releases: In the separated area, sewage releases to surface water are prevented for storm events up to a 5-year frequency. In the combined sewer area, prevent releases to buildings or streets up to a 25-year storm frequency.
  - Erosion and landslide hazards: Limit risk claims due to City stormwater.
  - Localized/nuisance flooding: Design and manage infrastructure to limit nuisance flood events.
  - Groundwater contamination: In the UIC area, facilities are managed to effectively reduce pollution to the groundwater.
- Protect biological communities and improve ecological function:
  - Loss of habitat: Address water quality and quantity consistent with requirements of the Endangered Species Act.
  - Mitigate contamination of surface water and sediments through use of pollution reduction facilities.
  - Minimize disruption to the hydrologic cycle by managing impervious area and through flow attenuation.
- Support community needs:
  - Address deficiencies that impede community improvements. Increased impervious surface area – whether public of private – requires an approvable discharge point for stormwater conveyance.

Stormwater System Current and Projected Condition and Capacity

Comprehensive condition data is not available for the stormwater system. Of particular concern for stormwater management are the miles of public right-of-way that lack access to adequate stormwater facilities, see Figure 6.12

Recently, the Bureau has intensified its work related to stormwater. A new work group has been established and tasked with updating the *Stormwater Management Manual* (SWMM) and developing a comprehensive system plan for stormwater. The proposed stormwater system plan focuses first on identifying risk associated with failing to meet defined levels of service at the citywide scale, and then performing a targeted alternatives analysis at a subwatershed scale with the specific goal of identifying and mitigating the greatest sources of risk. While this comprehensive stormwater system planning is underway, existing plans and modeling information reveal unique condition and capacity issues related to the stormwater system in each watershed. These are summarized below.

Columbia Slough/Columbia River Watersheds

The existing stormwater systems in the Columbia Slough watershed and on Hayden Island are shown in Figure 6.11. The Columbia Slough watershed is flat, primarily sandy alluvium with good infiltration, but a high water table, which limits the use of sumps and surface infiltration facilities in some areas.

Three drainage districts, see Figure 6.13, are responsible for flood control within their respective district boundaries. Flood control responsibilities include keeping Columbia River water from flooding property within the districts and keeping stormwater generated from within the district boundaries from flooding property by operating pump stations to convey flow into the Columbia Slough and Columbia River. There are over 600 privately owned stormwater conveyance systems that discharge runoff from private properties into the slough. The Portland International Airport and the Oregon Department of Transportation (ODOT) own and operate stormwater systems that discharge to the slough at 15 different outfall locations. There are several more private stormwater systems owned by the Port of Portland that discharge stormwater from Port-owned property into the slough.

This mix of responsibilities for the conveyance and treatment of stormwater runoff creates unique challenges. The City of Portland is only responsible for local stormwater systems that convey stormwater from public right-of-way to the slough. The City manages stormwater in the southeast portions of the watershed using sumps (UICs). In the Columbia Slough watershed, there are approximately 3,500 active sumps. In the Columbia South Shore Well Field, wellhead protection area regulations prohibit infiltration of stormwater, but require treatment of the flow in order to protect the groundwater.

Stormwater system capacity deficiencies (see Figure 6.13) are currently being re-assessed through hydrologic and hydraulic modeling that is being completed for much of the service area through a cooperative project with Multnomah County Drainage District #1 (MCDD). This work is related to the need for MCDD to evaluate the flooding potential within the district boundaries in order to recertify their levee system with the Corps of Engineers. Stormwater system deficiencies related to slough sediment quality are being evaluated as part of a DEQ Consent Order.

Figure 6.12 Roads Underserved by Stormwater System

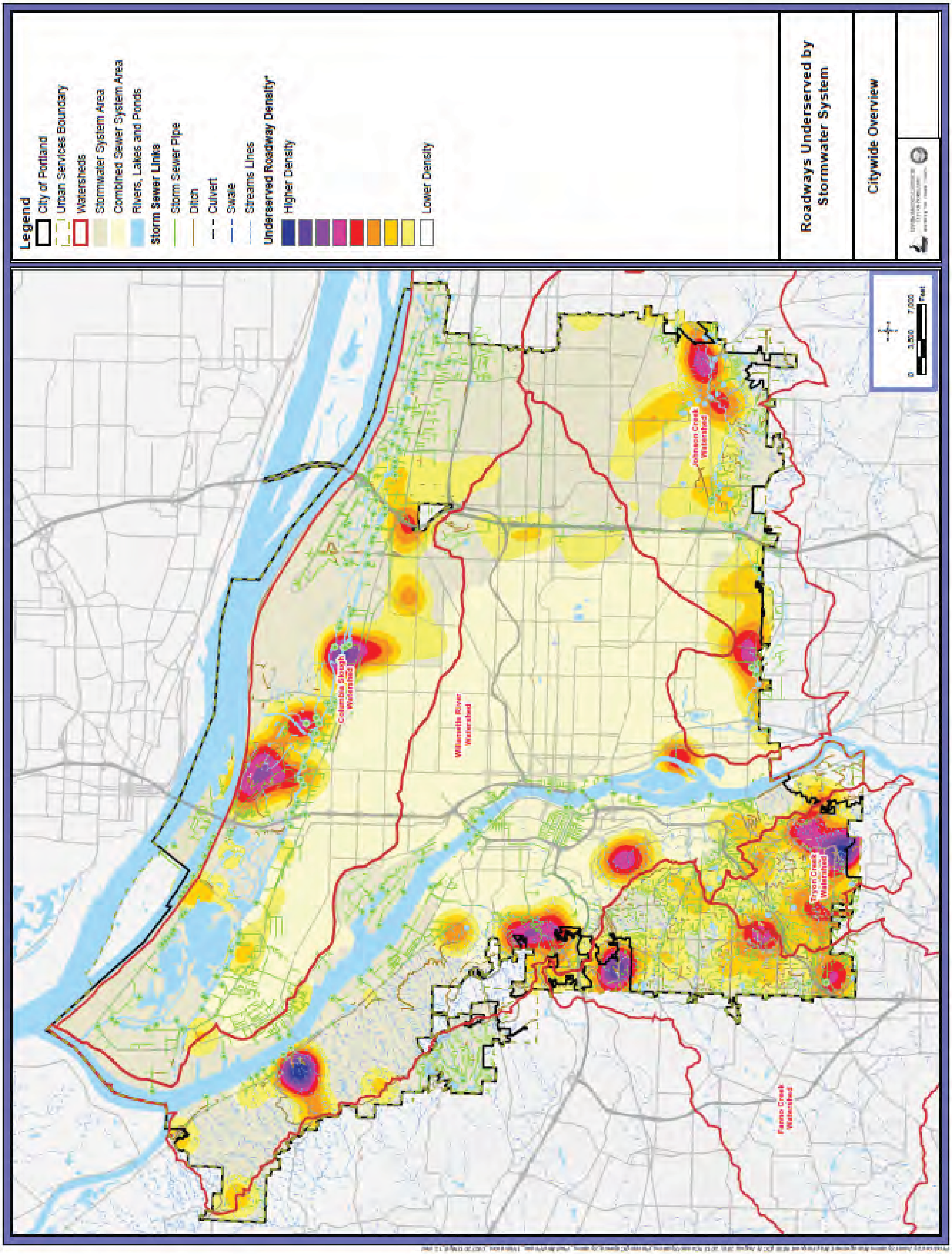
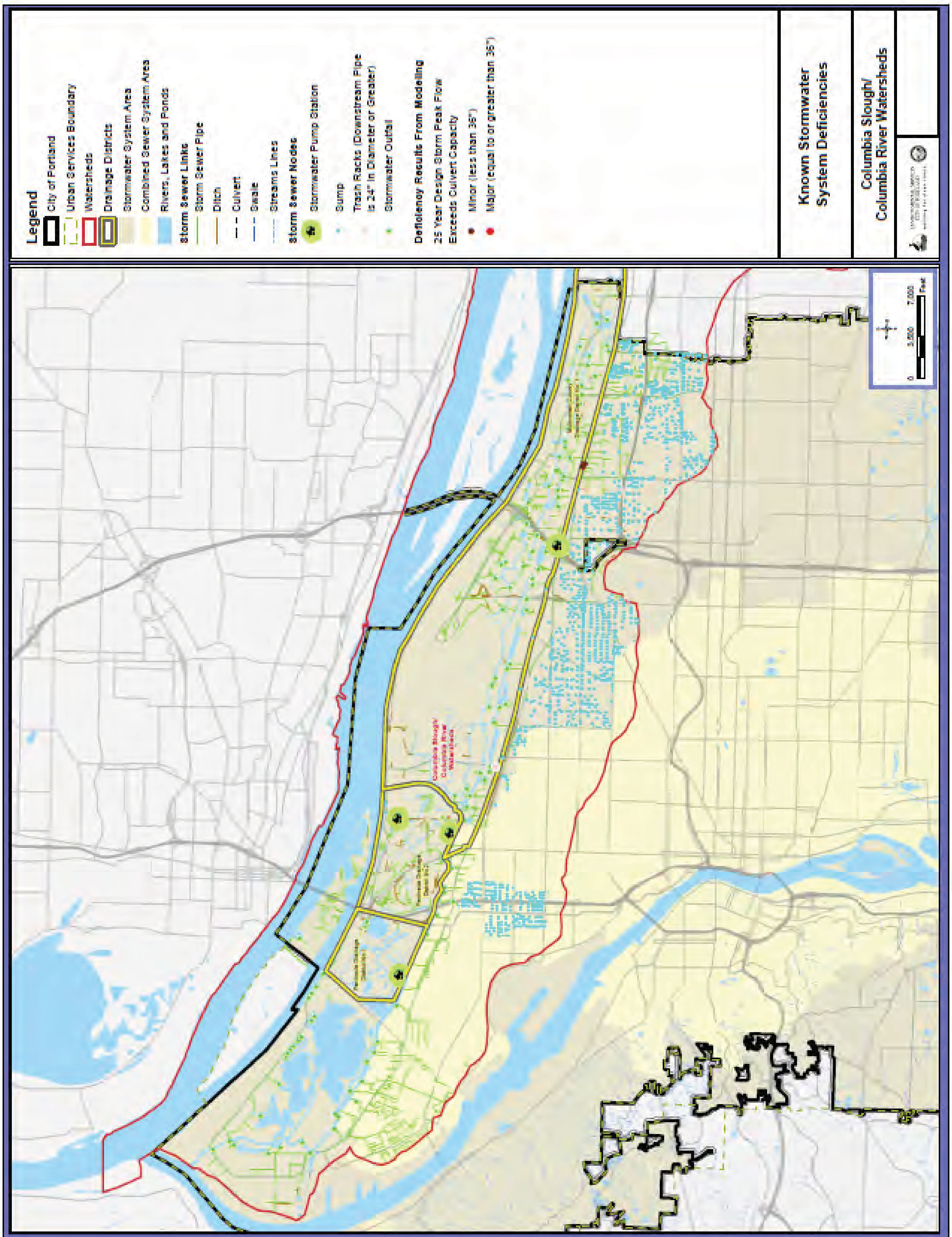


Figure 6.13 Columbia Slough Drainage Districts and Stormwater Deficiencies



Johnson Creek Watershed

The existing stormwater systems in the Johnson Creek watershed are shown in Figure 6.11. The primary system used for stormwater management within the watershed are stormwater sumps. In the Johnson Creek watershed, there are approximately 2,400 active sumps.

Issues with flooding along Johnson Creek are indicative of broader issues with stormwater management in the watershed. Under the Johnson Creek Restoration Plan (2001), the City is working to reduce “nuisance floods” (floods that have about a 10% chance of occurrence in any given year, or an average of once every 10 years), while also improving water quality and habitat. For example, until recently, Johnson Creek flooded Foster Road in the Lents area about every other year. With the completion of the East Lents/Foster Floodplain restoration project in 2012, flooding is expected to be reduced to a six to eight year recurrence.

Resources have not been available to fully study and understand the characteristics of the stormwater sub basins that drain to the creek. Stormwater master planning is expected to identify additional system deficiencies. Based on hydraulic modeling and field observations during storm events, stormwater system capacity deficiencies are predicted to occur in the steep, natural channel drainage systems south of Johnson Creek and east of Interstate 205. The relatively recent development in some neighborhoods east of I-205 and south of Division Street has resulted in increased impervious area and a loss of vegetation which contributes to the flashiness (rapid rise and fall) of Johnson Creek and its tributaries and has had an effect on the creek’s floodplain. In some areas, natural drainage and local seeps and springs make on-site stormwater management difficult.

Figure 6.14 illustrates known stormwater deficies in the Johnson Creek Watershed.

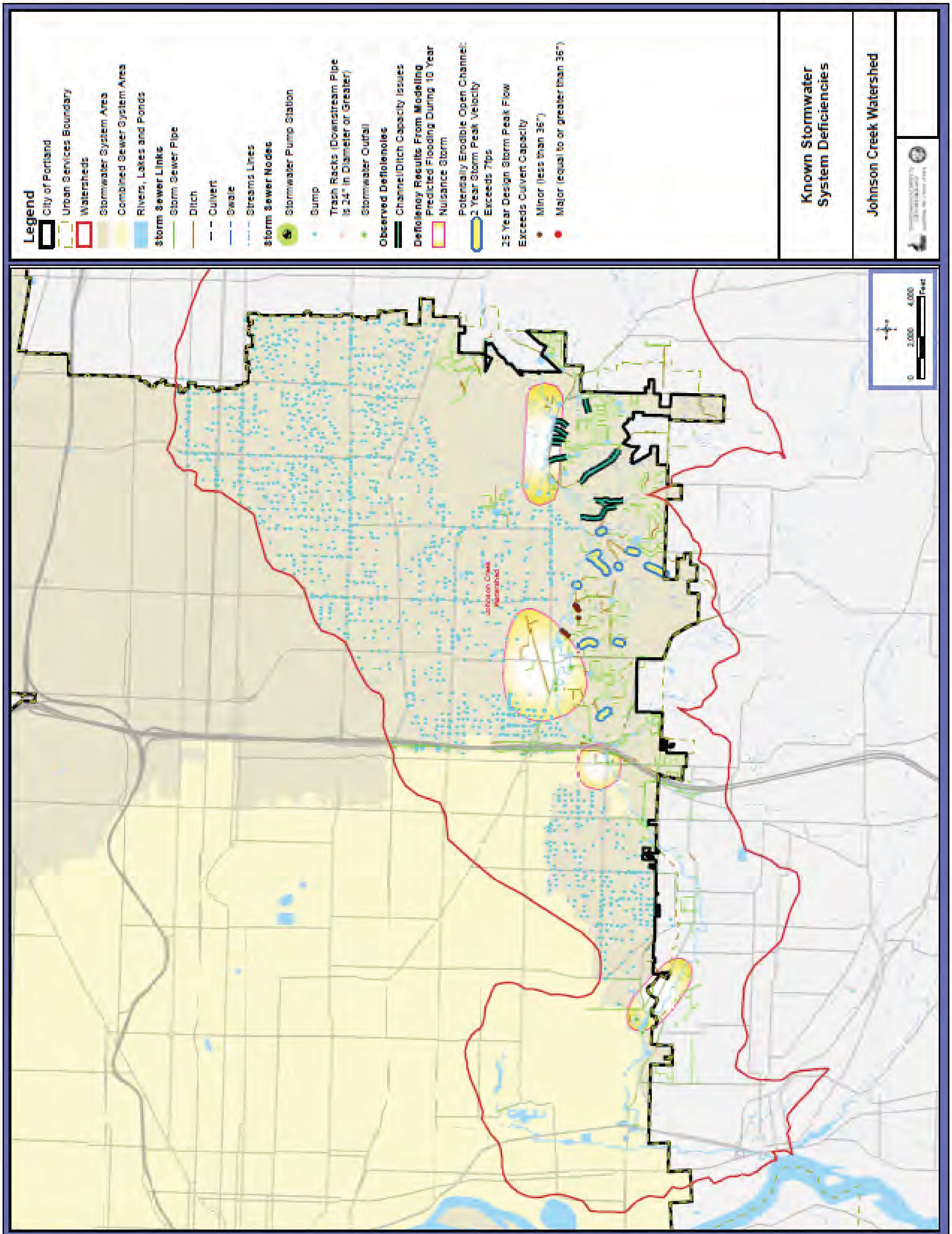
Fanno and Tryon Creeks Watersheds

The existing stormwater systems that contribute flow to Fanno Creek, other Tualatin River tributaries, and Tryon Creek are shown in Figure 6.11. This figure also shows the portions of the stormwater system that have been assessed using hydrologic and hydraulic models.

Water quality is a primary challenge related to stormwater in these watersheds. As a part of the Fanno and Tryon Creeks Watershed Management Plan (2005), pollutant loading from different land uses was calculated through the use of the BES GRID model. These results were utilized to estimate the source of water quality deficiencies in these watersheds and are used as a guide to help in the development of pollution reduction projects. Some existing stormwater detention ponds have been identified as temperature concentrators.

There are numerous stormwater capacity deficiencies at culvert crossings and within piped systems that were identified during the development of the 2005 Fanno Tryon Watershed Management Plan. In addition, a majority of the properties and streets in Portland that are underserved by stormwater systems are in the Fanno and Tryon watersheds. These areas tend to have soils with low infiltration capacity that

6.14 Johnson Creek Known Stormwater Deficiencies



do not allow for on-site stormwater discharge; steep slopes that have potential landslide hazards; and streets that lacking drainage infrastructure for off-site stormwater discharge. Figure 6.15 illustrates known stormwater deficiencies in the Fanno and Tryon Creek watersheds.

Willamette Watershed

The Willamette Watershed's developed areas are lagely served by the combined sewer system, but portions of the area are also served by sumps (UICs) and the City's MS4 system. The areas within the watershed that have been modeled are shown in Figure 6.11.

Primary deficiencies in the Willamette watershed are water quality and high flows in the natural channels of the west hills that lead to degredation of the streams. Similar to the Fanno Creek and Tryon Creek watersheds, steep slopes and low infiltration capacity of soils presents challenges for on-site stormwater management in some areas. See Figure 6.16 for known stormwater deficiencies.

Studies such as the Westside Streams Water Quality and Trend Analysis Status Report (2010) and the Tanner Creek Water Quality Characterization (2011) help identify sources of water quality deficiencies in the watershed and guide the development of pollution reduction projects.

The Stephens Creek subwatershed has had the most complete and recent stormwater evaluation (2013). It was the first watershed analysis that evaluated not only conveyance system capacity and water quality, but also the hydrologic indicators of stream health. In this area, approximately 22% of taxlots do not have an approvable stormwater discharge point and approximately 25% of the city-managed right-of-way in the watershed does not have an approved stormwater system.

Recommended Stormwater System Improvements

Recommended improvements can be divided into two categories: retrofits to existing development and proactive options that can reduce the need to expand the stormwater management system or provide opportunities for more effective system improvements. These vary somewhat by watershed and by stormwater basins.

In the combined sewer basins, there is a need to continue to identify opportunities to locally manage stormwater in order to manage the system within the requirements of the NPDES permit. Such projects will include private property retrofits (eco-roofs, rain gardens, parking lot retrofits) and stormwater detention facilities in the right-of-way. Also in the current combined basins, there may be opportunities to separate stormwater management from the sanitary system. This is currently under review in the Lloyd District area.

In the separated areas, the Bureau has identified a vary of projects and programs to address stormwater system needs. In addition to the types of projects identified for the combined area, there are also projects to address flood management, pollution reduction, and overall watershed health. However, it is important to note that the Bureau anticipates that there will be areas where it is neither technically nor financially feasible to provide stormwater management services and land use changes may be the only viable solution. In areas without approvable discharge locations for stormwater, it may be desirable to down

Figure 6.15 Fanno/Tryon Known Stormwater Deficiencies

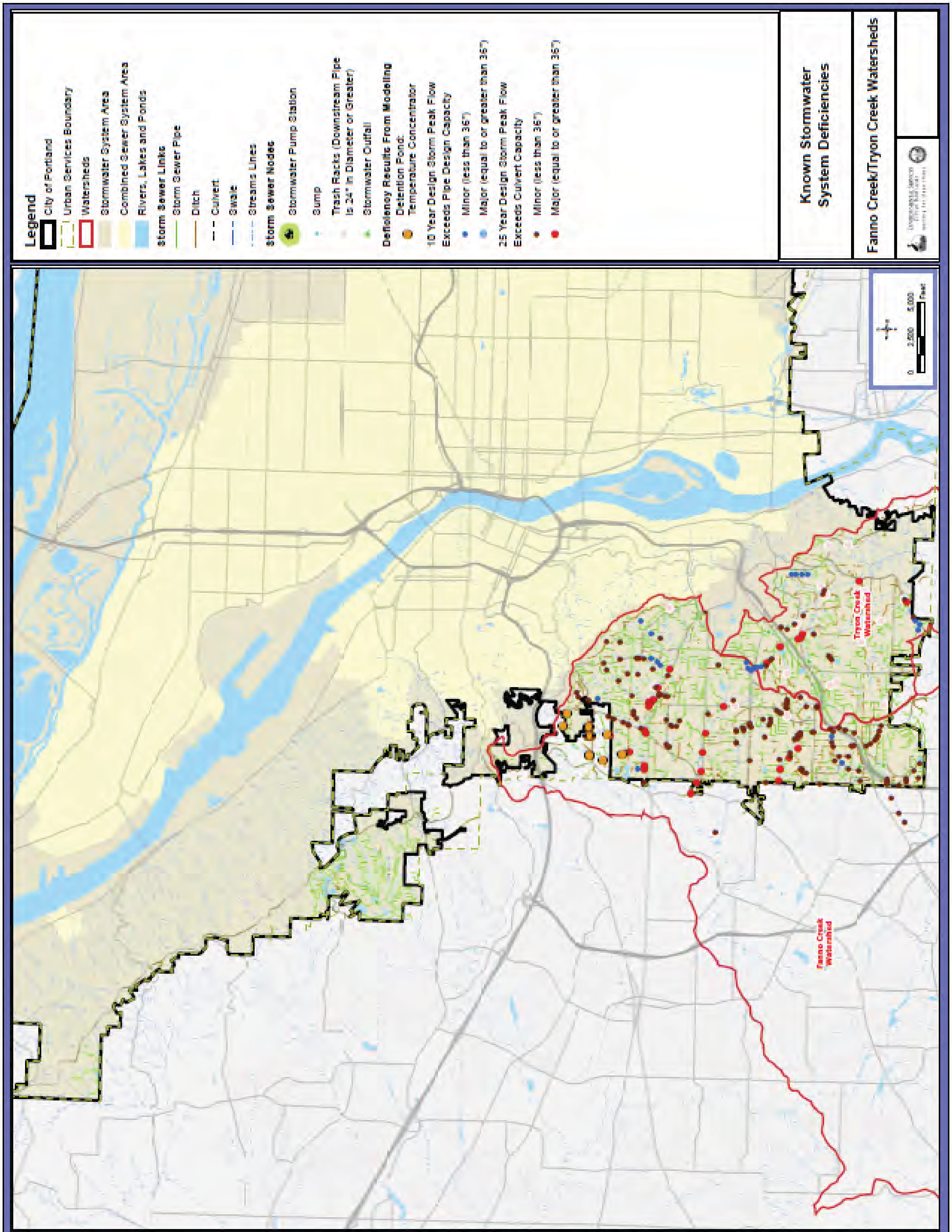
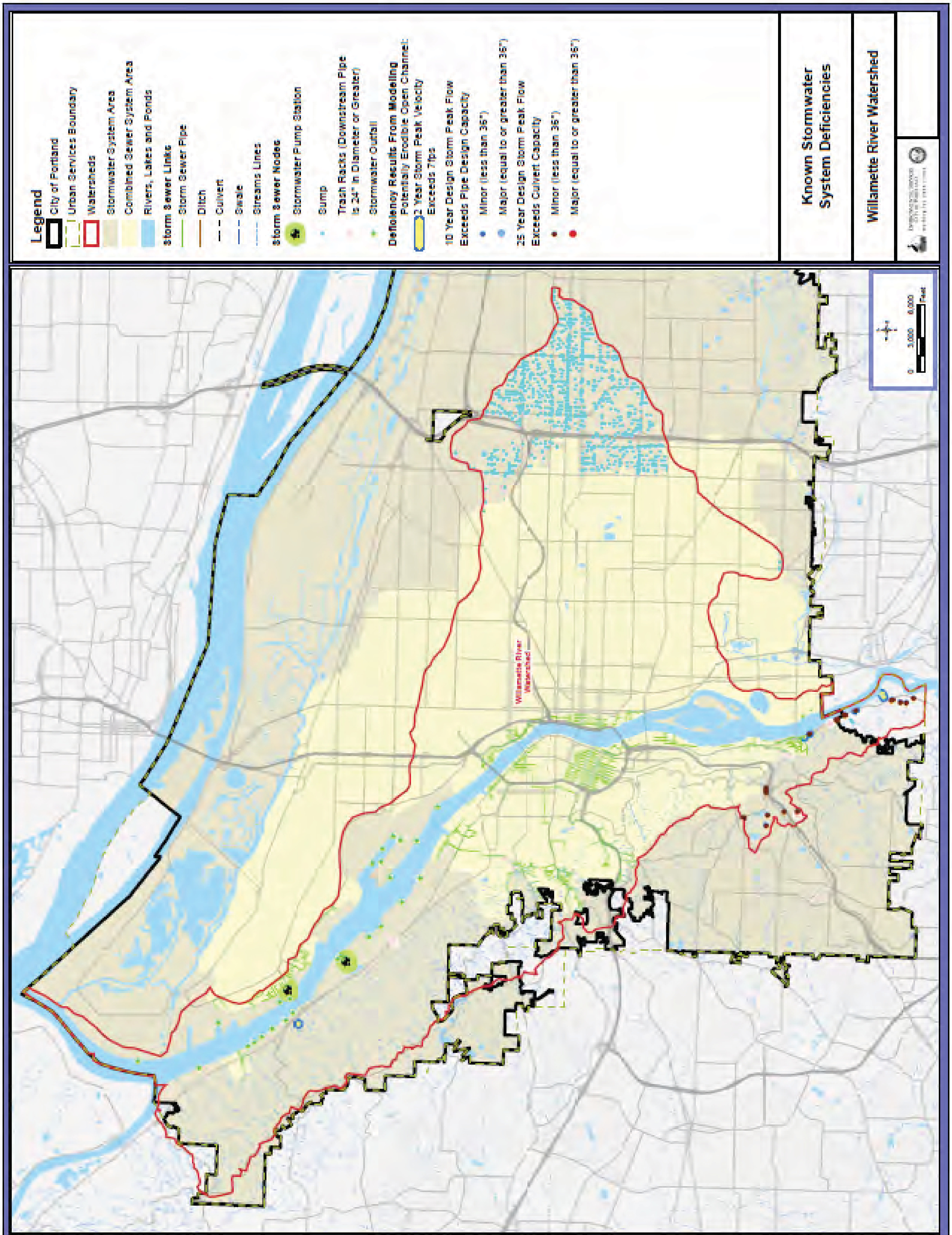


Figure 6.16 Willamette Watershed Known Stormwater Deficiencies



zone. Conversely, it may be desirable to encourage increased density in areas that are already highly impervious – existing corridors and centers. By upzoning, higher density, and therefore more customers, may make small neighborhood stormwater management system improvements more cost effective.

While citywide stormwater system planning is not yet complete for all areas, existing watershed and stormwater plans recommend the following investments. Additional stormwater system improvements to address system risk will be recommended in the coming years.

In the **Columbia Slough**, projects will focus on water quality with a primary goal of improving the quality of the sediments in the Slough. Specific water quality projects are being identified as part of the Columbia Slough Sediment Order. Flood control is also an issue in the slough, both keeping Columbia River water from flooding property within the drainage districts and keeping stormwater generated from within the drainage district boundaries from flooding properties. A study will determine whether or not a new stormwater pump station is required. The bureau continues to invest in protection, restoration, and enhancement of natural resources as well as built infrastructure improvements.

In the **Johnson Creek** Watershed, projects will continue to focus on flood control through restoration along the main stem of the creek. These projects are typically multi-objective, providing flood mitigation, improvement to water quality, and enhanced aquatic and terrestrial habitat. Identified areas for larger flood mitigation projects include West Lents and Freeway Lands. Restoration is underway on Crystal Spring Creek, a tributary stream that is a source of clean, cold, and constant flows. Projects are also underway to protect and restore natural resources in the uplands and tributaries. Future work will begin to address upland stormwater system conveyance and capacity.

In the **Fanno/Tryon** Watershed, projects will focus on stormwater system improvements including flow control and treatment to improve water quality, protect streams, and ensure storm system reliability. Stormwater retrofits will focus on existing impervious area in major transportation corridors such as Beaverton-Hillsdale Highway, SW Barbur Boulevard, and Interstate 5. Projects to increase culvert capacity and improve fish passage are underway or planned. Additional projects include stream dalighting, sewer infrastructure protection, stream enhancement, and roadside drainage and shoulder improvements. The bureau and partners continue to focus on protecting, restoring, and enhancing natural resources that support water quality, hydrology, and habitat.

In the **Willamette River** Watershed, the Bureau will continue to implement stormwater projects to address capacity in the combined sewer system to comply with overflow limits and improve watershed health. Work outside the combined sewer system will address other stormwater-related impacts to the river and its subwatersheds and tributaries. Projects will focus primarily on flow control and improving water qualilty through retrofitting existing impervious area along public right-of-way and on private property. Construction of new neighborhood-scale water quality facilities could be a cost-effective solution in some areas. As in the Fanno/Tryon Watershed, projects often require partnering with other public agencies (such as Oregon Department of Transportation) or private property owners. Restoration and enhancement of remnant habitat areas along the main stem Willamette River to create “stepping stones” through the industrial harbor and downtown core is important to connect ESA-listed species to existing high quality, intact habitats upstream.

Investment Strategy

Process

Each year, the Bureau prepares capital and operating budgets for the upcoming fiscal year and for the five-year planning horizon. The work of the Bureau is focused on strategic and comprehensive program delivery protecting public health and restoring the environment within a prescribed, but negotiated, regulatory framework. Using asset management principles including risk and likelihood of failure, the Bureau budgets to maintain infrastructure and natural systems to meet regulatory requirements and enhance the health of watersheds. Asset management addresses life-cycle costs, trade-offs between capital and operating expenditures, and prioritization of projects based on risk and consequence of failure, to achieve long-term system sustainability and acceptable levels of service. The Bureau uses an integrated approach, rather than one that addresses only single subject regulatory requirements, whenever possible. This integrated approach is often more cost-effective and improves watershed conditions – hydrology, water quality, habitat, and biological communities – as it solves urban environmental problems.

The Bureau is several years into implementing an asset management approach to guide investment. To date, extensive work has focused on the Combined and Sanitary Collection System where an updated Systems Plan has evaluated projects using a risk-based asset management framework. This approach will be expanded to the Bureau's other systems and asset types as resources are available to do the required analysis. Watershed monitoring data, regulatory requirements and watershed planning (e.g., Johnson Creek Restoration Plan) guide prioritization of much of the Surface Water Management program area. Applying asset management approaches to the natural systems and green infrastructure is a relatively new effort.

The Capital Improvement Plan (CIP) is developed utilizing a multi-step process to identify, develop, review, score, and rank projects for funding and scheduling priority. The process ensures that the core needs of the sanitary sewer and stormwater systems and the community they serve are appropriately funded and scheduled. A bureau-wide stakeholder review team investigates, scores, and ranks all CIP projects in accordance with identified CIP criteria. CIP weighted criteria, scoring, instructions, scheduling guidelines, estimating procedures, and project request forms are used to ensure each project is developed, reviewed, and scored based on detailed and consistent information. A CIP development strategy guides project selection and scheduling. Projects are reviewed by managers in finance, program areas, operations, and engineering to ensure financial resources are expended effectively and appropriately. The CIP management team evaluates all the information from the process, meets with selected bureau project and program managers to refine cost and schedule data, and submits a recommendation to the bureau director. The bureau director reviews the findings and approves the CIP plan, which is then submitted to City Council in the annual City budget process.

BES engages the public in the budget development process through its Budget Advisory Committee and the Public Utilities Review Board. CIP projects that affect the public include public involvement and outreach plans.

Projects and Programs

The major components of the sewer system define the program categories within the capital budgeting process: Sewage Treatment, Maintenance and Reliability, Surface Water Management (i.e., stormwater and watershed health), and Systems Development.

The Bureau focuses efforts on comprehensive, multi-purpose solutions in the highest priority areas for work in all four program areas of the CIP, guided by both regulatory requirements and the Bureau's mission and Strategic Plan. The Bureau anticipates approximately $2 billion in capital investment in these programs over the next twenty years. CIP projects and programs under these program areas are drawn from the recommended system improvements discussed in earlier sections. The Bureau's 20-year Investment Strategy, included in Appendix A, is summarized in Table 6.4.

Table 6.4 Investment Strategy Summary

Program	FY 2013-2018	FY 2018-33
Wastewater Treatment and Pumping	$90.388,000	$300,000,000
Maintenance & Reliability	$343,179,000	$900,000,000
System Development	$26,687,000	$60,000,000
Surface Water Management	$79,997,000	$200,000,000
TOTAL	**$540,251,000**	**$1,460,000,000**

Specific objectives for the program areas are described below.

Sewage Pumping and Treatment Systems

Regulations, primarily through the NPDES Waste Discharge permits, require investment in the ten year planning horizon with a focus on process improvements at Columbia Boulevard Wastewater Treatment Plant (CBWTP) such as secondary process improvements and upgrades to the mixing systems in the digesters. The balance of this program area focuses on ongoing maintenance needs at the CBWTP and the Tryon Creek Wastewater Treatment Plant through the Repair, Rehabilitation and Modification program and for the pumping system through the Pump Station Improvement program. An updated Facilities Plan for CBWTP was completed in March 2010; no new projects were identified for the near term. An update to the TCWTP Facilities Plan is underway and is expected to identify several needed investments.

Collection System Maintenance and Reliability

This program area is focused on improving and maintaining the existing sanitary and combined sewer collection system to provide accepted levels of service. The March 2012 Systems Plan (for sanitary and combined sewers) recommends projects with a favorable benefit/cost ratio and that reduce bureau risk. Approximately $175 million in pipe rehabilitation need was identified for near-term investment. Additional projects are planned to address the highest risk of basement sewer backup. In response to system failure in the Fanno Basin, an extensive improvement program is underway through fiscal year 2016, including a new pump station to augment the existing pump station. A small amount of work is related to ongoing requirements for the Combined Sewer Overflow Program. These remaining projects focus on increased efficiency of system operations.

Surface Water Management

This program area focuses on systematically protecting and restoring surface water assets and improving overall watershed health to protect public health and safety and address regulatory drivers. Projects often involve collaboration with other program areas and community partners. The Bureau prioritizes projects that protect the most critical existing watershed functions and/or preserve those locations at the greatest risk of damage. This is accomplished by implementing the Watershed Management Plan recommendations for systematically restoring important natural functions and/or using green infrastructure to reduce or avoid stormwater impacts. A stormwater system plan for the Stephens Creek subwatershed was completed in 2012, and identified investment needs for that area. Work is now underway to expand stormwater system planning to the entire service area, and projects recommended through that system plan for conveyance, capacity and water quality will fall under this CIP program area. Other near-term priorities for this program area include continuing restoration of Johnson Creek; stormwater retrofit projects in Fanno/Tryon and the Columbia Slough; and restoration and enhancement projects along the main stem Willamette River, tributaries, and the Columbia Slough.

Systems Development

In support of Metro's 2040 plan, this program area funds projects that cost effectively and incrementally expand the sewer collection system. Work is underway to identify clusters of properties that are currently served by on-site sewage systems such as septic or cesspools and to plan for alternatives prior to failure of on-site systems. This program also funds sewer improvements in association with public works projects by others, primarily transportation projects – both road and transit. In response to Council action, the Bureau has developed a program to address non-conforming sewer connections. Most of the work to date has been in response to either a service failure or a property sale. Some work has been accomplished in conjunction with planned pipe rehabilitation projects.

Financial Strategy

The Bureau annually prepares a five-year financial plan. Periodically, the Bureau forecasts on 10-year and 20-year horizons to gain additional understanding and insight into long-term financing needs and rate implications. The five-year financial plan has three key elements. Initially, operating and capital expenditure requirements for the Bureau are developed through separate operating and capital planning processes and then they are brought together. Overall revenue requirements and a corresponding five-year funding program are developed taking into account the impact of capital construction on future operations and maintenance requirements.

The financial planning process lays the groundwork for setting utility rates, which are formally adopted each year by the City Council. Rates are set on a cost of service basis, meaning that rates are designed to charge customers for their proportional cost of collecting, transporting, and treating discharges. From time to time, the Bureau reviews all policies and planning standards and may elect to change them.

Existing Financial Strategies

The Bureau of Environmental Services receives revenue for capital investment from:

- **Fees, charges and permits**, which include reimbursements for engineering, administration, and construction management services charged to local improvement districts and other local government agencies.
- **Line and branch and system development charges**.
- **Cash transfers from the Sewer System Operating Fund**. After discharging all other obligations, operating funds in excess of the operating reserve are available to fund capital improvements.
- **Bond proceeds** ,are the primary funding source of the Bureau's capital expenditures. These flow through the Operating Fund and emerge as construction spending as described in the section below.

System Funds

The Bureau's financial reporting system is organized into five separate funds:

- The **Sewer System Operating Fund** provides for the day-to-day operation, maintenance and management of Bureau programs.
- The **Sewer System Construction Fund** holds equity contributions and net bond proceeds for transfer to the Sewer System Operating Fund to reimburse capital-related expenditures.
- The **Sewer System Debt Redemption Fund** provides for payment of debt incurred for capital construction.
- The **Sewer System Rate Stabilization Fund** functions as a reserve that enables the Bureau to level its projected annual revenue requirements. This greatly reduces year to year volatility in the City's sewer and stormwater rates.
- The **Environmental Remediation Fund** was created to provide funding to remediate former solid waste disposal sites. The Environmental Remediation fund now also provides funding of the Portland Harbor Superfund program remedial investigation and feasibility study costs and the City's source investigation program

Debt Service Coverage

The Bureau's current planning standard is to set rates adequate to provide Net Revenues (gross revenues less operating expenses) including transfers from the Rate Stabilization Fund equal to or greater than 1.50 times the annual debt service requirement on first lien debt, and 1.30 times the annual debt service requirement on all (first and second lien) debt. These targets exceed the requirements specified in the existing debt covenants.

Ending Fund Balances

The Bureau's current policy is to maintain combined ending fund balances within the Operating Fund and the Rate Stabilization Funds equal to or greater than 10 percent of each year's operating expenses.

The Construction Fund ending fund balance is targeted at 35 percent of the next year's CIP, or $500,000, whichever is greater, for planning purposes. Actual ending fund balance will differ depending on the rate of expenditures and the timing of CIP borrowings.

Projected revenues and expenditures

Table 6.5 depicts forecast resources and requirements for the Operating Fund. While the Bureau annually prepares a five-year financial plan, Table 6.5 includes an FY2019 – FY2033 summary column to provide a 20-year extended outlook.

Table 6.5 Sewer system operating fund forecast sources and use of funds ($1,000)

Item	2014	2015	2016	2017	2018	FY2019 – FY2033
Resources						
Service Charges & Fees	$275,404	$294,507	$315,179	$335,524	$353,283	$6,733,906
Connection Fees	9,910	9,364	9,909	10,494	10,773	266,070
Wholesale Contracts	3,445	3,555	3,669	3,787	3,909	77,778
Other Service Charges & Misc.	7,907	6,335	6,475	6,681	6,872	140,826
Cash Transfers In -						
Rate Stabilization Fund	10,400	-	-	-	-	32,250
Sewer Construction Fund	86,400	112,100	110,345	108,732	112,424	2,080,868
Capitalized Overhead	8,255	8,413	8,574	8,738	8,905	155,960
Other Funds	697	181	186	192	199	3,951
Interest Income	81	36	54	53	48	652
Beginning Fund Balance	52,999	58,176	62,214	66,539	70,786	74,404
Total Resources	**$469,226**	**$491,052**	**$515,200**	**$544,623**	**$567,356**	**$9,566,665**
Requirements						
Personal Services	45,637	47,014	50,498	51,878	54,149	1,072,772
Materials & Services	36,893	38,470	40,657	43,172	44,897	820,078
Internal Services	33,153	34,689	36,233	37,722	38,986	759,166
Capital Outlay (1)	113,121	111,623	111,548	117,357	112,837	2,156,169
Int. Accruals/Lease Purchase	71	46	67	79	73	277
Cash Transfers -						
General Fund Overhead	6,965	7,348	7,753	7,966	8,186	156,865
Construction Fund	18,759	20,096	20,916	22,963	29,153	1,660,573
Rate Stabilization Fund	1,550	5,550	5,825	4,750	-	28,875
Debt Redemption Fund	151,949	160,579	171,426	183,984	200,474	2,741,297
Other Cash Transfers	2,977	3,401	3,727	3,972	4,205	59,763
Ending Fund Balance	58,176	62,214	66,539	70,786	74,404	110,830
Total Requirements	**$469,226**	**$491,052**	**$515,200**	**$544,623**	**$567,356**	**$9,566,665**

(1) Includes capitalized personal services, materials & services, internal services, land, equipment and capital improvements

Revenues from service charges and fees, and transfers from the Sewer Construction Fund are the largest resources for the Operating Fund. Projections of new customers, water use per account, impervious area and planned rate increases are used to forecast revenues over the forecast period.

Operating expenses include personal services, materials and services, internal services, transfers for general fund overhead, and transfers to the Rate Stabilization, Construction, Environmental Remediation, and Debt Redemption Funds. The operating expense forecast reflects the Bureau's existing operating budget, assumed cost escalation factors and service additions associated with CIP and other programs.

Factors Influencing the Forecast

The following are considered risks to the forecast as their potential effects were not explicitly included in the investment strategy or financial forecast. Potential costs are not known in all cases.

- **Portland Harbor**
  The Portland Harbor Superfund Site investigation is currently focused on a stretch of the Willamette River from River Mile 2 to River Mile 12. The City is one of the potentially responsible parties actively engaged in assessment and evaluation of cleanup alternatives in this section of the river. The total cost associated with the cleanup and restoration activities and the City's ultimate share of those costs are unknown.
- **Willamette Basin TMDLs**
  DEQ intends to finalize a mercury TMDL within the next few years, and an update of the temperature TMDL is also pending. Changes may affect the Tryon Creek Wastewater Treatment Plant and some projects and programs, but specific implications and the ultimate costs are unknown at this time.
- **MS4 Permit**
  The City's MS4 permit includes requirements to evaluate program effectiveness at reducing applicable TMDL parameters. As new TMDLs are developed and approved, technical work and associated budgets will likely increase.
- **Sanitary Sewer Overflows (SSOs)**
  State and federal regulators continue to study the operations and maintenance of municipal sewer systems and potential guidelines regarding SSOs. Should SSO rules similar to those proposed in 2001 eventually become effective, the Bureau's sewer system would be affected. Such rules could have significant financial impacts to both capital (via upsizing of facilities) and operating (increased system oversight) budgets.
- **Sanitary and Stormwater Service to Residents**

  As discussed in earlier sections, there are challenges to providing sanitary sewer service to all properties within the USB. These include properties with onsite disposal, undeveloped properties, and properties serviced by under capacity sewer lines. While some of the solutions are included in the financial forecast, the full extent of the need is not fully known. Similarly, the Bureau recognizes the need to make improvements to the stormwater system, however, the extent of these improvements is not fully known at this time.

- **Sanitary Sewer and Stormwater Rates**

  The bureau's capital and operating budget forecasts are influenced by annual sewer and stormwater rates approved by the City Council. Planned operations and maintenance of, and capital improvements to, the sewer and stormwater systems will depend on continued predictable increases in rates. Annual rate increases determine the bureau's ability to address the key issues and concerns listed in the Overview section. Lower rate increases than planned require either reduced operation and maintenance expenditures or delays in maintenance of existing infrastructure and new capital system improvements, which may increase future costs.

In addition, the financial forecast makes assumptions about factors internal to the Bureau and the City such as program levels, and external factors such as inflation and borrowing costs. Changes to these factors may change the forecast. This is particularly true of an extended forecast such as the 20-year forecast shown in Table 6.5. The following is a description of some of these factors, and the risks involved in unanticipated changes:

- The financial forecast is based on a 1.5% decrease in average use per single-family residential customer, and a 0.75% decrease in average use per multi-family, commercial and industrial customer, roughly consistent with recent history. The forecast also assumes an account growth rate of 0.5% per year. Should consumption or account growth be lower than anticipated, revenues would be adversely affected.
- Changes in interest rates will affect the cost of new debt. Any significant increase in interest rates over the forecast interval will increase revenue requirements for interest on new debt. Lower-than-anticipated interest rates would reduce borrowing costs and therefore revenue requirements.
- The forecast rate increases include best estimates of inflation over the forecast interval. An increase in the actual rate of inflation over the forecast inflation rate will lead to correspondingly higher revenue requirements.
- The current economic recession has resulted in a drastic drop in all construction related fees and permits - most notably System Development Charges, which are a material revenue source. The financial plan assumes construction activities will rebound. If construction activity does not rebound as assumed, revenues would be adversely affected.

Chapter 7
Portland Water Bureau

Overview

The Portland Water Bureau has supplied domestic water to residents of the Portland area for more than 100 years and is the largest supplier of domestic water in Oregon. The Portland water system serves drinking water to about 932,000 Oregonians, almost one-quarter of the state's population. In 2010-11, the Portland Water Bureau directly served a retail population of over 566,000 people in 161,000 residential households (both single and multi-family residences) and about 20,000 commercial and industrial customers. Portland's wholesale customers served an estimated population of more than 442,000 in 2010-11.

Vision, Mission & Values

The mission of the Portland Water Bureau is to provide reliable water service to customers in the quantities they desire and at a quality level that meets or exceeds both customer and regulatory standards; to provide the highest value to customers through excellent business, management, and operational practices, and appropriate application of innovation and technology; to be responsible stewards of the public's water infrastructure, fiscal and natural resources; and to provide the citizens and the City Council with a water system that supports their community objectives and overall vision for the City of Portland.

System Services

Service Area

Approximately 932,000 people living within a 225-square-mile service area around Portland are served by the Water Bureau's retail and wholesale water sales, see Figures 7.1 and 7.2. The Water Bureau delivered 33 billion gallons (BG) to customers during fiscal year (FY) 2010-11. The 19 wholesale water customers are located in Multnomah, Clackamas and Washington counties. In 2009, the City signed a contract with a 20th wholesale customer, the City of Sandy, for water to be delivered beginning no later than November 2013.

Services Provided

The Water Bureau provides reliable water service to customers in the quantities they desire. Water from two sources, the Bull Run watershed and the Columbia South Shore Well Field, is of consistently high quality and meets all regulatory standards.

Service Agreements & Partnerships

The Portland Water Bureau currently has wholesale contracts with 19 water providers in Portland's metropolitan area -- including cities, water districts, and private water companies. Eight of these water providers have service areas within the Urban Services Boundary of the City of Portland. These include: Burlington Water District, Lorna Water Company, Palatine Hills Water District, Raleigh Water District, Rockwood PUD, Tualatin Valley Water District, Valley View Water District, and West Slope Water District. Some wholesale providers also provide service to small groups of Portland citizens through “wheeling” agreements. These agreements are used where it is difficult or overly expensive to provide water directly from Water Bureau facilities.

The Clackamas River Water District and Sunrise Water Authority provide water services to unincorporated areas within Portland’s urban service boundary to the south of Portland. These water districts operate in partnership with each other through a cooperative agreement and use the Clackamas River as their main water supply source.

The Portland Water Bureau is a member of the Regional Water Providers Consortium. Members include more than 20 municipalities (including the City of Portland), water districts and Metro. (Metro is the regional growth management agency serving Clackamas, Multnomah, and Washington counties.) The Consortium serves as a collaborative and coordinating organization to improve the planning and management of regional municipal water supplies, including regional water conservation implementation and emergency preparedness coordination. The Consortium and its members endorse the Regional Water Supply Plan as the region's water supply strategy for the future. Water providers belonging to the Consortium retain full authority to operate and upgrade their systems and infrastructure.

The Portland Water Bureau maintains partnerships and agreements with other city bureaus and regional and state transportation agencies, providing services such as relocating water mains as directed by City Council. The bureau also has agreements with the U.S. Forest Service for activities within the Bull Run watershed, which is located in the Mt. Hood National Forest.

The City of Portland also maintains partnerships with the cities of Gresham and Fairview regarding participation in the Columbia South Shore Well Field Wellhead Protection Program.

Figure 7.1 Drinking Water Supply System Retail and Wholesale Service Areas

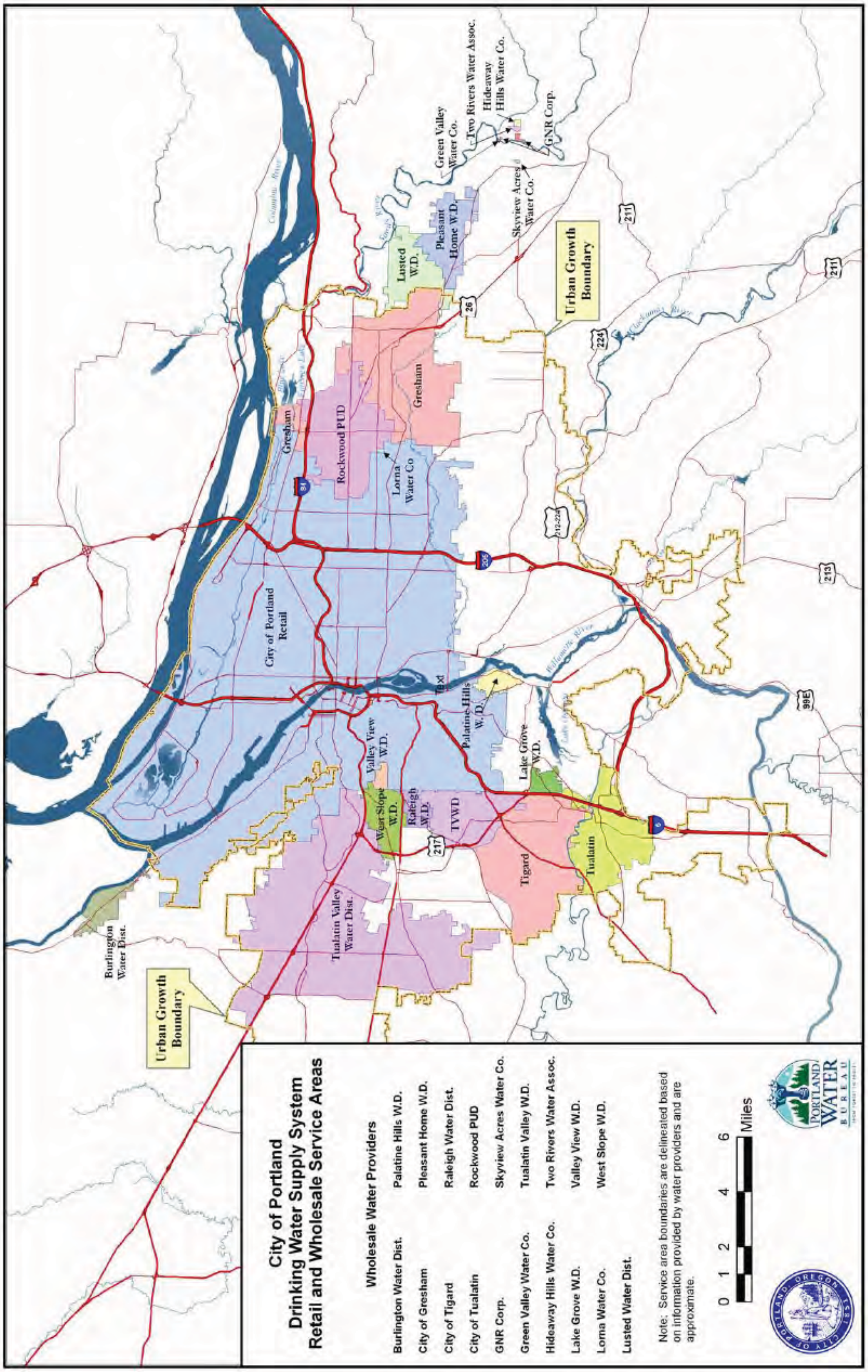
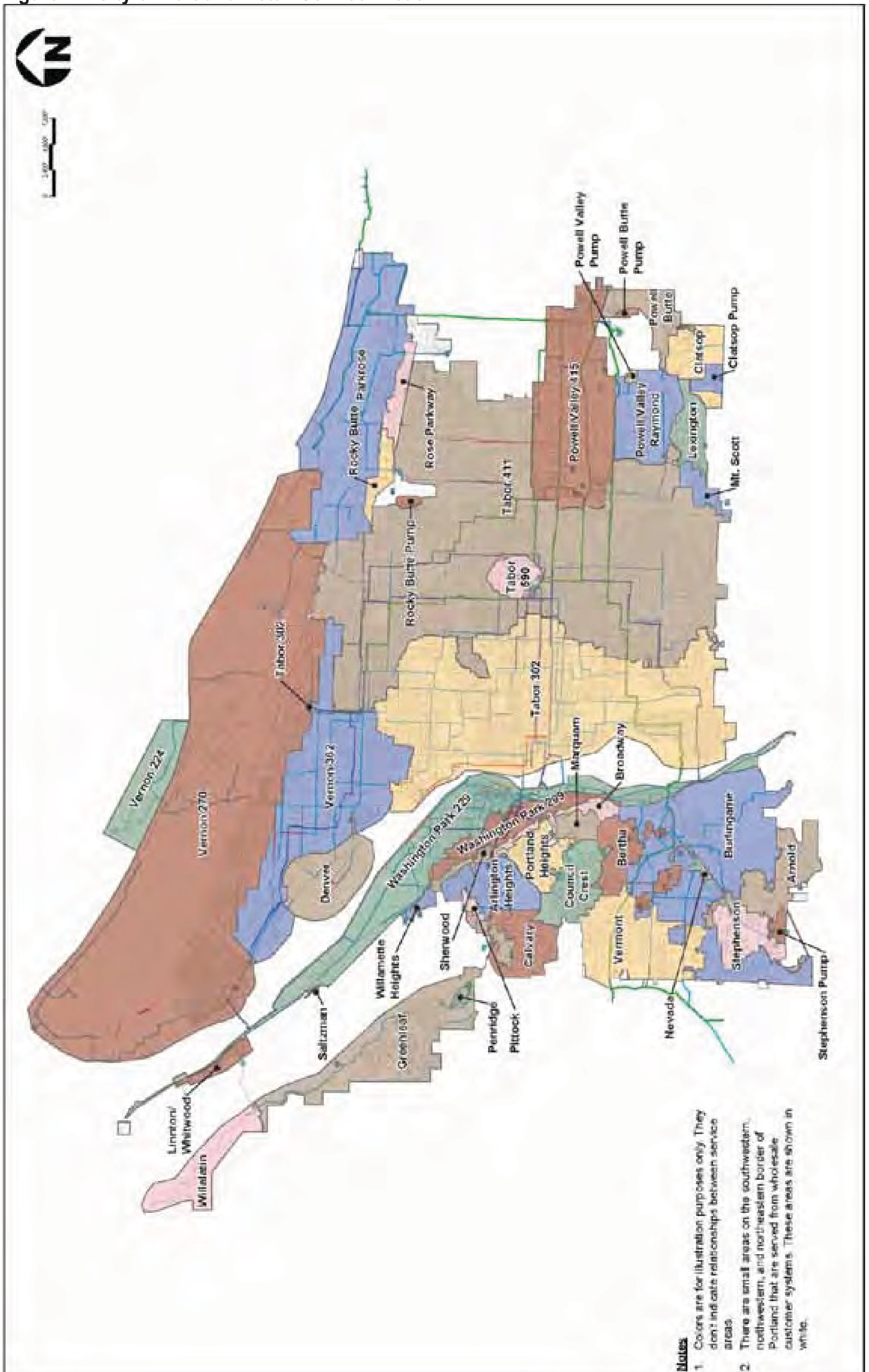


Figure 7.2 City of Portland Retail Service Areas



Inventory Summary

Water is supplied from the Bull Run watershed and the Columbia South Shore Well Field through approximately 2200 miles of pipes within the City's boundaries. In 2012, the water system was valued at about $7.1 billion.

The City's water system includes five integrated sub-systems:

- a supply system, which collects water from the Bull Run watershed and Columbia South Shore Well Field;
- a transmission system of conduits, which moves water to a number of reservoirs;
- a terminal storage system of reservoirs;
- a distribution system of mains, service lines, pumps and tanks, which distribute water to residences and businesses; and
- support facilities to assist in the operation and maintenance of the water system.

Figure 7.3 illustrates the main components of Portland's water system. The components are described in more detail in Tables 7.1 and 7.2.

Figure 7.3 Portland's Water System

Condition Summary

The most recent Status and Condition Report prepared by the Water Bureau is summarized in Tables 7.1 and 7.2. The replacement value of the water system is estimated at $7.1 billion in 2012 dollars. Almost 60% of the value of the water system is in the distribution system. The supply system constitutes about 12% of the value of the water system, transmission accounts for 17%, terminal storage is 11%, and support facilities account for 1.5% of the Bureau's asset value.

Roughly 40% of the water system is estimated to be in good condition with 10% being considered very good. One-third of the water system is considered to be in fair condition, 14% is poor and 2% is considered to be very poor. Table 7.2 provides additional detail on asset status and condition.

Table 7.1 Portland Water Bureau Summary of Value and Condition of Assets, 2012

	Value ($ million)					
Asset Group	**Very Good**	**Good**	**Fair**	**Poor**	**Very Poor**	**Total Value**
Supply	$33.9	$465.6	$250.6	$63.2	$13.0	$860.8
Transmission	$63.5	$502.4	$537.5	$89.6	$0.2	$1,194.5
Terminal Storage	$0.0	$2.7	$188.6	$579.8	$0.0	$771.2
Distribution	$602.3	$1,884.8	$1,303.0	$266.6	$96.1	$4,176.3
Support Facilities	$26.2	$18.9	$11.4	$18.3	$34.4	$109.2
TOTAL	**$725.9**	**$2,874.4**	**$2,291.0**	**$1,017.5**	**$143.7**	**$7,112.0**

Table 7.2 Portland Water System Status and Condition, 2012

	Value ($ million)					
Asset Group	**Very Good**	**Good**	**Fair**	**Poor**	**Very Poor**	**Total Value**
Supply	**$33.9**	**$465.5**	**$250.6**	**$63.2**	**$13.0**	**$860.8**
Bull Run Roads	10.5	35.1	65.4	40.0	13.0	164.2
Bull Run Lake Facilities	0	18.6	.9	.9	0	20.4
Dam 1 Facilities	0	134.6	102.4	0	0	240.0
Dam 2 Facilities	0	157.3	41.3	13.4	0	212.0
Headworks & Lusted Hill Facilities	0	26	8.6	4.4	0	39.0
Groundwater Well Sites	0	36.5	26.6	2.9	0	66.0
Groundwater Pump Station and Treatment	14.7	4.5	5.5	1.6	0	60.6
Groundwater Collection System	8.6	50.0	0	0	0	58.7
Transmission	**$63.5**	**$502.4**	**$537.5**	**$89.6**	**$0.2**	**$1,194.5**
Bull Run Transmission	44.8	193.8	323.8	56.0	0.2	**619.8**
Groundwater Transmission	0	20.8	4.7	0	0	**25.4**
Combined Source Transmission	18.8	287.9	209.0	33.7	0	**549.3**
Terminal Storage	**$0.0**	**$2.7**	**$188.6**	**$579.8**	**$0.0**	**$771.2**
Powell Butte	--	--	170.5	--	--	**170.5**
Mt Tabor Reservoirs 1, 5 and 6	--	--	--	463.8	--	**463.8**
Washington Park Reservoirs 3 and 4	--	--	--	115.9	--	**115.9**
Kelly Butte	--	--	--	--	--	**0**
Mayfair	--	--	11.6	--	--	**11.6**
Sam Jackson #2	--	--	6.4	--	--	**6.4**
Terminal Storage Treatment	--	2.7	--	--	--	**2.9**
Distribution	**$602.3**	**$1,884.8**	**$1,303.0**	**$266.6**	**$96.1**	**$4,176.3**
Distribution Mains	304.2	1049.3	109.0	134.9	51.7	**2249.0**
Services	138.0	259.4	386.3	55.4	10.6	**849.7**
Valves	95.0	282.2	50.2	40.2	11.3	**478.8**
Meters	12.4	14.1	8.8	3.3	0.7	**39.3**
Hydrants	5.1	81.8	59.2	17.5	20.2	**183.7**
Regulators	0.0	5.9	5.9	6.1	0	**17.8**
Fountains	1.9	7.0	7.0	2.8	0.9	**19.4**
Pump Stations	35.7	50.6	18.8	4.4	0.8	**118.5**
Tanks	10.0	134.6	57.9	2.2	0.0	**220.0**

Support Facilities	**$26.2**	**$18.9**	**$11.4**	**$18.3**	**$34.4**	**$109.2**
Interstate Facility	14.7	2.7	1.2	2.3	25.2	49.1
Other Facilities	11.4	13.2	10.1	16.0	9.2	60.1
TOTAL	**$725.9**	**$2,874.4**	**$2,291.0**	**$1,017.5**	**$143.7**	**$7,112.0**

Capacity Summary

Population Growth and Water Use

The population in the Portland metropolitan area is expected to continue to increase. Although the physical boundaries of the retail service area are not expected to be redefined beyond the limits of the urban growth boundary (UGB), vacant land and redevelopment lots within the retail service area are increasingly being developed with higher-density housing and more mixed-use development than in the past. In addition, several of the bureau's 19 wholesale customers have identified growth in existing service areas as well as some small additions to the UGB in 2004.

Historical water use, both retail-only and combined retail and wholesale demand, has not kept pace with the increase in the service area population. Since 1992, the number of gallons per capita per day for the entire retail and wholesale area has declined while the population has grown.

Demand Forecast

Although the growth in demand does not increase at the same rate as the growth in population, analysis of future demand and population shows that demand will increase over time. Using a single-equation econometric model, the Water Bureau estimated the mathematical relationship between the overall demand for water and a series of explanatory variables including population change, weather factors such as precipitation and temperature, the average price of water, weekend use, climate change, and others. The result is a weather-normalized demand forecast for annual demand. The forecast also estimates demand under weather conditions that generated the highest average daily demand during the peak season (1967) and the highest single peak-day water demand (1981). Forecasts for Portland's retail and wholesale annual average daily demand (ADD) have been developed to 2030 for both weather-normalized and 1967 weather conditions for the entire year and for the peak season, respectively.

Population estimates generated as a part of the population and allocation forecasts prepared for the Regional Transportation Plan were provided by METRO. Estimates were made based on approximate service territories of Portland and each wholesale customer. No estimate for future growth outside the existing service territories was included, although some growth outside the existing service territory is likely for some providers as the UGB is expanded to accommodate the required 20-year land supply.

According to the Water Management and Conservation Plan (2010), the average annual daily retail demand for 2030 is predicted to be around 70 million gallons a day (MGD). The average annual daily retail plus wholesale demand for 2030 is predicted to be around 135 million gallons a day (MGD). Both numbers would be a substantial increase from current demands.

Key Issues & Concerns

Regulatory Compliance

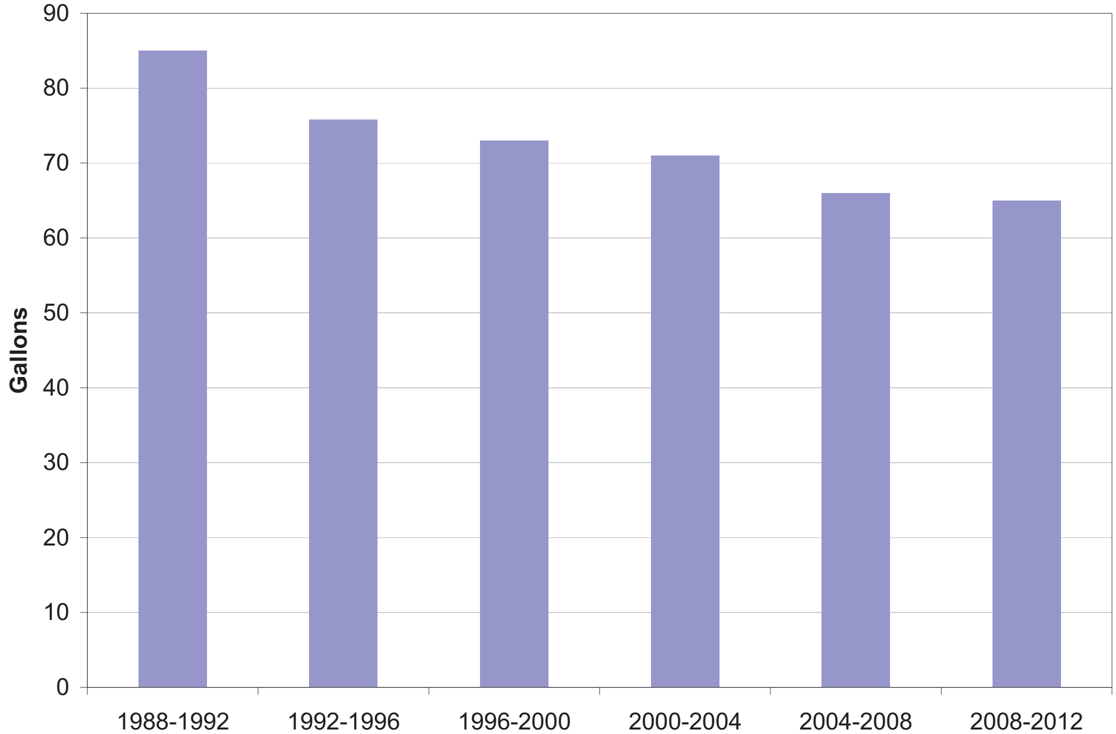
Many large system projects are moving forward to achieve compliance with the Long Term 2 Enhanced Surface Water Treatment Rule (LT2 rule) of 2006. The rule requires that water systems with uncovered finished water reservoirs, like those at Mount Tabor and Washington Park, either cover the reservoirs or provide treatment at the outlets of the reservoirs to inactivate *Cryptosporidium*, *Giardia* and viruses. All of the compliance projects are in the Transmission and Terminal Storage Program. These projects included design and construction for an additional enclosed water storage reservoir at Powell Butte, a replacement storage reservoir at Kelly Butte as well as design work for adjustments necessary to disconnect the uncovered reservoirs at Mt. Tabor and Washington Park from the drinking water system Additional work to replace storage at Washington Park is also necessary. It is expected to cost between $330 million and $400 million to fulfill these requirements (see Table 7.3 under Transmission and Terminal Storage).

In addition, the bureau has capital projects in and around the Bull Run watershed to achieve compliance with regulations of the Clean Water Act and the Endangered Species Act. These projects are described in the bureau’s Bull Run Water Supply Habitat Conservation Plan.

Declining Water Demand

As discussed previously, total water demand for the Portland system has fallen over the last few years, as retail and wholesale customers buy less water. Per capita water use for retail single-family residential customers has gone down significantly since 1992. The average consumption for retail single-family customers between 1987 and 1992 was 87 gallons per capita per day (GPC), is now down to about 66 GPC, and has been as low as 62 GPC. Variables such as the water shortage of 1992, updated state and national plumbing codes, the change from flat rates to consumption-based rates for wastewater (in 1994), and behavioral changes resulting from conservation education have helped to reduce each household’s overall consumption. Figure 7.4 shows the average annual GPC from 1988–2007.

Figure 7.4 Average Residential Per Capita Daily Water Use[1]



Water demand forecasts developed by the Water Bureau anticipate that while per capita water demands will continue to decline somewhat over time, the overall demands on the Portland water system will increase due to population growth. The status of continued wholesale water sales is not known at this time, but the bureau anticipates continuing to sell surplus water to wholesale customers.

Accommodating Growth

The City of Portland provides water to retail customers within the city limits, as well as a significant number of large wholesale customers. Average daily demand for retail customers in 2012 was 62 million gallons per day (MGD). This is expected to grow to approximately 70 MGD by 2030. While this is not a huge growth rate within the City, it is something that needs to be addressed in the planning of infrastructure.

A larger issue is the impact of regional growth, which is happening at a pace that is much faster than growth within the city limits of Portland. Population in areas served through wholesale contracts is expected to increase significantly. However, as wholesale customers make decisions on future supply sources which may or may not include supply from the City of Portland, it is unknown just how this growth will impact the Water Bureau.

[1] Each bar is an average of the gallons-per capita for the four-year period.

Maintaining Existing Infrastructure

The replacement value of water system assets was estimated at $7.1 billion in 2012. Many water system facilities are nearing the end of their useful lives. Half of the 2,200 miles of distribution mains are older than 50 years. The open reservoirs are all over 100 years old. Transmission conduits are 60 to 100 years old. Dams and reservoirs are 50 to 80 years old. The Water Bureau faces new costs to maintain and replace aging infrastructure, respond to security and vulnerability issues, and comply with regulatory requirements. In the meantime, there is pressure to hold down rate increases.

For 2013, the Water Bureau estimates a $12 million annual funding gap, primarily in the replacement of assets in poor condition, including distribution system components, transmission conduits, and the seismic upgrades of tanks and other facilities. Over the next 5 years, the Water Bureau expects to invest over $490 million on water-related capital improvements, primarily on the Distribution Program, which will help reduce the funding gap.

Vulnerability and Security

The City of Portland Water Bureau is dedicated to protecting public health and safety by ensuring that key components of the water system will withstand most human-caused or natural disasters. The Water Bureau has completed a number of studies on vulnerabilities within the system. Significant funding will be required to increase protection of more than 80 critical facilities, including dams, reservoirs, water supply pipelines, pump stations, and operations facilities.

Climate Change

The Water Bureau studies the issue of climate change and is establishing both adaptation and mitigation strategies. The ability of Portland's two water systems to meet future demands, as well as the need for conservation and efficiency programs, will be important considerations as climate change impacts become more clear.

The City of Portland has kept detailed climate records for the past 70 years and continues to research and model climate patterns and their effects in the Bull Run watershed. The City also monitors current global and regional climate change information. In 2002, researchers at the University of Washington developed a climate change study for the Bull Run watershed.[2] This study showed that winter precipitation would increase on average, but that snowmelt would provide less flow in spring. Although the length of the longest drawdown period was not predicted to increase, the average length of drawdown for all years was expected to increase. The study also showed that the storage in the Bull Run system would still be filled each year, because overall winter flows in the watershed are still much greater than the amount needed to refill storage reservoirs.

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2 Palmer, RN, and Margaret Hahn (Ales). 2002. The Impacts of Climate Change on Portland's Water Supply: An Investigation of the Potential Hydrologic and Management Impacts on the Bull Run System. Department of Civil and Environmental Engineering, The University of Washington, Seattle.

Although global climate change models vary in predictions of precipitation amounts and patterns, predictions of increased temperatures in the future show a more consistent trend. The University of Washington Climate Impacts Group's (CIG) review of newer global climate models for the 2007 Intergovernmental Panel on Climate Change reports show that, for the Pacific Northwest, the precipitation changes in the summer are still fairly unpredictable, and temperature increases are 10-20 years further into the future than predicted in studies conducted in 2002.

The City is preparing for climate change through research and monitoring, revising long-term planning models, working with other west coast cities on adaptation and mitigation strategies, developing its rights in the Columbia South Shore Well Field to provide summer supply and emergency backup capacity, and supporting water conservation and sustainable use practices.

The Water Bureau has been a member of the Water Utility Climate Alliance since its inception in 2008. Currently, the City is one of the participating entities in the Pilot Utilities Modeling Application (PUMA) project on modeling climate change on the Bull Run. This reanalysis of global climate models will entail two intergovernmental agreements with universities in the northwest to first provide an analysis of the best fit for a hydrologic model for the Bull Run, applying the recommended model(s) and then using newer climate model results provided by NOAA to estimate streamflows using the developed hydrologic model. Portland's membership in the Alliance helps City staff stay current with the latest climate change science and learn from other similar large municipal water systems about how to study climate change and apply adaptation strategies to provide increased system resilience.

Regulatory Compliance

Federal Mandates

The City of Portland must comply with a variety of federal mandates, including the Clean Water Act, the Safe Drinking Water Act, the Lead and Copper Rule, and several mandates related to the protection and management of the Bull Run watershed. Programs and projects to maintain compliance are included in the Bureau's investment strategy.

Safe Drinking Water Act (SDWA)[3]

Under the Safe Drinking Water Act, which is implemented through Oregon Revised Statutes and Administrative Rules, the Portland Water Bureau is required to conduct water quality sampling and submit results to Oregon Health Authority, in order to demonstrate compliance with maximum contaminant levels. The bureau also participates in on-site inspections (sanitary surveys) of treatment and distribution facilities by State Drinking Water Program personnel every three years, and participate in annual inspections. The Portland Water Bureau is also required to submit a Water System Master Plan every 20 years, submit a list of completed projects annually, produce and distribute annual Consumer Confidence Reports, meet operator certification requirements, and submit annual cross-connection reports.

[3] of 1974, 1986, 1996 as administered under the U.S. EPA Primacy Agreement by the Oregon Department of Human Services (ODHS) under Oregon Revised Statutes (ORS) 448 and Oregon Administrative Rules (OAR) 333-061

Unregulated Contaminant Monitoring Rule (UCMR)[5]

The UCMR is administered under direct authority of the U.S. EPA and requires monitoring for 25 unregulated contaminants using five analytical methods during 2008-2010. The U.S. EPA uses the data generated by the UCMR to evaluate and prioritize contaminants on the Drinking Water Contaminants Candidate List, a list of contaminants EPA is considering for possible new drinking water standards.

Stage 2 Disinfection Byproducts Rule[4]

The Stage 2 Disinfection Rule is administered under direct authority of the U.S. EPA and requires the Portland Water Bureau to submit a sample plan and conduct sampling for disinfection byproducts.

Enhanced Surface Water Treatment Rule, LT2[5]

The Long Term 2 Enhanced Surface Water Treatment Rule (LT2) was promulgated in January 2006. This federal rule applies to surface water or groundwater under direct influence of surface water (GWUDI) systems, and increases regulations regarding *Cryptosporidium* in the water supply. LT2 also addresses the regulation of *Cryptosporidium, Giardia* and viruses in uncovered finished drinking water reservoirs.

Compliance with LT2 has impacts on two separate parts of Portland's water system. First, the rule requires the city to provide additional treatment to its Bull Run supply to either remove or inactivate *Cryptosporidium*. Portland developed a comprehensive treatment variance request based on the results of a one-year-long water-quality sampling program and study of Bull Run water. A variance to this part of the rule was granted to the Water Bureau by the Oregon Health Authority on March 14, 2012.

In 2002, new treatment facilities were estimated to cost between $55 and $204 million to construct and millions more to operate on an annual basis. If OHA's variance is revoked, the Water Bureau would likely be required to construct these new treatment facilities. [6]

Second, the rule requires changes to how uncovered finished drinking water reservoirs are managed and operated. The rule requires that water systems with uncovered finished water reservoirs, like those at Mount Tabor and Washington Parks, either cover the reservoirs or provide treatment at the outlets of the reservoirs to inactivate *Cryptosporidium* and viruses. A schedule for this work has been provided to the EPA and the Oregon Health Authority.

In its 2009 LT2 Storage Recommendation, the Water Bureau estimated that it will cost approximately $400 million to come into compliance with the open reservoir requirements of the rule.

[4] U.S. EPA Safe Drinking Water Act of 1974, 1986, 1996 - 40 CFR Parts 9, 141, and 142 - Federal Register: January 4, 2006 (Volume 71, Number 2), Rules and Regulations Page 387-493.

[5] U.S. EPA Safe Drinking Water Act of 1974, 1986, 1996 - 40 CFR Parts 9, 141, and 142 - Federal Register: January 5, 2006 (Volume 71, Number 3) - Rules and Regulations Page 703-752

[6] The Water Bureau has plans for an ultraviolet light (UV) treatment facility (completed in early 2012) to address treatment requirements, should the variance be revoked. The UV treatment option was selected by the Portland City Council as the preferred treatment option in 2009 (Resolution 36720).

Lead and Copper Rule

Lead and copper enter drinking water primarily through plumbing materials. Exposure to lead and copper may cause health problems ranging from stomach distress to brain damage. On June 7, 1991, EPA published a regulation to control lead and copper in drinking water. This regulation is known as the Lead and Copper Rule (also referred to as the LCR or 1991 Rule).

In January 1997, the Portland Water Bureau began corrosion treatment, raising the pH of the water to make it less acidic and less likely to leach metals. Corrosion treatment has reduced lead levels at the tap by more than 50% since the City began this treatment in 1997.

Americans with Disabilities Act[7]

The Americans with Disabilities Act of 1990 (ADA) prohibits discrimination and ensures equal opportunity for persons with disabilities in employment, State and local government services, public accommodations, commercial facilities, and transportation. ADA requires some new Portland Water Bureau facilities, and in some instances existing facilities, to be brought up to specified accessibility standards.

Bull Run-Related Mandates

Compliance with a variety of federal mandates and agreements affects protection, management, and operation of the Bull Run Watershed that in turn enables the Water Bureau to provide a reliable water supply to the City of Portland. These include federal statutes specific to Bull Run, federal requirements applicable to national forest land, requirements of other federal agencies applicable to Bull Run, and agreements between the City and the Mt. Hood National Forest. Primary examples include the following:

Federal Statutes and Regulations Specific to Bull Run

- Bull Run Watershed Management Act, P.L. 95-200, (1977) directs the Forest Service to consult and coordinate with the City of Portland to ensure management programs, practices, and standards on watershed lands are protective of drinking water quality
- 2012 Mt. Hood National Forest Closure Order for the Bull Run Watershed Management Unit—Closure Order MH-2012-05 closes forest service lands within the BRWMU to the public
- Oregon Resource Conservation Act, P.L. 104-208 (1996), prohibits timber cutting within the hydrographic boundary of the Bull Run River drainage, except as necessary to protect or enhance water quality or for the construction, expansion, protection, or maintenance of water supply, energy transmission, or approved hydroelectric facilities
- Little Sandy Protection Act, P.L. 107-30 (2001), extends the boundaries of the Bull Run Management Unit and associated land management protections

Federal Requirements Implementing Policy Applicable to National Forest Land

- 1990 Mt. Hood National Forest Land and Resource Management Plan provides guidance for natural resource management.

[7] 1990, administered through Oregon Structural Specialty Code Oregon Administrative Rules 918-460

- 1994 Northwest Forest Plan set management direction for the lands within the range of the northern spotted owl.

Requirements of Other Federal Agencies

- 1995 Bureau of Land Management (BLM), Salem District, Record of Decision and Resource Management Plan provides guidance for the management of non-native species
- BLM Permanent Closure Order for the Bull Run Watershed Management Unit (2011) closes BLM lands within the BRWMU to public access
- Bull Run Water Supply Habitat Conservation Plan (2009) defines the actions the City will take to address impacts of the Bull Run water supply system on native fish species in the Bull Run River, as regulated by the federal Endangered Species and Clean Water Acts and administered by the National Marine Fisheries Service and the Oregon Department of Environmental Quality

Agreements with the Mt. Hood National Forest

- The Bull Run Watershed Management Unit Agreement was established in 2007. Under this agreement, the city participates in collaborative efforts to maintain and manage various aspects of the watershed. This agreement is reviewed and updated every five years.

State Mandates

In addition to federal mandates, the City of Portland must also comply with state and regional mandates set through Oregon Revised Statutes and Administrative Rules. Projects to maintain compliance are included in the Bureau's investment strategy.

Statewide Planning Goals and Guidelines[8]

Requires the City to maintain policies, service agreements, public facilities plans, and project lists for water service, through the City's Comprehensive Plan and public facilities plan. These plans must be submitted to the Oregon Department of Land Conservation and Development (DLCD) for acknowledgment as consistent with statewide goals.

Water Rights[9]

To maintain water rights granted by the state, the Portland Water Bureau developed a Water Management and Conservation Plan. This plan was approved by the state in 2010, and reports annual water use. Portland has state statutory right to full flow of the Bull Run and Little Sandy Rivers. The state also granted full extensions for the four primary CSSWF groundwater rights in 2009. The bureau is required to provide plan updates every five years.

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[8] SB 100, Statewide Planning Goals and Guidelines (OAR 660-011), Compliance procedures (ORS 197, and) Goal 11-Public Facilities and Services

[9] ORS 436 and 437 and OAR 690-086, 690-410, and 690-315 Water Rights - Oregon Water Resources Department (OWRD) Oregon Revised Statutes 436, 537 Oregon Administrative Rules 690-086, 690-410, 690-315

Oregon Structural (OSSC), Mechanical (OMSC) and Electrical (OESC) Specialty Codes[10]

Requires new facilities and in some instances existing facilities to be brought up to new building code standards.

House Bill 3543 (2007)

The Oregon Legislative Assembly declared that it is the policy of the state of Oregon for state and local governments, businesses, nonprofit organizations, and individual residents to prepare for the effects of global warming and, by doing so, prevent and reduce the social, economic and environmental effects of global warming. House Bill (HB) 3543 (2007) sets greenhouse gas emissions targets for the state of Oregon with goals for progressively lower greenhouse gas emissions every decade until 2050.[11] The City of Portland and Multnomah County have adopted a Climate Action Plan (2009) with a goal of reducing carbon emissions by 80 percent by the year 2050.[12] The City also adopted Resolution No. 36749 directing its bureaus to implement policies and programs related to the Climate Action Plan.[13]

Regional Plans

Regional Water Supply Plan

The Regional Water Supply Plan (RWSP) (2004) was adopted by most of the region's individual water providers and is coordinated by the Regional Water Providers Consortium. The RWSP provides a comprehensive, integrated framework of technical information, resource strategies and implementing actions to meet the water supply needs of the Portland Metropolitan Area to the year 2050.

Metro Regional Framework Plan (2005) - METRO

In 1992, the region's voters adopted a Metro charter for Metro which gave Metro jurisdiction over matters of metropolitan concern and required the adoption of a Regional Framework Plan. The Regional Framework Plan unites all of Metro's adopted land use planning policies and requirements. The charter directs Metro to address the water sources and storage in the plan. The Regional Framework Plan, originally adopted in 1997, was amended in 2005, 2010 and 2011 and contains regional policies contained in the Regional Urban Growth Goals and Objectives (RUGGO), 2040 Growth Concept, Metropolitan Greenspaces Master Plan and Regional Transportation Plan to create a coordinated, integrated Regional Framework Plan.

The Metro 2040 Growth Concept provides a structure for the preferred form of regional growth and development in the Portland metropolitan region. The Water Bureau will need to provide the water infrastructure to meet demands associated with projected population densities.

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[10] 2007 OSSC – OAR 918-460, 2007 OMSC – OAR 918-440, 2005 OESC – OAR 918-305
[11] Oregon Legislative Assembly. 2007. House Bill 3543. An Act relating to climate change; appropriating money; and declaring an emergency. Salem, Oregon.
[12] City of Portland and Multnomah County. 2009. Climate Action Plan. Portland, Oregon. Available at http://www.portlandoregon.gov/bps/index.cfm?c=49989&a=268612. Accessed November 11, 2009.
[13] City of Portland. 2009. Portland City Council Resolution No. 36749. Adopt the joint City of Portland and Multnomah County Climate Action Plan to reduce local greenhouse gas emissions by 80 percent from 1990 levels by 2050.

Section 4.1 of the Regional Framework Plan acknowledges the Regional Water Supply Plan developed and adopted by the Regional Water Providers Consortium. It is the policy of Metro to:

promote and achieve regional water conservation and demand management goals as defined in the Regional Water Supply Plan;

- promote the coordination between regional growth management programs and water supply planning;
- promote the coordination between land use planning and achieving goals of the Regional Water Supply Plan and;
- Set benchmarks and evaluate achievement of the targets and goals established in the Regional Water Supply Plan in coordination with the region's water providers.

Urban Growth Management Functional Plan - Title 6 (Metro Code Sections 3.07.610 - 3.07.650) - Centers, Corridors, Station Communities and Main Streets - METRO

The Urban Growth Management Functional Plan was adopted by the Metro Council and codified in Section 3.07 of the Metro Code. The purpose of this functional plan is to implement regional goals and objectives contained in the Regional Framework Plan.

The Regional Framework Plan identifies Centers, Corridors, Main Streets and Station Communities throughout the region and recognizes them as the principal centers of urban life in the region. Title 6 calls for actions and investments by cities and counties, complemented by regional investments, to enhance this role. PWB is expected to complete infrastructure improvements as needed in order to support activities related to development of these urban environments.

Goals & Policies

Draft Goals and Policies related to Water Facilities and services can be found in Chapter 5. Key Infrastructure Policies.

Investment Strategy

The Portland Water Bureau's Investment Strategy for the Citywide System Plan is divided into seven (7) primary programs: Supply, Transmission and Terminal Storage, Distribution, Treatment, Regulatory Compliance, Customer Service, and Administration & Support. The Water Bureau anticipates over $1.5 billion in new investment in these programs over the next twenty years, see Table 7.3. This chapter and Appendix A. Investment Strategy provides greater detail on anticipated water projects and investments.

Table 7.3 Investment Strategy Summary

Program	FY 2013-2018	FY 2018-33
Supply	$14,291,000	$88,500,000
Transmission and Terminal Storage	$191,170,000	$242,000,000
Distribution	$244,197,288	$461,650,000
Treatment	$2,500,000	$150,000,000
Regulatory Compliance	$25,504,000	$30,000,000
Customer Service	$3,057,000	$53,700,000
Support	$10,000,000	$50,500,000
TOTAL	**$490,719,288**	**$1,076,350,000**

Supply System[14]

The primary drinking water source for Portland is the Bull Run watershed, supplemented by a groundwater supply from the Columbia South Shore Well Field (CSSWF) and the wells in the former Powell Valley Road Water District. The Bull Run watershed is located east of Portland and just north of the western foothills of Mt. Hood; the CSSWF is south of the Columbia River and east of the Portland International Airport, see Figure 7.5. The former Powell Valley Road Water District is located in southeast Portland, near Powell Butte.

Since 1895, Portland has relied on the Bull Run watershed as its principal source of supply. Rainfall runoff and snowmelt from within the watershed are captured in the Bull Run storage system, which includes Bull Run Lake, and Reservoirs 1 and 2, all located on the Bull Run River. At Reservoir 2, water enters the Headworks, the origination point of the three conduits that convey water from the Bull Run system to Powell Butte Reservoir. Until 2015 and 2020 respectively, water from Powell Butte will be supplied to Mt. Tabor and Washington Park reservoirs. These reservoirs have served as terminal storage for the water supply transmission system, and as central points for distributing water into the retail water system. As these facilities are decommissioned, water from Powell Butte will follow one of three paths: to Kelly Butte, an enclosed underground storage facility; to other terminal storage-system reservoirs; or through large transmission mains to the distribution system and/or wholesale customers.

The federal Safe Drinking Water Act, which regulates public drinking water supplies, typically requires surface water supplies to be filtered to meet federal drinking water standards. Because the Bull Run source water quality is very high and Portland implements source water protection measures, Portland is currently exempt from filtration requirements. Portland's water supply is disinfected using chloramines. Water is chlorinated at the Headworks at Reservoir 2. Ammonia and caustic soda are added at a second treatment facility, Lusted Hill.

Since 1985, Portland has used groundwater from the Columbia River South Shore Well Field, as an emergency seasonal supply, and as a backup supply when winter storms cause high turbidity in the Bull Run watershed. The groundwater supply comes from three aquifers along the south shore of the Columbia River. The system includes 27 wells, one storage tank, a groundwater booster pump station,

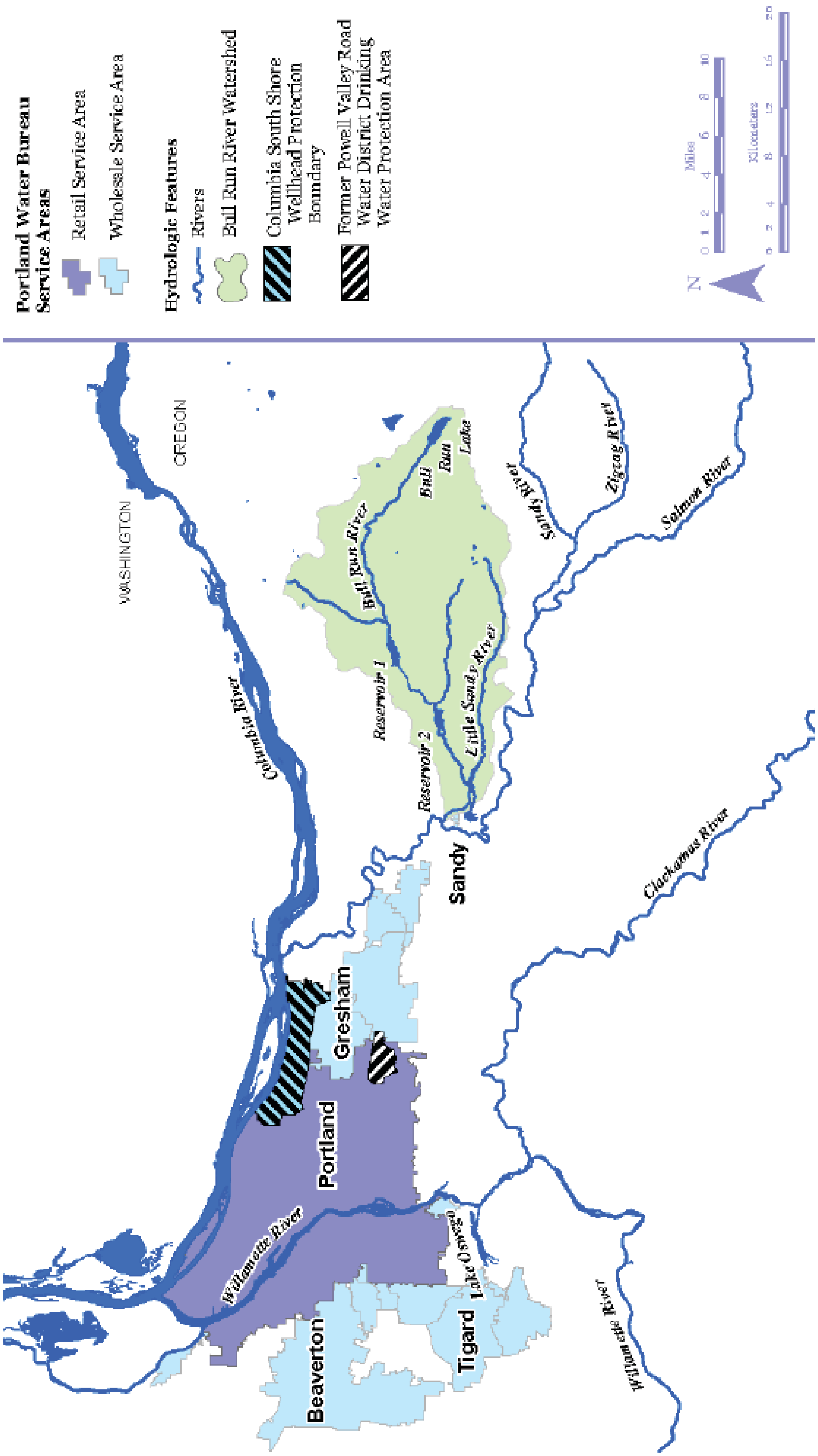
[14] Portland Water Bureau, Distribution System Master Plan and Portland Water Bureau, Water Management and Conservation Plan

and a treatment facility. Portland also has access to wells previously owned by the Powell Valley Road Water District.

Wholesale Customers

The Water Bureau supplies water to its wholesale customers; the City of Portland does not typically receive water from any sources owned or operated by its wholesale customers. The City’s water supply system is interconnected with other water suppliers including the City of Lake Oswego, the City of Milwaukie, and Clackamas River Water. Portland is able to receive water from these other sources on a limited basis in an emergency.

Figure 7.5 Drinking Water Supply System Water Sources



Bull Run Watershed

Inventory

The water of the Bull Run River is primarily impounded in two reservoirs: Reservoir 1, completed in 1929, and Reservoir 2, completed in 1962. Periodically, the Water Bureau relies on storage capacity in Bull Run Lake, a natural lake that is upstream of the headwaters of the Bull Run River, to enhance the supply of the two reservoirs.

At the Headworks facility below Dam 2, the raw water is disinfected. The water then flows to the Lusted Hill facility for further treatment, and is fed by gravity to the terminal storage, transmission, and distribution systems. The Bull Run water system includes facilities for generating hydropower. The Portland Hydroelectric Project's hydropower facilities at Dams 1 and 2 generate electricity that the city sells to Portland General Electric (PGE).

The Water Bureau's facilities in the Bull Run Supply system are served by a network of 123 miles of roads and 11 bridges. In total, infrastructure assets in the Bull Run supply system have a 2012 replacement value of $675 million.

Current Condition

The vast majority of assets in the Bull Run watershed are in fair to good condition, see Table 7.2. Eight percent of assets are in poor condition; two percent are in very poor condition.

Adequacy and Reliability of Supply

The Bull Run watershed is the city's primary water source. The approximate median annual water yield from the Bull Run watershed (measured at Headworks) is 180 billion gallons. The median annual diversion for water supply is approximately 20 percent of the total median yield. The reservoirs in the Bull Run are recharged during the fall, winter, and spring when rainfall is abundant. During the dry summer months (starting in June or July), the reservoirs are drawn down. This drawdown period typically lasts until early October but can sometimes last until November or December. During this period, the water flowing out of the reservoirs exceeds the water flowing into the reservoirs from rainfall and tributary flow.

Water demand varies annually, driven primarily by weather. In warm, dry summers when demand is high, the yield from the Bull Run watershed is at its lowest. In cool wet summers, water demand is often lower and yield from the Bull Run tends to be higher.

The duration of the dry season is also important because it determines the time period during which the city will rely on the limited storage in the watershed's reservoirs. Long dry seasons increase the proportion of groundwater that the city uses to meet demand before fall rains return.

The two Bull Run reservoirs are relatively small in comparison to the amount of precipitation and stream discharge in the basin. The reservoirs are not large enough to provide a multi-year water supply. Refill each winter is necessary to ensure supply for the following summer.

Over the last 20 years, the city has examined a number of options for increasing water storage in the Bull Run system. In the future, the city will continue to explore these and other options to meet long-term water supply needs.

Columbia South Shore Well Field

The Columbia South Shore Well Field (CSSWF) is the second-largest developed water source in the state (after the Bull Run Supply), and the largest developed groundwater source in the state. Located on the floodplain of the Columbia River northeast of downtown Portland, this 11-square-mile area spans the boundaries of three cities: Portland, Fairview, and Gresham. The wells in the well field provide water when the Bull Run supply is shut down due to emergency conditions such as turbidity events, landslides, fires, or other natural or human-caused disruptions. The groundwater system is a supplemental supply when the Bull Run supply cannot provide enough water to meet demands during the summer peak season.

Inventory

As of 2012, there are 27 wells in the CSSWF.[15] These wells draw on three aquifers: the Sand and Gravel Aquifer (SGA); the Troutdale Sandstone Aquifer (TSA), and the Blue Lake Aquifer (BLA). The sum of the nominal instantaneous pumping capacity for all of these wells is approximately 103 to 118 million gallons a day (MGD), based on the maximum pumping rates of the individual wells. In use, the well field has an empirically determined initial 30-day operating capacity of approximately 90 MGD. A large pump station moves water to the city's Powell Butte Reservoir, where it is mixed with Bull Run water (unless the Bull Run supply is off-line).

Current Condition

Roughly half of the wells in the CSWWF are in fair (53%) or good condition (41%). Collection mains are primarily in good to very good condition (85% and 13%, respectively). The treatment facility is in good condition and the pump station is in fair to good condition. Additional condition information can be found in Table 7.2.

Supplemental and Emergency Use of the CSSWF

According to the Seasonal Water Supply Augmentation and Contingency Plan—also referred to as the Summer Supply Plan (SSP), the CSSWF is used for supplemental and emergency supply under the following conditions:

- Supply Augmentation: During seasonal warm dry periods, groundwater may be used to augment the Bull Run supply to meet demand when the Bull Run water supply is not sufficient to meet the needs of the bureau's retail and wholesale customers; to maintain in-stream flows for fish habitat; or if water demand exceeds the conduit capacity long enough to deplete in-town storage below

[15] A map of the Columbia South Shore Well Field can be found in Figure 2-3 of the *Water Management and Conservation Plan*, 2010.

safe levels.[16]

- Turbidity Event Augmentation: Groundwater may be needed to augment or replace the Bull Run surface supply to avoid violating state and federal drinking water standards for turbidity. Turbidity in the surface water supply is typically caused by storm events in the Bull Run watershed.
- Emergency Use: Groundwater may be needed during catastrophic events (in addition to turbidity events) that would cause a loss of part or all of the Bull Run surface water supply. Catastrophic events include, but are not limited to, severe or extended drought, fire in the watershed, flood, landslides, volcanic activity, earthquakes, and acts of vandalism or terrorism. Any of these events could cause significant water quality problems or result in damage to, or shutdown of, the conduits or other critical infrastructure used to transfer Bull Run water to the Bureau's in-town reservoirs. An example of a catastrophic event in the watershed was a landslide in 1995 that damaged two conduits. Groundwater was used for 27 days and provided an average of 25.4 MGD to the distribution system.[17]

Contamination and Remediation

The City of Portland has an extensive multi-aquifer monitoring well network. The bureau tracks groundwater quality and changes in groundwater levels over time. Data from city groundwater quality monitoring indicate that the deep confined aquifers are free of contamination within the capture zones of active wells.

Anthropogenic, or human-related, contamination was first discovered in shallow groundwater aquifers near the well field in the 1980s. Since the early 1990s, the city has worked closely with the Oregon Department of Environmental Quality (ODEQ) to expedite the discovery, assessment, and remediation of contaminant sources and plumes, and to keep the well field operational. Remediation technologies used to remove contaminants from soil and groundwater include pump-and-treat, soil vapor extraction, electro-resistive heating, air sparging, and chemical and biological treatment.

High-manganese concentrations in two wells have limited the ability of the Water Bureau to utilize these wells. Manganese can cause water discoloration which can affect laundry businesses served by the Water Bureau. The Water Bureau avoids using the high-manganese wells unless no Bull Run supplies are available and the full capacity of the well field is needed.

Groundwater Protection Program

The Groundwater Protection Program adopted in July 2003 (updated in 2010) replaced existing programs in Portland and Fairview and initiated requirements for groundwater protection in Gresham. The Groundwater Protection Program requires businesses that use, store, or transport hazardous material above a certain threshold amount to implement best management practices to prevent spills on the ground.

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[16] Conduit capacity may be exceeded if demand is exceptionally high or if one or more of the conduits is out of service.
[17] Although the average is 25.4 MGD, the actual amounts per day varied widely.

Regulated businesses in Portland are inspected every two years as part of their regular fire inspection to ensure the business is in compliance with the program requirements. In Gresham and Fairview, inspections are conducted by Gresham watershed management staff. The Water Bureau and its partners provide free technical assistance to businesses on compliance issues.

The Columbia South Shore Well Field protection area delineation was certified by the Oregon Health Authority Drinking Water Program (October 2003). A certified wellhead protection area is considered a significant groundwater resource under Statewide Planning Goal 5 if the public water system served by the wellhead area has a service population greater than 10,000 and relies on groundwater as the primary or secondary source of drinking water. Local governments are required to develop a program to reduce the risk of groundwater contamination. In June 2008, the Department of Environmental Quality certified the Columbia South Shore Well Field Protection Program which addresses Goal 5 requirements for protecting these groundwater resources.

Adequacy and Reliability of Supply

The Portland Water Bureau has not experienced any major supply deficiencies in the last 10 years. Portland is fortunate in that it has a high-quality secondary source of drinking water in the Columbia South Shore Well Field (CSSWF) to use should there be a supply shortage in the Bull Run watershed. In the past ten years, water from the CSSWF was used to augment Bull Run supply due to turbidity, for summer supply augmentation, and for maintenance runs. The groundwater system was installed in the mid-1980s. As of February 1, 2012, it has been used a total of 28 times—7 times for turbidity events in Bull Run, once for a landslide that took two of the three conduits out of service, 14 times for summer supply augmentation, and four times for maintenance reasons.

Although current well field capacity is sufficient to meet short-term (less than 30-day) emergency needs during the non-peak-season, there is no additional reliable capacity. As such, the current capacity of the well field system is not sufficient to meet demand during a full shutdown of the Bull Run system due to emergencies or catastrophic events, for events longer than 30 days. In addition, groundwater may be limited in the future due to increased withdrawal from the aquifer by full-time and growing municipal users in Oregon and Clark County, Washington.

The city has evaluated several options for maintaining and improving the adequacy and reliability of supplies the Bull Run watershed, CSSWF, and other sources. The results of these studies indicate that developing supplies in the CSSWF is the most cost-effective option.

The Water Conservation and Management Plan (2010) anticipates the potential development of 53 MGD in the CSSWF by 2028 to meet the annual average water demand of the current retail and wholesale service areas.

Former Powell Valley Road Water District Wells

On July 1, 2005, the City of Portland annexed areas served by the Powell Valley Road Water District (PVRWD) in southeast Portland, northwest of Powell Butte. Residents of this former water district are now served by the Portland Water Bureau’s retail system. Under an intergovernmental agreement, Portland assumed control of all of the district's assets, including six active wells.[18] The PVRWD assets included water rights and water infrastructure. The installed capacity of the Powell Valley wells can be as much as 8.6 MGD, however less than half of this capacity is currently available.[19] Several capital improvement projects are planned to repair various facilities and fully integrate the wells into the Water Bureau system. These projects may be completed in three to ten years.

The former Powell Valley Road Water District wells are in good condition, are productive, and do not have significant water quality issues. In the future, the Water Bureau intends to upgrade these facilities to allow connection of these wells to the main system through Powell Butte. This integration would allow the bureau to increase capacity if needed and to blend well water with water from the Bull Run watershed and/or CSSWF before it enters the distribution system. The Powell Valley Road Water District's wells have a state certified delineation and approved wellhead protection plan (July 1998). That program is non-regulatory and relies on best management practices. Now that the Water Bureau owns those assets it reassessed the delineation with an updated methodology. The new delineation was certified October 2010 and the protection program needs to be updated so that protection requirements are consistent within the City of Portland.

The state-approved WMCP includes the potential use of 7.36 MGD of the developed supply to meet future demands.

Current & Projected Demands

Table 7.4 summarizes existing and 2030 retail demands for the distribution system by service area. The 2005 average daily demand was 61.5 mgd.[20] The Distribution System Master Plan, finalized in 2007, estimated that the average daily retail distribution-system demand for 2030 is projected to increase to 70 mgd. Historically, per capita demand in the retail area has shown a steady downward trend since 1993. However, current demand forecasts project relatively steady total demand through 2015, with an upward trend thereafter based on population increase.

Regional population forecasts from Metro, the state-approved Water Management and Conservation Plan, finalized in 2010, estimate the average system-wide demand to be between 132 and 138 million gallons a day. According to the Water Management and Conservation Plan (2010) the average and peak demand for the total service area is anticipated to increase 21% between 2007 and 2030.

[18] A map of the former Powell Valley Road Water District can be found in Figure 2-4 of the *Water Management and Conservation Plan*, 2010.
[19] Additional information on these wells, including size, depth, and capacity can be found in Table 2-2 of the Portland Water Bureau's Water Management and Conservation Plan.
[20] A 2005 demand of 64 mgd was used in capacity evaluations, projected from 2002 demand data at the outset of the study.

Table 7.4 Existing and Projected Retail Water Demands[21]

Service Area	2005 - Daily Demand Avg (mgd)	2005 - Daily Demand Peak (mgd)	2030 – Daily Demand Avg (mgd)	2030 – Daily Demand Peak (mgd)	Service Area	2005 - Daily Demand Avg (mgd)	2005 - Daily Demand Peak (mgd)	2030 – Daily Demand Avg (mgd)	2030 – Daily Demand Peak (mgd)
Arlington Heights	0.7	1	0.9	1.3	Powell Butte Pump	0.02	0.03	0.03	0.05
Arnold	0.5	1	0.6	1.2	Powell Butte	0.2	0.4	0.4	0.7
Bertha	0.5	1.1	0.6	1.3	PV Pump	0.03	0.05	0.03	0.1
Broadway	0.2	0.4	0.3	0.5	PV Raymond	1	1.8	1.3	2.3
Burlingame	1.9	3.3	2.1	3.7	PV 415	2.9	5.1	3.6	6.5
Calvary	0.6	1	0.8	1.3	Rocky Butte Pump	0.02	0.03	0.02	0.04
Council Crest	0.3	0.8	0.4	1.1	Rocky Butte	0.2	0.3	0.2	0.4
Clatsop Pump	0.1	0.2	0.1	0.2	Rose Parkway	0.3	0.6	0.3	0.7
Clatsop	0.2	0.3	0.2	0.4	Saltzman	0.001	0.003	0.002	0.004
Denver	0.9	1.6	1	1.7	Sherwood Field	0.5	0.9	0.6	1.2
Greenleaf	1	1.6	2.1	3.5	Stephenson	0.4	0.7	0.4	0.7
Lexington	0.2	0.4	0.3	0.5	Stephenson Pump	0.1	0.1	0.1	2
Linnton/Whitwood	0.1	0.2	0.2	0.3	Tabor 302	10.6	15.6	12.7	18.7
Marquam	0.7	1.2	0.9	1.6	Tabor 4112	15.1	22.7	16.9	25.4
Mt Scott	0.2	0.4	0.3	0.5	Tabor 590	0.3	0.5	0.3	0.5
Nevada	0.1	0.2	0.1	0.2	Vermont	1.6	2.5	1.8	2.7
Parkrose	1.9	3.6	2	3.9	Vernon3	10	15.2	12.1	18.2
Penridge	0.04	0.1	0.1	0.2	Willalatin	0.1	0.3	0.3	0.8
Pittock	0.04	0.1	0.1	0.1	Washington Park 229	6.2	9.8	8.9	14
Portland Heights	0.6	1	0.8	1.3	Washington Park 299	3.7	5.8	5.2	8.2
Totals[4]	**64.2**	**102.6**	**79.2**	**126.6**					

1 Willamette Heights service area demands are included in Sherwood service area total.
2 The demands for Tabor 411 include Tabor 338.
3 The demands for Vernon include Vernon 224, Vernon 270 and Vernon 362.
4 The area served via Rockwood WD is not included in the total. The average daily demand for this area is estimated to be 0.3 mgd with a peak demand of 0.5 mgd. In the future the average daily demand will remain the same and the peak demand will rise to 0.6 mgd.

Wholesale Water Agreements

The Portland Water Bureau has wholesale contracts with 19 water purveyors in the Portland, Oregon metropolitan area, including cities, water districts, and private water companies. As of mid-2012, PWB has 19 wholesale customers. In 2009, the City signed a contract with a 20th wholesale customer, the City of Sandy, for water to be delivered beginning no later than November 2013.

Portland can potentially sell water to a wholesale population of 385,000 and routinely provides wholesale service to over 260,000 people. Annual wholesale water sales account for 19 percent of annual water sales and 39 percent of annual water demand. These agreements require the Portland Water Bureau to meet levels of service outlined in each of the wholesale contracts.

[21] Portland Water Bureau, Distribution System Master Plan, June 2007 (Table 2-4)

Table 7.5 Portland Water Bureau Wholesale Agreements[22]

5-Year Contract	10-Year Contract	20-Year Contract
GNR Water Company	Pleasant Home Water District	Burlington Water District
Green Valley Water Company	Lake Grove Water District	City of Gresham
Hideaway Hills Water Company	City of Tigard	Lusted Water District
Lorna Water Company	City of Tualatin	Raleigh Water District
Skyview Acres Water Company	Tualatin Valley Water District	Rockwood Water PUD
Two Rivers Water Association		Valley View
		West Slope Water District

The Palatine Hill Water District remains a wholesale customer under a previous agreement. The City of Sandy will begin receiving water from PWB by November 2013.

Needs & Approach

Bull Run Supply

Although the demand needs are not critical at this juncture, the City will continue to explore options for increasing water storage in the Bull Run system in order to meet long-term water supply needs.

Groundwater Supply

Although current well field capacity is sufficient to meet short-term (less than 30 days) emergency needs during the non-peak-season, there is no additional reliable installed capacity. As such, the current capacity of the well field system is not sufficient to meet demand during a full shutdown of the Bull Run system due to emergencies or catastrophic events, for events longer than 30 days. In addition, groundwater may be limited in the future due to increased withdrawal from the aquifer by full-time and growing municipal users in Oregon and Clark County, Washington.

The current approach is to enhance the groundwater supply is to implement several capital improvement projects that would repair various Powell Valley facilities and fully integrate these wells into the Water Bureau system. These projects would be completed within the next 20 years and are included in the Project List.

Asset Management Plans

Asset management plans are being developed for the Bull Run Supply and Groundwater Supply. These plans will help identify maintenance, repair and replacement strategies necessary to maintain and improve the water system.

Recommended Supply System Improvements

Bull Run Watershed

The function of this program is to allocate funds for the capital projects necessary to maintain, improve, and protect the watershed facilities that are not directly related to the water supply system facilities. This

[22] Portland Water Bureau, 2007.

includes Bull Run watershed road reconstruction to ensure continuous, reliable, and safe access to all facilities, as well as maintenance of other city-owned infrastructure within the watershed.

The Dam 2 Tower Improvements Project provides for modification of the north tower inlet to allow selective-depth withdrawal from Bull Run Reservoir 2. The intent is to help regulate temperatures for flows released to the lower Bull Run River and to improve water quality by providing flexibility during turbidity events. The anticipated completion date is 2014.

Dams and Headworks Repair and Rehabilitation

This program provides for assessment of the condition and rehabilitation of dams and facilities at Headworks. As many of these facilities are between 50 and 70 years old, their safe and reliable operation requires ongoing investment. The program includes preliminary engineering and design of needed repairs, rehabilitation of these facilities, and actual repair work.

Columbia South Shore Well Field

The Columbia South Shore Well Field (CSSWF) is Portland’s alternative supply of water should the Bull Run watershed supply be interrupted for any reason. Projects funded in this program improve the maintenance of this aging infrastructure, including repairs, selective replacements and upgrades.

Groundwater Collection Main Hardening

Much of the piping connecting the wells to the Groundwater Pump Station is located in liquefiable soils which are vulnerable during a seismic event. This project would design and install measures to “harden” the piping and reduce this vulnerability.

Groundwater Electrical Improvements

This project designs and constructs a new 115kV/4160V transformer and other components to complete a double-ended electrical substation at the Groundwater Pump Station. It will also design and construct a 5kV main breaker replacement and purchase selected spare components.

Groundwater Pump Station (GWPS) Expansion

As water demand increases, the bureau will need to increase the available flows from the groundwater system. The system expansion will include upgrade of the Groundwater Pump Station to provide additional capacity.

Groundwater Well Field Expansion

As water demand increases, the bureau will need to increase the available flows from the groundwater system. The system expansion will include additional well development and collection mains in the Columbia South Shore area.

Groundwater Well Field Reliability Enhancements

The bureau is attempting to increase the flexibility and preparedness to meet the future challenge of an interruption of Bull Run water. The bureau is improving its emergency preparedness by evaluating electrical vulnerability for the pumping system, reviewing the flood inundation vulnerability of the site, and development of a groundwater intertie that would reduce transmission system vulnerability. The inundation review may be partially completed through a partnership with Multnomah County Drainage District.

Powell Valley Well Improvements

The project includes upgrade of the facilities in the previous Powell Valley Road Water District area and connection and integration of these facilities to the PWB water system.

Transmission and Terminal Storage System

Inventory

Three large-diameter conduits carry the water from the Bull Run watershed to the Water Bureau's in-town storage and distribution system. The conduits have interconnections in three places to ensure reliability, should one or two conduits fail. The water flows downhill from an elevation of 735 feet above mean sea level (MSL) then through the Lusted Treatment facility to Portland's easternmost storage reservoir on Powell Butte, at 530 feet above MSL. Alternatively, groundwater can be pumped to Powell Butte from the Columbia South Shore Well Field through the Groundwater Pump Main when the Bull Run Supply is not available or limited. When water is supplied from both Bull Run and the Columbia South Shore Well Field, the water is blended at Powell Butte. See Figure 7.6 for a schematic diagram of the City's water system.

The Water Bureau maintains water storage, or reservoirs, to provide for daily fluctuation of water use, to fight fires, and to provide time to connect to emergency sources of supply when primary sources are unavailable. In 2012, the terminal storage in Portland's water system consists primarily of Powell Butte Reservoir 1, Mount Tabor Reservoirs 1, 5 and 6, and Washington Park Reservoirs 3 and 4. It also includes storage at Kelly Butte, Sam Jackson and Mayfair. After 2012, the terminal storage system will undergo changes in response to regulations. The system will be reconfigured so that water from Powell Butte will be directed along multiple paths: to Kelly Butte, an enclosed underground storage facility; to the terminal storage-system reservoirs, or through large transmission mains to the distribution system and/or wholesale customers.

Current Condition

The transmission system's 75 miles of conduits is primarily in fair to good condition, although an estimated 10% is in poor condition. More detailed condition assessments of the conduits are needed. The Washington County Supply Line and Groundwater Pump Main are primarily in good condition (90%), while the Mt. Tabor to Washington Park transmission mains are in fair to good condition.

Terminal storage located at Mount Tabor and Washington Park are classified as uncovered reservoirs, and therefore must be decommissioned or covered as part of the federal LT2 regulations. The Mount

Tabor and Washington Park reservoirs are ranked in the condition assessment as poor. As a result of the LT2 regulations, plans are currently underway to build additional terminal storage at Powell Butte (Reservoir #2) and and replacement storage at Kelly Butte to replace the function of the Mount Tabor Reservoirs. Design work to replace the uncovered reservoirs at Washington Park is under way.

Terminal storage at Sam Jackson and Mayfair is considered to be in fair condition, see Table 7.2.

Projected Condition

Current Capacity

The conduits have a combined maximum capacity of approximately 212 MGD. The current average annual demand (retail plus wholesale) is approximately 100 MGD. Peak-day demand is approximately 170 MGD. At this time, transmission capacity is available to meet demands when all facilities are in operation. However, transmission system outages and vulnerability remains a concern.

Total storage capacity of the terminal storage reservoirs is currently approximately 195 million gallons (MG). This will be reduced to 148 MG through the elimination of the uncovered reservoirs and construction of new covered storage.

Projected Capacity

At the point in time that peak-day demands are projected to exceed the capacity of the three conduits, Conduit 5 will likely be required. Peak-day demands are not expected to exceed the capacity until near the end of the time period covered by this plan, or later.

Terminal storage capacity will be 148 MG for the time period covered in this plan.

Needs & Approach

The conduits are a critical part of the supply system and represent a significant financial investment for the Water Bureau. Gaining better information on the condition of the conduits and providing the necessary maintenance is therefore of great importance to the Bureau. This work has begun with the completion of a Conduits Asset Management Plan. Over the next few years, the City will need to invest to help improve knowledge of the condition of the conduits. The recently constructed Sandy River crossing reduced vulnerability and replaced conduit sections that were considered in poor condition. A new seismically hardened Willamette River crossing is also planned and included in the capital improvement plan.

Replacement of terminal storage reservoirs is expensive—significant funding is needed to complete the new storage within the time frames required by EPA.[23] Additional transmission main improvements will also be required as part of the reservoir replacement work. An asset management plan for terminal storage is currently being developed. This plan will help identify projects and replacement strategies necessary to maintain and improve the system.

[23] See the bureau's website on Uncovered Reservoirs, http://www.portlandoregon.gov/water/article/330807, for the most up-to-date information.

An overall seismic evaluation of the Transmission and Terminal Storage system is recommended.

Recommended Transmission and Terminal Storage System Improvements

Conduits and Transmission Mains

The conduits that bring water to Portland from the Bull Run watershed are large pipes - 56 to 72 inches in diameter. This program funds repairs, replacements and upgrades to the conduits. In future years, PWB plans to upgrade 4-5 miles of conduits each year at an estimated cost of $4-$5 million per mile.

Conduit 5

This project would include installation of sections of a new Conduit 5 as growth occurs and the condition of the existing conduits worsens.

Kelly Butte Reservoir

This project would increase storage capacity from 10MG to 25MG by replacing the existing tank with a buried reservoir. The project includes site access, construction access and easements, staging areas, and on-site storage areas. This project establishes Kelly Butte as a key facility that will be used for system pressure equalization and in-town terminal storage in lieu of the Mt. Tabor uncovered reservoirs.

New Conduit Intertie

This project would address concerns about the capability of the conduit system to withstand hazards and deliver an uninterruptible supply to the City. The project will connect the conduits through additional piping and valving to improve reliability of flow during emergency conditions and for maintenance by providing additional isolation and interconnectivity.

Powell Butte Reservoir 2

This LT2-related project is being constructed in two phases – Phase 1 is complete. The project is currently in Phase 2, the construction of a 50-million-gallon buried reservoir at Powell Butte. It includes a short section of Conduit 5, construction of a maintenance and storage facility, replacing the caretaker’s house, construction of an interpretive center and restrooms, reservoir overflow faciliites, park improvements and mitigation requirements (required in the 2003 Land Use Review Type III Conditional Use Master Plan).

Powell Butte Reservoir 3

This project constructs a third reservoir at Powell Butte and possible bypass piping around the Butte for additional system reliability .

Sandy River Conduit Relocation, Phase II

The bureau is committed to increasing the flexibility and preparedness to meet the future challenge of a natural disaster. Conduits 2, 3, and 4 were identified in the system vulnerability study as vulnerable to seismic, volcanic, flood, and other natural and human-caused hazards. This project will relocate the Sandy River crossings of Conduit 3. The replacement of crossings of Conduit 2 and 4 have already been completed.

Sandy Wholesale Connection

The project consists of the design and construction of a wholesale meter connection for the City of Sandy to the PWB supply and is anticipated to be completed in late 2013.

Tabor Reservoir Adjustments

This project includes adjustments to piping, structures and other features at Mt. Tabor in order to move storage elsewhere and physically disconnect the open reservoirs from the public water system for compliance with LT2. The project does not include disposition of the reservoirs after they have been disconnected from the public water system.

Washington Park Reservoir 3

The project will plan, design and construct a new buried reservoir to replace uncovered Reservoir 3. This project is one solution toward compliance with LT2 replacement of the open reservoirs. It is assumed that Reservoir 4 will be used as the overflow detention structure. The covered Reservoir 3 will likely retain its visual appeal and historical features.

West Side Transmission Main Improvements

These mains include the Sam Jackson to Downtown Pipeline and the Jefferson Street Supply mains. These new large transmission mains will strengthen the supply to terminal storage located on the west side of the Willamette River.

Wholesale Connections

This project provides for facilities serving wholesale customers including repairs, replacements, and upgrades of pump stations and meters.

Distribution System

The retail distribution system within the City of Portland comprises approximately 2,200 miles of mains connected to 67 active storage tanks and reservoirs and 39 pump stations, located in 42 service areas. The distribution system configuration has evolved over the past 100+ years in response to changing requirements and regulation. Many parts of the system originated as small, independent water districts that have been incorporated into the PWB system over the years. Table 7.6 lists the retail distribution service areas and the number of service connections (according to Water Bureau maps as of August 2006). The distribution systems for wholesale water customers are owned and managed by other water service providers and are not included in this report.

Table 7.6 Service Connections by Service Area

Service Area	# of Connections	Service Area	# of Connections
Arlington Heights	825	Powell Butte Pump	50
Arnold	1,548	Powell Valley Road 415	3,782
Bertha	1,730	Powell Valley Road Pump	15
Broadway	604	Powell Valley Road Raymond	2,000
Burlingame	7,816	Rocky Butte	892
Calvary	643	Rocky Butte Pump	46
Clatsop	438	Rose Parkway	766
Clatsop Pump	277	Saltzman	8
Council Crest	1,334	Sherwood	679
Denver	225	Stephenson	1,383
Greenleaf	2,414	Stephenson Pump	379
Lexington	526	Tabor 302	32,362
Linnton/Whitwood	192	Tabor 411	59,070
Marquam	170	Tabor 590	888
Mt Scott	699	Vermont	3,650
Nevada	144	Vernon 224 & 270	15,932
Parkrose	4,167	Vernon 362	18,545
Penridge	37	Washington Park 229	5,223
Pittock	78	Washington Park 299	4,297
Portland Heights	1,323	Willalatin	213
Powell Butte	431	Willamette Heights	292
Total Service Connections	**176,093**		

Figure 7.2 presents a map showing the locations of service areas. Figure 7.6 is a schematic of the City's system, showing key Bull Run and CSSWF supply and transmission facilities, and key distribution system pipelines, pump stations and storage tanks.

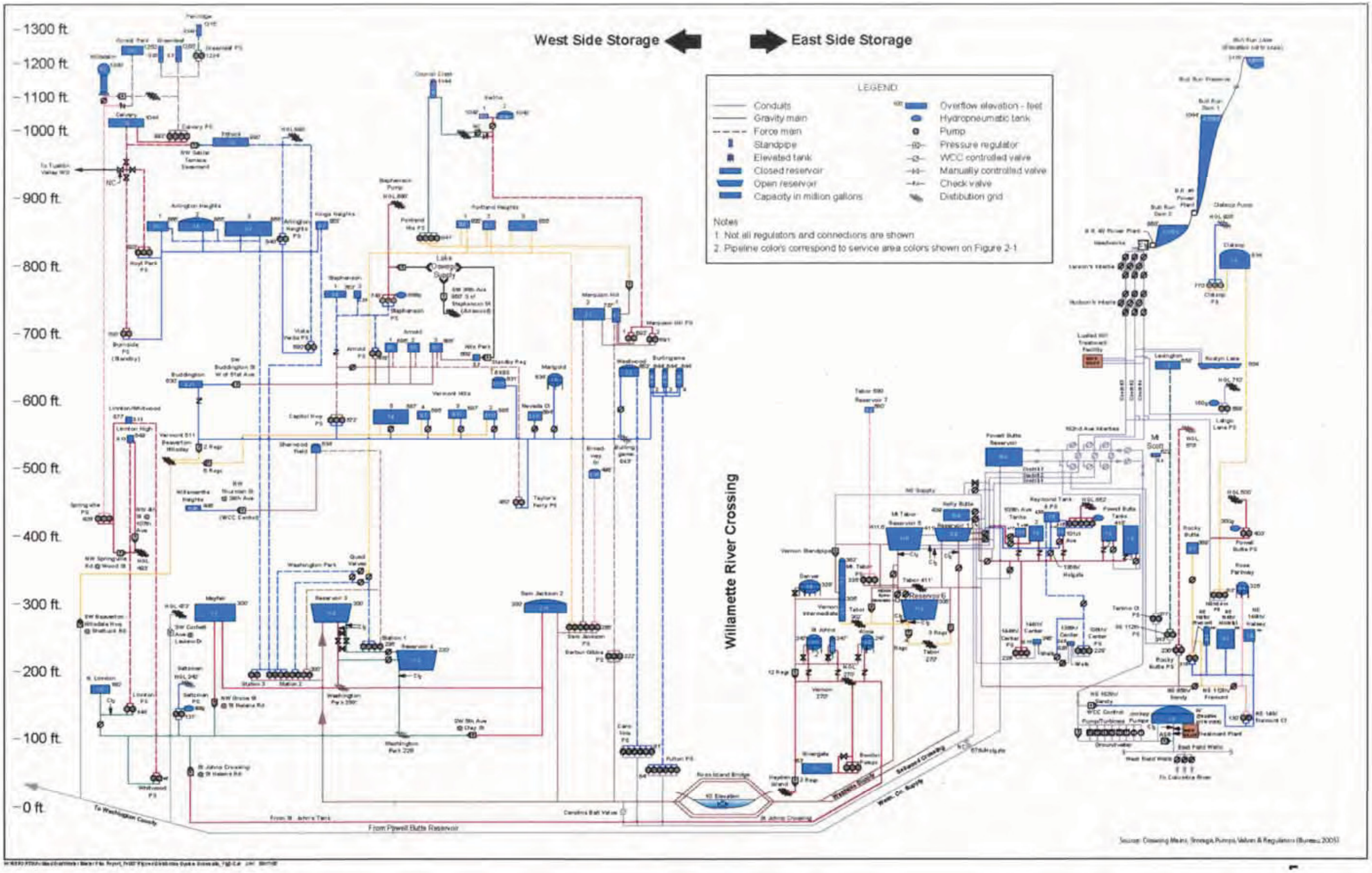
Service areas east of the Willamette River are shown on the right side of Figure 7.6. Most of the areas east of the Willamette are supplied by gravity (without pumping) from Powell Butte and the Mount Tabor Reservoirs, which are fed from the supply and transmission system. Exceptions are small areas in southeast Portland, in and around Powell Butte, the Tabor 590 Service Area, which is located on Mount Tabor, and some areas of northeast Portland, shown on the far right-hand side of the schematic.

Service areas west of the Willamette River are shown schematically on the left side of Figure 7.6. Higher elevation service areas west of the Willamette are served from several key pump stations (Carolina, Fulton, Sam Jackson, and Washington Park) that draw from major transmission lines that currently run from the Mt. Tabor Reservoir complex to the Washington Park Reservoirs.

Inventory

Portland's retail water distribution system is composed of vast networks of distribution mains, service lines, pump stations, and tanks, as well as hydrants, meters, valves, and fountains.

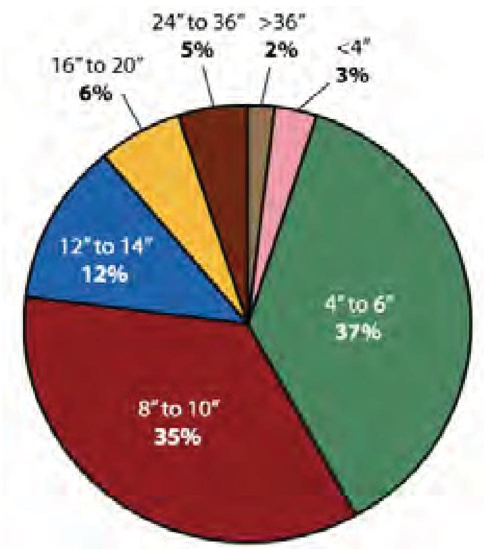
Figure 7.6 City of Portland Water Supply Schematic[24]



Mains

Portland's retail distribution system comprises approximately 2200 miles of pipeline. Figure 7.7 summarizes pipeline diameters in the distribution system. Distribution piping includes a number of materials, including unlined and lined cast iron (65%), ductile iron (29%), steel (2%), and a small percentage of other materials. The City's distribution mains have a combined replacement value of over $2.2 billion.

Figure 7.7 Pipeline Diameters in the Distribution System[25]



Service Lines

The retail distribution system also includes over 183,000 service lines. The vast majority of these lines (94%) are smaller than 2" in diameter, although larger lines do exist in some areas. The network of service lines has a replacement value of $850 million.

Tanks

The retail water system is served by 67 active storage tanks with a total storage capacity of approximately 270 million gallons. Table 7.7 lists the tank, its service area, capacity information, and whether the condition of the tank was assessed in 2006 as a part of the Distribution System Master Plan. Portland's storage tanks have a replacement value of $205 million.

Pump Stations

The distribution system includes 35 pump stations, valued at $110 million. Table 7.7 lists the capacity of each pump station, and whether a condition assessment was performed in 2006 as a part of the Distribution System Master Plan.

[25] Portland Water Bureau, Distribution System Master Plan, 2007

Meters

The Portland Water Bureau has nearly 180,000 meters worth approximately $37 million. Small meters are replaced every 30 years while large meters are tested and replaced based on condition and criticality.

Valves

The water distribution system contains approximately 43,800 system valves, with a replacement value of $444 million.

Hydrants

The distribution system includes about 14,400 hydrants, with a combined replacement value of $181 million.

Table 7.7 Distribution System Service Areas, Storage Reservoirs and Pump Stations[26]

Service Area and # of Connections		Reservoirs/ Tanks	Capacity (mg)	Pump Stations	Capacity[1] (mgd)
Arlington Heights	825	Arlington 1	0.5	Arlington Heights	NA
		Arlington 2	1	Sam Jackson	1700
		Arlington 3	3	Wash. Park 1	3200
		Kings Heights	0.2	Wash. Park 2	7500
				Wash. Park 3	1300
Arnold	1,548	Alto Park	0.2	Capitol Hwy	2500
		Arnold 1	0.5	Taylors Ferry	2000
		Arnold 2	0.5		
		Arnold 3	0.6		
Bertha	1,730	Bertha 1	0.2	Marquam Hill 1 & 2	2410
		Bertha 2	0.9		
Broadway	604	Broadway Drive	0.4	Sam Jackson	800
Burlingame	7,816	Buddington	0.3		
		Burlingame 2	1.6	Carolina	10800
		Burlingame 3	0.4		
		Burlingame 4	0.9		
		Marigold	1	Fulton	6400
		Texas	0.7		
		Westwood	1		
Calvary	643	Calvary	1	Burnside	470
				Hoyt Park	2800
Clatsop	438	Clatsop	3	162nd Avenue	880
Clatsop Pump	277			Clatsop	775
Council Crest	1,334	Council Crest	0.5	Portland Heights	4300
Denver	225	Denver	3		
Greenleaf	2,414	Forest Park	0.5	Calvary	1900
		Greenleaf 1	0.03		

[26] *Portland Water Bureau, Water Management and Conservation Plan, 2010 (Tables 2-21 and 2-22)*

		Greenleaf 2	0.3		
Lexington	526	Lexington	1	112th Avenue	1100
Linwit	192	Whitwood	0.1	Linnton Whitwood	130 640
Marquam	170	Marquam Hill 1 Marquam Hill 2	0.3 2.3	Barbur Gibbs Sam Jackson	1300 2100
Mt. Scott	699	Mt. Scott	0.4	Tenino Ct.	320
Nevada	144	Nevada Ct	0.6		
Parkrose	4,167	104th/Klickitat 148th/Halsey	4 2		
Penridge	37	Penridge	0.1	Greenleaf	130
Pittock	78	Pittock	1	Verde Vista	1000
Portland Heights	1,323	Portland Heights 1 Portland Heights 2 Portland Heights 3	0.6 0.5 1.9		
Powell Butte	431	Powell Butte N/S	50	1st & Kane	N.A.
PB Pump	50			PB Heights	1480
Powell Valley Road 415	3,782	101st Ave 109th Ave 1 109th Ave 2 160th Ave 1 160th Ave 2 PV 144th/Center	0.5 3 0.7 7 3 0.2		
PV Rd Pump	15			PV Raymond St	440
PV Road Raymond	2,000	PV 138th/Center Raymond	0 2	PV 138th / Center	1100
Rocky Butte	892	Rocky Butte	0.5		
RB Pump	46			Rocky Butte	200
Rose Pkwy	766	Rose Parkway	0.5		
Saltzman	8			Saltzman	75
Sherwood	679	Sherwood	0.4	Washington Park 2	1400
Stephenson	1,383	Stephenson 1 Stephenson 3	1.3 0.3	Arnold	1000
Steph. Pump	379			Stephenson	500
Tabor 302	32,362	Mt. Tabor 6 Vernon 2	37.8 2.5		
Tabor 4113	59,070	Kelly Butte Mt. Tabor 1 Mt. Tabor 5	10 12 49		
Tabor 590	888	Mt. Tabor 7	0.2	Mt. Tabor	1200
Vermont	3,650	Vermont Hills 2 Vermont Hills 3 Vermont Hills 4 Vermont Hills 5	0.6 0.9 0.5 2.8		
Vernon 224 & 270	15,932	Alma St Johns 2	1 1.5		
Vernon 362	18,545	Vernon 3	3.2		
Washington	5,223	North Linnton	1		

Park 229		Washington Park 3	16		
		Washington Park 4	17.6		
Washington Park 299	4,297	Sam Jackson 2	2.8		
		Mayfair	5.6		
Willalatin	213	Willalatin	0.2	Springville	630
Willamette Heights	292	Willamette Heights	0.1		

Current Condition

In general, the majority of the Water Bureau's distribution system asset groups are in fair to very good condition. However, over half of the bureau's steel distribution mains (52%) are in poor to very poor condition, as are over one-fifth of the meters (23%), and hydrants (25%) (by value). Half of the 2,200 miles of distribution mains are older than 50 years. More information on the condition of major asset groups can be found in Table 7.2. The Water Bureau evaluates asset condition as one factor in asset management decisions.

Service Area Assessment

In 2007, the Portland Water Bureau completed a series of hydraulic evaluations of the "backbone" distribution system, or the essential distribution-system components. The purpose of the evaluation was to assess the ability of the sytem to meet demands under both existing (i.e., 2005) peak-day conditions and 2030 peak-day conditions.[27] The evaluation found that the system that will reliably deliver water through 2030. Of the 42 service areas evaluated representing the retail system, 20 service areas, accounting for 86 percent of the 2030 peak-day demand, have no deficiencies.

Table 7.8 summarizes the results of the preliminary screening.

Of the remaining 22 service areas, accounting for 14% of 2030 peak day demand:

- Six service areas (Clatsop Pump, Powell Butte Pump, PV Raymond Pump, Rocky Butte Pump, Saltzman Pump, Stephenson Pump) are direct-pump service areas with no storage. Deficiencies are based on providing sufficient capacity to meet fire flows. In some instances, pump stations were designed for lower fire-flow requirements, in place at the time of pump station design. In other instances, the Bureau has designed pumps to meet fire-flow requirements with all units in service. If all units are used in the screening, three (3) service areas show no deficiencies (Powell Butte Pump, PV Raymond Pump, Stephenson Pump).
- Eight service areas have recognized deficiencies and are being evaluated by the Bureau in other studies. These are: Calvary, Council Crest, Greenleaf, Linnton/Whitwood, Penridge, PV Raymond, Willalatin, and Willamette Heights.
- Five service areas were flagged for further assessment in the hydraulic evaluation. These are: Broadway; Mt Scott; Sherwood; Stephenson; and, Tabor 590. Although the preliminary screening did not identify deficiencies in the Burlingame service area for the planning scenarios evaluated,

[27] More information can be found in the Portland Water Bureau's Distribution System Master Plan, 2007. Options to integrate the former Powell Valley Road 415 service area with the Tabor 411 service area, and supply capacity through Washington Park were also assessed in this plan.

the Bureau has recently completed a Master Plan for the service area that includes several capital projects to remedy previously identified deficiencies.

- The remaining three service areas have mitigating circumstances that relieve some of their identified deficiencies. The Lexington service area was deemed deficient in the outage screening, but the Bureau has purchased a generator to supply the service area in a power outage situation. However, the generator would not address a service outage of the pump main, so the service area was still deemed deficient. The second, Bertha, was deficient for both storage and outage. However, the service area has additional regulated supply from other service areas. The third, the Vernon 362 service area, has a large number of regulators that supply the zone, which addresses the storage deficiencies.

Table 7.8 Results of 2007 Preliminary Screening of Service Areas[28]

Service Areas that Passed Preliminary Screening for Pumping, Fire, Storage and Outage Service Goals; or Are Being Addressed in Other Studies*

Arlington/Portland Heights **	Arnold	Burlingame
Clatsop	Denver	Marquam Hill
Nevada	Parkrose	Pittock
Powell Butte	PVRWD 415	Rocky Butte Tank
Rose Parkway	Tabor 302	Tabor 411
Vermont	Vernon 270	Washington Park 229
Washington Park 299		

Service Areas that were Deficient for One of More Screening Service Goals

Service Area	Pumping	Fire	Storage	Outage	Notes
Bertha	✓	✓	X	X	Additional regulated supply available
Broadway	X	X	X	X	Additional regulated supply available
Calvary	X	X	X	N/A	Being evaluated in NW Hills study
Clatsop Pump	X	X	N/A	X	
Council Crest	✓	✓	X	X	Being evaluated by Bureau
Greenleaf	✓	✓	X	X	Being evaluated in NW Hills study
Lexington	✓	✓	✓	X	The Bureau has purchased a generator with an automatic transfer switch for 112th St Pump Station. The generator would not address outages due to a pump main break
Linnton / Whitwood	X	X	X	X	In Upper Linnton Tank Analysis
Mt. Scott	X	X	X	X	Additional regulated supply available
Penridge	X	X	X	✓	Being evaluated in NW Hills study
Powell Butte Pump	X	X	N/A	✓	Not deficient if all pumps used
PV Raymond Pump	X	X	N/A	✓	Not deficient if all pumps used
PV Raymond	X	X	X	X	Being evaluated by Bureau
Rocky Butte Pump	X	X	N/A	✓	
Saltzman	X	X	N/A	✓	
Sherwood	X	X	X	X	Additional regulated supply available
Stephenson	X	X	X	✓	
Stephenson Pump	X	X	N/A	✓	Not deficient if all pumps used
Tabor 590	✓	X	X	X	

[28] Portland Water Bureau, *Distribution System Master Plan*, 2007

Vernon 362	N/A	X	X	N/A	Large regulated supplies available
Willalatin	X	X	X	X	Being evaluated in NW Hills study
Willamette Heights	N/A	X	X	X	Being evaluated in Willamette Heights Tank study

* Passed all screening criteria (Arnold, Clatsop, Denver, Marquam Hill, Nevada, Rocky Butte Tank, Vermont), were only deficient in storage screening (Parkrose, Rose Parkway), or passed pumping, storage, and fire screening goals, but were not screened for outages, since these are being addressed by other studies, or are large service areas with adequate redundancy (Arlington/Portland Heights, Burlingame, Powell Butte, PVRWD 415, Tabor 302, Tabor 411, Washington Park 229, Washington Park 299).

** Arlington Heights and Portland Heights service areas are hydraulically interconnected and were evaluated together.

N/A = Not applicable, or not evaluated in DSMP ✓ = Passed screening X = Failed screening

Backbone Hydraulic Evaluation

The backbone evaluation assessed system operation, taking into account system hydraulics, to find further deficiencies not evident in the preliminary screening. The model simulated a 24-hour period on the peak-demand day for 2005 and 2030 demand conditions. Results of the hydraulic evaluation were consistent with the preliminary screening. No additional deficiencies were identified.

Three service areas, however, that had deficiencies in the screening evaluation showed no deficiencies in the hydraulic evaluation. All three (Broadway, Sherwood Field, and Stephenson) have adequate pumping capacity to meet normal demand, but insufficient capacity to meet peak-day demand plus re-fill of storage following a fire within the service area.

Assessment of Pump Stations and Tanks[29]

Condition assessments have been conducted for 35 pump stations and 66 tanks in the distribution system. The pump station assessment found that, in general, the pump stations originally constructed by the Bureau were in good condition. With the exception of the recently acquired Powell Valley system pump stations, pump stations acquired from other formerly independent water systems had more deficiencies.

- 15 pump stations are in good condition with only minor corrective maintenance needed;
- 20 pump stations are operationally and functionally sound, but exhibiting some signs of wear, with some need for corrective action;
- Deficiencies were identified in the Fulton, Linnton, Portland Heights, Sam Jackson, and Taylors Ferry service areas.
- Of the 66 tanks assessed, 4 tanks are in conditions that substantially diminish performance; 55 tanks are operationally and functionally sound, but exhibiting some signs of wear, with some need for corrective action; and 7 tanks are in good condition with only minor corrective maintenance needed.

The tank assessments found that coating and painting for tanks has not been performed routinely in recent years. A strategic coating and painting program was recommended. The analysis also found seven

[29] Portland Water Bureau, *Distribution System Master Plan*, 2007

tanks that require further evaluation to address extensive cracks observed during inspections. Fifty-two tanks also had minor repair or maintenance recommendations, and several tanks require anchoring and/or flexible piping connections to reinforce tanks to withstand an earthquake. All work will be performed as part of ongoing capital and maintenance programs.

Seismic Assessment

As part of the Distribution System Master Plan (2007) a qualitative seismic assessment was provided for 32 tanks to identify conceptual-level seismic improvements. The analysis used condition information collected in the tank inspections, along with probabilistic ground-motion data from U.S. Geological Survey, to assess which tanks would be most vulnerable in a large-scale earthquake in the Portland area (100- year to 500-year frequency). For tanks identified to be the highest risk, conceptual-level improvements were identified to reinforce the tanks.

Needs & Approach

Backbone Hydraulic Evaluation

In selecting improvements, service areas were reviewed to identify water supply issues including service pressures, fire flow requirements, water quality goals and sizing for new facilities.

For direct-pumped service areas, the improvements were developed based on a criterion of meeting peak-hour demands plus fire flow with one pumping unit out of service, rather than peak-day plus fire flow, since direct-pumped areas have no storage and pumps and must be able to meet both normal and fire demands. In some instances, the bureau has designed pump stations to meet fire flows with all units in service. In the Powell Butte Pump, Powell Valley Road Water District Pump and Stephenson Pump service areas, pump stations can provide adequate fire flow if all units are used. The bureau will need to determine whether these pump stations - built to then-current standards - should be upgraded based on the Distribution System Master Plan criteria of meeting peak-hour demands plus fire flows with one unit out of service.

Condition Assessment of Pump Stations and Tanks[30]

All of the pump station projects generated from the pump station condition assessment will be constructed as part of ongoing capital and maintenance programs, or as part of larger planned pump station rehabilitation projects.

Asset Management Plans

Asset management plans are being developed for all assets within the distribution system. These plans will help identify additional projects and replacement strategies necessary to maintain and improve the system. These plans may identify additional projects to be included in the 20-year Project List.

[30] Portland Water Bureau, *Distribution System Master Plan*, 2007

Recommended Distribution System Improvements

Burnside Pump Station Replacement

This project will decommission the old undersized pump station and modify the nearby Verde Vista pump station to serve the Burnside pumping needs for the next 50 years. The project will also acquire property for the future Burnside pump station to be built 50 years from now.

Carolina Pump Main Extension

This project will connect the existing Carolina Pump Main (Westwood Tanks) and the Fulton Pump Main (Burlingame Tanks) together. This will be a pump main from the intersection of SW Capital Hwy and SW Terwilliger Blvd to the Burlingame Tank site. Phase 1 is replacing the existing 16" Fulton pump main with a 24" pump main from Burlingame Tank site to SW Chestnut and SW Burlingame as well as improvements at the Burlingame Tank site. Phase 2 is the new construction of a 24" pump main from SW Chestnut and SW Burlingame Ave to tie into the existing Carolina Pump main at Capitol Hwy and Terwilliger Boulevard.

Control Center SCADA Server Replacement

This project replaces the aging supervisory control and data acquisition (SCADA) system at the Water Control Center with a secure, Windows based system. The bureau will add, as part of the upgrade, a disaster recovery SCADA system to our Lusted Treatment site. The new system will have better system functionality, improved integration tools, management tools and security and will provide PWB with critical water supply monitoring and control for 10 years plus. The system includes hot standby real-time and historical servers, client workstations at various facilities, a decision-support server, and a terminal server for remote access.

Distribution Mains

This program includes rehabilitation and replacement of mains with high leakage or break rates, substandard mains (2-inch galvanized steel), expansion due to applications from private developers, increasing supply for fire protection, improving water quality and water system upgrades due to local improvement districts (LIDs), and street improvements. Water main replacements also include appurtenances such as fire hydrants, valves, pressure regulators, service branches, and other facilities.

Field Support

This project funds vehicles and major equipment purchases, including heavy construction equipment such as dump trucks and backhoes, and Bureau-owned computer software with a unit cost greater than $5000.

Forest Park Low Tank

This project will plan, design and construct a single 1.3 million gallon tank at NW Cornell and NW Skyline Drive for the Greenleaf 1034 pressure zone. This storage is to augment regular system capacity and increase fire flow to a large area of Northwest Portland.

Fulton Pump Station Improvements

This project will replace the Fulton Pump Station with a new pump station located in Willamette Park.

Greenleaf Pump Station

This project will plan, design and construct a replacement Greenleaf pump station at the existing site. Flow upgrades will remove the Penridge tank from the system. The new pump station will pump directly to the distribution system.

Hydrants

The bureau maintains about 16,000 fire hydrants. These hydrants allow Portland the flexibility and preparedness to respond to a fire emergency through coordination with the Fire Bureau. This project provides for the replacement of fire hydrants that are no longer repairable. Replacements may also occur as part of the bureau's ongoing efforts to standardize hydrant types for more efficient and effective management of maintenance and repair activities.

Meters

This project funds the purchase and installation of water meters. The Bureau’s objective is increase accuracy based on replacing high usage meters. High usage meters typically wear out faster than others.

Portland Heights Pump Main

This project will replace the portion of the 12" pump main in SW Montgomery Drive between the southern end of the 16" pump main from Washington Park and the Portland Heights Tank site with approximately 3,500 feet of 16" main in Montgomery Drive and Greenway Avenue. The new main will replace a poor condition main and provide additional supply capacity to the area.

Portland Heights Pump Station Electrical Improvements

The project will design and construct a new prefabricated building at the Portland Heights Pump Station to house electrical and control equipment, and also install in the existing pump vault a new 100hp pump and vault improvements.

Portland to Milwaukie Light Rail

This project consists of relocation of over 5,000 feet of main impacted by TriMet’s SE Corridor Light Rail project.

Pump Stations and Tanks

This project includes a large variety of infrastructure consisting of water storage tanks, pumps, and pump and control facilities. The bureau uses a reliability centered maintenance (RCM) approach to manage its assets. A key focus of the next twenty years will be to replace the remote telemetry units at over 140 remote sites. The existing units are over 15 years old, and are becoming obsolete. The servers are at the end of their service cycle, and must also be replaced.

Sam Jackson Pump Station and Mains

This project will make multiple capital improvements to the Sam Jackson Pump Station, including seismic improvements, replacement of RTU and motor controllers, installation of pump control and check valves, extension of the crane rail, a concrete pad, and installation of a security fence and gate.

Services

This project constructs replacement and customer requested water services. A water service is the connection between the water main and any given customer's service meter. Service connections are always performed by Water Bureau crews directed by a certified Water Service Mechanic. An ongoing budget of approximately $5 million per fiscal year provides for installation of about 1,000 water service connections annually and other upgrades to existing water services.

Willamette River Crossings

The project replaces major pipelines to strengthen the transmission link between Powell Butte and the service areas west of the Willamette River, including downtown and the storage reservoirs at Washington Park. It includes construction of a new seismically strengthened river crossing to replace the first one of potentially two Willamette River crossings, and new transmission piping on both sides of the Willamette.

Treatment System

Inventory

The Federal Safe Drinking Water Act, which regulates public drinking water supplies, typically requires surface water supplies to be filtered to meet federal drinking water standards. Because the Bull Run source water quality is very high and Portland implements source water protection measures, Portland is currently exempted from filtration requirements. Portland’s water supply is disinfected using chloramines. Water is chlorinated at the Headworks at Reservoir 2. Ammonia and sodium hydroxide are added at a second treatment facility, Lusted Hill.

Ammonia ensures that disinfection remains adequate throughout the distribution system. Sodium hydroxide increases the pH of the water helping to control lead and copper levels at customers' taps should these metals be present in the customers' home plumbing.

New federal regulations are constantly being developed and that may require additional treatment processes in the future.

Treatment is also required for the groundwater supply.

Facilities used to provide water treatment include a chlorination building and equipment, and flow metering at Headworks; treatment facilities and equipment at Lusted Hill; and treatment facilities and equipment at the Groundwater Pump Station.

Current and Projected Condition

Headworks treatment facilities are rated as good to fair. The flow meters are rated as poor.

The Lusted Treatment Facility was constructed in 1992. Condition is assessed at good to fair. However, buildings at this site were built as temporary structures and do not reflect the full cost of replacing the facility with permanent buildings. Future facility upgrades will include permanent structure replacements.

The treatment facilities at the Groundwater Pump Station were recently upgraded and are rated in very good to good condition.

Current and Projected Capacity

Due to changing regulations, the suitability of a treatment facility is a moving target. As federal and state rules are modified and as technology changes, treatment facilities must change as well.

With the State granting the Bureau a variance on the treatment provisions of the LT2 rule, many related facility improvements planned at Headworks were postponed as well. Among these improvements were replacement of the chlorination system and the operators' station. Both of these will need significant upgrades within the next 20 years.

Needs & Approach

Asset management plans are being developed for the Bull Run Supply and Groundwater. These plans should help identify needed improvements.

Recommended Treatment System Improvements

Headworks Flow Meters

This project would install new flow meters on the Primary Intake conduits; install new flow meters and flow control valves on Screen house #3 conduits; and address the sump pump drainage system in Bailey pressure-reducing valve vault.

Treatment Facilities Improvements

This project includes several related projects for treatment facilities for the Bull Run water supply, at both the Bull Run Headworks and the Lusted Hill Facility. Specific treatment improvements have not been determined at this time. Projects would likely be driven by state and federal regulations.

Support System

Inventory

The Support system includes miscellaneous facilities and equipment necessary to support the Water Bureau's mission. Support system assets are shown in Table 7.2. Chief among these assets are the Interstate Facility, and Sandy River Station.

Funding for Support system projects often resides in budget programs other than “Support”. The Interstate Rehabilitation Project is currently funded through the Distribution program in the CIP.

Current and Projected Condition

The Interstate Maintenance Building is more than 85 years old. Studies have indicated that this building is highly vulnerable to collapse during an earthquake. This building fails to meet building codes in many areas including structural, mechanical and electrical requirements. Renovations required to bring the building up to code are extensive. A major rehabilitation plan has been developed that will result in the demolition and reconstruction of this building, anticipated to be completed in 2016.

Other buildings include Sandy River Station which is primarily in good to fair condition.

Current and Projected Capacity

Needs & Approach

Buildings classified as part of the Support system will require maintenance and rehabilitation over the next 20 years. An asset management plan for facilities/buildings is being developed that should help identify work that is needed.

Recommended Support System Improvements

Building Maintenance

The bureau maintains hundreds of structures from the Bull Run watershed to downtown Portland. These structures range in size from small pump houses to the maintenance hub on Interstate Avenue. The necessary work involves structural repairs and maintenance.

Interstate Facility Rehabilitation

The project rebuilds PWB’s main maintenance facility. A four-year master planning effort from 2002 – 2006 developed the baseline requirements for both current and long-term needs. Recent updates to the master plan along with additional program summary work has created the basis for the design of the facility now underway. Two new buildings will replace the eighty-five year old Maintenance Building that currently serves as the main office and warehouse. Site improvements to the 11 acre campus improves vehicle and employee circulation. It also brings the property up to current code requirements for storm water management and landscaping.

Planning

This program consists of general planning studies for projects needed to improve the operation of the water system. These include pressure zone adjustments, facility modifications, and system element studies.

Sandy River Station Upgrades

This project consists of upgrades to the Sandy River Station facilities including an evaluation of a potential move to a different site.

West Side Maintenance Facility

A hub is needed on the west side of the Willamette River for maintenance and construction crews, vehicles, equipment and materials, and emergency operations. Property previously owned by the Federal government (the Jerome Sears site) has been acquired by the City for this purpose. This project includes improvements to the facility over the next 20 years.

Regulatory Compliance

Inventory

The Regulatory Compliance program ensures that water throughout the system meets Federal and State of Oregon drinking water quality standards and environmental protection standards. Included in this program is implementation of the federally approved Habitat Conservation Plan (HCP) and the multiple easements and improvements required by this plan. Chief among these in the Bull Run Dam 2 tower intake structure which will allow the bureau to better control the release of water to enhance downstream conditions for anadromous fish species in compliance with the Endangered Species and Clean Water acts.

Regulatory Compliance system assets are included in Table 7.2.

Needs & Approach

The focus of this program is implementation of the federally approved Habitat Conservation Plan and the multiple easements and improvements required by this plan.

Recommended Regulatory Compliance System Improvements

Bull Run Dam 2 Tower

The Water Bureau is installing steel multi-level intake structures onto the North Dam 2 Tower located in the Bull Run watershed. Modifications are designed to allow selective water withdrawal, proper operation during flood conditions, and enable the tower to better withstand seismic events.

HCP Alder Creek Fish Passage

This project will design and install two fish passage facilities as planned in the Habitat Conservation Plan (HCP). The project is in Alder Creek, a tributary to the Sandy River. There will be a fish ladder at the waterfall and a fish ladder at a water diversion.

Regulatory Compliance

This project responds to requirements of the Endangered Species Act (ESA), including the implementation of the Habitat Conservation Plan (HCP) Consistent with HCP commitments, this project funds easements, purchases land, and also supports projects jointly conducted with other watershed partners.

Customer Service

Inventory

The Customer Services Program includes facilities that provide services for customers other than the direct supply of water. It includes customer billing, collection, and call center facilities and equipment, which is the largest part of the program. It also includes conservation, security, emergency management and grounds maintenance for Bureau-owned properties. Specific assets included in the Customer Services program are Dodge Park and the Security and Emergency Management facilities, including the new City Emergency Coordination Center.

Customer Service system assets are included in the Distribution section and the Support Facilities section in Table 7.2.

Current and Projected Condition

Dodge Park is considered to be in good condition. Upon completion of the new Emergency Coordination Center in 2014, the Security and Emergency Management facilities (including the Ranger Station and security gates) should be in very good condition.

Current and Projected Capacity

Needs & Approach

Automated meter reading would reduce operational costs and provide better customer service (i.e. access to more current consumption data).

Maintenance and upgrades of Water Bureau facilities including Dodge Park and Security and Maintenance facilities will be a continual need. An asset management plan for facilities/buildings has been developed that should help identify work that is needed.

Recommended Customer Service System Improvements

Automated Meter Reading (AMR) Implementation

This project provides for the replacement of customer meters throughout the City with automatic water meter reading equipment.

Emergency Coordination Center

This project designs and constructs the City's Emergency Coordination Center. The bureau will locate its emergency response and security staff at this location. The project location is adjacent to the City's 911 Call Center at SE 99th Ave and Powell Blvd. The total project cost is $19.85M and PWB is a contributing bureau.

Security and Emergency Management

The bureau is committed to increasing flexibility and preparedness to meet future security challenges, to enhance security throughout the water system and to modernize security practices and infrastructure. This program includes physical security improvements to major and minor facilities as well as improved security in the overall water distribution system and control/communications system.

Investment Strategy

Process

Annually, the Portland Water Bureau prepares capital budgets for the upcoming fiscal year and for the five-year planning horizon. The major components of the water system define the program categories within the capital budgeting process. These capital programs are: Supply, Transmission and Terminal Storage, Distribution, Treatment, Regulatory Compliance, and Customer Service. ,The Capital Improvement Plan (CIP) is an annual planning process which allows a review of capital projects and programs. PWB engages the public in developing its budget and the CIP. All PWB CIP projects that affect neighborhoods or that require city, state, and/or federal permit review processes include public involvement elements.

The Engineering Services Group (ESG) receives requests and ideas for CIP projects from a number of sources. Internal bureau stakeholders groups including Asset Management, Development Services, Design or Construction, Operations, Maintenance and Construction, and Resource Protection all may identify the need for a capital project. Other sources include projects generated from ESG CIP Planning Section listed in Master Plans or Public Facility plans, and recommendations from the Asset Management group that include business case studies. In addition, PWB receives notifications from other agencies or bureaus planning or producing work that may impact the water system. External requests may also come from citizens, wholesale customers, the City Council, and developer requests for projects administered through ESG’s Development Services Branch.

PWB performs economic analyses and/or business cases for new projects, and ensures that investment decisions are economically justified.

Contributing Plans

Asset Management

The Bureau’s Asset Management Program is intended to guide the strategic management of physical assets to best support the delivery of identified services. It helps the Bureau to better manage existing assets, and plan for future needs. This process is guiding decisions as to the effective mix of maintenance, repair, renewal or replacement of the water system components, and has led the Bureau to focus on critical assets. A risk analysis methodology has been applied to assess the relative risks of asset failure; those assets with the highest risks are then identified for follow-up actions.

Asset condition assessments have been completed or are underway for many asset classes. Business case methodology is helping ensure that investment decisions deliver good value by comparing the cost of an investment to the benefits it provides. Benchmarking with best practices helps the Bureau better understand process improvement opportunities. Asset Management Plans have been prepared for almost all asset classes, capturing current information on service levels, inventory, condition, failure modes, risks of asset failure, and asset strategies.

System Plans

A number of plans are consulted in preparation of the CIP. These include the Infrastructure Master Plan (2000), the Distribution System Master Plan (2007), the Bull Run Water Supply Habitat Conservation Plan (2008), the Water Management & Conservation Plan (2010), and various master plans and project specific planning documents developed by PWB.

Alternatives Analysis and Prioritization Process

PWB's methodology and criteria for the selection and ranking of capital projects depends on the magnitude of the project and duration of the project's lifecycle. For major projects, an initial concept report is developed evaluating possible project alternatives and recommending potential capital projects. Senior management approves projects to continue with a larger planning effort to create a Basis of Design Report. To develop this report, PWB Planning section uses industry practices in cost-benefit analysis and risk assessment to identify and weigh alternative solutions, and compare them with PWB service standards. PWB selects projects based on these quantitative analyses but also considers the logistics of rate impacts, sharing cost with interagency partners, creating revenue opportunities, and achieving compliance with regulatory requirements.

The criteria used to select projects for inclusion in the budget include fulfilling service levels (such as maintaining pressure and limiting customer outages), mitigating high risks of asset failure, operating assets at the most efficient and cost-effective levels, contributing to local and regional sustainability and energy-conservation goals, providing appropriate redundancy within the supply system, complying with all state and federal water-quality regulations, ensuring access to key water-supply facilities, and coordinating with other agency infrastructure projects.

Projects & Programs

The FY 2013-18 CIP provides balance between longer-term infrastructure replacement and maintenance needs and short-term water system infrastructure needs to ensure compliance with drinking water regulations. The CIP priorities for the bureau's budget and capital program include:

- Implement improvements necessary to assure compliance with current safe drinking water regulations, including the LT2 rule.

- Continue to expand the utilization of an asset management system plan and the computerized maintenance management system to support planning and implementation of system maintenance activities.
- Implement the Bull Run HCP, a comprehensive multi-decade Clean Water and Endangered Species Act compliance agreement for the Bull Run watershed.
- Support other governmental agency capital improvement projects (e.g., light rail, Sellwood Bridge, Columbia River crossing) as directed by City Council.

The 5-year CIP is summarized within the following seven Bureau programs with key projects identified:

Customer Service

The Bureau's participation in the City Emergency Coordination Center is the primary project included within this program over the first five years. Bureau security staff will operate from this location with the Portland Bureau of Emergency Management. In the event of a major emergency, all City coordination staff will operate from this center.

Distribution

Over the first five years, approximately $244 million of the CIP is for improvements to the distribution system. Of the total, about $83 million is to be used for direct water line replacement projects, including work initiated by other bureaus and agencies, as well as replacement of the oldest or most deteriorated portions of the distribution system. About $35 million is to continue rehabilitation of the Interstate maintenance building. There is $57 million for the Willamette River Pipe Crossing Project. Almost $16 million is for pump stations and tanks. Other improvements include services, meters, hydrants, fountains, and vehicle and equipment replacement.

Regulatory Compliance

Over the first five years, more than $25 million has been planned for improvements to the water supply from the watershed, principally the Dam 2 Tower Improvements. Construction continues on the HCP Alder Creek project to enhance fish habitat.

Support

The Support Program includes funding for master system planning, focusing on identifying the need for, and timing of, improvements to or acquisitions for the water system. Master planning uses asset management methods to determine the most cost-effective investments. Individual asset studies help guide the selection of major capital projects for the short and long term. PWB has included funds for some of the planned studies on vulnerable and aging infrastructure in upcoming fiscal years.

Supply

This program includes projects to improve existing facilities and roads in the Watershed and to improve the groundwater system. An example is the Groundwater Electrical Supply Improvements project that will reduce the risk of an extended electrical supply outage to the groundwater pump station.

Transmission and Terminal Storage

Over the first five years, the major projects in this program include $35 million to continue construction of an additional 50-million-gallon water storage tank at Powell Butte and $119 million for other enclosed storage including Kelly Butte reservoir and Washington Park reservoir. Also included is $33 million for other conduit and transmission main projects.

Treatment

Headworks Flow Meters project, to accurately record treated water flow and regulate chemical additions to the system in compliance with drinking water regulations, is the only project in the first five years.

Financially Constrained Investment Strategy

The Bureau focuses its efforts on regulatory compliance elements, improving the condition of its aging infrastructure, and addressing operations and maintenance needs. The CIP addresses longer term infrastructure replacement and maintenance needs, while addressing short-term water system infrastructure needs to ensure compliance with drinking water regulations.

Recently, the primary focus of the bureau's capital Investment Strategy has been responses to EPA's LT2 rule (reservoir replacement projects), the HCP (Dam 2 towers project), and the Interstate Facility Improvement project. Upon completion of these projects, the focus will return to improving the maintenance and reliability of existing facilities. As facilities within the water system begin showing their age, major reconstruction and maintenance projects will need to be undertaken.

Planned CIP outlays (excluding capitalized overhead) total $491 million over the five-year forecast period.

Table 7.9 Investment Strategy Summary

Program	FY 2013-2018	FY 2018-33
Customer Service	$3,057,000	$53,700,000
Distribution	$244,197,288	$461,650,000
Regulatory Compliance	$25,504,000	$30,000,000
Supply	$14,291,000	$88,500,000
Support	$10,000,000	$50,500,000
Transmission and Terminal Storage	$191,170,000	$242,000,000
Treatment	$2,500,000	$150,000,000
TOTAL	**$490,719,288**	**$1,076,350,000**

Financial Strategy

This section will be updated in the Proposed Draft to reflect a twenty-year planning period.

Existing Financing Strategies

As part of the Bureau's overall mission and values, its financial objective is to "maintain fiscal integrity, undertake sound financing practices and ensure auditable results" which:

- Provides for sufficient annual funding of operating, maintenance, and capital programs approved by City Council.
- Provides for rates and charges to customers that are equitable and based on generally accepted cost of service principles unless otherwise directed by City Council.
- Strives for a natural optimal balance between financial health, operational effectiveness, infrastructure condition, effective management, rate affordability, and a skilled and experienced workforce.
- Strives to optimize capital financing strategies, today and into the future.
- Ensures the maintenance of appropriate and adequate cash balances (operating fund, construction fund, sinking fund, and rate stabilization account) consistent with City policies, bond covenants, and industry standards

Rates and charges for water services are established annually based, in part, upon cost-of-service principles and methodologies recommended by the American Water Works Association (AWWA). The process used by the Bureau follows the Commodity Demand method set by the AWWA. Under this approach, developed for the Bureau by Raftelis Financial Consultants, Inc in 2006, water system costs are allocated to customers based on their average and peak water demand characteristics and use of the system. Retail rates are then established based on the residual financial requirements of the system.

The Bureau assesses both a volumetric usage charge and a fixed monthly base charge. A monthly base charge is imposed on water services connected directly to the water system. The base charge is in addition to the rates charged for water usage.

Financial Plan and Rate Setting Process

The Bureau annually prepares a requested budget and five-year financial plan. The Bureau’s budget process includes a Budget Advisory Committee (BAC). The BAC meets between October and January to review and provide input on the requested budget including the five-year capital improvement plan and proposed retail rates. The financial plan includes operating and capital expenditure and expected rates for each year of the five-year forecast period. The requested budget and financial plan reflects the financial implications of the bureau’s priorities, strategies, and service levels.

The financial planning process lays the groundwork for setting rates. Section 11-105 of the City Charter authorizes the City Council to fix fees and charges for connection to and use of the Water System. Water user fees and connection charges are formally reviewed every year by the Bureau. Rates required to support proposed activities for the next year are submitted by the Bureau Administrator to the City Council for review and approval.

Water Funds

The Bureau’s financial system is organized into three separate funds:

- The Water Operating Fund serves as the operating fund of the Bureau and, with the exception of debt service, all expenditures made from this fund are for operation and maintenance of capital assets. Receipts from the sale of water are the primary source of revenue for the Water

Operating Fund. The cash flow in this fund determines the need for rate increases. The Rate Stabilization Account is within the Operating Fund.

- The Water Construction Fund is the recipient of proceeds from bond sales to provide for the funding of water system capital improvements. Other sources of revenue include reimbursements for capital expenditures, such as main extensions and service installations, system development charges and sale of assets. Also, a portion of the water sales revenues is transferred to this fund to finance routine system repair and replacement. The Water Construction Fund reimburses the Water Operating Fund for capital asset requirements including capitalized overhead, capitalized interest, and the cost of issuing bonds.
- The Water Bond Sinking Fund provides for the repayment of bonded debt and interest incurred in conjunction with construction of water system facilities. The revenue bond reserve accounts are also maintained in the Sinking Fund. The source of revenue for this fund is a transfer from the Water Operating Fund, reduced by interest earnings on fund balances and a transfer from the Water Construction Fund of interest earnings on bond proceeds.

These three funds enable the Bureau to segregate resources for specific uses and ensure that reserves are not used to supplement daily operating needs. Maintenance of the fiscal integrity of each fund is a key objective of the Bureau's financial planning and analysis efforts.

Anticipated Revenues

The bulk of the Bureau’s CIP is financed by Water revenue bonds. Though not required by bond covenants, the Bureau’s planning standard is to set rates such that Net Revenues provide at least 1.90 times debt service coverage on First Lien Bonds. Additionally, the Bureau maintains a planning standard that results in Stabilized Net Revenues providing at least 1.75 times coverage on the Combined Annual Debt Service (as defined in the Master Second Lien Water Revenue Bond Declaration) for both First and Second Lien Bonds. These standards exceed the debt service coverage required by bond covenants.

Additional revenues to support the capital plan include cash financed capital funding from rate revenues, system development charges, new services and main reimbursements, City interagency reimbursements on capital projects, and sales of assets.

Revenue and expenditure comparison

The Bureau plans for a minimum fiscal year-end operating cash reserve of $15.0 million in the Operating Fund. This represents about 45 to 60 days of operating costs. This standard conforms to the generally accepted industry standard for such reserves, and has been approved by the Office of Management & Finance as a reasonable amount for this reserve.

The Bureau also has a Rate Stabilization Account (RSA) within the Water Operating Fund that is used to smooth rate increases over the financial planning period and beyond. This smoothing is one of the Bureau’s key financial planning objectives and is aimed at maintaining financial stability and predictability.

Financial challenges, unmet needs and risks

The Bureau’s financial projections include key assumptions underlying the revenue and expenditure forecast. Key assumptions in the revenue forecast include:

- Retail water demand
- Wholesale water sales
- User charges
- Issuance of additional First Lien Bonds or Second Lien Bonds to fund capital program requirements

Key assumptions in the expenditure forecast include:

- Annual inflation
- The bureau’s cost related to the City’s outstanding pension obligation bonds
- Pension system contribution rates
- All costs related to compliance with the LT2 rule including regular monitoring and capital projects
- No capital or operating costs have been included to fluoridate Portland drinking water supply
- Continuing to operate under the Bull Run Treatment Variance[31]

[31] On March 14, 2012, OHA issued a Final Order granting the City a variance to the treatment requirements of the LT2 Rule. The variance went into effect on April 1, 2012, and will be in effect for ten years as long as the City is able to meet a set of important conditions designed to protect the health of Portland drinking water customers. These conditions require the Bureau to continue to monitor Bull Run source water for Cryptosporidium, maintain all legal protections in the Bull Run, and monitor and manage any potential sources for Cryptosporidium contamination in the watershed. In the event of a first detection of Cryptosporidium, the Bureau is required to increase its monitoring efforts, coordinate with health officials to determine what, if any, impacts the detection may have, and communicate this information to its customers. The communications requirement in the variance conditions requires, at minimum, a press release to Portland-metro media outlets and posting of the information on the Bureau website if Cryptosporidium is detected at the intake. If one or more detections occur during this one-year period of increased monitoring, it is likely that OHA will revoke the variance.

Chapter 8
Bureau of Transportation

Overview

Portland's transportation system served nearly 584,000 residents in 2010, and tens of thousands of individuals who live, work, or spend time in the Portland Metro area. The $8.1 billion dollars the public invested in this system enables individuals to get to work, school, recreation, and activities to sustain daily household needs. Collectively, the City's transportation system does much more. It creates the foundation for a variety of activities essential to our lives: livable and safe neighborhoods, land uses and managing growth, commerce and job creation, environmental protection, freight mobility, and revitalization.

Transportation assets include facilities for pedestrians, bicyclists, transit users, all motorists, and emergency vehicles. Portland's transportation system, provided by the City and a variety of other jurisdictions and agencies, includes not only the networks of roads and highways but also right-of-way, sidewalks and paths, bikeways, bridges and other structures, transit (light rail, bus, streetcar, and tram), and thousands of supporting assets (lights, signals, signs, etc.). This transportation system is a fundamental component of regional access and mobility, serving residents, businesses, and travelers and providing connections to local, regional, interstate, national and international destinations. The combined transportation assets make Portland one of the most livable cities in the country.

Vision, Mission & Values

The vision of the Portland Bureau of Transportation is to provide multimodal mobility and access for people and goods while promoting safety, health, a strong and diverse economy, equity, and the wise application of financial resources. PBOT aims to provide transportation infrastructure that accommodates the geographic and area context in which it is located.

The mission of the Portland Bureau of Transportation is:

"The City of Portland Bureau of Transportation is a community partner in shaping a livable city. We plan, build, manage and maintain an effective and safe transportation system that provides people and businesses with access and mobility. We keep Portland moving."

The values of the Portland Bureau of Transportation are to:

- Implement and improve transportation infrastructure using the priorities established by the Portland Comprehensive Plan and the Portland Transportation System Plan.
- Plan, build, manage and maintain a complete multimodal transportation system to provide access and mobility to connect people and goods to destinations.
- Foster safety, health, equity, and sustainability.

System Service

Service Area

Portland's transportation system assets are distributed over an area of approximately 147 square miles within the Portland urban services boundary (see Figure 4.1). This service area includes north, northeast, northwest, southeast, and southwest Portland. It extends east as far as 185th Drive, North to the Columbia River encompassing Hayden Island, West as far as Scholls Ferry Road or Skyline Boulevard, and south as far as Johnson Creek Boulevard or Mt. Scott Boulevard.

Services Provided

The Bureau of Transportation (PBOT) provides transportation infrastructure and programs for all transportation system users, including pedestrians, bicyclists, transit users, freight, carshare members, taxi customers, commercial transportation users, private automobile drivers, and occupants of emergency vehicles. PBOT is the lead bureau for the planning, implementation, and maintenance of the transportation system and programs that manage the demand on that system. PBOT is also the City's responsible bureau for compliance with regional and state regulatory requirements for transportation.

Core services that the Portland Bureau of Transportation (PBOT) provides:

- **Network completion and implementation**
  PBOT implements the transportation networks within the City of Portland. These include networks for pedestrians, bicyclists, commercial transportation, freight, and private automobiles, and the parking system that supports the transportation system.
- **Maintenance**
  PBOT maintains transportation assets including the aerial tram, bridges, parking systems, pavement systems and markings, roadside barriers, lighting, signage, traffic signals, and the streetcar system.
- **Programs**
  PBOT engages in multiple programs, from those that relate to maintenance to others that relate to demand management. These include:
  - Education and encouragement: PBOT implements programs that advocate for, implement, and encourage transportation options that increase fitness, save money, reduce traffic congestion, and help maintain a livable environment.
  - Leaf Day Pickup: PBOT implements a Leaf Day Pickup program that cleans up leaves from early November to mid-December.
  - Weather response: The City of Portland responds to conditions caused by inclement weather.

Service Agreements & Partnerships

Other jurisdictions and agencies provide and maintain transportation assets within the City of Portland. These include:

- Oregon Department of Transportation (ODOT): Owns and maintains interstate facilities including Interstates 5, 84, 205, and 405; the Glenn Jackson, Marquam, Fremont, and Interstate 5 – Columbia River bridges; and supporting infrastructure including smaller bridges, retaining walls, lane markings, and signage. ODOT also owns and in some cases maintains district highways and supporting assets including US Routes 26 and 30; State Routes 10, 43, 99, 99W and 213; and the Ross Island and St. Johns bridges.
- Multnomah County: Owns and maintains the Sellwood, Hawthorne, Broadway, Burnside, and Morrison, and Sauvie Island bridges;
- Union Pacific Railroad: Primary owner of the Steel Bridge, the Union Pacific Railroad bridge, and rail lines and yards.
- TriMet: TriMet is the primary transit service provider for the City of Portland, and provides bus and light rail service.
- Neighboring Jurisdictions: Transit agencies serving some neighboring counties, including Clark County (C-Tran) and Columbia County (Columbia County Rider) provide limited connector service to locations in Portland.
- Port of Portland: The Port of Portland operates the Port of Portland and the Portland International Airport. The Portland International Airport is served by domestic and international carriers.
- Private Companies: A variety of private and for-hire companies offer taxi, bus, rental car, pedi-cab and limousine transportation. Zipcar and Car2Go operate membership-based car sharing programs. RelayRides and GetAround offer membership-based peer-to-peer carsharing.

Inventory Summary

The Portland Bureau of Transportation manages transportation assests with a replacement value of over $8 billion. The transportation system helps move people, goods, freight and emergency response vehicles through the city. Moyor vechiles, mass transit, bicyclists and pedestrians all benefit from the development, operations and maintenace of Portland’s infrastructure. The transportation assets include the systems of pavement, sidewalks, streetcar infrastructure, parking meters, and traffic signals as well as lights, signage, and roadside barriers.[1]

Transportation assets include:

Streets

Streets, also referred to as the “pavement system,” are the largest capital asset category of the City, with a replacement value of $5.4 billion.[2] They make up 17 percent of the City’s capital assets.[3] Streets include local, collector, and arterial streets that total 4,842 paved lane miles.[4]

[1] Bureau of Transportation, City of Portland. Asset Status and Conditions Report, 2013.
[2] Griffin-Valade and Kahn. Street Pavement. February 2013. p. 3.
[3] Griffin-Valade and Kahn. Street Pavement. February 2013. p. 3.
[4] City of Portland Transportation System: Status and Condition Report – 2012, p. 20.

Sidewalks

The sidewalk system represents an investment of $1.8 billion.[5] It includes 2,510 miles of sidewalks, 37,813 curbs, and 3,260 miles of corners.[6]

Bridges and structures

The City's bridges, retaining walls, guardrails, stairways and the harbor wall had a replacement value of $698 million in 2012.[7] The City owns and maintains 160 bridges that do not include the Willamette River bridges owned by Multnomah County and the state of Oregon.

Traffic signals

Traffic signals had a replacement value of nearly $291 million in 2012.[8] The signal assets included signalized intersection infrastructure, beacons, hawks, overhead crossing signs, islands lights, equipment related to intelligent transportation systems, and fiber optic or copper cables.

Parking garages

The parking garages owned by the City of Portland had a $121.4 million replacement value in 2012.[9]

Other transportation assets

All other inventories, including traffic calming devices, street lights, street signs, pavement markings ($8.8 million replacement value in 2012[10]), the streetcar system ($97 million in replacement value in 2012[11]), aerial tram ($52.8 million replacement value in 2012), building facilities, and parking meters ($11.6 million replacement value in 2012[12]) account for $232 million or 3% of the transportation system's replacement value.

Transportation assets not included in the facilities total

- The City of Portland also owns over 2,000 lane miles of public right-of-way (see Map 3-1), with an estimated 2007 value of over $7.5 billion. The right-of-way includes the land area of the streets, sidewalks, and planting strips. The value of the right-of-way is not included in the facilities total.[13]
- TriMet assets are not owned by the City of Portland. The City of Portland's inventory does not include assets owned by the regional transit agency, TriMet.

[5] City of Portland Transportation System: Status and Condition Report – 2012, p. 28.
[6] City of Portland Transportation System: Status and Condition Report – 2012, p. 28.
[7] Portland Office of Transportation, *City of Portland Transportation System: Status and Condition Report*, 2012.
[8] City of Portland Transportation System: Status and Condition Report – 2012, p. 42.
[9] Portland Office of Transportation, *City of Portland Transportation System: Status and Condition Report*, 2012.
[10] City of Portland Transportation System: Status and Condition Report – 2012, p. 14.
[11] Portland Office of Transportation, *City of Portland Transportation System: Status and Condition Report*, 2012, p. 40.
[12] Portland Office of Transportation, *City of Portland Transportation System: Status and Condition Report*, 2012, p. 12.
[13] Portland Office of Transportation, *City of Portland Transportation System: Status and Condition Report*, 2007.

Figure 8.1 Public right-of-ways

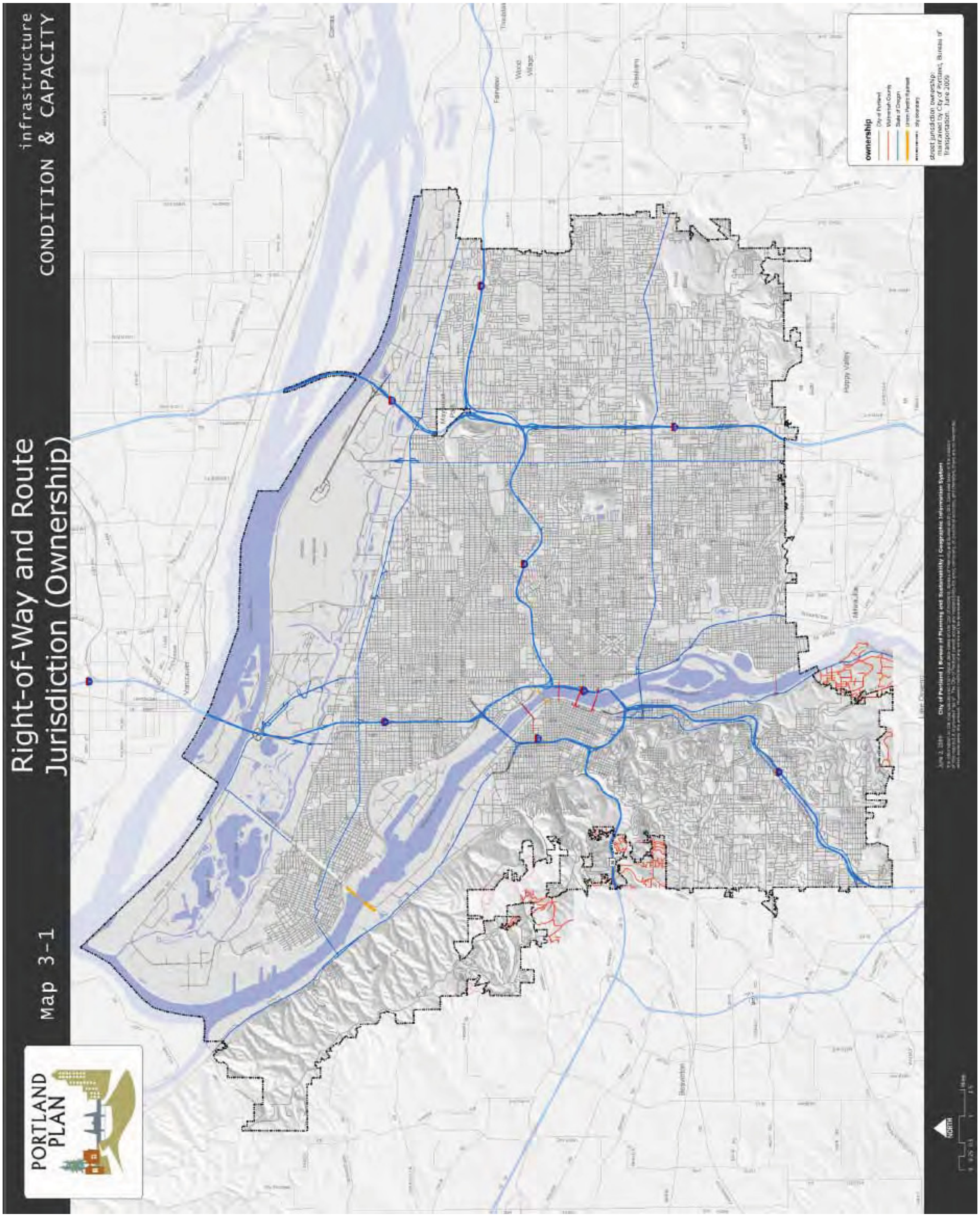


Table 8.1 PORTLAND TRANSPORTATION SYSTEM STATUS, CONDITION, AND VALUE JULY 2012

Facility	Status	Estimated Replacement Value	Condition						Unmet Need
			VG	G	F	P	VP	TBD	
Pavement		$2,450,963,232							$750,000,000
Improved Streets - Arterial/ Collector	1,871 lane miles	$2,304,813,532	18%	21%	21%	32%	8%		$400,000,000
Improved Streets - Local	2,971 lane miles	n/a	12%	19%	22%	36%	11%	--	$350,000,000
Unpaved Streets	59.5 centerline miles	$4,755,776,764	--	--	--	--	100%	--	n/a
Sidewalk System		$1,805,169,208							$232,183,677
Sidewalks	8,833,812 sq yds	$1,113,060,312	10%	25%	30%	25%	10%	--	n/a
Curbs	3,260 centerline miles	$533,596,800	12%	50%	16%	12%	10%	--	$138,735,168
Corners									
Improved	37,813	$158,512,096	10%	18%	17%	28%	27%	--	$93,448,509
with Ramps	17,063	n/a							
Bicycle Network	328 centerline miles	(included with Pavement)	--	100%	--	--	--	--	tbd
Structures		$698,495,745							$132,392,342
Bridges	160	$378,549,124	6%	42%	33%	18%	1%	--	$126,690,014
Retaining Walls	555	$95,791,554	68%	22%	8%	2%	--	--	$4,830,513
Stairways	188	$4,444,860	19%	58%	21%	2%	--	--	$871,815
Guardrails	26 centerline miles	$6,864,000	--	--	--	--	--	100%	tbd
Harbor Wall	5,133 feet	$212,846,207	--	100%	--	--	--	--	$0
Traffic Signals		$290,920,008							$195,246,822
Hardware	1,072	$275,343,200	15%	16%	23%	23%	23%	--	$189,411,808
Controllers	1,072	$9,648,000	34%	14%	45%	7%	--	--	$5,016,960
Equipment	280	tbd	--	--	--	--	--	100%	tbd
ITS Equipment	1,224	$1,187,790	91%	--	9%	--	--	--	$106,901
Fiber Optic/ Copper Cables	288 miles	$4,741,018	44%	41%	--	--	15%	--	$711,153
Streetcar		$96,910,508							

Facility	Status	Estimated Replacement Value	Condition						Unmet Need
			VG	G	F	P	VP	TBD	
Streetcars	10	$35,000,000	30%	70%	--	--	--	--	$35,000,000
Tracks	13 centerline miles	$57,221,736	60%	40%	--	--	--	--	$57,221,736
Maintenance Facilities	17,871 square feet	$4,688,772	100%	--	--	--	--	--	$0
Tramway and Related Structures	1	$52,825,128	--	100%	--	--	--	--	$0
Traffic calming devices	1,620	$3,114,650	--	99%	1%	--	--	--	tbd
Street lights	55,389	$194,311,640							$55,478,586
Option B (PGE Maintains)	44,105	$25,051,640	3%	8%	38%	35%	16%	--	$18,777,662
Option C (City Maintains)	11,284	$169,260,000	8%	29%	42%	9%	12%	--	$36,700,924
Street signs		$20,583,049							$6,715,183
Street Name	39,908	$2,499,868	3%	14%	21%	26%	36%	--	$2,074,890
Parking	55,033	$1,808,575	--	25%	25%	50%	--	--	$1,356,431
Traffic Control	54,684	$3,664,323	20%	27%	18%	25%	10%	--	$1,942,091
Stop Signs	14,840		22%	30%	28%	13%	7%	--	$477,319
Guide Signs	9,619	$663,865	--	25%	25%	50%	--	--	$497,899
Sign Mounts	74,450	$11,946,419	--	--	--	--	--	100%	$843,871
Pavement Markings		$8,790,218							$5,029,512
Center Lines	734 pass-miles	$859,488	--	--	50%	50%	--	--	$429,744
Traffic Lane Lines	99 pass-miles	$233,501	--	--	50%	50%	--	--	$116,750
Bike Lane Lines	56 pass-miles	$1,335,995	--	--	50%	50%	--	--	$667,997
Edge Lines	279 pass-miles	$659,134	--	--	50%	50%	--	--	$329,567
Crosswalks	4,696	$2,121,141	--	--	50%	50%	--	--	$1,060,570
Stop Bars	2,812	$213,780	--	--	20%	80%	--	--	$171,024
Symbols & Words	20,018	$2,448,303	--	--	30%	70%	--	--	$1,713,812
Island Markings	649	$331,358	--	--	70%	30%	--	--	$99,407
Parking	2,150	$587,519	--	--	25%	75%	--	--	$440,639
Parking Meters	1,754	$11,593,253							$0

Facility	Status	Estimated Replacement Value	Condition VG	G	F	P	VP	TBD	Unmet Need
Single	411	$330,855	--	90%	10%	--	--	--	$0
SmartMeter	1,343	$11,262,398	100%	--	--	--	--	--	$0
Buildings		$6,928,270							$0
Parking Garages	6	$121,406,730	--	83%	17%	--	--	--	$0
Albina Yard	46,706 square feet	$1,867,460	--	10%	30%	60%	--	--	tbd
Sunderland Yard	16,402 square feet	$333,280	50%	--	17%	33%	--	--	$0
Kerby Building - Main/Shop/Office	54,318 square feet	$4,281,700	--	10%	60%	30%	--	--	tbd
Kerby Building - Storage Building	6,000 square feet	$320,510	--	--	30%	70%	--	--	tbd
Stanton Yard – Basement	91,260 square feet	tbd	--	10%	60%	30%	--	--	tbd
Valvoline Bldg	7,394 square feet	$125,320	--	10%	30%	60%	--	--	tbd
Facilities SUBTOTAL		$8,066,825,172							$1,469,267,858
Right-of-Way	1,989 centerline miles	$7,140,645,600							$0
TOTAL		$15,207,470,772							$1,469,267,858

*not all assets are categorized using a 5-level condition assessment

**The unmet need is defined as the amount of additional funding and resources needed to bring (restore) a given asset class to a fair or better condition and to maintain it at that condition.

Notes: n/a= Not Applicable, TBD = To Be Determined, VG= Very Good, G= Good, F= Fair, P= Poor, VP= Very Poor

Capacity Summary

One of the goals of PBOT is to provide the maximum capacity within the transportation system through the implementation of transportation improvements and maintenance. Right-of-way is limited in the City of Portland because streets that need additional capacity are typically surrounded by dense development. Hence the capacity of the transportation system capacity is limited and the transportation system can only accommodate a limited number of people, goods, and vehicles. Population and jobs are expected to continue grow in the Portland Metropolitan Area in the next 20 years. As a result of this growth, the transportation system is expected to reach capacity at times and in certain areas, especially during peak hours. It will be essential, given the limited right-of-way available, for PBOT to implement strategies to increase the capacity for the multimodal movement of goods and people, as well as increase access to destinations.

Additionally, there is a need for the transportation system to operate at greater multimodal capacity in all areas of the city, especially to maximize capacity in the areas of the city where capacity is needed most. In areas such as East Portland the pedestrian and bicycle system does not operate at full capacity and residents do not have access to walking, bicycling, and transit. Infrastructure improvements can increase capacity citywide while providing amenities to residents.

Service Levels

Service levels for transportation can be measured a number of different ways. One is level of service (LOS) of an intersection or link of a road. Current LOS standards at the city and regional level are unable to adequately access pedestrian and bicycle service levels. The city needs to determine if lower levels of service (i.e. more motor vehicle congestion) are an acceptable reality in a growing region. Another way to measure service levels is in the presence or adequacy of transportation facilities. How many streets are paved? How many City Walkways have sidewalks? How many City Bikeways have bike facilities? These service levels may also need to change in order to accommodate topography, environmental concerns and fiscal restraints.

Maintaining Existing Infrastructure

The Portland Bureau of Transportation is the steward of $8 billion in transportation assets. Inventories have increased dramatically over the last 25 years due to annexation and development. Many City streets and facilities are reaching the end of their useful life, and maintenance was deferred due to inadequate funding.

To keep pace with the demands of the system, the Portland Bureau of Transportation has a goal to bring all assets up to standard or good condition. The unmet need over $338 million excluding pavement needs. The sidewalk system has one of the greatest unmet needs , plus corners needing curb ramps installed to meet American with Disabilities Act requirements. The othe costs are to replace curbs that are currently in poor condition. The City's transportation structures have an unmet needs as do traffic signals. The City has seven bridges considered structurally deficient and 29 bridges considered to be in poor or very poor condition. The vast majority of these bridges are weight-restricted. Traffic signal hardware has experienced substantial declines in condition. The recent decline in condition reflects a reduction in signal maintenance funds that began a few years ago. Even facilities in fair condition, such as street lights, face serious decline if adequate funding is not found. Over the next 10 years, pavement and signals will have more assets in poor than good condition if the level of current funding continues. See sections below for specific financial information.

The city's street system is aging and facing ever-increasing use. The transportation system, vital to the City and its citizens, is deteriorating. Without increased revenue, the costs required to bring the system back to good condition will grow four to five times if routine maintenance is not completed in a timely manner.

Accommodating Growth

A majority of the city's transportation infrastructure is developed at the time of construction, by private developers. Major infrastructure improvements as streetcar, arterial street reconstruction or bridge repair, are done by the city as a capitol project. A difficult aspect of accommodating growth for transportation is the lack of existing transportation infrastructure especially in East Portland and SW Portland. Not only do the areas lack infrastructure for current growth projections, and any additional density proposed, but there are also environmental and topographic restraints. The city's transportation plan (TSP) and project lists that support that plan must also comply with the regional transportation plan's projections for growth and infrastructure improvements. The RTP is being updating and will have new growth and infrastructure targets in Fall 2009.

Multi-Modal Transportation

Portland is recognized nationwide for its approach to transportation planning and for making significant investments in bicycle, transit and pedestrian infrastructure. The Transportation System Plan, PBOT's long-range plan to guide transportation investments and policies, acknowledges that people will not use alternatives to driving unless they have viable choices. While providing transportation choices is important for achieving regional 'mode split' targets (the percentage of trips taken by each of the possible modes of travel: auto, transit, bicycle, and walking) transportation choices are even more important for people who cannot or choose not to drive. PBOT also recognizes the environmental, economic and community benefits of investing in a multi-modal system.

PBOT has laid a solid foundation for increasing transportation choices for Portlanders. Several plans including the Bike Plan for 2030 and the Pedestrian Master Plan have been instrumental in laying this foundation. Portland has seen significant changes to the physical infrastructure as well as changes in the mode splits. Since the first Bicycle Master Plan was adopted in 1996 through 2010, PBOT more than doubled the bikeway network to 300+ miles. As measured during summer months over Portland's four "bike friendly" bridges (Hawthorne, Burnside, Broadway, and Steel), the number of daily bike trips more than doubled between 1996 and 2010. The number of transit riders has also increased.

Three key multi-modal issues need to be addressed:

- Bicycling, walking and transit are increasing as viable transportation modes. Funding for these projects needs to increase in order for the system to be built to its full potential.

- Another critical issue is the lack of right of way to accommodate multiple modes onto a single street. The City may have to consider other measures such as reducing on-street parking, removing travel lanes and prioritizing pedestrians, bicycles and transit.
- Currently, unless in a 'modal district" or with specific guidelines, the TSP does not give modal preference, therefore there is no policy direction to design streets in an order of priority. For example, Policy 6.4, Objective C does not allow improvements for one mode that will prevent improvements for another mode and states, "All of a street's classifications must be considered in designing street improvements and allocating funding. While a proposed project may serve only one classification, improvements should not preclude future modifications to accommodate other classifications on the street." The Street Design Classification policy gives some direction on what elements the street should have, but there is still no full direction if there is a policy difference. For example, if a street is classified at the highest level for Traffic, Transit and Bicycle, all elements need to be addressed within a usually limited right of way.

Regulatory Compliance

Federal Mandates

Federal mandates or regulations guiding PBOT's services or assets include:

Moving Ahead for Progress in the 21st Century Act (Map 21) was signed into law on July, 6, 2012. Funding surface transportation programs at over $105 billion for fiscal years (FY) 2013 and 2014, MAP-21 is the first long-term highway authorization enacted since 2005. MAP-21 creates a streamlined, performance-based, and multimodal program to address the many challenges facing the U.S. transportation system. These challenges include improving safety, maintaining infrastructure condition, reducing traffic congestion, improving efficiency of the system and freight movement, protecting the environment, and reducing delays in project delivery. MAP-21 builds on and refines many of the highway, transit, bike, and pedestrian programs and policies established in 1991.

National Bridge Inspection Standards is the national standard for all publicly owned highway bridges longer than twenty feet located on public roads. Inspection is conducted to locate and evaluate existing bridge deficiencies to ensure the safety of the traveling public. The standards require bridge inspection every 2 years for established criteria.

The Manual on Uniform Traffic Control Devices (MUTCD) contains standards for traffic control devices that regulate, warn, and guide road users along highways and roads in all 50 states;

The **American with Disabilities Act (ADA)** sets guidelines for accessibility to places of public accommodation and commercial facilities by individuals with disabilities. These guidelines are to be applied during the design, construction, and alteration of such buildings and facilities to the extent required by regulations issued by Federal agencies, including the Department of Justice, under the Americans with Disabilities Act of 1990.

The **Government Accounting Standards Board Statement 34 (GASB34)** requires governmental financial statements to reflect the value of all infrastructure, in Portland, using the depreciation method

National Environmental Policy Act, which requires Environmental Impact Statements (EIS) any federally (ODOT) funded projects.

NPDES Permit (MS4 Permit) Stormwater- NPDES Requirements- Water Quality/ Erosion and Sediment Control; PDOT coordinates on-site construction management and green streets project design and evaluation with BES.

State Mandates

The **Oregon Transportation Plan (OTP)**, adopted in September 2006, is the state's guide for transportation policy and long-range, comprehensive planning for the multimodal transportation system. Developed by the Oregon Department of Transportation (ODOT), the plan emphasizes maintaining the assets in place, optimizing the existing system performance through technology and better system integration, creating sustainable funding and investing in strategic capacity enhancements.

The OTP has many profound effects on regional transportation planning, in no small part because the state's **Transportation Planning Rule (TPR)** requires consistency between state, metropolitan and local plans. The main policy features of the OTP center around the emerging trend of demand/supply management of the roadway system, which is captured in the second goal. As noted above in the trend section, transportation agencies are increasingly attentive to the strategies they can use to make existing infrastructure work better.

The Land Conservation and Development Commission adopted the Transportation Planning Rule (TPR) (OAR 660-012) in 1991 to implement Statewide Planning Goal 12. The rule requires the state, the four metropolitan areas (Medford, Eugene, Salem and Portland), and all other cities and counties to adopt Transportation System Plans (TSPs). Each TSP is required to determine transportation needs and plans for roadway, transit, bicycle, pedestrian, air, rail, water, and pipeline facilities. TSPs in larger jurisdictions also are required to address transportation system management, demand management, parking, and finance. The TPR requires the development of modal system plans, including those for road, rail, and aviation systems.

The **Oregon Highway Plan (OHP)**, adopted in 1999, focuses specifically on Oregon's state highway system. The plan emphasizes efficient system management, partnerships with regional and local agencies, connecting land use and transportation, access management, connectivity between modes, and environmental and scenic resources.

Regional Mandates

In 1979, the voters in this region created Metro, the only directly elected regional government in the nation. In 1991, Metro adopted **Regional Urban Growth Goals and Objectives (RUGGOs)** in response to state planning requirements. In 1992, the voters of the Portland metropolitan area approved a home-rule charter for Metro. The charter identifies specific responsibilities of Metro and gives the agency broad powers to regulate land-use planning throughout the three-county region and to address what the charter identifies as "issues of regional concern." Among these responsibilities, the charter directs Metro to provide transportation and land-use planning services.

The charter also directed Metro to develop the 1997 **Regional Framework Plan** that integrates land-use, transportation and other regional planning mandates. The Regional Framework Plan is a comprehensive set of policies that integrate land-use, transportation, water, parks and open spaces and other important regional issues consistent with the 2040 Growth Concept. The Framework Plan is the regional policy basis for Metro's planning to accommodate future population and employment growth and achieve the 2040 Growth Concept.

The **2040 Growth Concept** text and map identify the desired outcome for the compact urban form to be achieved in 2040. It envisions more efficient land use and a diverse and balanced transportation system closely coordinate with land use plans. Bicycling is an important element of the transportation concept envisioned in Region 2040. The 2040 Growth Concept has been acknowledged to comply with statewide land use goals by the Land Conservation and Development Commission (LCDC). It is the foundation of Metro’s 1997 Regional Framework Plan.

The **Regional Transportation Plan** upated in 2010 and currrenty under revision for a July 2014 update, implements the goals and policies in 1995 RUGGOs and the 1997 Regional Framework Plan, including the 2040 Growth Concept. The region’s planning and investment in the regional public transportation system are directed by current RTP policies and objectives for the regional public transportation system.

Goals & Policies

General Transportation Goals and Policies are located in the Working Draft Part 1 of the Comprehensive Plan Update, Chapter 7: Transportation. Right of Way and other infrastructure policies are located in Chapter 6, Public Facilities. Addtioional polcies that have an impact on the transportation system are also located in Chapter 5, Urban Deisgn. Draft goals and policies will be updated to reflect public and agency feedback in the Proposed Draft, available in 2014.

Desired Levels of Service

The Portland Bureau of Transportation aspires to provide essential levels of multi-modal mobility and access to all Portlanders. These levels of multi-modal mobility and access vary depending upon the geographic and area context. Portland Bureau of Transportation is currently engaged in efforts to create new measures for levels of service appropriate for pedestrians, bicycles, transit, freight, and single-occupancy vehicles. These levels of service are anticipated to differ from the volume-to- capacity (v/c) measures that the City of Portland currently employs to measure level of service.

Portland Bureau of Transportation and other transportation agencies define levels of service by volume-to-capacity (v/c) measures, which focus on the flow of motorized vehicles on a street. This measure of level of service is used to define transportation problems. The measure is flawed because it defines success by vehicle flow rather than by other objectives that are significant to the aims of the City of Portland, including safety, costs per user, health, emissions, and mobility for bicycles and pedestrians. The volume-to- capacity (v/c) measures do not meet Portland’s goals of creating a balanced multi-modal transportation system.

Pedestrian transportation system

Sidewalk System

Portland’s sidewalk system is made up of sidewalks, corners, and curbs. The system provides pedestrians with a safe way to access transit, neighborhood businesses, parks, and schools. Curbs not only mark the edge of the pedestrian network, but also channel water to the drainage system, which helps preserve street pavement.

Per City Code, property owners are responsible for constructing, reconstructing, maintaining and repairing the sidewalks abutting their property.

The Americans with Disability Act (ADA) mandates that Transportation upgrade the sidewalk system with accessible corners. Portland Bureau of Transportation schedules construction of these ramps by citizen request, as well as annual programmatic reconstruction of corners. Corners in poor condition or in need of enhanced pedestrian access receive priority. Sidewalk inspectors identify hazardous corners that need maintenance.

Status

Table 8.2 Status of the Sidewalk System

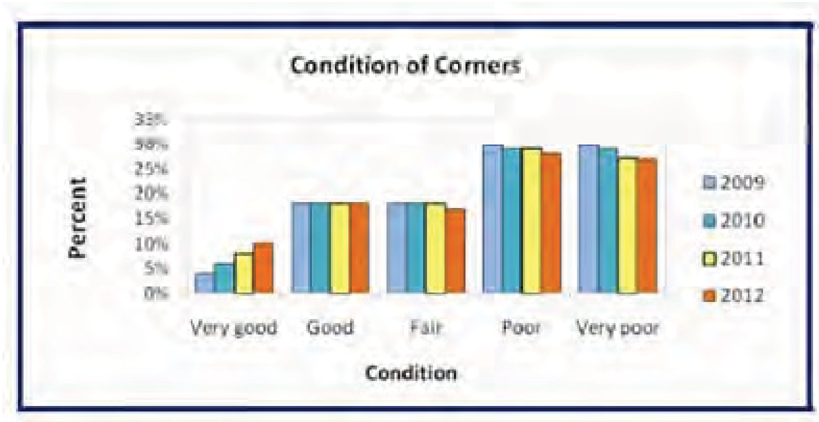
Facility	Status	Estimated Replacement Value	Condition						Unmet Need
			VG	G	F	P	VP	TBD	
Sidewalk System									
Sidewalks	8,833,812 yd^2	$1,113,060,312	10%	25%	30%	25%	10%	--	n/a
Curbs	3,260 centerline mi.	$533,596,800	12%	50%	16%	12%	10%	--	$138,735,168
Improved corners	37,813 (17,063 with ramps)	$158,512,096	10%	18%	17%	28%	27%	--	$93,448,509
Total		**$1,805,169,208**							**$232,183,677**

Condition

With proper maintenance and renewal, sidewalks and corners last about 40 years and curbs about 60 years. Due to budget reductions, the inspection of sidewalks is based on trip and fall complaints from citizens. Sidewalks with raised sections or openings that pose a trip hazard must be repaired. Bureau inspectors assess sidewalks and notify the property owner of needed repairs (a process called posting). Business and residential property owners must repair any posted deficiencies that make the sidewalk unsafe.

The City's Americans with Disabilities (ADA) Transition Plan aims to build 700 to 1,000 ADA compliant corners each year. ADA compliancy changes over time as new standards are adopted. When these standards change, Transportation changes the building standards to stay in compliance. Currently, 10% of corners meet the most current standards, which include detectable warning strips. In total, 45% of the sidewalk system has corner ramps, constructed to meet the ADA requirements of their day

The budget for the curb repair program was eliminated in fiscal year 2006-2007, which means that no maintenance is conducted. Current estimates rate 78% of curbs in fair or better condition. Substandard curbs impact drainage into the sewer system and allow for water to infiltrate the street bed, impacting the integrity of the paved roadway.



Levels of Service[14]

	Target	FY 11-12
% of corners in the City that are to current ADA standards	100%	10%
% of sidewalks in fair or better condition (based on hazards)	65%	65%

Corners

The Americans with Disabilities Act mandates that Transportation upgrade all corners with accessible corner ramps. To meet the mandate, the target is to build ramps on 100% of the corners in the City.

Sidewalk Condition

This level of service is based upon the number of postings and not the actual percentage of square yards of sidewalk that is in a specific condition.

Condition of sidewalks is influenced by several factors:

- Tree roots, which can cause damage
- Inspection cycle to identify repair needs and notify (post) property owners of repairs
- Property owner's response to notification of need to improve sidewalks

Unmet Need

An additional $232 million is needed to bring the curbs and corners into fair or better condition. Although sidewalks are typically in the public right-of-way and owned by the City, adjacent property owners are financially responsible for constructing and repairing the sidewalks. Developers are responsible for building or repairing sidewalks at the time of construction. The unmet need does not include the cost of building sidewalks where none exist. The cost to bring all corners into ADA compliance will be $93.4 million over the next ten years. To bring the 38% of curbs that are in fair to poor condition up to good condition would cost an additional $138.7 million over the next ten years.

[14] City of Portland Transportation System: Asset Status and Condition Report – 2012

Prioritization

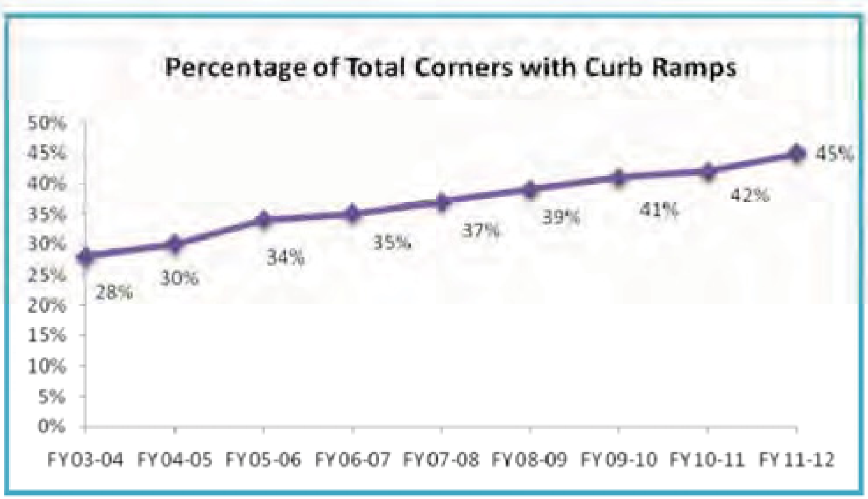
On an annual basis, the City targets 700-1,000 corners for construction of ADA compliant curb ramps, in order to systematically and incrementally advance towards the goal of making all corners compliant. Certain categories and criteria are used to prioritize locations where Maintenance Operations will reconstruct corners, in order to maximize usage and benefit people with disabilities while also maintaining an equitable distribution of benefits. Corner upgrades are prioritized for corners that lack any curb ramp. However, corners with ramps that are hazardous, in disrepair and/or considerably non-compliant with current ADA design guidelines/standards are also considered for upgrades.

Accomplishments

In FY 2011-2012, PBOT built 751 corner ramps. Transportation's Maintenance Operations crews built 537 ADA compliant corners and 214 new ramps were installed through capital projects. 191 existing ramps were upgraded to current day ADA standards. 32

In FY 2011-2012, 2.3 miles of sidewalks were built through the Capital Improvement Program and 1.9 miles were built by Maintenance Operations.

In FY 11-12, 1,800 properties were inspected for sidewalk deficiencies. Of those, 1,284 were posted for repairs.



Pedestrian Classification Descriptions

The City of Portland's Transportation System Plan includes five classifications for pedestrianways: Pedestrian Districts, Pedestrian-Transit Streets, City Walkways, Off-Street Paths, and Local Service Walkways. Table 8.3 and Figure 8.2 provide more information on pedestrianway classifications. The classifications are intended to maintain a system of pedestrianways to serve all types of pedestrian trips, particularly those with a transportation function. Chapter 2: Transportation Element of the TSP contains more detailed explanations of the functional classification of pedestrianways in Portland and eight maps showing traffic classifications for each of the seven transportation districts and the Central City.

Table 8.3 Pedestrian Classification Descriptions

Classification	Description
Pedestrian Districts	Pedestrian Districts are intended to give priority to pedestrian access in areas where high levels of pedestrian activity exist or are planned, including the Central City, Gateway regional center, town centers, and station communities.
Pedestrian-Transit Streets	Pedestrian-Transit Streets are intended to create a strong and visible relationship between pedestrians and transit within the Central City.
City Walkways	City Walkways are intended to provide safe, convenient, and attractive pedestrian access to activities along major streets and to recreation and institutions; provide connections between neighborhoods; and provide access to transit.
Off-Street Paths	Off-Street Paths are intended to serve recreational and other walking trips.
Local Service Walkways	Local Service Walkways are intended to serve local circulation needs for pedestrians and provide safe and convenient access to local destinations, including safe routes to schools.

Needs & Approach

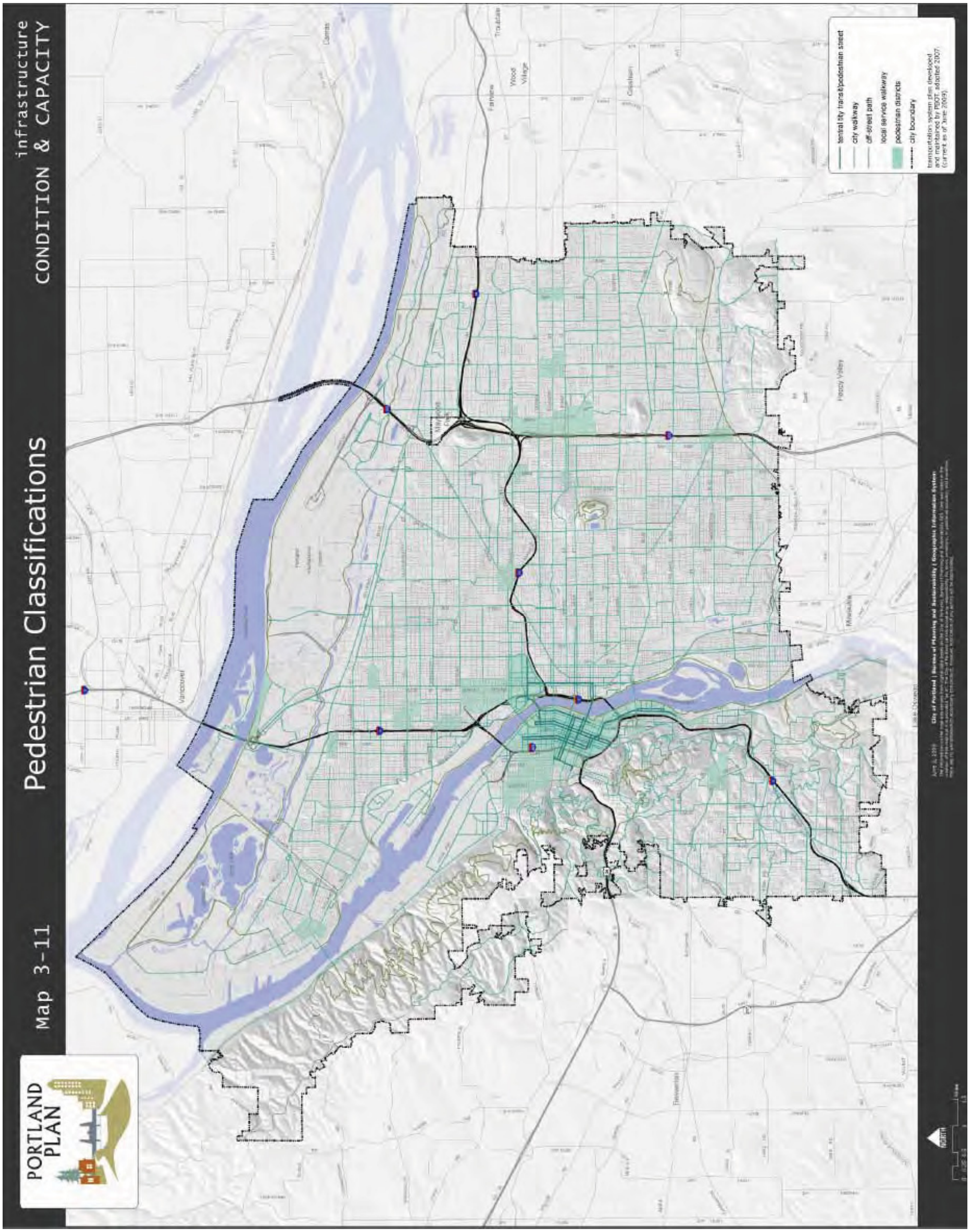
Network Connectivity

The sidewalk system has a relatively high level of connectivity in inner neighborhoods and the central city. However, a significant portion (greater than 60%) of streets in outer east and southwest Portland lack sidewalks. In outer southeast and southwest Portland, greater than 60% of arterials have no sidewalks, severely limiting safe, accessible pedestrian options for residents. In many cases, completing the sidewalk network in these areas is complicated by financial and topographic constraints.

Unmet Financial Need

An additional $232 million is needed to bring the curbs and corners into fair or better condition. Although sidewalks are typically in the public right-of-way and owned by the City, adjacent property owners are financially responsible for constructing and repairing the sidewalks. Developers are responsible for building or repairing sidewalks at the time of construction. The unmet need does not include the cost of building sidewalks where none exist.

Figure 8.2 Pedestrian Classifications



Bicycle transportation system

Inventory

The City of Portland's bicycle network currently includes approximately 270 miles of bikeways, including approximately 170 miles of bicycle lanes, 30 mile of bicycle boulevards, and 69 miles of off-street paths, see Table 8.4 and Figure 8.3.

Jurisdiction

Portland's Bureau of Transportation is the "road authority" for the City of Portland. While this means that PBOT owns and manages (and constructed) the majority of roads, and thus bikeways in the city, it is by no means the only agency involved in developing and managing the city's bikeways. The Oregon Department of Transportation owns a number of roadways in Portland, and is thus directly responsible for the existing and future bikeways on their roads. Multnomah County also owns and operates significant bikeways in the city—most significant among their holdings are a number of the bridges across the Willamette River, including the Hawthorne, Morrison, Burnside, Broadway, and Sellwood bridges. Portland Parks and Recreation also plays an important role in the city's bikeway system as they are the principal owner and manager of several significant off-street paths. Other jurisdictions and agencies with ownership and management responsibility for city bikeways include Metro, the Port of Portland, and the Multnomah County Drainage District.

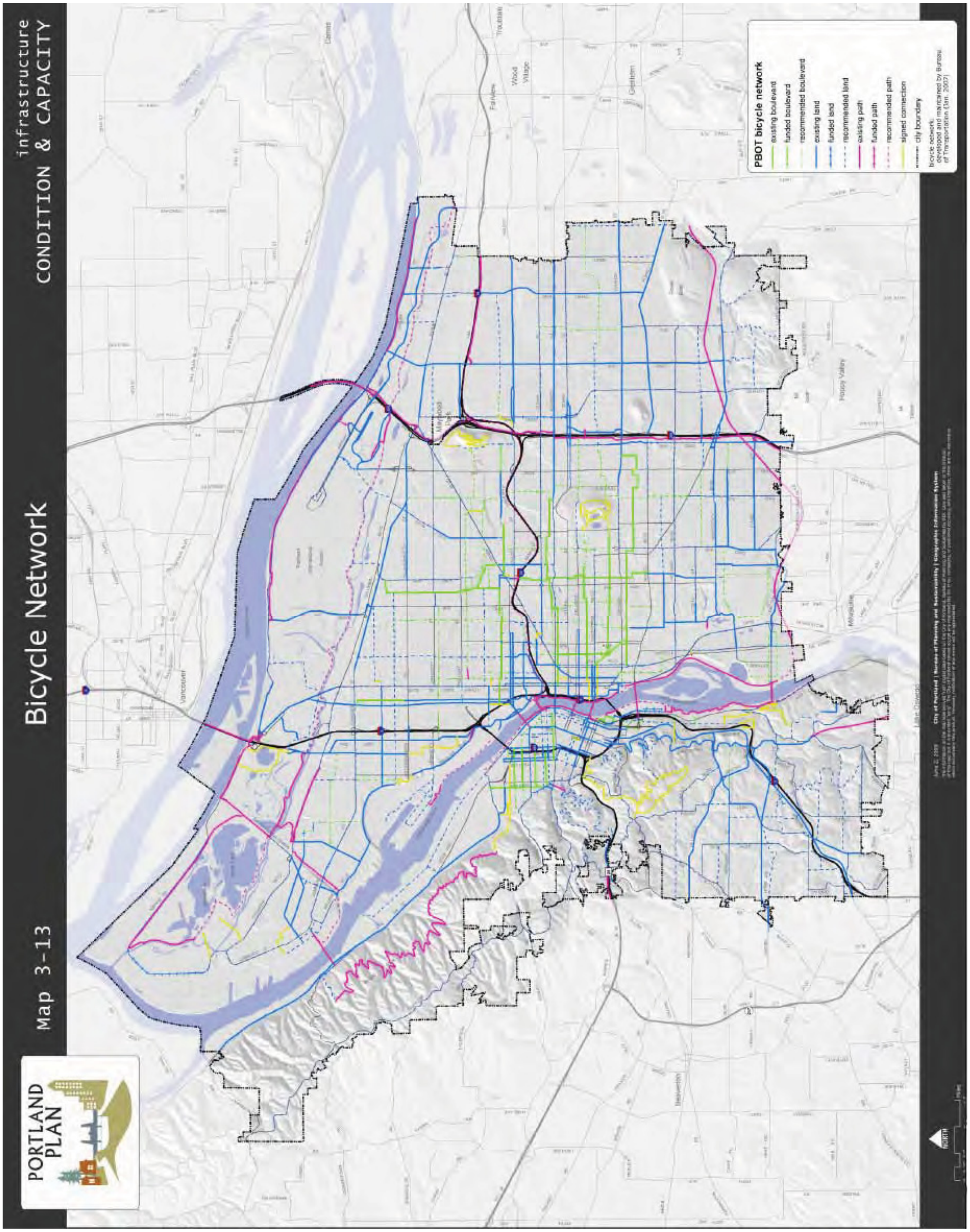
Bicycle Classifications

Street classifications designated in Portland's Transportation System Plan guide how each Portland street should function to determine the types of improvements they receive. Portland's 1996 Bicycle Master Plan established three bicycle classifications and descriptions: City Bikeways, Off -Street Paths and Local Service Bikeways. City Bikeways serve the Central City, regional and town centers, station communities and other employment, commercial, institutional and recreational destinations. Off -Street Paths serve as transportation corridors and recreational routes for bicycling, walking and other non-motorized modes. Local Service Bikeways serve local circulation needs for bicyclists and provide access to adjacent properties.

These bicycle classifications established a binary system for on-street bikeways. Streets designated as City Bikeways are prioritized for investments in bicycle infrastructure over Local Service Bikeways. This classification system did not distinguish how different streets classified as City Bikeways might be expected to function within a network.

The Portland Bicycle Plan for 2030 recommends modifying bikeway classifications in the Transportation System Plan to introduce a functional hierarchy of bikeway routes. A functional hierarchy directs the City to identify, anticipate and build for high demand on routes intended to carry those high volumes most efficiently. As Portland's bicycling ridership has increased, so has its need to improve the bikeways that carry – or are expected to carry – the highest volumes of bicyclists. Some routes should be optimized for these higher volumes based on their location, the areas from which they attract trips or the access they

Figure 8.3 Bicycle system



provide to destinations. This plan recommends a new classification of Major City Bikeways that will be applied to routes expected to carry the heaviest traffic and function most efficiently.

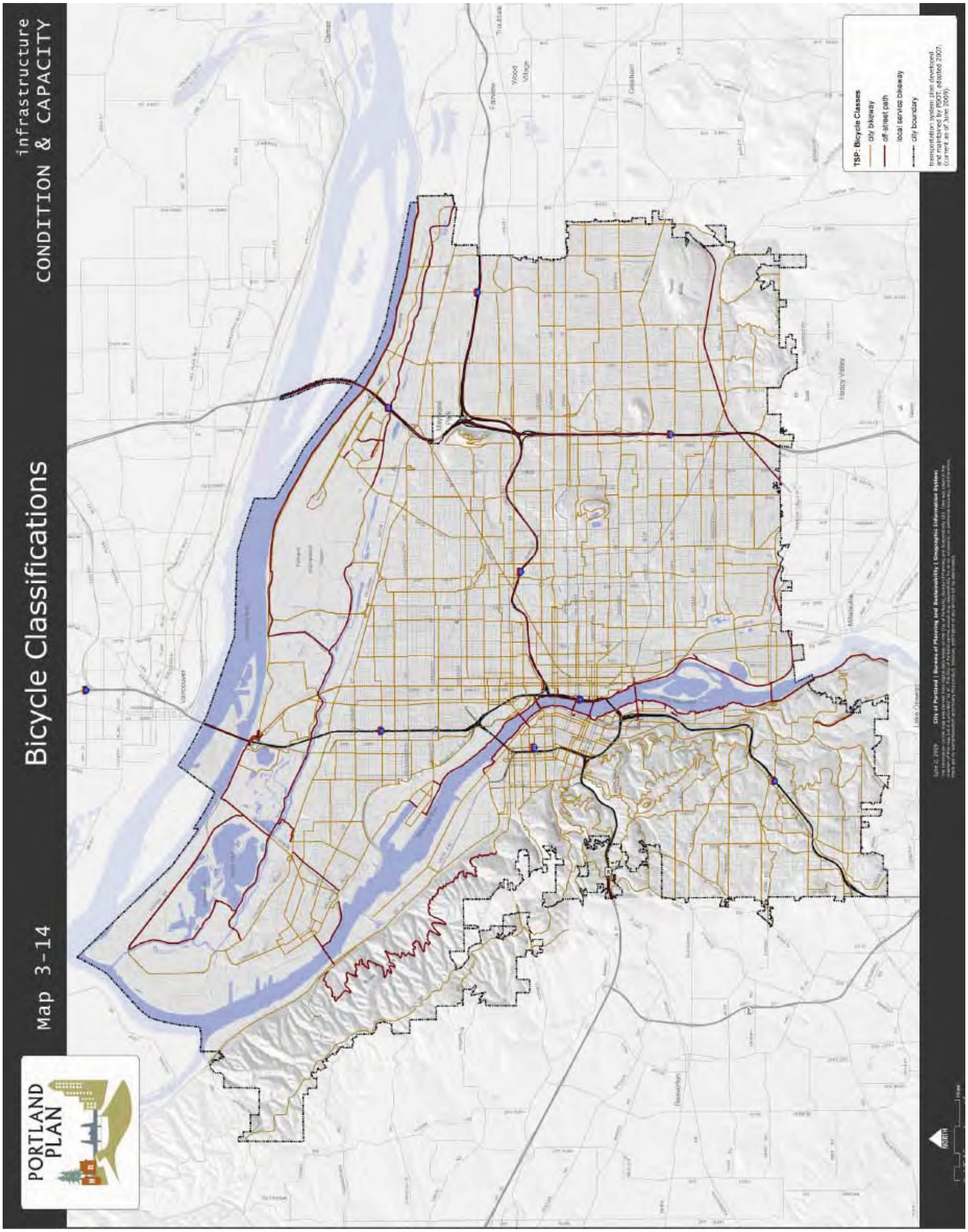
The functional classifications recommended for inclusion in the Transportation System Plan do not specify the facility on a given bikeway. Each roadway or path is assigned a suggested facility type on the City of Portland Recommended Bikeway Network Map that is a supplemental attachment to this plan document. The Off -Street Paths classification in the 2005 TSP is primarily a description of a facility type, and this plan recommends eliminating Off -Street Paths as a separate classification and instead classifying these non-motorized routes with one of the new functional classifications.

This plan recommends creating a further new classification: Bicycle Districts . The purpose of this classification is to recognize that, within certain dense, mixed-use areas of Portland with multiple destinations along most streets, all streets need to function well for people bicycling to or through the district.

Table 8.4 Bicycle Classification Descriptions

Classification	Description
Major City Bikeway	Major City Bikeways are intended to form the ‘mobility backbone’ of the city’s bicycle transportation system and provide primary connections to major attractors throughout the city such as downtown or regional centers.
City Bikeways	City Bikeways are principle bikeways not designated as Major City Bikeways.
Local Service Bikeways	Local service bikeways are intended to serve as local circulation routes for bicyclists and perceive access throughout a neighborhood.
Bicycle Districts	Bicycle districts re areas with a dense concentration of commercial, cultural, institutional and/or recreational destinations where the city intends to make bicycle travel more attractive than driving.

Figure 8.4 Bicycle classifications



Bikeway Treatments

In Portland's 1996 Bicycle Master Plan , facility types were assigned to roadways based on the average number of motor vehicles using that street each day. Bike lanes were recommended for streets where average daily traffic was more than 3,000 motor vehicles per day. Local streets with lower traffic volumes were designated as bicycle boulevards.

The Portland Bicycle Plan for 2030 expands the array of facility types and design treatments for bicycle infrastructure to appeal to a broader range of potential bicyclists. The sections that follow describe in detail the major facility types in this plan and under what conditions they may be implemented.

Separated in-roadway bikeways

Separated in-roadway bikeways are used where motor vehicle traffic volumes or speeds are high.

They include:

- Bike lanes: The portion of a roadway designated by an eight-inch stripe and bicycle symbol that is protected by Oregon law for exclusive bicycle travel.
- Wide bike lanes, buffered bike lanes, passing bike lanes and colored bike lanes: New bike lane types that achieve greater capacity and a more comfortable experience for bicyclists.
- Cycle tracks: An exclusive bicycle facility adjacent to the roadway but separated from motor vehicle traffic by a physical barrier or other buffer.
- Implementing separated in-roadway bikeways: Separated in-roadway facilities may be constructed through stand-alone bikeway projects, roadway reconstruction, new roadway construction or routine roadway resurfacing.

On existing roadways, separated in-roadway facilities may be implemented by one of four strategies – narrowing existing travel lanes, removing travel lanes, removing on-street parking or widening the roadway shoulder. Such strategies can be implemented only aft er consideration of impacts to all modes, including observation and forecasting of motor vehicle and bicycle volumes and parking utilization. Where there are competing demands for roadway space, policy and classification inform how these demands are managed and met.

Shared roadway bikeways

Shared roadway bikeways are intended to be implemented on lower volume roadways than separated in-roadway facilities. Except for enhanced shared roadways this facility type is intended to prioritize the movement of bicycles.

Bicycle boulevards: Streets with low motorized traffic volumes and speeds where bicycle travel is given priority and where signs, markings, traffic calming and other improvements are used to discourage through trips by motor vehicles and create safe, convenient bicycle crossings of busy arterial streets.

Advisory bike lanes: Non-compulsory dashed bike lane striping. Typically, a street would have an advisory bike lane on each side and a central motor vehicle travel lane wide enough for a single motor vehicle. Bicycles have priority, but motor vehicles may enter the bike lanes to pass oncoming traffic. This facility type has not been tested in Portland at the time of the publication of this plan.

Enhanced shared roadways: Roadways where bicycles are not given priority but bikeway signage and markings are used to increase driver awareness of bicycles on the roadway and traffi c calming devices and/or intersection crossing treatments enhance bicycle travel.

*Implementing shared roadway facility projects:*The principal considerations for implementing shared roadway bikeways are:

- Minimize the impact of motor vehicle volumes and speeds on the bicycling environment
- Create safe and comfortable crossings of high-volume roadways
- Create minimal disruption to the continuous fl ow of bicycle traffic

Each type of shared roadway bikeways also has its own unique considerations, as identified below.

Bicycle boulevards are best developed in areas with especially high potential for bicycle use so that the presence of bicyclists themselves on the street becomes a signifi cant design element. Bicycle boulevards are also best developed in areas where through motor vehicle traffi c can reasonably be directed to other streets.

Advisory bike lanes reflect a different method for providing priority in a shared roadway environment. This is a facility type that may best be used on low-volume streets that may have higher traffic volumes and speeds than would be desirable for a bicycle boulevard, although this remains to be tested. They may also be useful in areas where there are few opportunities to direct motorists to other streets due to a lack of nearby parallel routes. They may be appropriate where a high density of cycling activity is not immediately expected.

The enhanced shared roadways facility type is used on relatively low-volume roadways where the horizontal or vertical alignment of the roadway exceeds the recommended parameters for bicycle boulevards or advisory bike lanes.

Trails

Trails are bikeways that are outside of the roadway and fully separated from motorized vehicular traffic. They provide bicycle connections along corridors poorly served by streets and link bicycle trip origins to destinations along continuous greenbelts near rivers or other natural areas, where appropriate, or in abandoned or active railroad right-of-ways. Most trails in Portland are shared facilities, accommodating bicyclists, pedestrians, skaters and other non-motorized users. The Bureau of Transportation ’s preferred policy is to maintain separate and protected facilities for each mode whenever possible.

Implementing Trails: Trails may be shared by bicyclists, pedestrians and other non-motorized users, but should provide physical separation of each activity when practical. They should be protected or grade-separated at intersections with major roadways and be identified through signage. In May, 2009, Portland Parks & Recreation released its Trail Design Guidelines for Portland’s Park System . These provide comprehensive guidance on siting, design and construction of trails.

Condition & Capacity

Growth in Network

Between 1990 and 2013, Portland's bikeways have grown from 78 miles of roadway to more than 360 miles. Much of this growth occurred in the years between 1994 and 2002. During this period the city built 166 miles of bikeways, representing 60% of today's existing network. Those 166 miles included 20.5 miles of bicycle boulevards (68% of today's total of 30 miles), 111 miles of bike lanes (66% of today's total of 167 miles), and 34 miles of off-street paths (49% of today's total of 69 miles).

Portland has seen bicycle traffic—across the now four truly bicycle-friendly Central City bridges—increase from 4,500 daily trips in 1996 to over 19,000 daily trips in 2012. This correlation is not coincidental; it is the result of focused improvements on City Bikeways that prioritized connections, the filling in of important gaps, with a focus on projects that could generally be readily and realistically achieved. Bicycles now represent 10% of all vehicle trips on those bridges, up from approximately 2% in 1991. Figure 8.5 shows this correlation between overall network growth and increases in ridership across the four bicycle-friendly Willamette River bridges.

Table 8.5 Bicycle Network Expansion by Facility Type, from the Bike Plan for 2030

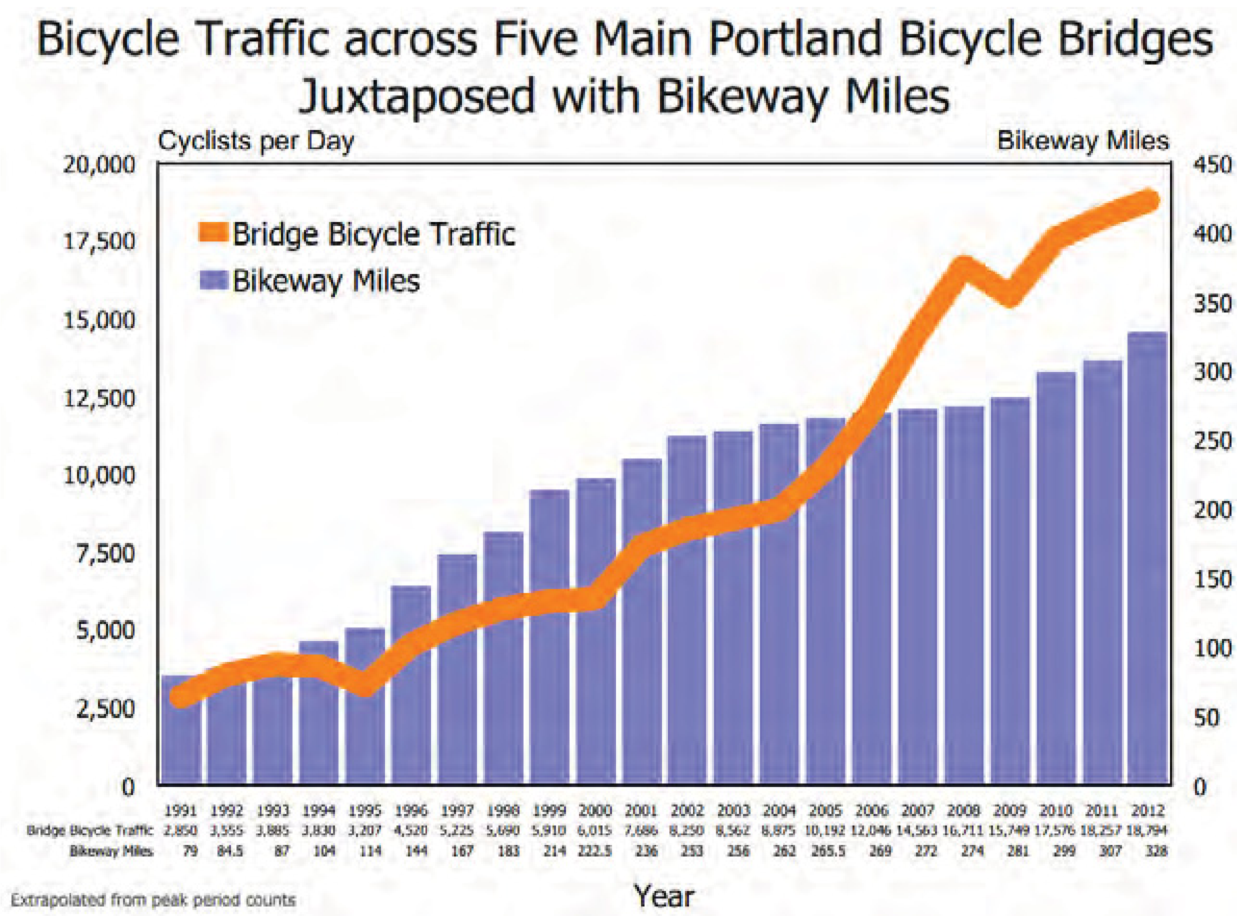
Bicycle network EXPANSION by facility type:

Bicycle facility type	Existing developed miles	Miles added by this plan	Total miles at plan completion	Facility proportion of total system
Trails	75 miles	64 miles	139 miles	14%
Separated in-roadways (bike lanes, buffered bike lanes, cycle tracks)	176 miles	314 miles	490 miles	51%
Bicycle boulevards / advisory bike lanes	30 miles	256 miles	286 miles	30%
Enhanced shared roadways	-	47 miles	47 miles	5%
Signed connections	28 miles	0 miles	0 miles*	0%
TOTAL	309 miles	681 miles	962 miles	100%

* Routes previously identified as signed connections will be developed as another bicycle facility type in the *Portland Bicycle Plan for 2030*.

FIGURE 3-1: Bicycle network expansion by facility type

Figure 8.5 Combined Bicycle Traffic over Four Main Portland Bicycle Bridges



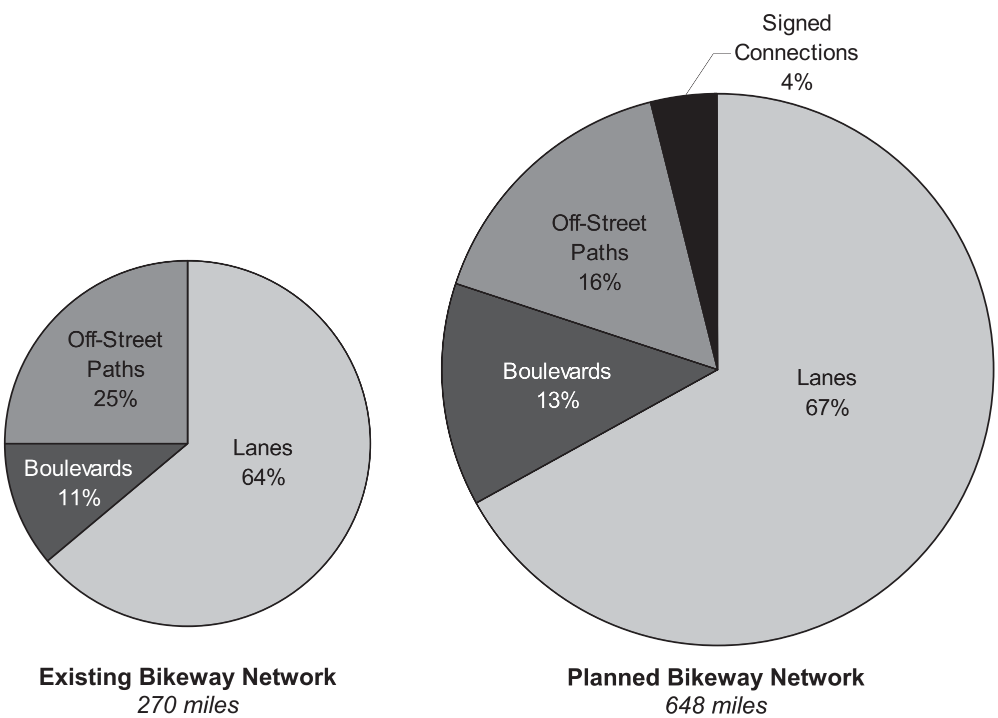
Percentage of City Bikeway Network Completed

As of 2010, Portland's Bikeway Network was approximately 45% complete. Under the 1996 plan, when complete it will comprise 431 miles of bicycle lanes, 84 miles of bicycle boulevards, 101 miles of off-street paths, and 27 miles of signed connections. There are notable differences between different areas of the city both in terms of what has been developed and what is slated for development. As shown in Table 8.6, city-wide, 67% of the network is complete. There is significant variation in percent completeness in the seven transportation districts in Portland, ranging from a low of 28% in Southwest Portland, to a high of 53% and 58% in North Portland and the Central City, respectively. Of the 280 miles that were developed up to 2010, 64% were bicycle lanes, 26% weredeveloped as off-street paths, and 11% were bicycle boulevards. Inner Northeast and Inner Southeast Portland had the highest percentage (24% and 28%, respectively) of the existing network comprised of boulevards. Northwest Portland is next highest, with 16% of developed bikeways consisting of boulevards. Outer East and Southwest Portland have no boulevards (as of 2010). North Portland and the Central City also contain relatively few miles of boulevards, with only 3% and 7%, respectively.

Table 8.6 Total Bicycle Master Plan miles by classification type

Facility Type	Total Plan Miles	Percent
Major City Bikeways	**205**	**21%**
Trails	54	5.5%
Separated in-roadways	96	10%
Bicycle boulevards	49	5%
Advisory bike lanes	5	0.5%
Enhanced shared roadways	1	0%
City Bikeways	**757**	**79%**
Trails	85	9%
Separated in-roadways	394	41%
Bicycle boulevards	199	21%
Advisory bike lanes	33	3%
Enhanced shared roadways	46	5%
Total	**962 miles**	**45%**

Figure 8.6 Existing and Planned Bikeway Networks as of 2010, by Type



Public transportation system

The City of Portland's public transit network includes the city's transit network of bus, light rail, and streetcar; the aerial tram; special transit services; intercity bus and rail networks; and an international airport. Providing transit services to Portland residents and visitors is dependent on the work and coordination of a wide variety of providers and partners.

TriMet is the primary transit provider for the region. However, the City of Portland has in the past and will continue to have a large role in the development of an effective transit system. The city actively promotes transit to the community, advocates for better transit service to TriMet, develops transit-supportive infrastructure, implements transit-preferential measures, and facilitates and helps fund the development of streetcar lines, river taxi stops, and light rail.

The Transportation System Plan's (TSP) public transit policy supports a transit system that serves City residents and workers 24 hours a day, seven days a week. The City believes that light rail is the foundation for the transit system, linking the Central City to regional centers and major destinations such as the airport. Streetcars serve Portland neighborhoods, employment centers, shopping, educational institutions, and recreation destinations on both sides of the Willamette River. Buses provide the principal means of transit for access and mobility needs for the City, helping to relieve congestion and support economic activities.

Jurisdiction

A variety of agencies and municipalities are responsible for the ownership, construction, maintenance, and operation of the City's transit system.

- City of Portland: The City of Portland owns the Streetcar system, which is managed by Portland Streetcar Inc. The City also owns and maintains the aerial tram, which is operated by the Oregon Health and Science University (OHSU).
- TriMet: TriMet is the primary transit service provider for the City of Portland, and provides bus and light rail service.
- Port of Portland: The Port of Portland operates the Port of Portland and the Portland International Airport, which is served by domestic and international carriers.
- Neighboring Jurisdictions: Transit agencies serving some neighboring counties, including Clark County (C-TRAN) and Columbia County (Columbia County Rider), also provide limited connector service to locations in Portland.
- The City is also served by Amtrak rail and Greyhound bus lines which provide passenger rail and bus connections to other destinations in North America.

Transit Classification Descriptions

The City of Portland's Transportation System Plan includes five classifications for transitways: regional transitways, major transit priority streets, transit access streets, community transit streets, and local service transit streets. Table 8.7 and Figure 8.7 provide more information on transit classifications. The classifications are intended to maintain a system of transit streets that supports the movement of transit vehicles for regional, interregional, interdistrict, and local trips. Chapter 2: Transportation Element of the TSP contains more detailed explanations of the functional classification of transitways in Portland and eight maps showing traffic classifications for each transportation district and the Central City.

Table 8.7 Transit Classification Descriptions

Classification	Description
Regional Transitways	Regional Transitways are intended to provide for interregional and interdistrict transit trips with frequent, high-speed, high-capacity, express, or limited service, and to connect the Central City with all regional centers.
Major Transit Priority Streets	Major Transit Priority Streets are intended to provide for high-quality transit service that connects the Central City and other regional and town centers and main streets.
Transit Access Streets	Transit Access Streets are intended for district-oriented transit service serving main streets, neighborhoods, and commercial, industrial, and employment areas.
Community Transit Streets.	Community Transit Streets are intended to serve neighborhoods and industrial areas and connect to citywide transit service.
Local Service Transit Streets	Local Service Transit Streets are intended to provide transit service to nearby residents and adjacent commercial areas.
Transit Stations	Transit stations are locations where light rail vehicles or other high-capacity transit vehicles stop to board and unload passengers.
Intercity Passenger Rail	Intercity Passenger Rail provides commuter and other rail passenger service.
Passenger Intermodal Facilities	Passenger Intermodal Facilities serve as the hub for various passenger modes and the transfer point between modes.

Transit Network[15]

TriMet was created in 1969 as a special district of the state of Oregon and is governed by a seven-member Board of Directors appointed by the Governor. TriMet's 575 square mile district serves approximately 1.3 million people in the urban portions of Clackamas, Multnomah and Washington Counties. TriMet provides a viable transportation option for hundreds of thousands of Portland-area residents every day.

Over one-half of the district's population lives within half a mile of TriMet service that arrives every 15 minutes or better. TriMet's network of fixed-route bus and rail lines attracts riders making trips at a variety of times and locations. The system is based upon a grid of north-south and east-west transit routes on arterial streets serving the Central City as well as crosstown trips.

This grid serves the more densely populated parts of the region with weekday service on most lines operating at least every 15 minutes. Less frequent service connects lower density areas to transit centers (located in Regional Centers and some Town Centers). Though many of the routes serve downtown Portland or Regional Centers because they have the highest travel demand, the system design allows travel from any point in the system to any other point, without necessarily passing through downtown. Park & Ride lots, bicycle lockers, sidewalks and shuttles help provide access to transit from areas without fixed-route service. Overall, 90 percent of people within the TriMet district live within one-half mile of TriMet service.

[15] TriMet, Transit Investment Plan, Fiscal Year 2009

Figure 8.7 Transit classifications

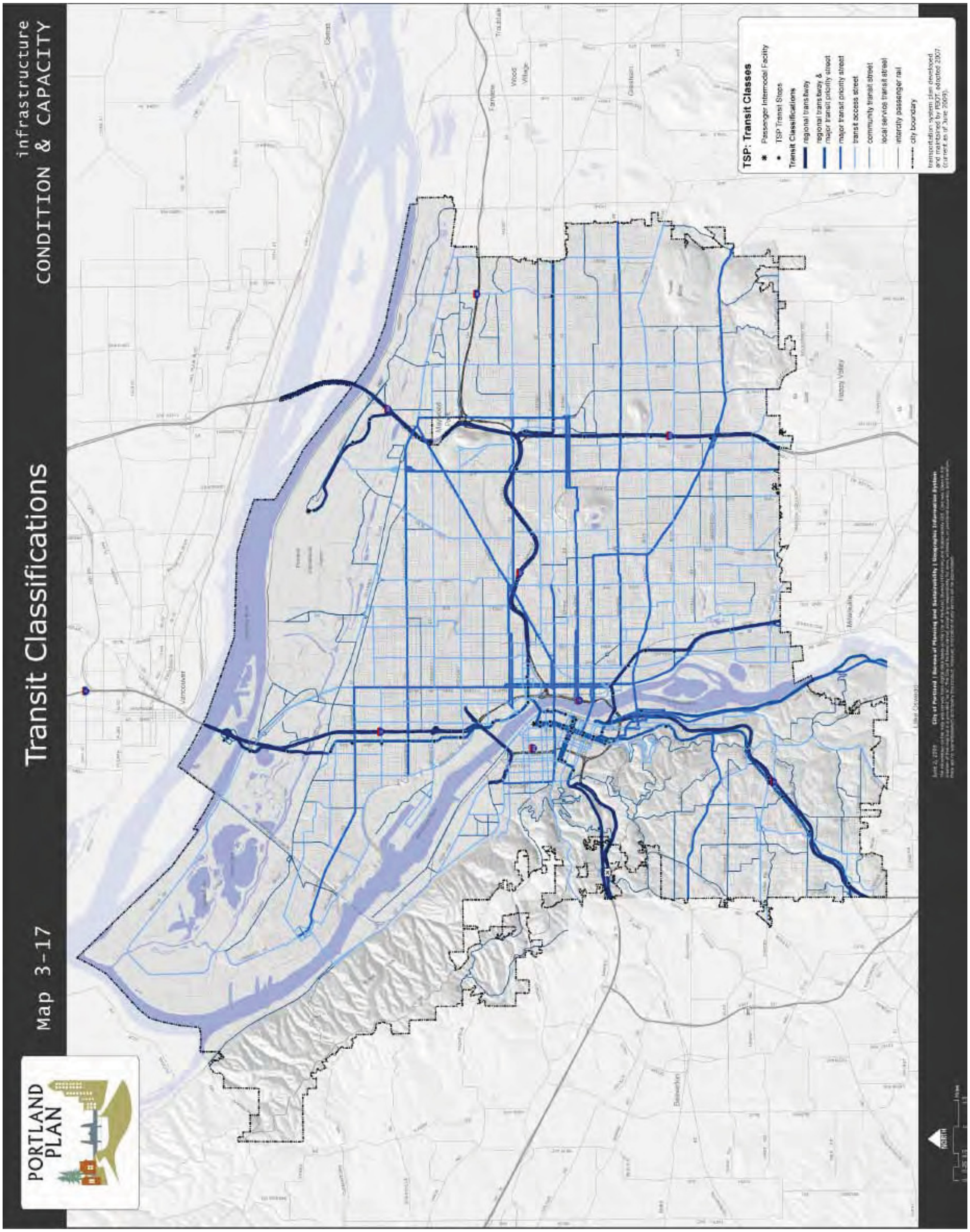


Table 8.8 Fixed Route Service Summary[16]

	Max Light Rail	Frequent Service Bus	Standard Bus Service
Routes	4	12	79
Length	52 miles	150 miles	728 miles
Vehicles at Peak Service	103	211	488

Fixed-Route Bus

The TriMet fleet of 625 buses serves 79 bus lines and seasonal shuttles with 6,800 bus stops and 1,100 bus shelters, see Figure 8.8. Buses serve 18 major transit centers in the Portland region and connect with the MAX and Streetcar.

TriMet's 12 Frequent Service bus lines operate every 15 minutes or better, every day along key corridors throughout the region. These lines offer low-floor, air-conditioned vehicles, new shelters and schedule information in addition to increased service frequency. The 150-mile Frequent Service network carries 57% of all bus trips, with 46% of weekly bus-service hours.

Light Rail Service

The 85-station MAX Light Rail system is over 52 miles long and is also intended to operate about every 15 minutes. Following the opening of the MAX Green Line in September 2009, TriMet's MAX Light Rail system now connects five of the seven Regional Centers in the TriMet district and the Portland Central City. TriMet's four light rail transit lines carry nearly 40 percent of total system ridership.

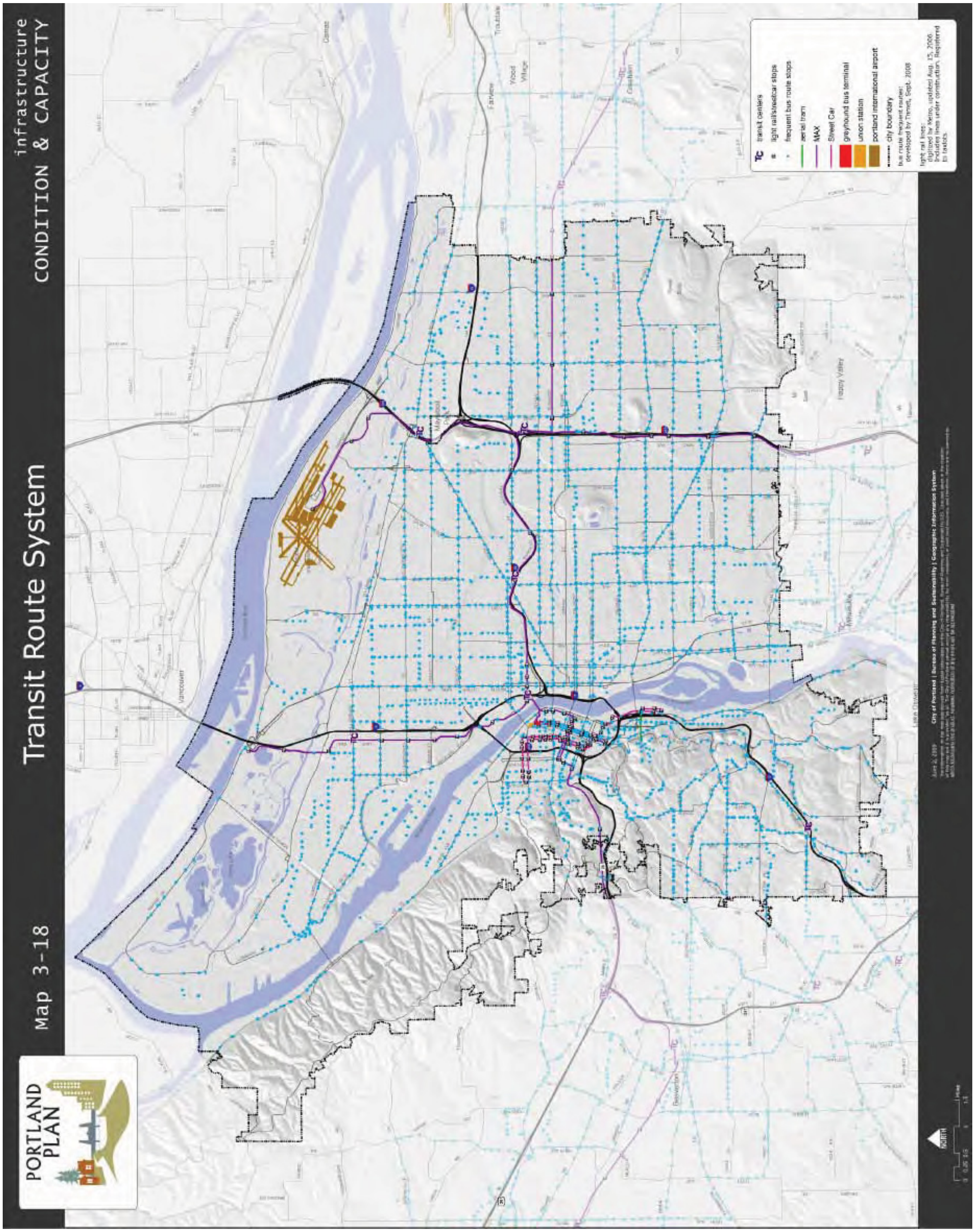
September 2011 marks the 25th anniversary of MAX Light Rail service beginning in 1986 with the Blue Line. The Red Line/Airport MAXcelebrated its 10th anniversary and 100 millionth ride in July 2011. Nearly 90 percent of the region's population lives within ½-mile of a bus stop or light rail platform.

Following necessary service cuts to match available funding, MAX operations on weekdays are characterized by:

- Blue Line average headways: 10-minute in AM and PM peak (two-hour) periods, 15-minute in midday, 30-minute early morning, 17-minute evening, and 34-minute late night
- Green Line average headways: 15-minute much of the day, 30-minute early morning, 17-minute evening, and 34-minute late night
- Red Line average headways: 15-minute most of the day, 30-minute early morning, 17-minute evening, and 34-minute late night
- Yellow Line average headways: 15-minute most of the day, 30-minute early morning, 17-minute evening, and 34-minute late night

[16] TriMet, 2012 Transit Investment Plan, Figure 2.2

Figure 8.8 Transit route system



Average AM and PM peak (two-hour) period headways in segments with multiple lines:

- Eastside—4.3 minutes (between Gateway TC and Rose Quarter TC)
- Westside—6 minutes (between Beaverton TC and JELD-WEN Field)
- DowntownPortland (Morrison/Yamhill)—6minutes (between Library/ Galleria and Rose Quarter TC)
- Portland Mall (5th & 6th Avenues)–7.5 minutes (between PSU and Rose Quarter TC)

With the opening of theThe Portland-Milwaukie Light Rail in late 2015, the Orange line will connect downtown Portland, the South Waterfront District, the Oregon Museum of Science and Industry (OMSI) and the central eastside industrial area, densely populated southeast Portland neighborhoods and the city of Milwaukie, ending just south of Milwaukie at Park Avenue on McLoughlin Blvd. The line is projected to carry up to 25,500 rides on an average weekday in 2030.

Table 8.9 MAX Light Rail Summary[17]

Line	Segment*	Open	Length (miles)	Annual Ridership, Opening Year	Annual Ridership FY2008	Stations	Park & Ride Spaces
Blue Hillsboro to Gresham	Eastside Portland to Gresham	September 1986	15	6,600,000		30	2,898
	Westside Hillsboro to Portland	September 1998	18	5,900,000		20	3,613
Red Beaverton to Airport	Airport Gateway to Airport	September 2001	5.5	571,484	41,200,000	4	193
Yellow City Center to Expo	Interstate Rose Quarter to Expo	May 2004	5.8	3,900,000		10	600
Green Clackamas to PSU	Clackamas to Gateway; Rose Quarter to PSU	September 2009	14.5	6,100,000		20	2,300

* Data for each construction segment.

Transit Centers, Stops, and Park-and-Rides

There are currently seven transit centers within the City of Portland. In general, bus stops are located at two-block intervals along each route. TriMet operates 60 park-and-ride lots in the tri-county region (10,400 spaces), 18 of which are located within Portland's City limits (3,300 spaces).

[17] TriMet, 2012 Transit Investment Plan, Figure 2.1

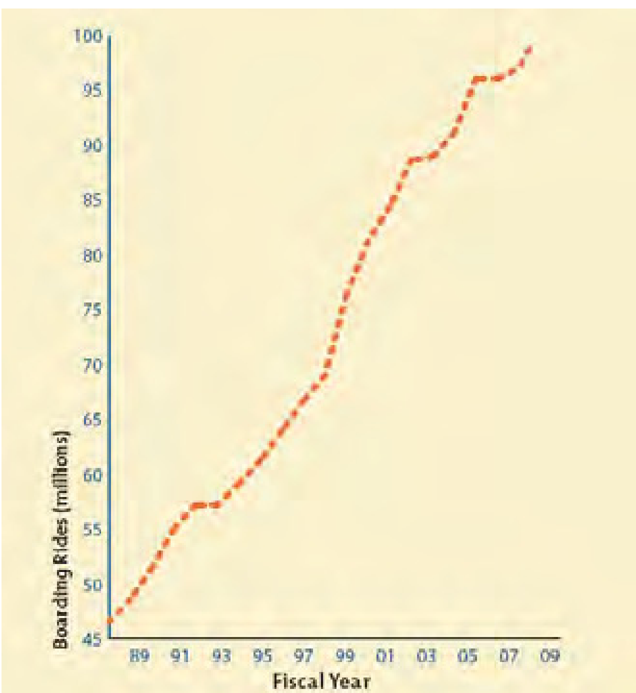
Door-To-Door Paratransit

In addition to fixed-route bus and MAX service, TriMet meets the needs of eligible elderly and disabled individuals with the LIFT and Medical Transportation Programs (see Chapter 8). TriMet operates 268 LIFT vehicles, providing door-to-door service for people with special needs. The LIFT service area is three-quarters of a mile from a regular TriMet route; both the origin and destination of a trip must be within this boundary. TriMet provides over 10 million rides annually to seniors and people with disabilities on the fixed-route system and an additional 1.12 million rides on LIFT.

Ridership

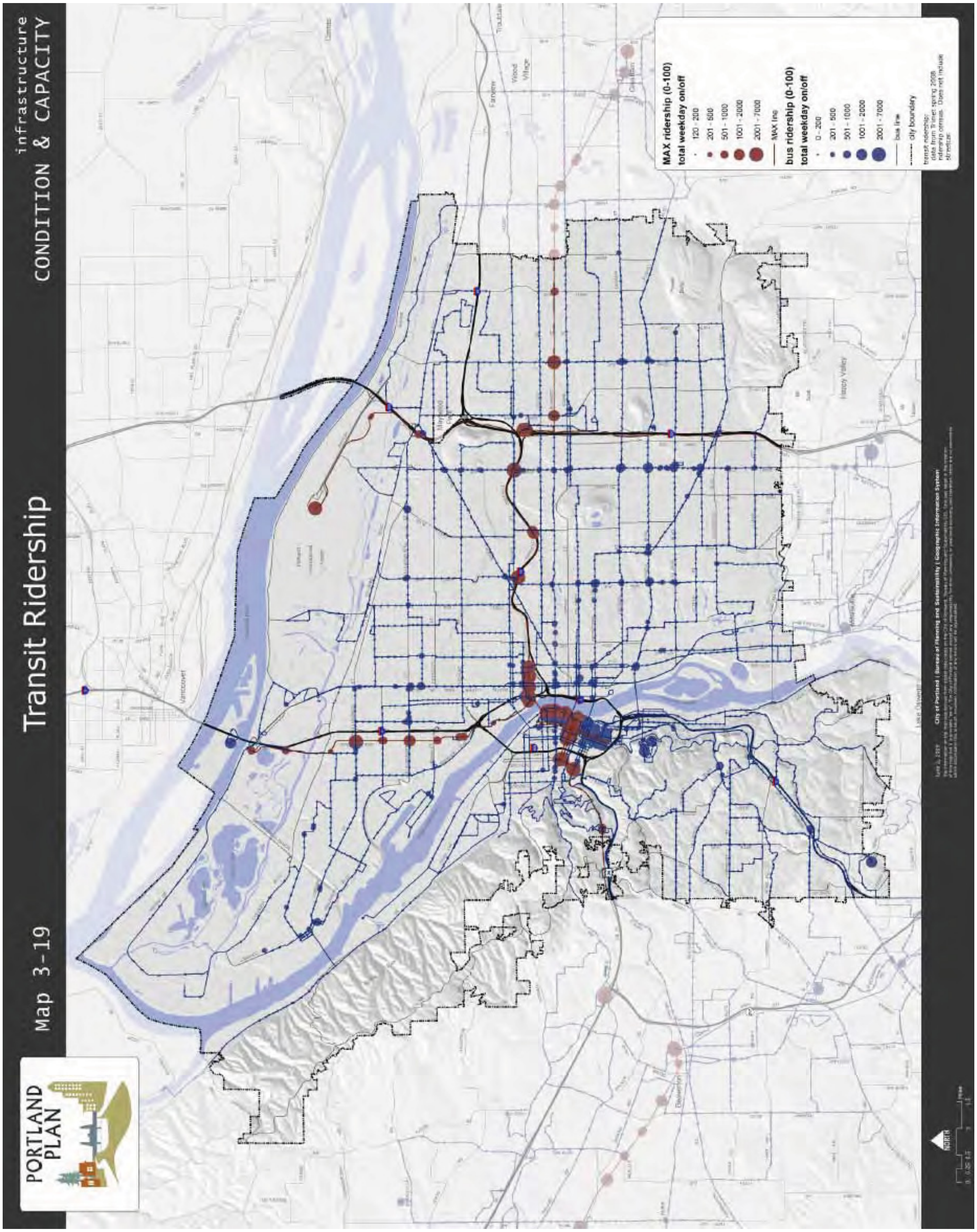
TriMet's annual ridership has increased every year since FY1988 but one (FY2006), see Figure 8.9. Passengers boarded a TriMet bus or MAX train 100 million times in FY2011 (up from 99.4 million in FY2010). Ridership growth reflects the investments TriMet has made in improving service, especially on Sundays. The portion of weekday riders served by Frequent Service increased from 17 percent in 1998 to 58 percent (for FY2011). All of the net bus system ridership growth since FY1999 has been on Frequent Service lines. Overall, TriMet ridership is increasing faster than other indicators of regional growth, including population and automobile vehicle miles traveled. Figure 8.10 shows the number of boardings and de-boardings at TriMet stops.

Figure 8.9 Annual TriMet Ridership Growth, MAX and Bus[18]



[18] TriMet, "Facts about TriMet". October 2008.

Figure 8.10 Transit ridership



Transit Underserved Areas

An area is considered to be a 'major underserved area' if it includes one or more of Metro's regional traffic zones in which less than 25 percent of the population is within one-quarter mile of existing transit service. The major underserved areas in Portland identified in the 1996 TSP inventory were Arnold/Stephenson, Front Avenue, Hart/Bany, and Johnson Creek/92nd. Since the inventory, weekday peak-hour service has been instituted on Front Avenue, between St. Johns and the Central City.

Intercity Bus and Rail

Policy 6.19 of the Transportation Element of the Comprehensive Plan states: Union Station is the hub of the multimodal Transportation Center located in the North Downtown area and should serve as the primary passenger rail and intercity bus terminal in the Portland metropolitan area, providing direct connections between passenger rail, light rail, vintage trolleys, intracity buses, taxis and airport bus shuttles. Portland's Greyhound terminal is located next to Union Station and provides bus service to cities and towns throughout the United States. (See Greyhound System Timetable available at www.greyhound.com)

Nine Amtrak trains serve the City of Portland each day, connecting the city by rail to cities throughout the U.S. and Canada. Five trains serve Portland daily along the Pacific Northwest Corridor from Vancouver to Eugene; two provide daily service from Seattle to Los Angeles; and two provide daily service from Seattle to Chicago.[19]

Streetcar

Portland's Streetcar is owned and operated by the City of Portland through its Bureau of Transportation. The City contracts with Portland Streetcar, Inc., a private non-profit corporation governed by a volunteer Board, for assistance with the planning, design, construction and operation of the streetcar. The Streetcar System provides transit circulation services to the Central City and other close-in neighborhoods. Street Car's Mission: To be an active participant in the continuing development of a high quality, livable environment in the City of Portland by supporting streetcar development serving high density areas and by delivering safe, reliable, clean, cost-effective transit service.

Service Characteristics: The streetcar line provides service from Good Samaritan Hospital in Northwest Portland to South Waterfront.

Expansion: The Portland Streetcar Loop Project will extend streetcar service to the east side of the Willamette River in support of residents and workers in the Oregon Convention District, Lloyd District, Central Eastside and in the OMSI area. It will add approximately 6.8 centerline miles of track and five new streetcar vehicles. The Project is being funded, in part, by the Small Starts Program within the Federal Transit Administration. The expansion will open September 2012.

What Transportation aims to achieve through the Streetcar System:

- Link neighborhoods with a convenient and attractive transportation alternative.

[19] Based on Route Schedules available from Amtrak (www.amtrak.com) on March 10, 2009.

- Fit the scale and traffic patterns of existing neighborhoods.
- Provide quality service to attract new transit ridership.
- Reduce short inner-city auto trips, traffic congestion and air pollution.
- Encourage development of more housing & businesses in the Central City and close in neighborhoods.

Table 8.10 Streetcar Status and Condition

Facility	Status	Estimated Replacement Value	Condition						Unmet Need
			VG	G	F	P	VP	TBD	
Streetcar									
Streetcars	10	$35,000,000	30%	70%	--	--	--	--	$35,000,000
Tracks	13 centerline mi.	$57,221,736	60%	40%	--	--	--	--	$57,221,736
Maintenance Facilities	17,871 ft^2	$4,688,772	100%	--	--	--	--	--	$0
Total		**$96,910,508**							

Condition

Currently all streetcars and tracks are in good or very good condition. The maintenance facilities are also in very good condition. TriMet estimates that the average life span of a streetcar is 30 years, yet with proper monitoring and timely maintenance, the life span of the cars can be extended.

Condition assessments of Streetcars are conducted on a routine basis. Software on the cars will alert maintenance crews to issues that need to be addressed.

Preventive maintenance is conducted at regular intervals, and as with automobiles, is based upon mileage or time elapsed. The maintenance facility conducts maintenance on all the electrical, software and hardware components. Most electronic components have a life span of about 10 years before the technology needs modernization.

Table 8.11 Streetcar levels of service

	Target	FY 11-12
% of streetcars in fair or better condition	100%	100%
% of streetcar system in fair of better condition	100%	100%
% of time streetcar system is operational during scheduled hours	98%	99%

Streetcar condition: For both safety and customer expectations, the condition of the streetcars must be in 100% fair or better condition. If the car falls below that level, there is a great safety risk to the passengers. The cars are composed of multiple components including trucks (bogies), the body, and electrical equipment.

Streetcar system condition: Several of the traction and electrification components of the system are integral for safety and must be maintained at 100% in fair or better condition. The threshold for maintaining the tracks and platform is not as high because many of the components serve a purely aesthetic purpose.

System Reliability: The goal is for the Streetcar system to function 98% of the time during operational hours. This is a customer expectation as well as an internal goal.

The unmet need reflects the capital replacement needs of the streetcars and tracks over a 30 year period. Although they are in good or better condition, they will need to be replaced at the end of their useful lives, which is based upon TriMet's estimated 30 year life span.

Aerial Tram

The Aerial Tram is Portland's public transportation link connecting South Waterfront with Marquam Hill and OHSU's campus. Opened to the public in January 2007, it is owned by the City of Portland and operated by OHSU. Approximately 1.5 million people ride the tram annually. The tram plays a vital role in the development and growth of the South Waterfront.

The University's decision to expand to the riverfront, which hinged on construction of the Tram, provided the catalyst for some $2 billion in investments in the South Waterfront after years of failed efforts by private developers. The district is rapidly taking shape as a dynamic new neighborhood of high-rise condominiums, a greenway along the river, and access to the Portland Streetcar.

The Tram also represents another pioneering step in Portland's march toward a sustainable future. The Tram links seamlessly to the energy-efficient Streetcar which, in turn, provides a connection to the rest of the city and other mass transit alternatives. The Tram eliminates the need for an estimated 2 million vehicle miles annually, thereby saving 93,000 gallons of gas and reducing greenhouse emissions by more than 1,000 tons.

Table 8.12 Tram Status and Condition

		Estimated Replacement	Condition						
Facility	**Status**	**Value**	**VG**	**G**	**F**	**P**	**VP**	**TBD**	**Unmet Need**
Tramway and Related Structures									
Tramway	1								
Haul Rope	7,150 linear ft								
Tram cars	2								
Total		**$52,825,128**	**--**	**100%**	**--**	**--**	**--**	**--**	**$0**

Condition

Three types of inspections are conducted on the Tram and its components. Every two years, the lower and upper stations and tower are inspected for structural integrity. Every year, the control systems and ropes are inspected to identify current conditions. These inspections are used to update maintenance needs that are then prioritized and addressed.

Currently, all the tram components are in good condition, due to the age of the tram. Over time, the condition of some of the “non-essential” components of the structures (i.e. paint) may deteriorate below fair; however, major maintenance will always be prioritized to ensure that the system is safe for all users.

Table 8.13 Tram levels of service

	Target	FY 11-12
% of time tram is inoperable due to maintenance issues/needs	1%	0.01%
% of tram system in fair or better condition (tramway and related structures only)	95%	100%

The goal for managing the tram structure is that 95% of the tram system will be in fair or better condition. Currently, Transportation is exceeding that goal, as 100% of the tramway and related structures is in fair or better condition.

Another established goal is to minimize the time that the tram is not operable. There are instances when the tram must be shut down to maintain the safety of the passengers. Those instances tend to be due to weather or other unforeseen events. Maintenance to the tram is usually conducted during the hours it is closed for business. Transportation exceeded its target in the past year, in that the tram was inoperable less than 1% of the time during operating hours.

Unmet Need

There is no unmet need for the Aerial Tram. Maintenance costs are covered by the revenues generated by the tram fare. Approximately $150,000 each year is set aside for addressing maintenance needs identified in the routine inspections.

Accomplishments

- The 5-year anniversary of the Tram opening to the public occurred on January 27, 2012.
- The tram saw its 7 millionth rider in February 2012.
- Tram performed its 250,000th trip in February 2012.
- The Tram has experienced less than .01% downtime during normal operating hours since its opening.

Air Travel[20]

Portland International Airport (PDX), owned and operated by the Port of Portland, is the primary commercial air transportation facility in the region. The airport is located on approximately 3,200 acres of land about 5 miles northeast of downtown Portland and primarily serves the surrounding Washington, Yamhill, Clackamas, Multnomah, and Clark Counties. PDX also serves the counties beyond this primary

[20] Portland International Airport, Online: http://www.flypdx.com

area, depending on the range and character of airline service provided in nearby cities such as Boise, Seattle, and Spokane. The PDX airfield consists of three active runways and supporting taxiways.

The Federal Aviation Administration (FAA) classifies Portland as a medium air traffic hub. The FAA defines a medium hub as a metropolitan region enplaning 0.5 to 1.0 percent of the total passengers enplaned on certified route air carriers in scheduled service in the 50 states and the District of Columbia; Portland accounted for 0.95 percent in 2007.

As of December 2008, PDX was served by 15 scheduled passenger airlines, including 9 major airlines. These airlines serve 44 domestic destinations and six international destinations (Vancouver, Amsterdam, Frankfurt, Tokyo, Guadalajara, and Mexico City). The airport served approximately 253,000 flights and nearly 14.3 million passengers in 2008. The majority (84%) of these flights were commercial, with a smaller number of general aviation (14%) and military (2%) flights. The vast majority of commercial flights were domestic flights by major or regional carriers.

As of 2008, 11 all-cargo airlines provided service at the airport. In addition, 98 general aviation aircraft were based at the airport.

Freight transportation System[21]

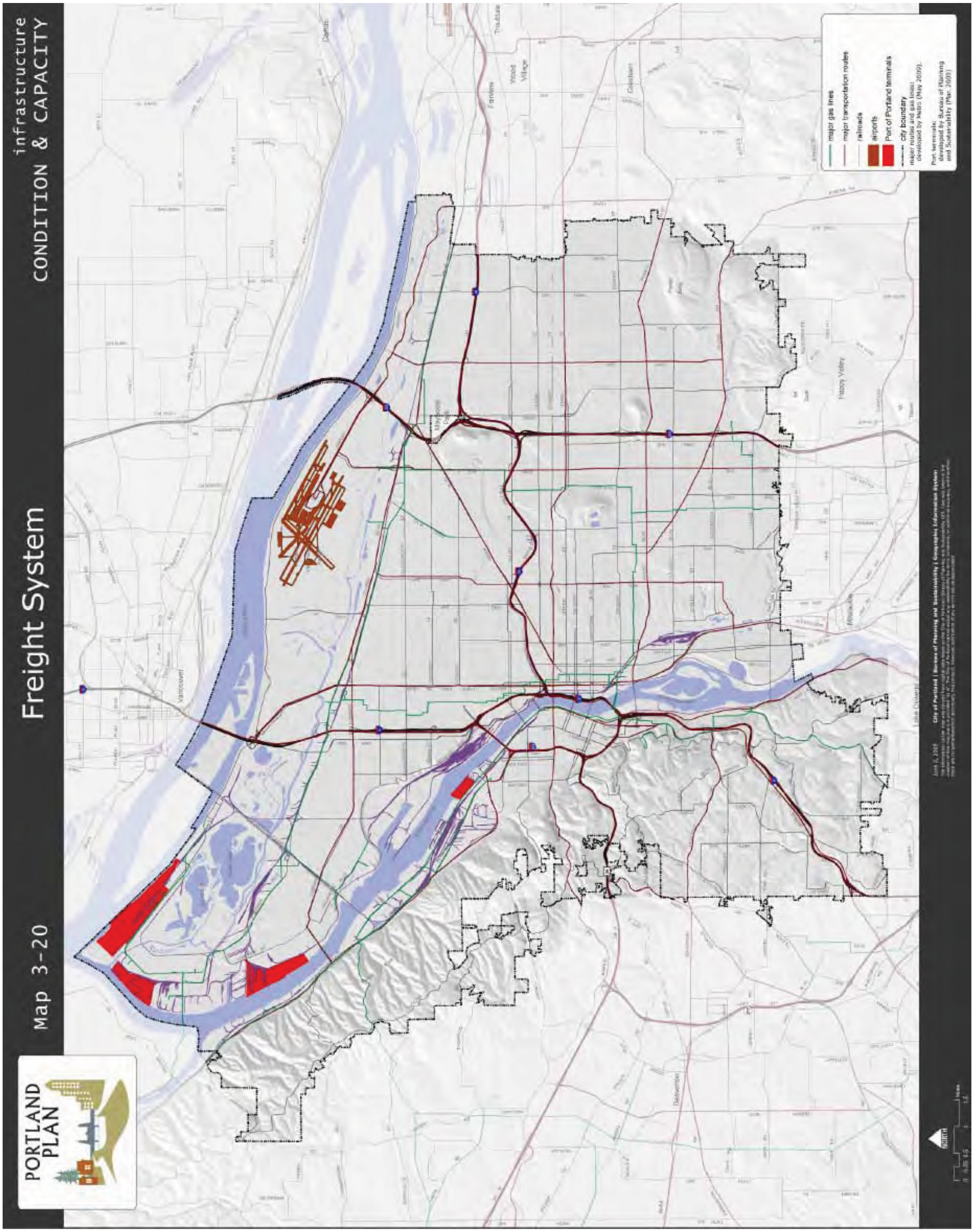
A combination of geography and multimodal freight infrastructure assures Portland’s role as a center for goods distribution to and from the Pacific Northwest and throughout the world. Portland is a “trans-shipment” center, where freight is handled on the way to somewhere else. In fact, more goods move through its transportation network to national and international destinations than are consumed here in the region. The economy of the Portland metropolitan region relies on the movements of goods, ideas and people. The ability to move these goods efficiently is critical to regional competitiveness and affordability, not only for businesses but also for all citizens.

Inventory

The Portland/Vancouver region is the fourth largest freight hub on the West Coast behind Los Angeles/Long Beach, Seattle/Tacoma and San Francisco/Oakland. Portland also serves as Oregon’s freight hub. Portland’s freight system is comprised of waterborne, rail, air, pipeline, and truck transportation networks, see Table 8.14, Table 8.15 and Figure 8.10.

[21] City of Portland Office of Transportation, *Freight Master Plan*, July 2006.

Figure 8.10 Freight System



Water

The city lies at the confluence of the navigable waters of the Columbia and Willamette rivers. The Port of Portland operates several deep-water marine terminal facilities along the Columbia and Willamette rivers.

Rail

Two Class I railroads, the Burlington Northern & Santa Fe Railroad (BNSF) and the Union Pacific Railroad, connect Portland with national rail services and markets along the west coast and to major Midwest and Eastern United States markets. The city is also served by several branch rail lines, which distribute freight to and from the Class I railroads, as well as between local customers.

Air

Portland International Airport, located entirely within the city of Portland, provides passenger and air cargo service for the Portland metropolitan area, including southwest Washington. Many air carriers provide domestic and international cargo transport in and out of the region.

Pipes

Without local petroleum refineries, all of the Portland/Vancouver metropolitan region's fuel must be imported from Puget Sound refineries. The Olympic pipeline is the primary mode for transporting gasoline, diesel, and jet fuel to the region. This 400-mile common carrier pipeline transports approximately 12.3 million gallons of fuel per day – the daily equivalent of 1,500 tanker trucks traveling Interstate 5. Portland is also the terminus for the Kinder Morgan pipeline, which distributes fuel products from Portland into the Willamette Valley. Portland also has 20 pipeline distribution centers located along the Willamette River: 17 in Northwest Portland and 3 in North Portland. (Figure 17 in the 1996 Inventory shows the locations of these centers.)

Roads

The link to all these modes is the network of freeways, highways, streets that connect the City's various modes of freight transport to their destinations. Two interstate freeways intersect in the heart of Portland. I-5 is the primary West Coast truck freight route linking urban centers between Canada and Mexico. Portland is the terminus for I-84, a primary freight route between the Pacific Northwest and Salt Lake City, where it merges with I-80 to the East Coast. I-205, I-405, US 26, US 30, and McLoughlin Blvd (OR 99E) are highways that facilitate intra-regional truck freight movement. Portland's streets are the first and last mile connections for trucks moving freight to and from marine terminals, rail yards, the airport, and industrial businesses. Trucks also use city streets to deliver goods and services to local businesses and residents.

Table 8.14 Mainline Facilities in the Portland Region[22]

Categories	Facilities
Navigable Waterways	Willamette and Columbia Rivers
Railroad Main Lines	Union Pacific, Southern Pacific, and Burlington Northern Main routes
Main Roadway Routes	I-84, I-5, I-205, I-405, US 26, Hwy 99E, Hwy 99W, Hwy 212/224

Table 8.15 Freight Facilities in the Portland Region[23]

Facility	Number of Facilities
Marine Facility	
General Cargo Terminal	8
Bulk Terminal	22
Forest Products Terminal	2
Grain Elevator Terminal	9
Auto Terminal	3
Container Terminal	1
Rail Facility	
Rail Passenger Station	1
Intermodal Yard	5
Switching Yard	3
Airport	
Air Passenger Terminal	1
Air Cargo Facility	14
Reload Facility	
General Rail/Truck Reload	31
Petroleum Rail/Truck Reload	1
Truck/Truck Reload	102
Grain rail/Truck Reload	0
Other	
Truck Terminal	30
Distribution Facility	35
Carrier (no on-site freight handling capabilities)	31
Freight forwarder and Customs Broker (no on-site freight handling capabilities)	7

Figure 8.10 shows how the State's most vital highway, railroad and marine freight routes converge in Portland.

Freight Classification Descriptions

The City of Portland's Transportation System Plan includes nine classifications for freight: freight districts, regional truckways, priority truck streets, major truck streets, truck access streets, local service truck

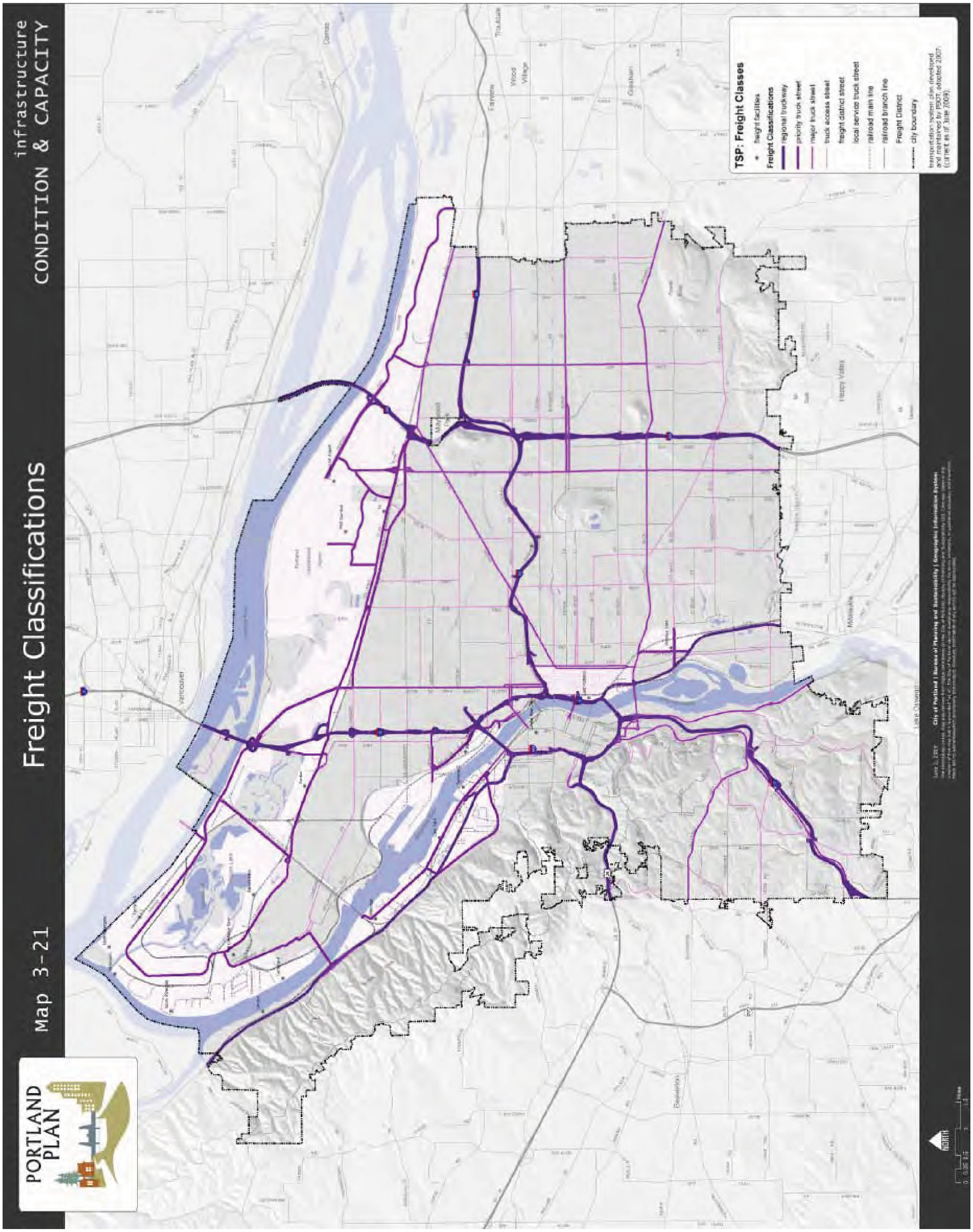
[22] Port of Portland
[23] RTP Freight Element, Freight Facilities, Port of Portland

streets, railroad main lines, railroad branch lines, and freight facilities. Table 8.16 and Figure 8.11 provide more information on freight classifications. The classifications are intended to maintain a system of truck streets, railroad lines, and intermodal freight facilities that support local, national, and international distribution of goods and services. Chapter 2: Transportation Element of the TSP contains more detailed explanations of the functional classification of pedestrianways in Portland and eight maps showing traffic classifications for each of the seven transportation districts and the Central City.

Table 8.16 Freight Classification Descriptions

Classification	Description
Freight Districts	Freight Districts are intended to provide safe and convenient truck mobility and access in industrial and employment areas serving high levels of truck traffic and to accommodate the needs of intermodal freight movement.
Regional Truckways	Regional Truckways are intended to facilitate interregional and movement of freight.
Priority Truck Streets	Priority Truck Streets are intended to serve as the primary route for access and circulation in Freight Districts, and between Freight Districts and Regional Truckways.
Major Truck Streets	Major Truck Streets are intended to serve as principal routes for trucks in a Transportation District.
Truck Access Streets	Truck Access Streets are intended to serve as access and circulation routes for delivery of goods and services to neighborhood-serving commercial and employment uses.
Local Service Truck Streets	Local Service Truck Streets are intended to serve local truck circulation and access.
Railroad Main Lines	Railroad Main Lines transport freight cargo and passengers over long distances as part of a railway network.
Railroad Branch Lines	Railroad Branch Lines transport freight cargo over short distances on local rail lines that are not part of a rail network and distribute cargo to and from mail line railroads.
Freight Facilities	Freight Facilities include the major shipping and marine, air, rail, and pipeline terminals that facilitate the local, national, and international movement of freight.

Figure 8.11 Freight classifications



Growth and Congestion in the Freight System

The region's travel forecast model estimates that between 2000 (base year) and 2020 (future year), the number of medium and heavy truck trips nearly double. Not surprisingly, arterials that serve the Portland's industrial areas have the highest volume of medium and heavy truck trips today and in the future. Along with the growth in truck movement, traffic congestion is also increasing on Portland's street system. Analysis of the travel forecast model data indicates that locations that experience peak hour vehicle congestion today will have increased levels of congestion in the future. The locations that demonstrate the greatest increases in travel delay for freight movement occur on roads approaching the Portland International Airport and surrounding industrial area, along the US 30 industrial corridor, and on all of the freeway corridors in the city.

Growth challenges are not confined to Portland's street system. The projected growth in freight moved by water, rail, and air is significant.[24]

- Air cargo is anticipated to increase at a rate of 5 to 9 percent per year over the next 15 years.
- Marine traffic is expected to grow by 7 percent per year between 2000 and 2020.
- Freight rail traffic increases by 3.5 to 4 percent per year. According to recent technical studies, the Portland region's rail infrastructure contains critical bottlenecks along several main line segments and rail yards operated by Burlington Northern-Santa Fe and Union Pacific. The delays experienced on the local freight network are equivalent to those experienced in the nation's largest rail hub – Chicago – which has 3.7 times the freight train traffic and 42 times the passenger train traffic of Portland.[25] In addition, branch line rail operations to and from rail yards and intermodal terminals are also highly congested. Rail capacity and service is also impacted by the need to expand and redesign some rail yards in the region.

Freight Mobility – Truck Delay

Freight mobility within and through Portland is key to the region's economic vitality. Delay in goods shipment incurs significant costs for businesses and consumers and detracts from the City's commercial competitiveness. The intent of this measure is to track progress toward accommodating the freight movement needs of commerce and industry. The goal is to minimize hours of delay to trucks on Major Truck Streets during both peak and off-peak times.

Freight delay is defined as the increased travel time attributable to congestion. This is the time increment accrued on road links above a 90 percent volume/capacity ratio. Only the positive differences are summed. Roads within the City are compared to all roads in the region.

Freight delay is measured for both the 2-hour p.m. peak and the 1-hour mid-day off-peak periods. The results are presented in Table 8.17. Mid-day (off-peak) delay in the 1994 model base year is quite small.

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[24] *Commodity Flow Forecast Update and Lower Columbia River Cargo Forecast Final Report*, prepared for the Port of Portland, Metro, Oregon Department of Transportation, Port of Vancouver, Regional Transportation Council, prepared by DRI-WEFA, BST Associates, and Cambridge Systematics, Inc, June 30, 2002.
[25] I-5 Rail Capacity Study, prepared by HDR Engineering, Inc, February 2003, page 2-5. Bertha Blvd underpass at Capitol Hwy. Truck detour at weight-limited MLK Jr. Blvd. Viaduct.

Trucks encounter very few delays as a result of congested facilities in this time period. In the scenario representing the 2020 constrained RTP conditions, hours of truck delay are expected to increase significantly because of a rise in congestion.

Table 8.17 Truck Delay (hours)[26]

	1994 Mid-Day 1 Hour	2020 Mid-Day 1 Hour	1994 PM 2-Hour	2020 PM 2-Hour
City Street System	1.8	29.3	82.0	344.5
Region	6.5	82.2	129.9	809.2

Infrastructure Barriers to Freight Mobility

Congestion is not the only challenge facing freight mobility in Portland. Physical barriers due to inadequate infrastructure also hamper the efficient and reliable movement of freight in the city. Some of the more significant obstacles include:

Weight-Restricted Bridges

A number of bridges on truck routes in Portland are weight-restricted to a single-unit truck weight of 50,000 pounds and 80,000 pounds for a combination truck, and in some instances less than 80,000 pounds. Industry efficiencies have led to an increase in the size of trucks since these bridges were constructed. Modern-day truck weights routinely exceed the design weight of these aging facilities. The result is that over-weight trucks are detoured from direct routes, increasing fuel consumption and operating costs. There is also the potential for diversion of trucks to streets that are not intended for frequent truck trips.

Bridges with Low Vertical Clearance

Bridges with sub-standard clearance are also an issue for trucks passing under them. The legal height for trucks operating on highways and city streets is 14 feet but many trucks operating by permit exceed this standard height. As many as 24 bridges in Portland have clearance between 14 feet and 17 feet, with most located on highways or priority truck routes. Like weight-restricted bridges, this barrier also results in detours from direct routes.

At-Grade Railroad Crossings

With the predictions of substantial increases in train traffic in the Pacific Northwest over the next twenty years, conflicts between train and truck traffic will likely rise. Safety at locations where roads and rails intersect has long been a concern. More recently, the concern has focused on longer delays. Crossings near intermodal facilities, ports, major rail yards, and classification and switching areas will experience higher volumes of train and truck traffic due to growth in domestic and foreign trade.[27] In Portland, most at-grade crossings are located in industrial areas. At some crossings, trucks and other traffic may be

[26] City of Portland Bureau of Transportation, *Portland Transportation System Plan*, Chapter 15, Table 15-11, 2007.
[27] *Status of Nation's Highways, Bridges and Transit:2002 Conditions and Performance Report to Congress*, U.S. Department of Transportation, Federal Highway Administration, Pg. 26-1.

stopped for up to a total of four hours in a 24-hour period creating congestion and increasing operating costs.

Pavement Condition

A gap exists between the current road condition and PBOT's goals. The City is deferring maintenance due to budget restrictions, and the contidion of arterial and collector streets is decreasing over time as a result. Regular maintenance of pavement increases its longevity, extending the time before major reconstruction is needed. The weight of large trucks accelerates the deterioration of paved surfaces. With forecasts of increasing truck volumes, the pavement on Portland's streets will certainly be subjected to increased wear and tear. The results of poor pavement conditions include decreased fuel economy, increased vehicle operation and maintenance costs, the potential for damaged cargo, and increased pressure on City pavement budget and staff capacity.[28]

Lift and Swing Spans over the Columbia River

A more unique freight barrier in the region is the misalignment of two adjacent bridge spans. Travel by river tow boats and barge vessels is complicated during high water periods by the indirect alignment of the high span of the Interstate Bridge and the swing span of the BNSF rail bridge over the Columbia river. Captains maneuver their vessels under the mid-section of the I-5 bridge to avoid I-5 bridge lifts that delay interstate traffic. Once clear of this bridge, captains maneuver their vessel to the northern river channel to clear the swing span of the rail bridge. During periods of high water, about six months of the year, this maneuver becomes far more difficult, increasing the potential for an accident.

Road Design

Most of Portland has a mature arterial street system, designed to accommodate vehicle traffic of a former era. Today, many of the trucks that use these older streets to deliver goods and services to the community are much larger than the street design is intended to support. At times, the needs for efficient truck movement are in conflict with other desired design features on the same street such as median islands or curb extensions. In other cases, trucks benefit from a design feature such as bike lanes that provide more space for turns. Balancing the needs of the different truck types using the streets with the needs of other users presents a challenge, especially in mixed-use centers and along main streets.

Parking and Loading

A critical element of the supply chain is the ability to efficiently transfer goods and materials between shippers, trucks, and customers. Portland provides commercial on-street loading zones along many of its streets. The zones are assigned by request from individuals who receive and/or make truck deliveries. Portland's zoning code has requirements for off-street loading spaces in commercial, employment and larger residential developments. Anecdotal evidence suggests that the existing supply of and demand for loading spaces is mismatched. The result is that drivers either double-park in travel lanes, blocking traffic, or park illegally. Currently, there is no comprehensive method to ensure that on- and off-street loading is adequate to meet business needs.

[28] Source: www.transportationca.com, Transportation California, April 28, 2004.

Over-Dimensional Truckloads

Some loads carried by trucks are not practically divisible, meaning that they can not be reduced to meet legal limits for weight, height, length, and/or width set by the State of Oregon. The State requires that trucks exceeding legal dimensions obtain a permit when traveling on public roadways. Portland also regulates over-dimensional loads and writes permits based on criteria established in Title 16 of the City Code. The most common type of over-dimensional load in Portland is construction equipment such as cranes and excavators but other manufactured items such as steel slabs and bridge girders require over-dimensional moves. These are an infrequent but an important type of freight movement in the city. There is a need to identify and maintain a primary network of over-dimensional routes, with a focus on connections in and between Freight Districts.

Recommended Freight System Improvements

Updating projects and improvements through TSP process in Fall 2013/Winter 2014.

Street System

Inventory

The purpose of Portland's transportation system is to move people, goods and services safely and efficiently through the City. The system must balance the requirements of motor vehicles, transit buses, freight, pedestrians, bicyclists, light rail and streetcars to meet the needs of the entire community. Well-maintained roads ensure access to businesses, medical facilities, schools, parks, community centers and other neighborhood resources. The Portland Bureau of Transportation is responsible for maintaining 4,842 lane miles of paved roads (Lane miles are computed by multiplying street length by the number of lanes in the street. For example, one mile of four-lane street equals four lane miles). Sixty percent of City streets are local roads and forty percent are collector and arterial roads (for a street systems inventory see Table 8.18).

Table 8.18 Street System Inventory[29]

Facility	Status	Estimated Replacement Value	Condition						Unmet Need
			VG	G	F	P	VP	TBD	
Pavement									
Improved Streets - Arterial/ Collector	1,871 lane miles	$2,304,813,532	18%	21%	21%	32%	8%	--	$400,000,000
Improved Streets - Local	2,971 lane miles	n/a	12%	19%	22%	36%	11%	--	$350,000,000
Unpaved Streets	59.5 centerline mi.	$4,755,776,764	--	--	--	--	100%	--	n/a
Total		**$2,450,963,232**							**$750,000,000**

[29] City of Portland Transportation System: Asset Status and Condition Report – 2012

Current Conditions

Condition pavement rating uses the Metropolitan Transportation Commission's Pavement Condition Index (PCI) methodology. This is a visual rating methodology that scores the street segment on a scale of 0-100 (worst to best). A PCI of 65 or higher translates to a condition of “fair” or better. A PCI below 40 represents very poor condition. Transportation has set a maximum threshold target of streets which will be tolerated in the poorest condition.

Figure 8.12 Arterial/Collector pavement condition, fiscal year 2011-2012

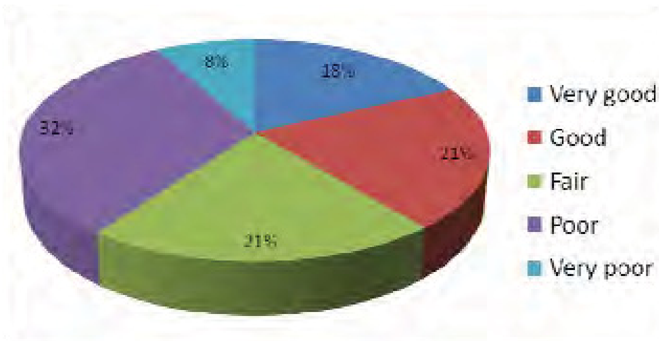
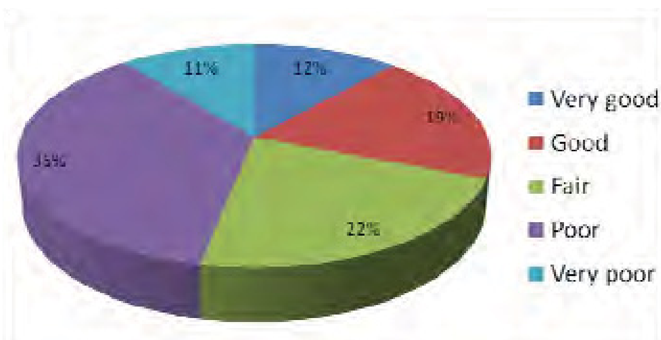


Figure 8.13 Local street pavement condition, fiscal year 2011-2012



The average Pavement Condition Index for all the collector and arterial roads is approximately 66. Approximately 40% of the collector and arterial system is in poor or very poor condition, 21% is fair and 39% is in good or better condition. For local streets, approximately 47% is in poor or very poor condition, 22% is in fair condition, and 31% is in good or very good condition (see charts from 2012 Asset Status and Conditions Report).

Jurisdiction

The Oregon Department of Transportation (ODOT), Multnomah County, and the City of Portland are the primary transportation jurisdictions within the City. The Port of Portland, railroads, and private owners are also involved in transportation infrastructure. There are two primary considerations with respect to roadway jurisdiction: right-of-way (ROW) jurisdiction and route jurisdiction. In Portland, most roadways are either City streets on City ROW, ODOT routes on City ROW, or ODOT routes on ODOT ROW.

Maintenance jurisdiction is somewhat more complex than ROW or route jurisdiction, and depends on particular agreements between the City, ODOT, Multnomah County, and adjacent property owners.

Classification Descriptions

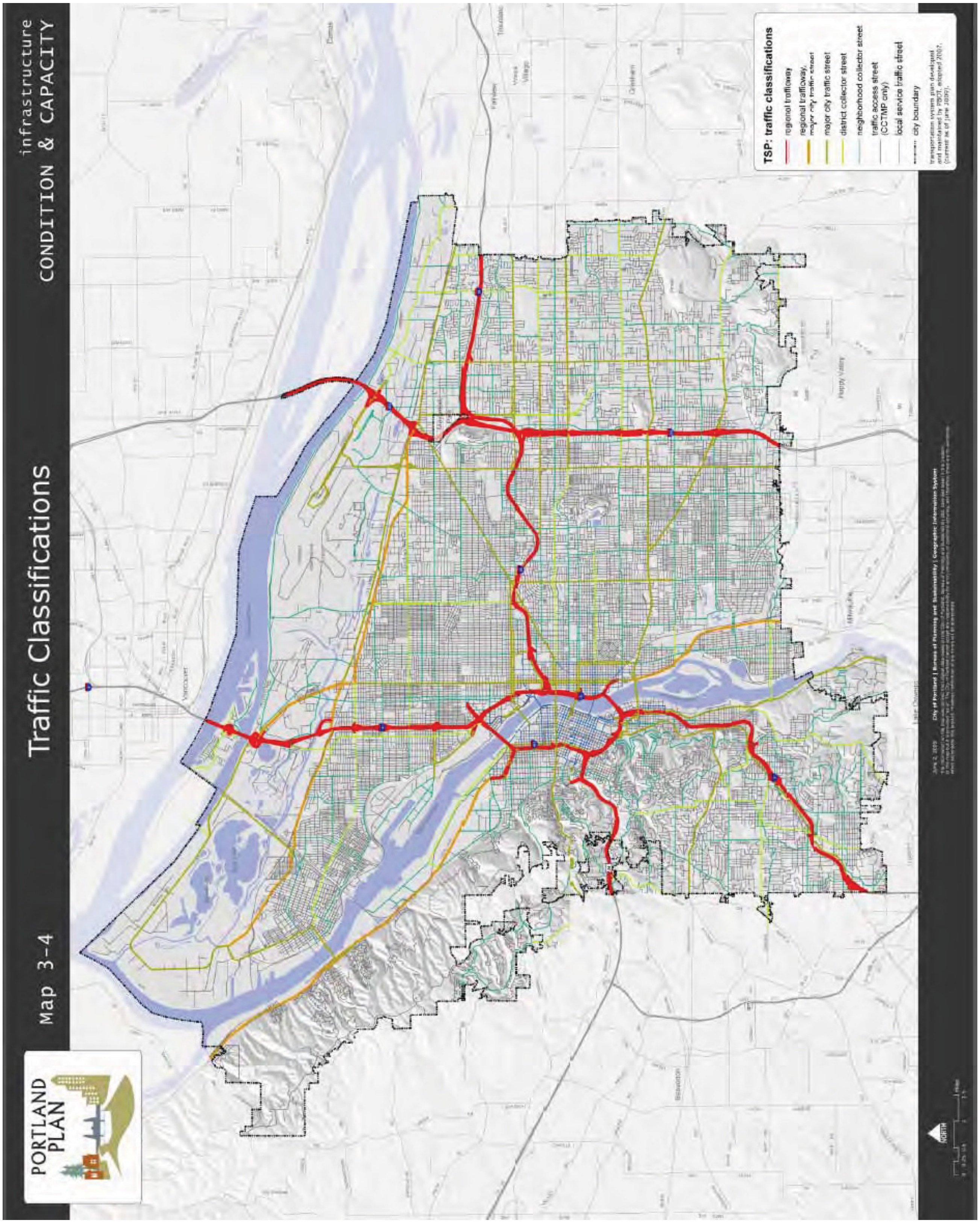
Traffic Classification Descriptions

The City of Portland's Transportation System Plan includes six classifications for traffic streets: Regional Trafficways, Major City Traffic Streets, Traffic Access Streets, District Collectors, Neighborhood Collectors, and Local Service Traffic Streets. Table 8.19 and Figure 8.14 provide more information on street traffic classifications. Each classification describes how a traffic street should function including what kinds of traffic and what kinds of trips are expected, and what types of land uses the street should serve.

Table 8.19 Traffic Classification Descriptions

Classification	Description
Regional Trafficways	Regional Trafficways are intended to serve interregional district movement that has only one trip end in a transportation district or to serve trips that bypass a district completely.
Major City Traffic Streets	Major City Traffic Streets are intended to serve as the principal routes for traffic that has at least one trip end within a transportation district.
Traffic Access Streets	Traffic Access Streets are intended to provide access to Central City destinations, distribute traffic within a Central City district, provide connections between Central City districts, and distribute traffic from Regional Trafficways and Major City Traffic Streets for access within the district. Traffic Access Streets are not intended for through-traffic with no trip ends in the district.
District Collectors	District Collectors are intended to serve as distributors of traffic from Major City Traffic Streets to streets of the same or lower classification. District Collectors serve trips that both start and end within a district.
Neighborhood Collectors	Neighborhood Collectors are intended to serve as distributors of traffic from Major City Traffic Streets or District Collectors to Local Service Streets and to serve trips that both start and end within areas bounded by Major City Traffic Streets and District Collectors.
Local Service Traffic Streets	Local Service Traffic Streets are intended to distribute local traffic and provide access to local residences or commercial uses.

Figure 8.14 Traffic classifications



Emergency Response Classification Descriptions

The City of Portland's Transportation System Plan also includes two classifications for emergency response routes: Major and Minor Emergency Response Streets. Table 8.20 and Figure 8.15 provide more information on emergency route classifications. Emergency Response Streets are intended to provide a network of streets to facilitate prompt emergency response. The Emergency Response Street classification descriptions were developed as part of the Emergency Response Study adopted by City Council resolution in 1998.

Table 8.20 Emergency Response Classification Descriptions

Classification	Description
Major Emergency Response	Major Emergency Response Streets are intended to serve primarily the longer, most direct legs of emergency response trips.
Minor Emergency Response	Minor Emergency Response Streets are intended to serve primarily the shorter legs of emergency response trips.

Chapter 2: Transportation Element of the TSP contains a detailed explanation of the functional classification of streets in Portland and eight maps showing traffic classifications for each of the seven transportation districts and the Central City. The modal plans in Chapter 5: Modal Plans and Management Plans, contain equivalency tables that compare the street classification schemes used in Portland's TSP with those used in Metro's Regional Transportation Plan (RTP). Classifications for pedestrian, bicycle, transit and freight networks are discussed in their respective sections of this document.

Current Structural Condition

The Bureau of Transportation initiated a Pavement Management System in 1983 to identify and track the condition of all streets within the City. Figure 8.16 displays priority pavement improvement areas, as determined by the Safe, Sound, and Green Streets Project.

The percentage of Portland's streets in fair or better condition declined from 86% in 1991 to 62% fifteen years later (2006). Without additional investment above projected levels, it is anticipated that the percentage of pavement in fair or better condition will decline even further, to approximately 40% by 2016, see Figure 8.17.

Figure 8.15 Emergency response classifications

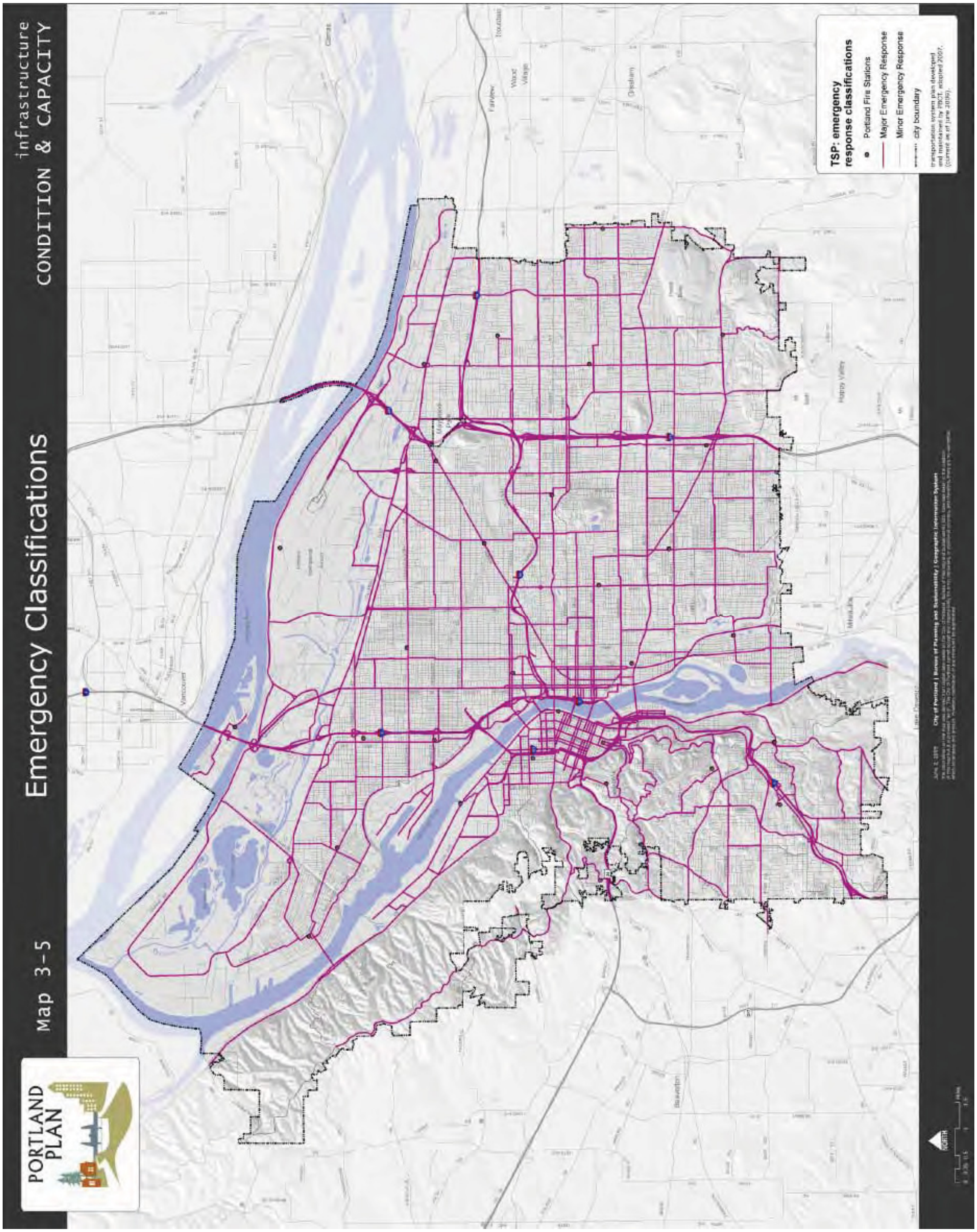


Figure 8.16 Priority pavement improvement areas

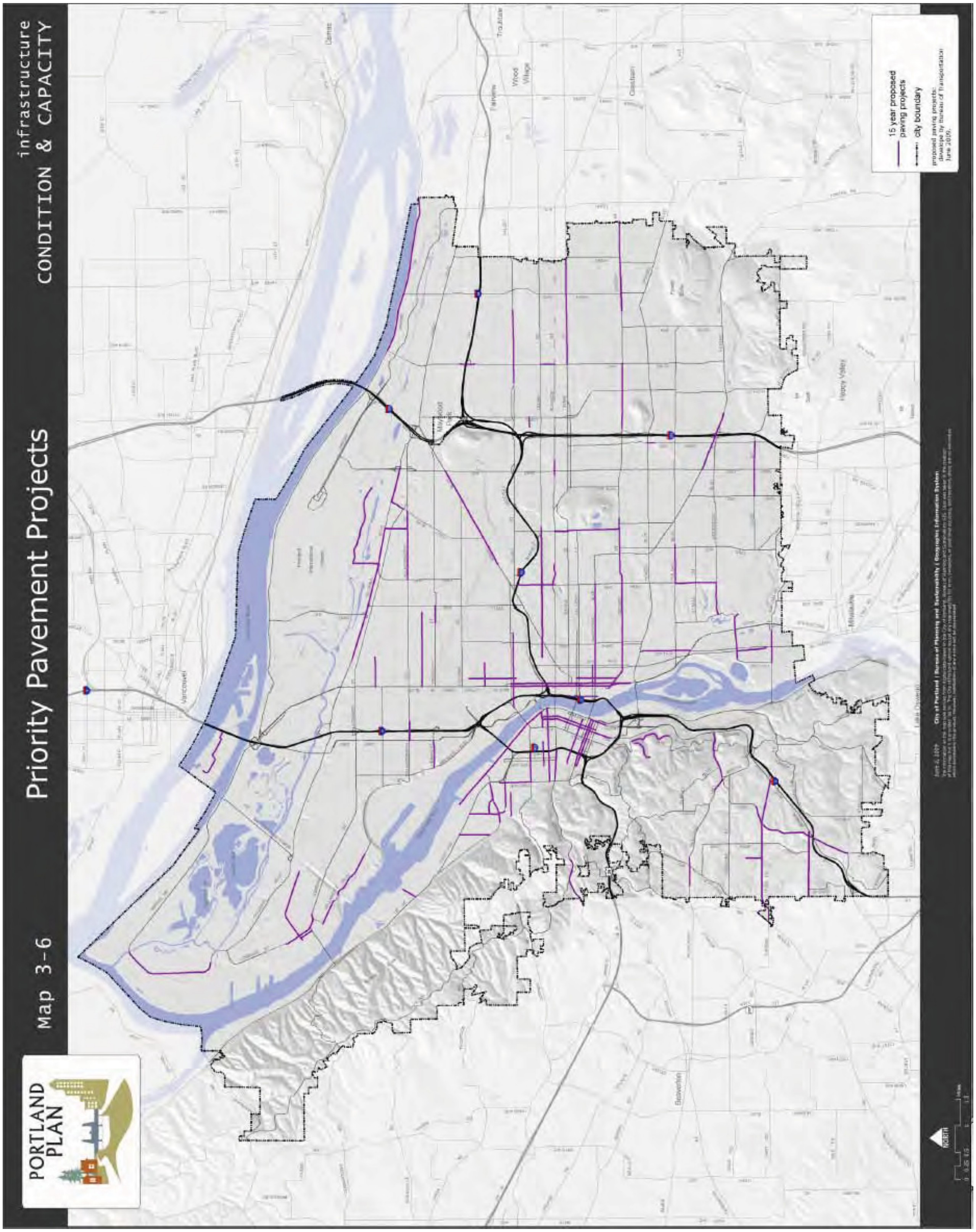
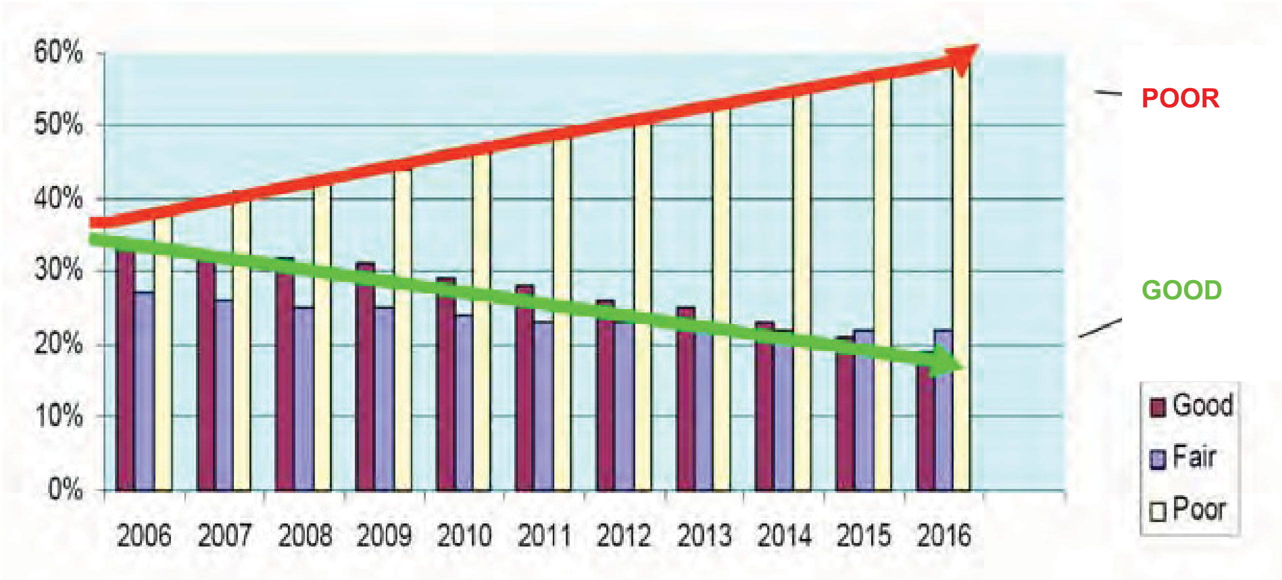


Figure 8.17 Projection of Pavement Condition, 2006 to 2016



Unmet Pavement Need

What do we need to improve our pavement system?

A gap exists between the current road condition and PBOT's goals. To determine what it would take to reach these goals, each repair type for pavement defects is assigned a dollar figure. These figures are incorporated into a formula that calculates how much money is needed over a ten-year period to bring the pavement condition up to the desired level.

Arterial/Collector Unmet Need

To meet the condition targets set for arterial/collector streets (80% in fair or better and no more than 2% in very poor condition) will take $50 million per year for ten years.

Table 8.21 Investment scenarios for arterial/collector streets

Condition Category	PCI Limits	Current Condition	$0 Investment per year	$9.8 Investment per year (current budget)	$50 million investment per year (to reach goal of 80% fair or better and 2% poor or worse)
		2012	2022	2022	2022
Very Good	85-100	18.2%	0.8%	11.5%	27.5%
Good	75-84	20.8%	2.3%	34.1%	69.4%
Fair	65-74	20.6%	23.5%	13.3%	0.1%
Poor	40-64	32.1%	36.8%	18.6%	0.4%
Very Poor	0-39	8.3%	36.7%	22.5%	2.5%

If PBOT's current pavement preservation budget of $9.8 million per year remains the same for the next ten years, we will see the condition of the collectors and arterials decline. The amount of streets in very poor (failed condition) will increase from 8.3% to 22.5%, because available funds will be prioritized for preventive maintenance, not major repairs. In 2021, rebuilding those roads would cost $1.12 billion.

However, if we raise our investment in pavement repairs to $50 million for each of the next ten years, roads will not need to be rebuilt and we will save $620 million.

Local Unmet Need

To meet the target level of service for local roads (70% in fair or better condition and no increase in the current 11% of local roads in very poor condition) will require $35 million per year for the next ten years.

Table 8.22 Investment scenarios for local maintained roads

Condition Category	PCI Limits	Current Condition 2012	$0 Investment per year (current budget) 2022	$35 million investment per year 2022
Very Good	85-100	11.6%	0.1%	25.1%
Good	75-84	19.3%	7.5%	59.2%
Fair	65-74	22.2%	21.6%	4.0%
Poor	40-64	36.1%	37.3%	0.9%
Very Poor	0-39	10.8%	33.5%	10.8%

Due to insufficient funding for transportation maintenance and operations, City Council passed a policy in 2009 that eliminates all paving work on local streets. This means that 2,971 lane miles of local roads, or 60% of the pavement system, will not receive any preventive maintenance or rehabilitation. Although local streets do not have the high volumes of traffic or the heavy loading that the arterials support, the majority of Portland's population lives on local streets. Since this policy was implemented, PBOT's work on local roads has been limited to patching potholes and addressing major hazards.

If funding is not found to support maintenance of local roads, by 2021 fewer than 8% of Portland's local streets will be in good condition or better and the number of streets in very poor condition will triple. The current budget of $9.8 million for road maintenance of arterials and collectors only is clearly insufficient to meet the needs of the City's pavement system. As seen above, an additional $75 million 23 (above the $9.8 million current budget) is needed to reach PBOT's pavement condition goals for all of its streets.

System Performance

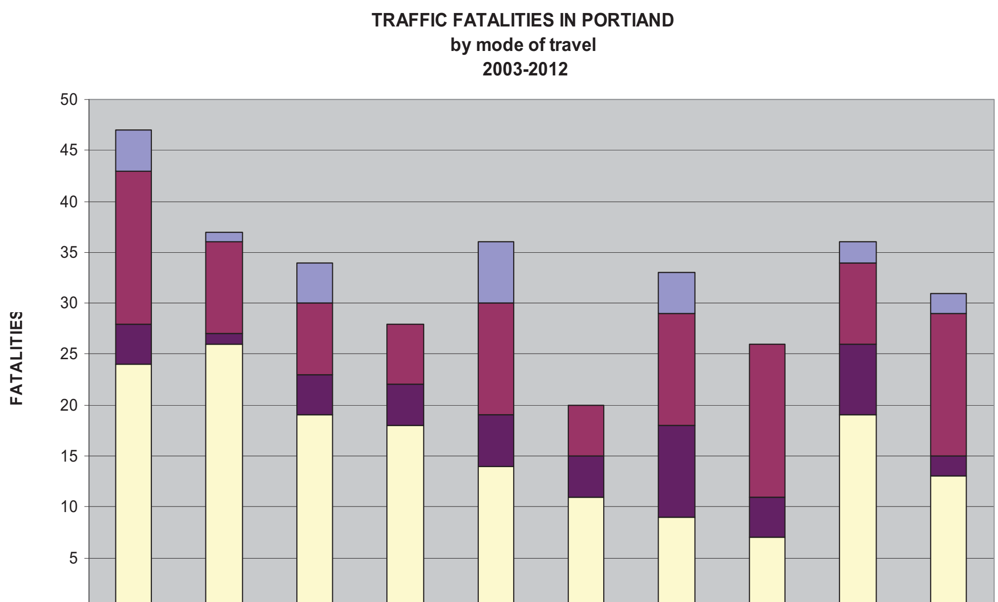
Vehicles Miles Traveled

New Metro and city of Portland transportation models have been dramaticaly updated since the last update of the TSP. In addition there is a new travel behavoir survey that will also impact system performance information. Updates to vehicle miles traveled (VMT) data (a measure used to describe total automobile use on a daily or annual basis). It is an important descriptor of changes in travel demand in an urban area and is a good indicator of the reliance on autos for urban mobility. VMT is more comprehensive than other indices used to measure travel by automobile because it incorporates both the number of vehicle trips and the length of those trips Updates will be done after addtional land use and transportation analysis with the Regional Transportation Plan update, TSP update and Comp Plan update in 2013/14.

System Safety

Improving transportation system safety is an integral part of the City's planning efforts. In the ten year period from 2003 to 2012, 328 people died in crashes on Portland roadways. Nationwide, crashes kill an average of 37,500 people per year and roadway safety remains one of the most challenging health issues nationwide. It is the City's and the region's goal to reduce the number of pedestrians, bicyclists, and automobile occupants killed or incapacitated on the roadways each by 50% in 2035 compared to 2005.

Figure 8.18 Traffic Fatalities in Portland, 2003-2012



	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Bike Fatal	4	1	4	0	6	0	4	0	2	2
Ped Fatal	15	9	7	6	11	5	11	15	8	14
Motorcycle Fatal	4	1	4	4	5	4	9	4	7	2
Motorist Fatal	24	26	19	18	14	11	9	7	19	13

High-Crash Locations

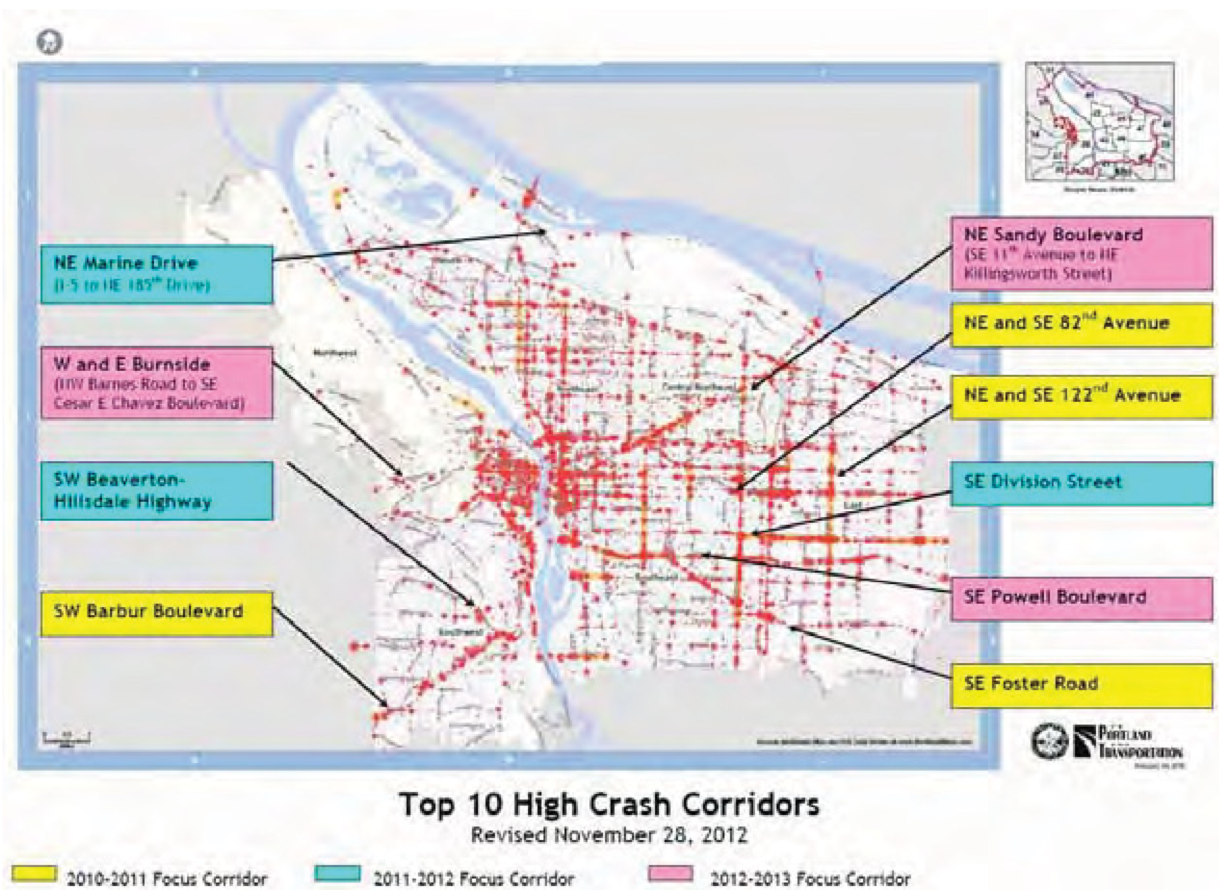
High-crash locations, or intersections with high numbers and high severity of crashes, persist along a number of major arterials in the City - most notably 122nd Ave , Powell Blvd, 82nd Ave, and Division St.

High Crash Corridor Program

In order to maximize limited funding, the Portland Bureau of Transportation's High Crash Corridor program targets engineering projects, educational programs and enforcement activities along ten identified roadways with exceptional concentrations of crash activity. These high crash corridors include:

- NE Marine Drive
- W and E Burnside
- SW Beaverton-Hillsdale Highway
- SW Barbur Blvd
- NE Sandy Blvd
- NE and SE 82nd Ave
- NE and SE 122nd Ave
- SE Division St
- SE Powell Blvd
- SE Foster Rd

Figure 8.19 Top 10 High Crash Corridors



While high crash corridors make up a fraction of the City's lane miles, they account for one-quarter of all crashes. From 2000 to 2009, there were 102,714 citywide crashes, 25,247 of those took place on high crash corridors.

Crashes impact people's lives and come with a high cost to society. The National Highway Traffic Administration has developed a formula for calculating the cost of crashes, at varying levels of severity, to society. Below is a calculation of those costs on Portland's ten high crash corridors from 2007-2010, which totaled $338,091,209.

Table 8.23 High Crash Injuries

HCC Crash Injury Data 2007-2010		Participants						
Corridor	Crashes	Fatal	Incapacitating Injury	Non-incapacitating Injury	Possible Injury	Property Damage Only	Subtotal	Total Societal Cost
N/NE Marine Dr	250	3	9	37	109	362	520	$17,759,009
NE/SE 82nd Ave	1428	1	48	181	817	2340	3387	$30,293,409
NE Sandy Blvd	788	2	18	110	313	1286	1729	$21,657,509
W/E Burnside St	879	4	24	139	339	1440	1946	$33,526,809
NE/SE 122nd Ave	1200	8	34	152	710	1934	2838	$54,791,309
SE Division St	1698	4	50	205	964	2701	3924	$45,819,009
SE Powell Blvd	2119	6	51	256	1251	3481	5045	$59,327,309
SE Foster Rd	733	5	16	76	428	1180	1705	$31,990,909
SW Beaverton-Hillsdale Hwy	177	2	10	25	72	280	389	$12,814,609
SW Barbur Blvd	557	5	9	82	249	889	1234	$30,112,309
Grand Total	9829	40	269	1263	5252	15893	22717	$338,091,209
Societal Cost		$4,300,000	$216,000	$55,300	$26,300	$2,400		

Supporting Transportation Assets

Parking Systems

Parking Meter Inventory

The purpose of the parking meter system is to encourage turnover, reduce traffic congestion and provide convenient access to adjacent businesses and facilities in the Central Business District (CBD) and in Portland's vibrant neighborhoods. A parking meter is a device used to collect money in exchange for the right to park a vehicle in a particular place for a specified amount of time. By metering parking spaces or requiring permits, more people can access the parking spaces throughout the day. Revenues collected through the parking system are used to fund the City's transportation system.

Enforcement of the parking system supports retail and commercial businesses and enhances neighborhood livability. Parking enforcement officers refer to parking control signs and pavement markings to monitor turnover and access and ensure that parking regulations are observed.

The parking meter system has three aspects:

- The physical equipment – meters, parking control signs and pavement markings.
- The "back office" software system which supports, tracks and reports on individual pay station performance and pay station status and activity.
- A business process that maintains and operates the equipment, and interfaces with customers for enforcement, asset maintenance, coordination with adjacent land users and customer service.

Transportation currently uses two types of meters: single and multi-space pay stations, see Table 8.24. The single meters are coin-operated. The multi-space pay stations accept a variety of payment types such as credit or debit cards, coins, and the City's SmartCard. Pay stations issue time-stamped receipts which must be displayed in the vehicle's curbside window. Each pay station includes a 10 watt solar panel which recharges its batteries, allowing meters to operate efficiently. Pay stations are used to control about 95% of the paid parking spaces in the CBD, which includes the Pearl and South Waterfront Districts.

Table 8.24 Parking meter system status and condition[30]

			Condition						
Facility	**Status**	**Estimated Replacement Value**	**VG**	**G**	**F**	**P**	**VP**	**TBD**	**Unmet Need**
Parking Meters									
Single	411	$330,855	--	90%	10%	--	--	--	$0
SmartMeter	1,343	$11,262,398	100%	--	--	--	--	--	$0
Total	**1,754**	**$11,593,253**							**$0**

[30] City of Portland Transportation System: Asset Status and Condition Report - 2012

Current Condition

The majority (90%) of the single parking meters are in good condition, and the remaining 10% are in fair condition. Fair condition means that the meters are old, but spare parts are still available to keep them serviceable. As a result of a pay station replacement plan that started in July 2009, one hundred percent of the pay stations are now in fair or better condition.

Parking Garage Inventory

The City owns and operates six SmartPark Garages, with a mission to support the economic viability of the Central City by providing an affordable system of parking garages which primarily meets the short-term needs of shoppers, visitors and business clients. The SmartPark rates structure is set up to encourage short-term turnover; however, several garages do allow monthly parking permits in an effort to maximize revenue potential. While the hourly rates are below market, the monthly parking rates are at market rates except in the retail core garages where the monthly rates are set above market rate as an incentive to encourage short-term use. Revenues from the garages support maintenance and operations of those facilities and any additional revenue is used to support Transportation's operations and maintenance programs.

Table 8.25 Parking garage system inventory[31]

Description	Inventory
Garages	6
Number of parking spaces	3,784
Heliport	1
Square feet of retail space	71,800
Replacement Value*	$121.4 million

Current Condition

The majority of the garages (5 out of 6) are in good condition. One garage is in fair condition. The City's Facilities Services staff conducts yearly inspections of the garages to identify maintenance needs. Facilities Services performs all the major maintenance on the garages as well as any preventive maintenance to ensure the garages are in good working order. It is realistic to expect that all six parking garages stay in good or better condition

Signals

Inventory

The Portland Bureau of Transportation maintains and operates a traffic signal system that includes hardware; an operating system that regulates signal timing; and the Intelligent Transportation System (ITS), which manages demand on the system and provides real-time traveler information.

[31] City of Portland Transportation System: Asset Status and Condition Report - 2012

Traffic signals exist to efficiently move traffic through the City and the region and to ensure a safe transportation system. Transit, freight and all travelers depend upon traffic signals for safe crossings at intersections. In addition to 1,072 signalized intersections, Transportation owns other traffic control devices including flashing beacons, overhead crosswalk signs, island lights, “hawk” beacons which are designed to help people safely cross intersections by visually alerting motorists that a pedestrian or bicycle is crossing, and owns over 288 miles of communication lines (fiber optic and twisted pair cables) which allows for communication between each signal and the Central Command System, see Table 8.26.

Current Condition

The condition of Traffic Signal hardware and controllers is based upon age. Engineers conduct condition assessments as needed. Thirty-one percent of signal hardware is in very good or good condition. The remaining 69% is in fair to very poor condition. Federal stimulus funding (in 2010) was used to upgrade 11% of signal controllers within the City (mostly on state-owned routes). Many of the remaining controllers are still operating with 1980s technology and need to be upgraded.

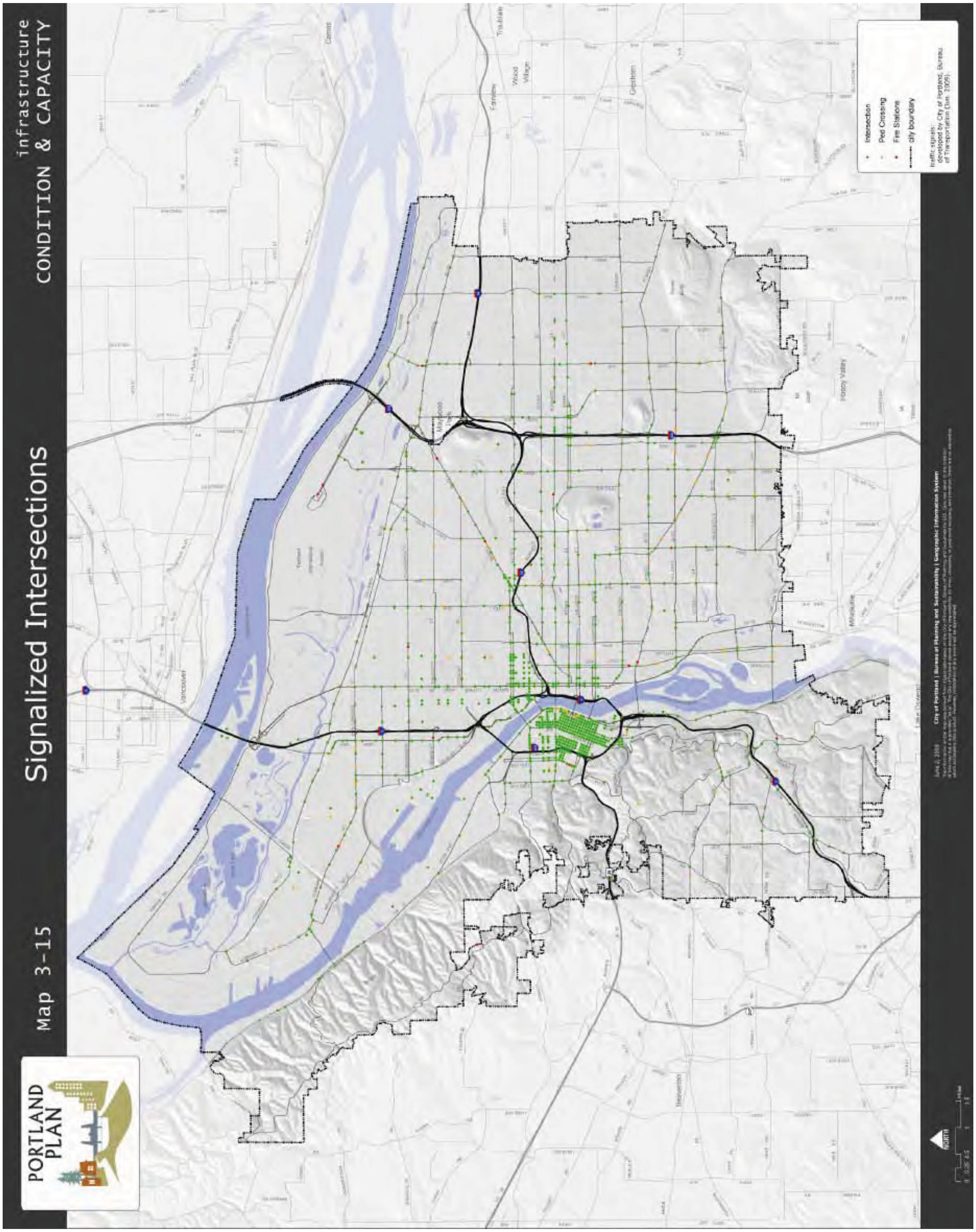
Table 8.26 Traffic Signal Inventory, Condition, and Replacement Value[32]

			Condition						
Facility	**Status**	**Estimated Replacement Value**	**VG**	**G**	**F**	**P**	**VP**	**TBD**	**Unmet Need**
Traffic Signals									
Hardware	1,072	$275,343,200	15%	16%	23%	23%	23%	--	$189,411,808
Controllers	1,072	$9,648,000	34%	14%	45%	7%	--	--	$5,016,960
Equipment	280	tbd	--	--	--	--	--	100%	tbd
ITS Equipment	1,224	$1,187,790	91%	--	9%	--	--	--	$106,901
Fiber Optic/ Copper Cables	288 mi.	$4,741,018	44%	41%	--	--	15%	--	$711,153
Total		**$290,920,008**							**$195,246,822**

An additional $195 million, over ten years, is needed to bring traffic signals (hardware and controllers) and other equipment into good condition. Transportation invests $570,000 per year to improve and maintain the traffic signals, but not all of the preventive maintenance and replacement needs for the system are being met. This underinvestment leads to a continual decline in the condition of the signal system, see Table 8.26.

[32] City of Portland Transportation System: Asset Status and Condition Report - 2012

Figure 8.20 Signalized intersections



Streetlights

Inventory

Street lighting is a public service that contributes to neighborhood livability and security. Street lighting illuminates hazards in the right-of-way, improving driver, cyclist, and pedestrian safety. Street lights are important for the safety of Portland's neighborhoods, as they can deter crime. Portland Bureau of Transportation partners with the Office of Neighborhood Involvement (ONI) to install street lighting in areas where ONI has identified and evaluated the need for lighting as a crime prevention tool. Local businesses also appreciate street lights because it illuminates their frontages at night and makes them more visible and welcoming to customers.

Transportation provides street lighting to public streets within the City limits, according to City lighting standards. Portland General Electric (PGE) contractually provides electricity for all 55,055 city-owned street lights, and maintains 80% of City-owned street lights ("Option B" lights). Transportation maintains the remaining 20% of the system ("Option C"). Street lights include luminaries, or "cobra heads," and "ornamental lights" that provide character to a neighborhood or commercial area. Transportation uses three types of efficient lighting: high pressure sodium vapor, induction, and light emitting diode (LED). City lights are "Dark Sky" friendly, which means that they minimize the amount of light pollution emitted at night

Street light inventory has increased 49% in the last thirty years, see Table 8.27. Before 1954, only about a quarter of Portland's paved streets had lights that met national standards. The advance of Portland's street lights from 1954 to 1990 has been due to street light levies. However, with the passage of Measure 5 in 1990, which limits property tax revenue for all local governments, the City Council cancelled the last street light levy and began to transition the streetlight program to General Fund support. During this time, the number of Portland's street lights has grown by 30%.

Table 8.27 Street light status, condition and value [33]

			Condition						
Facility	**Status**	**Estimated Replacement Value**	**VG**	**G**	**F**	**P**	**VP**	**TBD**	**Unmet Need**
Street lights									
Option B (PGE maintains)	44,105	$25,051,640	3%	8%	38%	35%	16%	--	$18,777,662
Option C (City maintains)	11,284	$169,260,000	8%	29%	42%	9%	12%	--	$36,700,924
Total	**55,389**	**$194,311,640**							**$55,478,586**

Current Condition

Many of the City's street light luminaries were replaced in the early 1980's when mercury vapor lights were converted to high pressure sodium light. These luminaries are now reaching the end of their useful

[33] City of Portland Transportation System: Asset Status and Condition Report - 2012

life, estimated at 30 years, and will need to be replaced. As of 2012, approximately 16% of the street light system was in good or very good condition. The majority of the lights, 39%, were in fair condition and the remaining 45% were in poor or very poor condition.

An additional factor affecting the condition of the lighting system is the nature of the street light cables. The cable running under much of the Central Business District is direct-burial lead-encased cable. This cable is over seventy years old, rapidly deteriorating, and located at depths varying from six inches to four feet. Approximately four miles of cable need to be replaced with a maintainable conduit system.

In order to bring the street light system into good or fair condition, an additional $55 million over ten years is needed. This total unmet need represents the conduit, lamps, poles and street light fixtures that must be replaced, as well as the preventive maintenance that will extend the lifespan of the system.

This unmet need is captured as the amount of additional funding and resources needed to bring a given asset class to a fair or better condition and to maintain it at that condition, as outlined in Table 8.27, for Option B and C lights over a 10 year period.

Signs and Markings

Inventory - Signs

Street signs are an important safety feature to direct and regulate motor vehicles, pedestrians and bicyclists using the transportation system.

Parking signs help manage parking availability for businesses and residents. In the Central Business District, parking signs for metered spaces help generate revenue for the Bureau of Transportation.

Transportation maintains about 159,000 signs, including traffic control, street names, guides and parking , see Table 8.28. Design and placement of signs is regulated by the Federal Highway Administration (FHWA). Regulations are published in the *Manual on Uniform Traffic Control Devices (MUTCD).*

Table 8.28 Street sign status, condition and value[34]

Facility	Status	Estimated Replacement Value	Condition						Unmet Need
			VG	G	F	P	VP	TBD	
Street signs									
Street Name	39,908	$2,499,868	3%	14%	21%	26%	36%	--	$2,074,890
Parking	55,033	$1,808,575	--	25%	25%	50%	--	--	$1,356,431
Traffic Control	54,684	$3,664,323	20%	27%	18%	25%	10%	--	$1,942,091
Stop Signs	14,840		22%	30%	28%	13%	7%	--	$477,319
Guide Signs	9,619	$663,865	--	25%	25%	50%	--	--	$497,899
Sign Mounts	74,450	$11,946,419	--	--	--	--	--	100%	$843,871
Total		**$20,583,049**							**$6,715,183**

[34] City of Portland Transportation System: Asset Status and Condition Report - 2012

Inventory - Pavement Markings

Pavement markings are an important communication tool for road users. Pavement markings help guide vehicles, including bicycles, by indicating when passing is allowed and warning of upcoming road conditions. Crosswalk markings help pedestrians cross the street more safely. Pavement markings communicate meaning through a uniform and recognizable system of colors, patterns, widths, symbols, and words. Because markings are located on the roadway, directly in line with the travel path, they are a highly visible safety device.

The pavement marking system is comprised of longitudinal lines (parallel to traffic), transverse lines (across traffic lanes), words (“Only,” “Bus,” “Bike,” etc.) and symbols (arrows, railroad). The number of pavement markings and amount of striping changes as improvements are made to the system, see Table 8.29.

Table 8.29 Pavement marking status, condition and value[35]

Facility	Status	Estimated Replacement Value	Condition VG	G	F	P	VP	TBD	Unmet Need
Pavement Markings									
Center Lines	734 mi.	$859,488	--	--	50%	50%	--	--	$429,744
Traffic Lane Lines	99 mi.	$233,501	--	--	50%	50%	--	--	$116,750
Bike Lane Lines	56 mi.	$1,335,995	--	--	50%	50%	--	--	$667,997
Edge Lines	279 mi.	$659,134	--	--	50%	50%	--	--	$329,567
Crosswalks	4,696	$2,121,141	--	--	50%	50%	--	--	$1,060,570
Stop Bars	2,812	$213,780	--	--	20%	80%	--	--	$171,024
Symbols & Words	20,018	$2,448,303	--	--	30%	70%	--	--	$1,713,812
Island Markings	649	$331,358	--	--	70%	30%	--	--	$99,407
Parking	2,150	$587,519	--	--	25%	75%	--	--	$440,639
Total		**$8,790,218**							**$5,029,512**

Current Condition - Signs

Transportation conducted a pilot project to assess and monitor the condition of regulatory and warning signs. The goal is to design a sustainable condition assessment program and provide criteria for preventive maintenance. This work will play an important part in helping Transportation meet the retroreflectivity standards mandated by the FHWA. An inspection and/or replacement plan to meet the new standards must be created and in use by June 13, 2014. A sample of 400 regulatory signs (Stop signs and regulatory signs {Black & White}) was evaluated in summer/fall of 2011. Another 527 Warning, School/Ped/Bike and Street Name Signs were inspected in the summer of 2012. This work will continue as Transportation determines the most efficient method of inspecting signs in order to meet federal standards and improve overall sign condition.

[35] City of Portland Transportation System: Asset Status and Condition Report - 2012

Street signs have a service life of approximately 12-15 years and the sign mounts about 20 years. Many of the signs must be replaced earlier due to vandalism, theft and crashes. The majority of street name signs and half of parking signs are in poor condition. An additional $6.7 million will be needed during the next ten years to bring the street signs into fair or better condition, see Table 8.29. The following tables illustrate the unmet need for signs over a 10 year period. Unmet need is defined as the amount of additional funding and resources needed to bring a given asset class to a fair or better condition and to maintain it at that condition.

Current Condition - Pavement Markings

Painted markings can last six months to a year. Since a majority of the streets are repainted on an annual basis, condition monitoring is not conducted. Transportation has transitioned to the use of durable markings (i.e. thermoplastic and cold thermoplastic) on new pavement surfaces and high wear locations such as arterials with sharp curves. These materials have an estimated life of 4.5 years, depending upon traffic and pavement conditions.

Bridges and Structures

Inventory

Portland is often described as a city of bridges due to the numerous spans that cross the Willamette River. However, the Willamette River bridges are not owned or maintained by the City of Portland’s Bureau of Transportation. They are owned by Multnomah County, the State of Oregon, or Union Pacific Railroad.

The 160 bridges that the City of Portland owns and maintains, including such recognizable spans such as the Vista and Bybee Bridges, are located throughout Portland’s neighborhoods and industrial districts, as well as retaining walls, stairways, and associated structures, see Table 8.30. All of the bridges, eye-catching or not, are a vital part of the City’s infrastructure. Their purpose is to provide a passage over an obstacle, such as a freeway, valley or river. They also allow for the movement of freight and goods, a key part of Portland’s economy. In addition to City-maintained bridges, 250 other bridges and over-crossings owned by ODOT, Burlington Northern Railroad, Union Pacific Railroad and Multnomah County are within the City boundaries, including 3 railroad bridges and 5 Willamette River bridges.

Table 8.30 City Bridges and Structures inventory[36]

Facility	Status	Estimated Replacement Value	Condition						Unmet Need
			VG	G	F	P	VP	TBD	
Structures									
Bridges	160	$378,549,124	6%	42%	33%	18%	1%	--	$126,690,014
Retaining Walls	555	$95,791,554	68%	22%	8%	2%	--	--	$4,830,513
Stairways	188	$4,444,860	19%	58%	21%	2%	--	--	$871,815
Guardrails	26	$6,864,000	--	--	--	--	--	100%	tbd

[36] City of Portland Transportation System: Asset Status and Condition Report - 2012

	centerline mi.								
Harbor Wall	5,133 ft	$212,846,207	--	100%	--	--	--	--	$0
Total		**$698,495,745**							**$132,392,342**

Current Condition

The design life of a bridge is recognized as 75 years. Many of Transportation's bridges exceed this age, but are still in use. Five of Transportation's bridges exceed 100 years and 29 bridges are over 75 years. Four bridges are less than five years old.

Transportation's bridges are continually exposed to harsh weather conditions as well as pounding traffic from trucks and buses. This continual wear and tear causes the bridges to deteriorate over time, necessitating routine and preventive maintenance. Fifty percent of Transportation's bridges are considered to be in good or better condition while 19% are considered to be in poor or very poor condition.

Many of Transportation's older bridges were designed for traffic loads that no longer meet modern freight demands. Consequently, Transportation has weight restricted the use of these bridges to prevent premature structure failure or excessive damage, which would require costly rehabilitation. Currently 25 of Transportation's bridges are weight restricted, which represents 16% of the inventory. This is an improvement from 2009, where 28 bridges were weight restricted.

Weight restrictions on bridges impact the ability to move freight and goods throughout the City, which impacts the economy. Freight drivers must find alternate routes, which extends travel time, uses more fuel and harms the environment.

Major System Concerns & Approach

Seismic Retrofit of Bridges

Most of Transportation's bridges have not been designed to resist earthquakes and could collapse in a moderate earthquake. 42%, or 67 bridges, need seismic rehabilitation. These bridges may be in good condition structurally, but are not designed to withstand moderate earthquakes. Transportation has written a Post-Earthquake Bridge Inspection Response Plan which provides for a systematic, efficient, and prioritized inspection of all bridges after an earthquake.

Recently, Transportation has worked to strengthen and upgrade some of its bridges to resist earthquakes. The bridges include:

- N Going Street bridge to Swan Island
- N Lombard over Columbia Slough
- NE 21st Ave Columbia Slough

Transportation has created a Risk Assessment Deficiency Ranking system to identify which bridges are in greatest need of repairs, rehabilitation, or replacement. This allows Transportation to focus its limited resources and funding requests to more efficiently and systematically manage the condition of its entire bridge inventory.

Table 8.30 illustrates the unmet need for bridges over a 10 year period. Unmet need is defined as the amount of additional funding and resources needed to bring a given asset class to a fair or better condition and to maintain it at that condition. For bridges, seismic upgrades, rehabilitation, and replacement needs factor into the unmet need.

Possible/Proposed Bureau Investment Strategy

Financial Strategy

Existing Financing Strategies

PBOT operates in a highly dynamic funding environment. With the evolving aspirations of its grantors, changing needs of other City agencies for Bureau services, the unpredictable nature of discretionary funding levels, and continued Federal disinvestment in transportation, the availability of funding to fulfill PBOT's mission changes from year to year. The revenue of PBOT, similar to jurisdictions nationwide, relies on the affinity for and reliance on the private automobile; affinity and reliance which are decreasing. As a result, PBOT's primary sources of discretionary revenue—State Highway fund and City parking revenues-- are decreasing. PBOT will likely continue to operate in a fiscally-constrained environment due to higher-than projected expenditures and lower-than-projected revenues.

The Bureau of Transportation aims consistently to:

- Provides for sufficient annual funding of operating, maintenance, and capital programs approved by City Council.
- Provides for rates and charges to customers that are equitable.
- Strives for a natural optimal balance between financial health, operational effectiveness, infrastructure condition, effective management, rate affordability, and a skilled and experienced workforce.
- Strives to optimize capital financing strategies, today and into the future.
- Ensures the maintenance of appropriate and adequate cash balances consistent with City policies, bond covenants, and industry standards.

Most of the city's discretionary transportation revenue comes directly and indirectly from fuel taxes collected by federal, state and county governments. The more fuel purchased, the more revenue collected. The fuel tax mechanism is directly at odds with decades of city direction to reduce reliance on auto travel to advance a litany of policy goals. Our policies and primary funding mechanism contravene each other. Not all of the PBOT budget relies on fuel consumption. Non-fuel tax revenue sources like paid parking are in place, but generate revenue as a consequence rather than intent.

The investment structure presumes that Portland wants to continue its forty-year focus of strategic investment in transportation assets. In order to maintain that approach, a recommended phased implementation of new revenue mechanisms that will provide funding adequacy and resilience consistent with the city's policy goals.

The transportation system is a collection of assets that collaborate to create an infrastructure network akin to a utility. Unlike traditional notions of a utility, however, the public's performance expectations for its transportation network evolve rapidly. The challenge is to provide and maintain existing assets in function while strategically investing in new or enhanced assets that improve performance in service to broader policy goals.

The funding models that support utilities and transportation systems are also very different. In Portland, customers fund sewer and potable water systems based on rates that city council adjusts annually. By contrast, Portland's transportation system is funded by six funding sources, each with its own variables, restrictions, and trend line.

Six interrelated but independent revenue sources comprise the city's transportation budget. For accounting purposes, PBOT combines State Highway Fund revenues with its share of the Multnomah County IGA revenues. Informally, this combination is often referred to as "gas tax" revenue. In FY 12/13 they comprise 30.7 percent of total revenue. Nearly one third of the PBOT budget is based on fuel taxes, and vehicle and driver-related fees at the state and county levels. Council controls four of the six transportation revenue sources. The city's two most financially significant sources are controlled by the federal and state governments based on complicated distribution formulas.

There is no formula articulating the right investment balance in asset maintenance and system improvement. There is a tension between asset maintenance and system improvement is predictable and inevitable. Expectations change; opportunities arise. And strategic investments in improved or new assets can reduce or expand maintenance obligations.

Table 8.31 PBOT Revenue source snapshot for fiscal year 2012-2013

Revenue by decision maker	**Amount** ($ million)	**Percentage**
State of Oregon		
State Highway Fund "Gas Tax"	$32.4	17%
Fuels tax	$16.5	9%
Weight-mile tax	$9.4	5%
Vehicle registration, title fees, license fees	$6.5	4%
Multnomah County		
County Fuels tax, share of Gas Tax	$25.0	13%
Portland City Council		
Parking meters, SmartPark garages	$43.3	23%
City agencies	$31.0	17%
City General Fund	$7.6	4%
Fees	$15.4	8%
Federal, State, Local Agencies		
Grants	$32.1	17%
Total	**$186.8 M**	**100%**

The "Gas Tax"

The so-called "gas tax" has its virtues. Oregon was the first state in the nation in 1919 to adopt it, with other states following shortly thereafter. Its policy rationale is straight forward: the user pays. In Oregon its collection process is extremely efficient. The tax is collected at the first point of distribution. There are relatively few (about 160) distributors in Oregon allowing for an easy collection process that consumes just one percent of the total value collected.

Oregon's state highway fund contribution to Portland is losing pace. Unlike the steady tax increases to match demand that occurred throughout the twentieth century, Oregon's gas tax stalled at $0.24 per gallon in 1993 for eighteen years. Finally in 2011 it was raised to $0.30 per gallon.

As anticipated dollars have declined in the face of revised projections, commitments to PBOT's share of those dollars have expanded.

There is a financial value in a local gas tax. However, establishing a local gas tax would expose the city to more reliance on a funding model that is increasingly obsolete. The embrace of hybrid and electrical vehicle auto technology and a growing preference to favor human-scale travel choices are core values in Portland.

Fewer miles driven have a direct negative impact on the PBOT budget, and so does increased fuel economy. The more efficient a vehicle, the less gas it consumes. Portland has embraced the opportunity to save money and reduce carbon emissions from increased fuel economy: in 2009 the number of new registered hybrid vehicles per thousand households was 8.8, highest in the nation.12Reduced gas consumption means fewer dollars generated through the gas tax. In 2012 the federal government increased the Corporate Average Fuel Economy standards to 54.5 mpg by 2025. All told, ODOT Director Matt Garrett concluded that by 2025 "the gas tax will no longer be a viable funding source."

In summary, we know this about the city's reliance on state highway fund revenue:

- Oregon is one of 36 states with a fixed-rate gas tax that is not indexed to rise with inflation. Any measure of inflation will erode the real value of a gas tax over time.
- Increasing the gas tax to align revenue with need for transportation services appears to be politically untenable.
- The nation's policy interests in fuel economy will make the gas tax unreliable as a primary means of transportation funding in the foreseeable future. This is exacerbated in Portland as more citizens choose fuel efficient vehicles and/or non-auto travel modes.

Paid Parking

Revenue generated from parking meters, City-owned SmartPark garages, other public parking lots, and parking enforcement constitute 23.3 percent of PBOT's budget in FY 12/13. From a revenue generation perspective, paid parking represents both opportunities and challenges.

In addition to SmartPark garages and on-street metered spaces, PBOT provides two other parking-related services: permits and event-pricing. The area parking permit program is designed to aid residential and retail parking in high-demand areas. From a revenue standpoint, permits are cost-neutral to PBOT per city council direction. PBOT applies event pricing to meters around JeldWen Field during Portland Timbers games. Higher parking rates apply, generating some net revenue after costs for management and enforcement.

Beyond its financial value, PBOT places a premium on parking revenue because it allows thebureau the most flexibility in its use. By contrast, state highway fund revenue may not be used to support transit per the state constitution. As a result, this means all of the city's share of streetcar operations, maintenance and debt service expense must be funded with parking revenue.

Grants

Competitive grant funds from federal and state sources in FY 12/13 constitute 17.1 percent of the PBOT budget. A grant is an award of financial assistance for a specific purpose and PBOT has a strong track record of leveraging grant dollars to multiply impact.

Reliance on grant funds is problematic in a number of important ways. First, federal and state grant dollars are in decline due to financial constraints and shifting priorities. The Congressional Budget Office forecasts the federal highway trust fund – a primary source of federal grant funding – will be bankrupt by 2014 after three infusions of general fund dollars in the last five years.17 ODOT has its own challenges; in 2011 ODOT reported that all of its state highway fund revenues are now essentially committed to debt service, the cost of running the agency and maintaining highways, leaving virtually no state funding for capital projects.

Over-reliance on grant dollars can create perceptions of inequitable service distribution. Grant dollars cannot be reallocated to a different need or location that may be a higher priority for PBOT, including basic maintenance.

Other City Bureau Interagency Agreements

Revenue from interagency agreements, services PBOT provides to other city bureaus at a fee, comprise 16.6 percent of PBOT's budget in FY 12/13.19 As with grant funding, this portion of the PBOT budget is subject to volatility as priorities in other city bureaus shift.

Fees

Fee-for-service work PBOT provides to the private sector is another cost-recovery revenue source. In FY 12/13, it provides 8.2 percent of PBOT's budget. Fees are most often collected when permits are issued to developers and other private citizens in exchange for use of public right-of-way. In addition, transportation system development charges (SDC) assessed to developers on a one-time basis to help offset the additional impacts on transportation infrastructure generated by new growth provided by the developer. Council sets the SDC rate and chooses the projects that receive SDC funding.

From a financial management perspective, however, this portion of the PBOT budget remains vulnerable to market volatility. PBOT does not have a "rainy day" reserve fund to cover downturns in the business cycle.

City General Fund

The City general fund accounts for 4.1 percent of PBOT's FY 12/13 revenue. Most of the transfer is dedicated to the cost of electricity associated with streetlights.

Utility License Fees

Utility license fees (and franchise agreements) currently contribute $2.2 million annually to the PBOT budget per council ordinance as part of the general fund transfer.

In summary, the PBOT revenue picture is complicated. Each of the bureau's six revenue sources brings its own variables, restrictions and trend line. In the recommendations that follow, the Task Force highlights potential new revenue options that would bring much needed stability and predictability to the bureau's financial status on a year-to-year basis.

Possible Revenue Options

Consider the development of a package of transportation services that would be funded by a general obligation bond.

Though use of a general obligation bond for transportation services would be new to Portland's experience it is common across the country it has numerous advantages. A "G.O." bond is a property tax that requires voter approval and is not subject to compression.

The scale of the bond can be tailored to whatever amount council – and ultimately the public – deems appropriate. For reference, the Office of Management and Finance indicates that a $25 average annual property tax increase could be used to support 20-year general obligation bonds that could provide approximately $108 million if applied to all properties citywide.

Because a G.O. bond sale is not subject to compression the value received is the value requested, its financial impact is distributed equitably across all property owners, and it has no unintended adverse impact on other city services or other governments. A discreet package of transportation improvements could be crafted by PBOT with committee oversight for voter consideration.

Street Maintenance Fee

Council could also reengage consideration of a street maintenance fee. A street maintenance fee would be assessed monthly on a water/sewer bill to all property owners based on trip generation models derived from the Institute of Transportation Engineers.

Like a G.O. bond, a street maintenance fee has many attributes:

- Simple; everybody directly or indirectly relies on streets and accompanying infrastructure.
- Low administrative costs; it could be a line item added to the existing sewer and water bill.
- Stable; it is based on property rather than consumption-based charges.
- Reliable in value; it is not subject to compression.

- Equitable; all property owners pay regardless of how they travel.

If the fee is established without a termination date, the city could enjoy a high degree of confidence in street maintenance fee-generated revenues given the relative stability of property tax revenues. The more confidence PBOT has in its "out-year" forecast, the better it can detail when any given improvement may occur.

Contemporary Approaches to Parking Management

Cities across the country and world are realizing resource management improvements with the adoption of parking pricing models that fluctuate based on demand – "performance pricing." Performance pricing allows for meter rates to change based on demand. Under a performance pricing strategy, the meter rate is adjusted up or down to account for changes in demand to achieve the desired 85 percent utilization rate.

Today's smart meter pay stations across the central city (and soon Washington Park) have the capacity to vary price, allowing PBOT to apply performance pricing with negligible administrative expense. Performance pricing does not guarantee increased revenue over the city's current fixed-rate meter pricing. The potential for increased revenue depends on the price range set by city council.

Commercial Parking Tax

Council could consider the adoption of a commercial parking tax. In Seattle the commercial parking tax is levied upon a person who pays to park a motor vehicle in a commercial parking lot within the city limits. The tax is imposed upon the consumer, not the commercial parking business

Shifting Fees to Complete Cost-Recovery

Finally, the Task Force recommends that council direct PBOT to apply a cost-recovery model for all services provided. That model should include an annual percentage contribution to a capital reserve to prepare for economic downturns for all services provided.

Potential Statewide Revenue Sources

Two revenue sources applied by the State are likely to be on the horizon in the foreseeable future and important to the City of Portland:

- Vehicle miles traveled tax
- Tolling

ODOT is currently the national leader in considering a vehicle miles traveled tax that would ultimately transition the state's highway fund away from overreliance on the inevitable decline of the fuels tax. PBOT could participate in ODOT's ongoing efforts to establish a VMT tax.

Council is encouraged to establish an equitable tolling mechanism within city limits. This could be done in partnership with Multnomah County or with the state in another capacity. The Task Force notes that partnerships of this nature could establish reserve funds that could be tapped to provide needed revenues for major capital replacement projects – such as the Sellwood Bridge or the Columbia River Crossing – in a manner that would not rely on PBOT's strained discretionary revenue sources.

Revenue Projections

Revenue projections will be developled as part of the CSP and TSP financial plan along with the current RTP update in fall 2013. New information will be incopraoted into the next draft, along with a draft financial plan, project selection criteria and project lists.

Chapter 9
Portland Parks & Recreation

Note: Parks and recreation facilities are not considered a required urban service for the purpose of public facility planning under the Oregon public facility planning goals and statutes.This chapter will be included in the comprehensive Citywide Systems Plan but willnot be submitted for review for compliance with public facility planning rules (OAR 660-011-0010(2)).

Overview

Portland Parks & Recreation (PP&R) provides care to over 11,000 acres of parks and natural areas, manages the urban canopy and the city's community gardens and offers thousands of programs for all ages at its community centers, swim pools, and other recreation facilities.

Vision

Portland's parks, public places, natural areas, urban forest, community gardens, and recreational opportunities give life and beauty to our city. These essential assets connect people to place, self, and others. Portland's residents treasure and care for this legacy, building on the past to provide for future generations.

Mission

The mission of Portland Parks & Recreation is to help Portlanders play – providing the safe places, facilities, facilities, programs, and nature experiences which 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. We accomplish this through:

- Establishing, safeguarding and restoring the parks, natural areas, public places, community gardens and urban forest of the city, ensuring that these are accessible to all;
- Developing and maintaining excellent facilities and places for public recreation and community building;
- Providing dynamic recreation programs and services that promote health and well being for all;
- Partnering with the community we serve.

Organizational Values

Portland Parks & Recreation has the following organizational values:

- Quality, responsive service to our diverse customers and partners.
- Community participation in program and project planning.
- Innovation, creativity, and excellence in all we do.

- Openness, honesty, and respect in all relationships.
- A diverse and culturally competent workforce.
- Transparent, ethical, and accountable decision making.

Equity Statement

We recognize, understand and encourage celebration of the differences that surround us. Diversity and equity are vital to Portland Parks & Recreation's ideals and values.

System Services

Service Area

Portland Parks & Recreation manages a system of developed parks, natural areas, the urban forest, community gardens, trails, community centers, and special recreation features that serve residents and visitors. See Figure 9.1 for a map of park facilities.

Core Services Provided

Portland Parks & Recreation's built and green infrastructure are the base by which Portland Parks & Recreation provides a wide variety of programs and services for the public. The focus of this chapter is built infrastructure, but Portland Parks & Recreation has five service areas:

- Community Services (includes Community Engagement, Leadership & Advocacy, Marketing & Business Development, and Visitor Services)
- Infrastructure Services (includes Capital Development, Maintenance, and Property)
- Support Services (includes Business Services and Planning), and;
- Recreation Services (includes Aquatics, Arts, Community & Socialization, and Sports & Games).
- Natural Resources Services (includes Natural Areas, Community Gardens, and the Urban Forest).

Service Agreements & Partnerships

A variety of other agencies and organizations provide park and recreation services to Portland residents, either independently or in partnership with Portland Parks & Recreation. These include Metro and neighboring jurisdictions, the state of Oregon, public and private schools, non-profit agencies, homeowners' associations, churches, and private social, athletic, and fitness clubs. To facilitate efficient and effective provision of services, Portland Parks & Recreation has a number of identified service agreements and partnerships. For example, Portland Parks & Recreation has a joint facilities agreement with Portland Public Schools, and agreements for the Schools Uniting Neighborhoods (SUN) program, Hoyt Arboretum, Pittock Mansion, Leach Botanical Gardens, Japanese Gardens, and many other Friends groups who help manage and maintain the park system.

Inventory Summary

In 2012, the Portland Parks & Recreation system consisted of 11,415 total acres. Of that, there were 203 developed parks, totaling 3,433 acres, 7,762 acres were natural areas, and 221 acres were undeveloped properties. Portland Parks & Recreation's built infrastructure has a replacement value of $984 million (in 2012), and includes five main facility types:

- Developed Parks: 203 Parks on 3,433 Acres
- Natural Areas: 7,762 Acres
- Trails: 152 Miles of Regional Trails
- Community and Arts Centers:14 Facilities
- Special Facilities: 54 Facilities including Golf courses, Pittock Mansion, Portland International Raceway, Community Gardens, etc.

In addition to the capital infrastructure, Portland Parks & Recreation oversees the City's urban forestry program, which is responsible for managing the urban forest on City-owned or managed land, and certain private properties, and which coordinates implementation of the City's Urban Forest Management Plan. In 2012, the urban canopy covered 29.9% of the City.

Condition Summary

Portland Parks & Recreation has inspected most of its assets, and will continue to re-inspect 20% of its assets each year so that condition information is never more than five years old for any given asset. In 2012, 35% of Portland Parks & Recreation inspected assets were in good or very good condition, 17% were in fair condition, and 8% were in poor condition. Another 40% of the assets have not yet been inspected and given a condition rating. Percentages are based on counts of individual assets, which range in value and complexity, e.g. from pools to playgrounds.

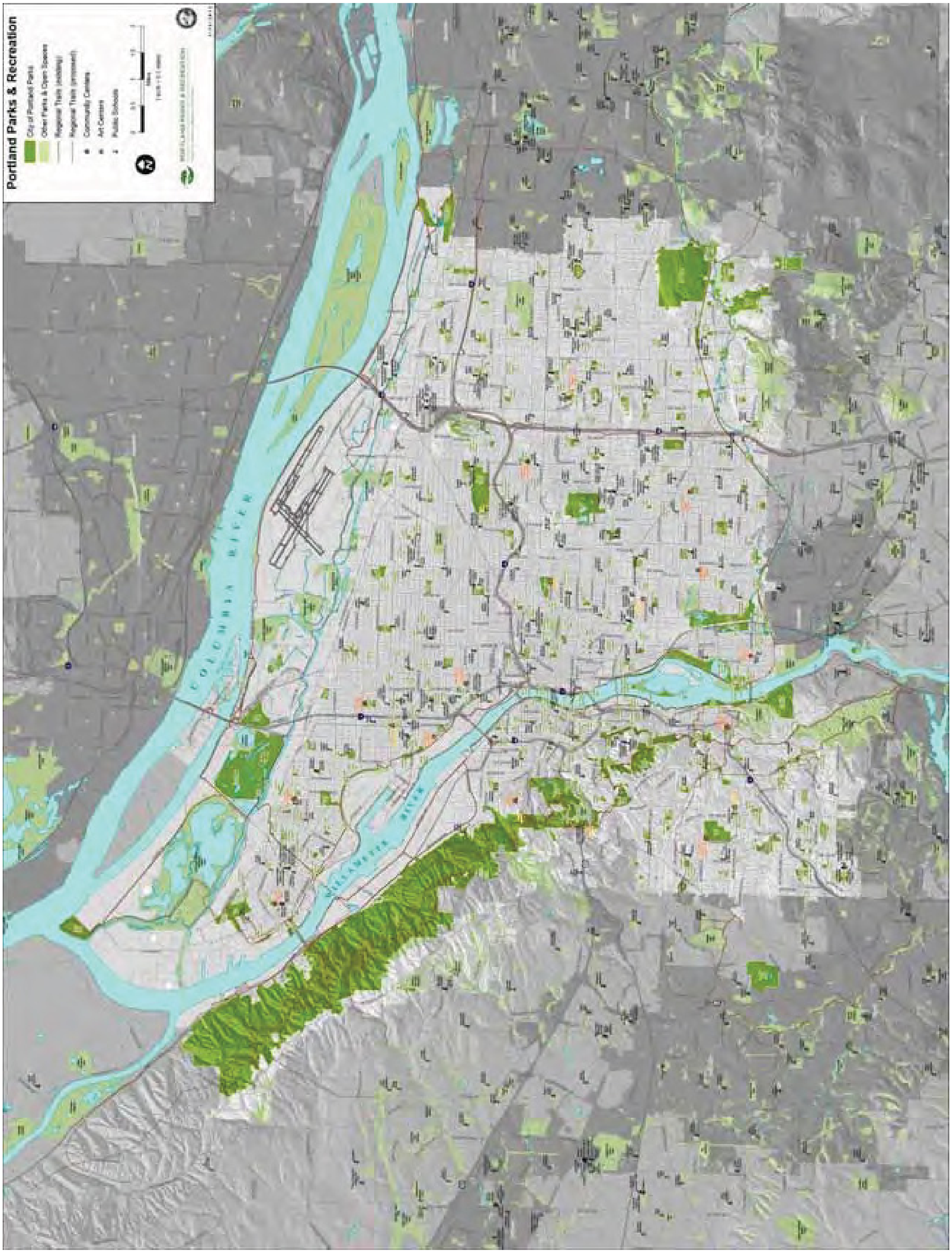
Capacity Summary

Portland Parks & Recreation serves a large number of Portlanders, and the park system needs to respond to population growth and recreational trends. In 2012, 4.5 million visits were recorded to a Portland Parks & Recreation recreational program. Thirty percent of Portlanders participated in a city recreation activity, and 88% of Portlanders visited a city park at least once in 2012. While the park system needs to have the capacity to continue serving the large number of Portlanders using parks and recreation programs, Portland Parks &Recreation is also working to deliver equitable access to parks and recreation facilities geographically across the city. These level of service goals are outlined in the Portland Parks & Recreation Vision 2020, and include the goals to have:

- 100% of households within ½ mile walk of a park or natural area,
- 100% of households within 3 miles of a full service community center.

In 2012, 79% of households were within a ½ mile walk of a park or natural area, and 69% were within 3 miles of a full service community center. For service area maps, see Figure 9.** and 9.**.

Figure 9.1 Portland Parks & Recreation Parks, Trails, Community Centers, and Natural Areas (2012)



Key Issues & Concerns

Providing Services in Underserved Areas

Unfortunately, not everyone in Portland has equitable access the benefits of parks and recreation. Virtually every district of the city has at least one parkland deficiency. In East, Northeast, and Southwest Portland, where there are fewer developed parks and often fewer trees and canopy cover, residents get fewer benefits from the social and recreational opportunities parks provide. Since there are few remaining sites appropriate for larger developed parks available in the city, remedying park deficiencies presents a formidable challenge. See Figure 9.3, which shows the areas currently being served and unserved using the ½ mile from a park or natural area level of service.

Although community centers provide the recreational programs and community gathering places that give appeal to urban living, those benefits are unavailable to some residents. Certain areas of the city have no community centers, and others have centers that are housed in old, ill-adapted buildings that lack fundamental elements. Sellwood Community Center (SCC), for example, was built in 1909 as a rooming house. It does not have adequate security surveillance, ADA accessibility, or storage, and many rooms lack basic equipment for classes and programs. Yet, the neighborhood depends on SCC to fulfill its recreation needs. Since recreation programs and facilities are inextricably intertwined, the shortage of quality community centers limits the availability, breadth, and quality of recreation programs. See Figure 9.4, which shows the areas currently being served and unserved using the 3 miles from a full service community center level of service.

Portland’s park system also lacks sufficient quantities of certain types of recreation facilities, like aquatic facilities and sports fields. Both are heavily used, highly programmed, and in short supply. Waiting lists also indicate that the Portland Parks & Recreation community garden program needs to keep expanding. While Portland Parks & Recreation currently has 47 community garden sites, only 7 gardens have plots available and there are almost 700 individuals on the waiting list for garden plots. As more people crowd into existing parks and facilities, user conflicts are increasing and the quality of park resources is declining.

Portland Parks & Recreation works to balance the need for expansion of the existing system to address level of service gaps, with the need to adequately reinvest in existing infrastructure.

Improving Access to Parks and Facilities

Lack of access to parks and few connections between parks limits the benefits of the system. Highways, heavy traffic, large taxlots, and industrial properties prevent many Portland residents from accessing park and recreation opportunities. In some situations, if better access were available, including completed sidewalk systems or public access easements acquired, some households not currently considered within ½ mile of an existing park or natural area due to existing street conditions would now be served. Fragmentation reduces optimal conditions and forfeits the immense benefits of a holistic system, because it is more difficult for people to safely and conveniently access a variety of park and recreation facilities.

Maintaining Existing Infrastructure

In 2012, Portland’s extensive park and recreation system had a current replacement value of over $984 million, excluding the underlying land. The condition of the system directly influences its ability to provide users with quality recreation experiences.

Preserving and improving the condition of a park, facility or natural area requires regular maintenance, which in turn requires sufficient funding. However, Portland Parks & Recreation is currently only able to reinvest 1-2% of an assets value annually, half of the industry standard of 2-4%. This is not sufficient to maintain the City’s facilities and provide the services that the residents of Portland expect.

While the Bureau has identified specific maintenance needs and is currently addressing the most serious needs, Portland Parks & Recreation continues to lack sufficient funds to maintain its assets properly. Improving the level of maintenance and repair of the existing system to sustainable levels would require nearly $35.2 million more in resources each year.

Portland Parks & Recreation has instituted an asset management program to ensure the provision of high-quality facilities, provide for long-range capital planning, and develop best management practices. Asset Management enables Portland Parks & Recreation to better determine acquisition and capital improvement needs, develop appropriate levels of maintenance, and determine which assets to acquire and dispose of in order to develop a stable asset portfolio that meets service needs.

Accommodating Growth

Parks and recreation facilities are an important contributor to quality of life in the City of Portland and essential public infrastructure. They provide not only a place to recreate and find respite, but also improve the environmental, social, and physical health of the community. Maintaining Portland's quality of life will require preserving access to high quality park and recreation experiences by acquiring and protecting park lands, maintaining existing facilities, and providing additional recreation facilities and services. The actual number of parks and facilities necessary will vary based on where and how growth occurs, the ability of existing facilities to serve additional users, and opportunities to locate and build additional parks and facilities. Generally, Portland Parks & Recreation's approach of providing services in underserved areas is how Portland Parks & Recreation plans to address needs related to growth.

Growth and increasing density will provide other challenges as well. Increased development will make acquiring new parks and retaining tree canopy more difficult, as development reduces the number of parcels available for parks and natural areas. Heightened competition for a fixed amount of land drives up prices. Growth may also place additional pressure on heavily utilized facilities, such as pools, and exacerbate needs in currently underserved areas. These pressures may be particularly acute in dense urban centers that currently lack sufficient park amenities, where both existing facilities and acquisition opportunities are scarce.

Currently, the City assesses a Park Systems Development Charge (SDC) on new residential and commercial construction to partially offset the costs associated with providing park services to new development. SDC funds are restricted to land acquisition and capital improvements in areas of population growth and new development. SDC funds cannot be used to correct existing parkland deficiencies, nor can they be used to meet the equally vital operations or maintenance needs. At a rate that is 75% of the targeted recovery rate, the SDC assessment does not fully offset the true costs of park development in Portland.

Meeting Increasingly Diverse Community Needs

Portland's system of parks and recreational activities includes a wide variety of facilities and programs. Over time, the recreational needs of Portland have and will continue to grow and evolve. Pickle ball has been replaced with Footsal, the waitlist for community gardens is growing and wading pools are obsolete.

Meeting the needs of a growing and diversifying population is a fundamental challenge for Portland Parks & Recreation. Open space is generally viewed as our most flexible and valuable asset. We are, however, asked to accommodate an increasing number of single use and specialized activities that require dedicated land. These facilities, including off-leash dog areas, community gardens, spray parks, skateparks, and disc golf courses provide valuable recreation opportunities to a wide variety of users. However, providing for these facilities, requires space and resources within a finite park system.

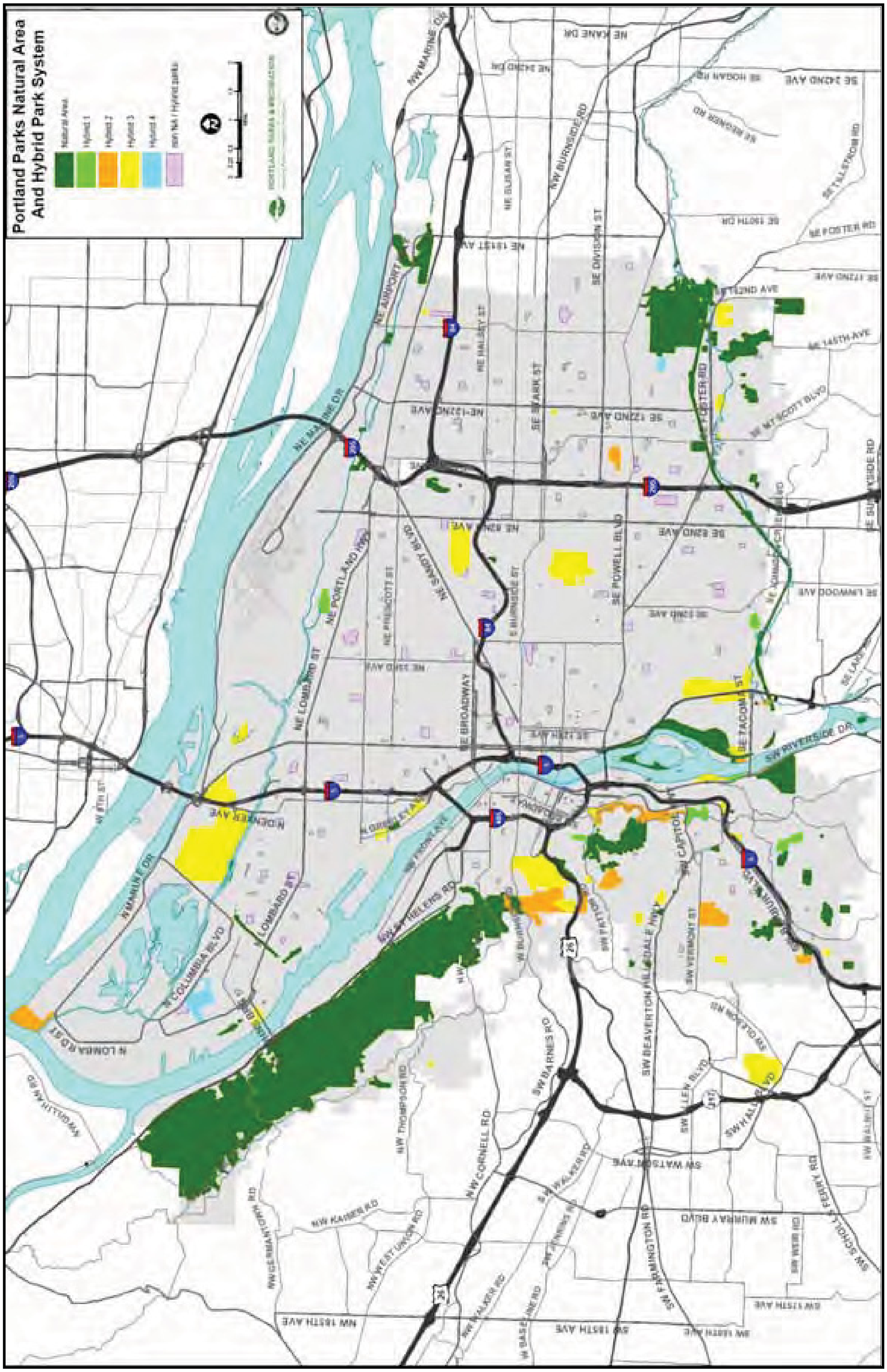
As Portland's demographics continue to change, recreational facilities and programs need to be able to accommodate the needs of growing cultural and ethnic communities. Currently, in order to address the needs of diverse communities, PP&R incorporates community feedback into the planning of new park facilities, and to the programming of facilities. Parks will need to further increase its investment in the diverse populations of the city by deepening its inclusion efforts in decision making.

Different perspectives will provide a richer analysis to factors including current distribution, service areas, and capacity; current and projected demand; available locations; demographics; and resources when planning for and siting new facilities.

Protecting Portland's Natural Resources

Portland's natural areas and urban forest provide innumerable environmental, economic, and health related benefits to the city. Natural area settings in Portland include forests, meadows, wetlands, streams, and riverbanks. Portland Parks & Recreation currently protects more than 7,700 acres of natural areas. The 7,700 acres currently managed by PP&R as natural area are primarily forest and represent the range of forest types naturally occurring in the region including upland Douglas fir stands, ash and cottonwood riparian forests, and younger deciduous forest types. The system includes some open woodlands, such as those dominated by Oregon white oak, and less frequently includes shrublands and grasslands, including wetland marshes and scrubs, which offer unique habitat features. Hybrid Parks are both managed as natural areas, and have portions that are developed.

Figure 9.2 Natural Area System



Protecting natural resources is very important to most residents who look to parks to maintain the quality of life and the quality of environment. As existing open space is developed, more people will seek and use park system resources — crowding into existing parks and facilities, escalating user conflicts, and degrading resource quality.

The City's Natural Area Acquisition Strategy (2006), focuses future acquisitions on protecting large, sustainable tracts of land and examples of exceptional value for habitat and watershed health. Of primary importance is protecting a large forested site on Portland's east side, including additional land at Kelly, Powell, and Clatsop Buttes. These, and other "last, best places" in Portland must be protected, as once developed they can never be returned to their natural state.

The urban forest, which includes all the trees and shrubs in the city, provides environmental, social and economic benefits to Portland's residents in the form of increased biodiversity, improved air quality, stormwater mitigation, improved neighborhoods and increased property values, and many others. Management of this important resource is led by Portland Parks and Recreation but shared among many city bureaus that have an interest in its improvement and well-being. These bureaus have developed an action plan to realize the goals of the 2004 Urban Forest Management Plan. The action plan calls for diverse activities to meet Urban Forest Management Plan goals and outcomes; activities such as education and stewardship, research and monitoring, planting and maintenance, and policy and regulatory improvements.

Portland's street and park trees form a sustainable resource vital to the city's environmental, social, and economic health. Portland's street and park trees cost the city and private property owners just over $6.5 million annually to maintain, yet provide nearly $27 million worth of environmental and aesthetic benefits1. For every dollar invested, $3.80 worth of benefits is returned. In fact, the Urban Forest Master Plan calls for expanding the urban forest canopy to cover 33 percent of the city and increasing street tree stocking levels, especially in underserved neighborhoods. Although these public trees provide a large return for

[1] Portland's Urban Forest Canopy – Assessment and Public Tree Evaluation (2007)

the investment, opportunities exist to further improve the structure and management of the urban forest on public and privately owned property. To maximize benefits, Portland Parks & Recreation and its partners are focusing efforts on retaining and expanding existing canopy, planting the right tree in the right place, planting large-growing species where appropriate, and keeping trees healthy. Portland Parks & Recreation and Bureau of Development Services also recently partnered in an effort to update the tree code, which covers privately owned land and was adopted by City Council in April 2011.

The city's urban forest faces a number of challenges. First, canopy cover is being lost to development, particularly in areas of southwest and outer east Portland. Traditional development patterns often involve significant losses of tree canopy cover and increases in impervious surfaces which limits areas for replanting, particularly large tree species. These changes can result in increased stormwater volumes and air temperatures, and heighten pressures placed on hillsides and streams. The urban forest is also threatened by the rise in invasive plants and animals. These invasive species can stress the ability of natural species to survive. Invasive pests and diseases can have sudden and devastating effects on the urban forest especially in areas that lack age and species diversity.

Managing Park, Recreation, and Natural Resources

Portland Parks & Recreation is developing a System Plan that will provide a holistic and comprehensive approach to park acquisition, management, programming, and resource protection. Portland Parks &

Recreation is also developing master plans to guide development, management and funding decisions to optimize resources and meet needs.

Portland Parks & Recreation is developing accurate inventory and assessment information for all assets, both capital and non-capital. Without valid, reliable information on which to base management decisions, it is difficult to effectively anticipate and prepare for new park uses, or manage green infrastructure resources like the urban forest. The City does not have a complete inventory of private trees, but recognizes that more than half of the tree canopy of the urban forest is located on privately owned land. Basic information such as canopy cover, species diversity and distribution is needed for proactive management.

Funding the City's Park, Recreation, and Natural Area System

In the fiscal year 2012/13 adopted budget, Portland Parks & Recreation will spend just under $100 million to operate, maintain, and expand Portland's park system. Over 40% of Portland Parks & Recreation's financial support comes from the city's General Fund (i.e., discretionary resources that the Council allocates). In addition to the discretionary General Fund revenue, Portland Parks & Recreation receives revenue from system development charges, user fees, interagency agreements, and a variety of other sources. A small (and unpredictable) fraction of Portland Parks & Recreation's budget comes from grants and donations. Portland Parks & Recreation also periodically raises fees to provide the variety and scope of programs that the public needs and wants. Scholarships are available to mitigate the effect this may have on those on fixed incomes or with lower incomes.

Portland Parks & Recreation operating expenses have risen steadily in recent years due to increasing use, utility costs and an aging park infrastructure, as well as construction of new facilities to accommodate a growing population and demand for different recreation activities. Unfortunately, over many decades, park system funding has not kept up with needs. Numerous parks need major renovation and many recreation facilities are in poor condition. Funding is not available for routine maintenance of park trees, and Portland Parks & Recreation's Urban Forestry program does not have a sustainable source of funding for tree replacement or canopy expansion.

Insufficient funding for public schools also has budget impacts on parks and recreation. As public schools cut youth programs, Portland Parks & Recreation's role as the state's second-largest provider of youth programs becomes even more vital. Portland Parks & Recreation now provides many of the arts, athletics and recreation programs that schools cannot.

Regulatory Compliance

Portland Parks & Recreation works to meet all regulatory requirements in the development and maintenance of its assets. Federal, State, Regional, and City legislation and mandates affect how Portland Parks & Recreation operates and manages its park system. Examples of legislation at all levels that affect Portland Parks & Recreation include:

Federal

- Federal Emergency Management Agency (FEMA)(floodplain regulations)
- Endangered Species Act
- Americans with Disabilities Act
- National Historic Preservation Act

State

- Department of Environmental Quality
- Statewide Comprehensive Outdoor Recreation Plan (SCORP)
- Statewide Planning Goals 2, 4, 5, 7, 8, 9, 10, 11, 15
- Oregon Recreation Trails System Act

Regional

- Metropolitan Greenspaces Master Plan
- Metro 2040 Growth Concept
- Regional Framework Plan

Local

- City of Portland Zoning and Building Permit Code Requirements
  For example, changes in these codes related to Americans with Disabilities Act (ADA) compliance, or the recent State of Oregon regulation change related to wading pools impact both existing and future assets. Portland Parks & Recreation works to modify the system as necessary to meet regulatory requirements. The State of Oregon regulation change related to wading pools meant closing all wading pools in the Portland Parks & Recreation system. Some wading pools have been converted to water play features, which spray water into the air; more are planned for conversion in the future.

Goals & Policies

Draft Goals and Policies related to Parks & Recreation facilities and services can be found in Chapter 5. Key Infrastructure Policies.

Desired Levels of Service

Portland Parks & Recreation has two defined level of service goals, from its adopted Parks Vision 2020:

- Provide a developed park or natural area within ½ mile from every household
- Provide a full-service community center within 3 miles of every household

More asset-specific service goals are outlined in Technical Papers, and as Bureau Performance Measures, identified in the Portland Parks & Recreation Strategic Plan. As Portland Parks & Recreation continues development of its new System Plan, it will continue refinement of recreational feature levels of service.

Capital Improvement Program (CIP) Strategy

Portland Parks & Recreation's Capital Planning Process is outlined in the Portland Parks & Recreation Capital Planning Manual (2009). The goals of the Capital Planning Process are to:

- Protect and maintain those existing assets that provide desired levels of service through maintenance, rehabilitation and renewal that extend the life of the asset.
- Provide new service and expand capacity that accommodates growth and provides equitable levels of service through the expansion of existing facilities and the construction of new parks and facilities. Improve efficiency, environmental quality and energy conservation wherever possible.

Portland Parks & Recreation updates its Capital Project List annually. The list identifies projects on a 1-5 year CIP timeframe, a 5-10 year CIP timeframe, and a 10-20 year timeframe. PP&R, BES, and the Water Bureau are investigating the possibility for modifying capitalization definitions so that the city can capitalize many of the important green infrastructure assets, including trees, which are not currently capitalized. See the Investment Strategy section later in this chapter for more detail on the Portland Parks & Recreation Capital Planning process and project criteria, and Appendix A for a summary list of the PP&R 20 year Capital Project List.

Inventory

Built Infrastructure

Portland Parks & Recreation's built infrastructure system is currently valued at over $984 million, see Table 9.1. This is based on 5 main types of assets, with green infrastructure being the largest percentage of the overall replacement value, at $405 million. Buildings and pools are the next largest category, at $228 million. This multitude of parklands, recreation facilities, support facilities, trees, and natural areas contribute to access to nature, recreational opportunity, environmental quality, and livability within the city.

Besides Portland Parks & Recreation, Metro is the largest park and natural area provider in the city. Metro's inventory includes significant natural habitat areas, including the over 2,000 acre Smith & Bybee Wetlands, as well as Glendoveer Golf Course, the M. James Gleason Memorial Boat Ramp on the Columbia River, and fourteen pioneer cemeteries. Metro also owns and operates the Oregon Zoo, the Oregon Convention Center, the Portland Center for the Performing Arts, and the Portland Metropolitan

Exposition Center. State parks, public schools, cemeteries, and other open spaces also provide park and natural area opportunities.

Table 9.1 Parks & Recreation Asset Groups and Replacement Values, 2012

Capital Asset Class	Value (in millions)
Amenities	$17.6
Buildings and pools	$268.5
Recreation features	$228.6
Built infrastructure	$63.8
Green infrastructure	$405.8
Total Parks	**$984.3**

Table 9.2 Inventory of Portland Parks & Recreation Facilities by Type, 2012

Inventory by Facility Type	
Parks	3,433 acres
Natural Areas	7,762 acres
Regional Trails	152 miles
Community and Arts Centers	18 facilities
Aquatic Facilities	13 pools
Tennis Facilities	124 courts
Athletic Fields	>300 fields
Golf Courses	5 courses
Restroom Buildings	97 facilities
Basketball Hoops	229 hoops
Spray Features and Interactive Fountains	24 facilities
Skateparks	5 facilities
Community Gardens	47 gardens
Playgrounds	125 areas
Stadiums and Sports Complexes	4 facilities
Botanical/Public Gardens	8 gardens
Administrative Facilities	10 facilities
Maintenance Facilities	40 facilities
Off-Leash Dog Areas	32 areas
River Beaches	5 areas
Motorsports raceway	1 area
Reservable Picnic Areas	86 areas

Urban Forest

Portland's public streets, parks, and natural areas host a diverse array of tree types. Nearly 1.5 million trees grow in these public spaces. The street tree population is estimated at 236,000 trees of 171 different types, and over 1.2 million trees of 41 types are found in developed parks (39,000) and natural areas (1.2 million). Replacement of the city's urban forest is estimated at $6 billion.

Broadleaf deciduous trees dominate the landscape, accounting for 85% of street trees and 77% of park trees. Tree size designations (small, medium, and large) are determined by both the functional type and mature tree size of the tree. Parks contain more large-at-maturity trees (64%) and more conifers (23%) than do street rights-of-way. Streets host four times the diversity of tree types than parks, one-third of which are small when mature.

Current Condition

Portland Parks & Recreation is in the process of developing a more formal Asset Management program. Portland Parks & Recreation is working to develop an Asset Register to maintain collected inventory and condition information about its assets. Portland Parks & Recreation has developed an inspection program work plan, and has begun the process of adding routine inspection and condition assessment information into annual operations practices. In general, 20% of all Portland Parks & Recreation assets would be inspected each year, so that condition information on an asset would never be more than five years old.

Table 9.3 illustrates the condition of PP&R's capital assets, as reported in 2012. Some assets have yet to be assessed, but of those that have been, the majority of assets were in fair or better condition. However, 11% of park furnishings were in poor or very poor condition, 4% of major buildings were in very poor condition, 9% of minor buildings were in poor or very poor condition, 24% of marine facilities were in poor condition, 7% of play areas were in poor or very poor condition, 22% of sports courts and fields were in poor or very poor condition, 18% of circulation systems were in poor or very poor condition, 13% of natural areas were in poor or very poor condition, and 11% of developed park landscapes were in poor or very poor condition.

Table 9.3 Current Condition: Parks and Recreation System, 2012

	Current Condition (in %)					
Capital asset type	**Very Good**	**Good**	**Fair**	**Poor**	**Very Poor**	**To Be Determined**
amenities						
furnishings in developed parks	10	38	37	9	2	4
furnishings in natural areas	0	0	0	0	0	100
decorative elements	0	0	0	0	0	100
buildings and pools						
Major buildings	61	9	26	0	4	0
Minor buildings	42	19	29	6	3	0
recreation features						
gathering places	0	0	0	0	0	100
marine	71	0	6	24	0	0
off-leash areas	0	0	0	0	0	100
play areas	3	38	52	5	2	0
sports courts and fields	39	24	15	19	3	0
water play	0	0	0	0	0	100
built infrastructure						
circulation	0	41	40	18	0	0
utilities	0	0	0	0	0	100
green infrastructure						
natural areas	50	31	6	12	1	0
developed areas	10	34	45	7	4	0

Condition of Urban Forest

Tree condition is the health of the tree as manifest in the condition of its bark and leaves. The condition of urban trees reflects species hardiness, site conditions, and maintenance history. Trees that are well suited to Portland's climate, that can adapt to the challenges of growing in an urban environment, and that have been maintained using proper arboricultural techniques are generally the most successful. Urban forest condition also includes the distribution of trees and make-up of the forest in terms of tree species; more even distribution of trees and a wide array of tree species comprise a healthier forest which is more resilient to pests, pathogens and catastrophic events such as storms or climate change

Table 9.4 Current Condition: Street and Park Trees, 2007[2]

	Current Condition (in %)			
Asset type	**Good**	**Fair**	**Poor**	**Dead/Dying**
Tree type				
Street trees	64	28	7	1
Park trees	88	7	5	1

Portland's park trees are in generally better health than its street trees. While roughly the same proportion of park (94%) and street (91%) trees are in fair to good condition, 24% more park trees are classified in good condition. Compared with parks and natural spaces, the street environment – where growing space is limited, soils are generally poor, and automobile exhaust reduces local air quality – is far less hospitable to trees.

Projected Condition

Portland Parks & Recreation is in the process of developing a full Asset Management program, which will provide projected condition information for assets. At this time, Portland Parks & Recreation does not have projected condition information.

Current Capacity

Portland Parks & Recreation has not yet met its level of service goals to have every household within ½ mile of a park or natural area, and within 3 miles of a full service community center. In 2012, 79% of households were within ½ mile of a park or natural area, and 69% of households were within 3 miles of a full service community center.

PP&R's 2020 Vision includes a goal to "Provide a wide variety of high quality recreation services and opportunities for all residents." An objective of this goal, and a measure of our level of service, is to provide a park experience within a half mile (approximately 10 to 15 minute walk) of every Portland resident. The park experience includes developed parks (parks with, at a minimum, grass, trees, circulation, open play areas and seating), and accessible natural areas over 1/6 of an acre in size.

[2] Portland Parks & Recreation, *Portland's Urban Forest Canopy Assessment and Public Tree Evaluation*, October 2007

Map X shows the percentage of households in each neighborhood coalition that are within 1/2 mile walk of a park or natural area. The 1/2 mile distance is calculated using the walkable street and trail system, so parks in areas with poor transportation circulation systems have smaller service areas and serve fewer people. The calculation also takes into account walkability to actual park entry points.

Typically, the districts with lower levels of service are the more recently annexed parts of the city, where former county parks with fewer amenities were added to the system. PP&R is actively working to improve that level of service. In 2010, the percentage of households within a 1/2 mile walk of a developed park or natural area was 77%; in 2011, it was 79%.

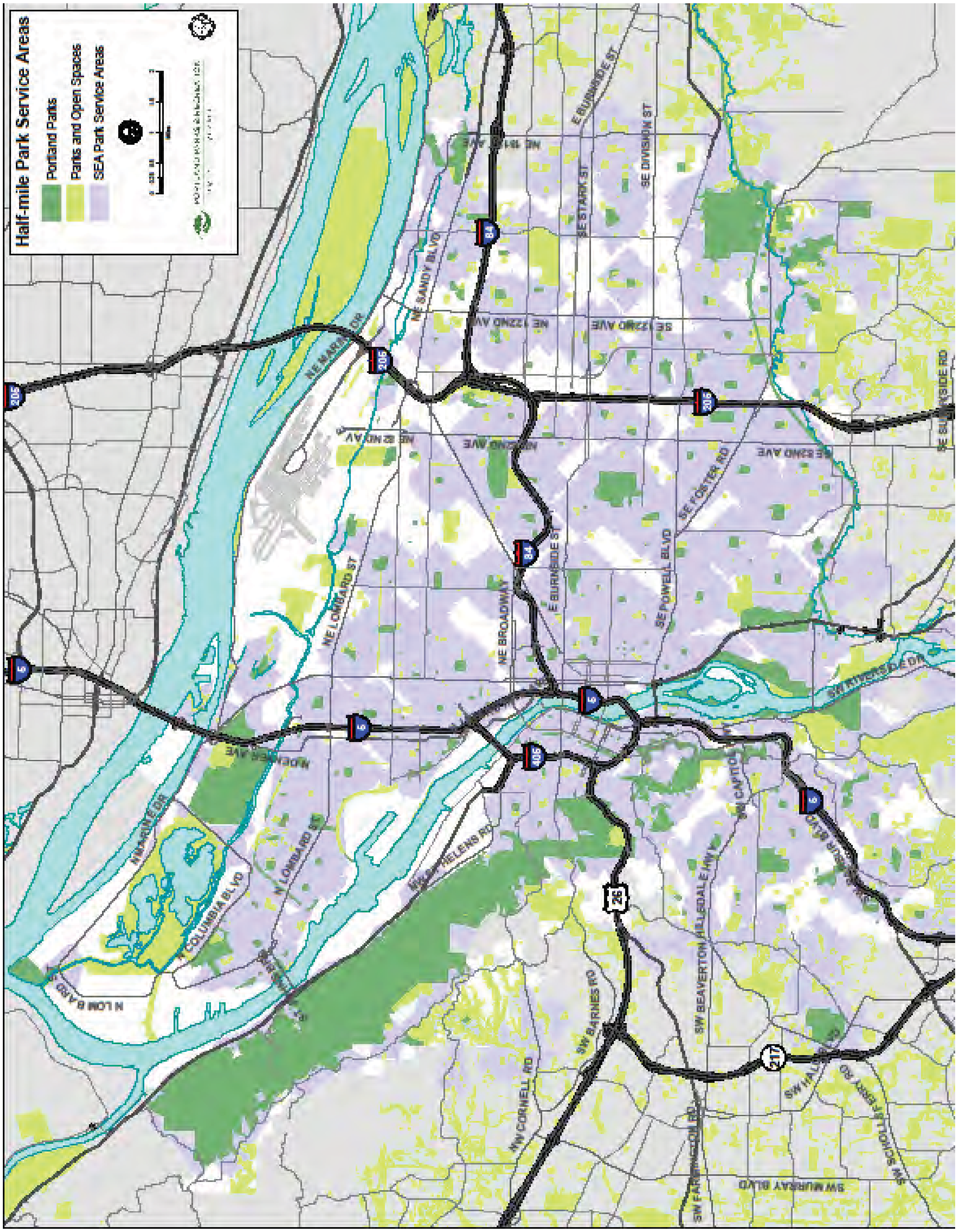
As PP&R works to meet the ½ mile goal, it faces the following challenges:

- Properties with the capacity and characteristics to provide a reasonable park experience are not always available in the areas of greatest need.
- Funds for acquisition of new park land often come with restrictions on how or where they can be used. For example, Service Development Charges (SDC) funds can only be used to address needs created by population growth, not to remedy deficiencies in levels of service. Funds that come from Urban Renewal Areas (URA) are restricted to parks within those geographic areas. These restrictions slow progress in meeting the goal.

The percentage of households within a ½ mile walk of a developed park or natural area does not include undeveloped properties or properties not owned or managed by PP&R.

Map X shows the areas of the city (in blue) that currently meet that ½ mile level of service goal.

Figure 9.3. Portland Parks & Recreation ½ Mile to Park or Natural Area Service Area



PP&R's 2020 Vision includes a goal to "Provide a wide variety of high quality recreation services and opportunities for all residents." An objective of this goal, and a measure of the level of service, is to provide a full-service community center within 3 miles of every Portland resident. A full service community center includes a gymnasium, fitness and classrooms, and a pool.

The 3 mile distance is calculated using the walkable street and trail system, so community centers in areas with poor transportation circulation systems have smaller service areas and serve fewer people. The calculation also takes into account walkability to actual community center entry points.

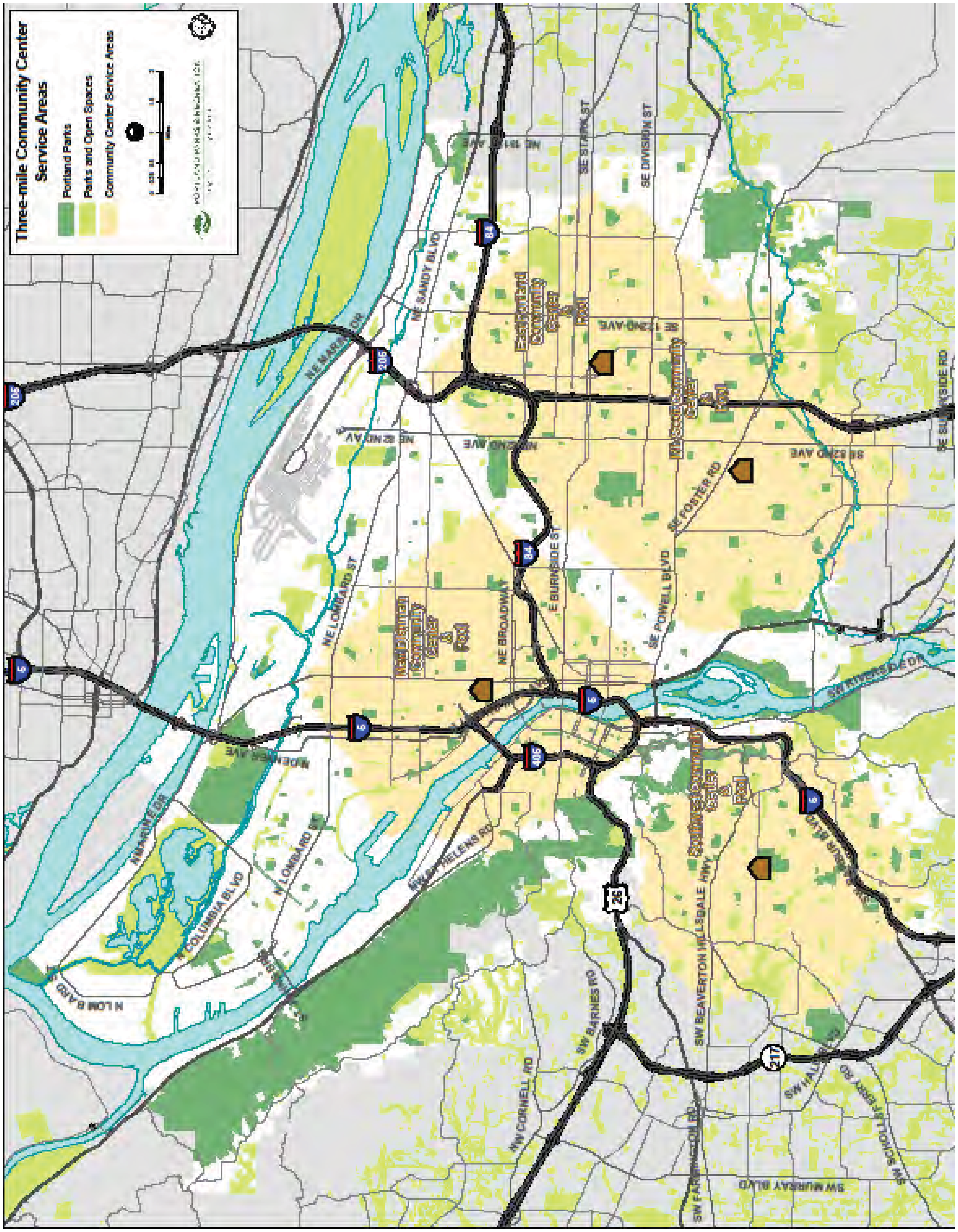
PP&R is actively working to improve that level of service. In 2002, the percentage of households within 3 miles of a full-service community center was 36%; in 2011, it was 69%.

As PP&R works to meet the 3 mile goal, it faces the following challenges:

- Development of a new full-service community center is a major undertaking. Properties with the capacity and characteristics to support a full-service community center are not always available in the areas of greatest need. Furthermore, experience shows that co-locating any community center with a park expands recreation programming options and enriches the participant experience.
- Funds for acquisition of new land and facilities often come with restrictions on how or where they can be used. For example, Parks Service Development Charges (SDC) funds can only be used to address needs created by population growth, not to remedy deficiencies in levels of service. Funds that come from Urban Renewal Areas (URA) are restricted to facilities within those geographic areas. These restrictions slow progress in meeting the goal.

The percentage of households within a 3 miles of a full-service community center does include smaller community centers or other facilities owned by PP&R and managed by partners. Map X shows the areas of the city currently meeting the 3 mile to a full service community center level of service goal.

Figure 9.4. Portland Parks & Recreation 3 Mile Full Service Community Center Service Area



Projected Capacity

Portland Parks & Recreation's level of service goals from its 2020 Vision are to have 100% of residents within ½ mile to a park or natural area, and within 3 miles of a full service community center. Additionally, not all parks or natural areas are developed to the same extent. A successful Portland Parks & Recreation system will meet the goals outlined in 2020 Vision, and will be prepared to continually respond to changes in recreation trends and demands.

Needs & Approach

Portland Parks & Recreation uses community outreach processes to inform design of new park and facility master plans. It occurs in the form of surveys, trend analysis, project committees, open houses, and other specific targeted outreach. Public involvement during initial project planning helps to inform creation of capital projects that are added to the 20-year project list.

Portland Parks & Recreation has strategically mapped the areas of the city that are currently not meeting the 3-mile desired service level for proximity to a full-service community center (see map X), and areas not meeting the ½ mile desired service level for proximity to a park or natural area (see map X), and is working to fill in those gaps. At the same time, Portland Parks & Recreation needs to invest in and maintain existing infrastructure. Portland Parks & Recreation balances the needs for system expansions and maintenance in decision-making.

The PP&R 20-year Capital Project List includes projects to maintain the existing system, and projects to expand or grow the system to meet service level goals. Typically, the 20-year Capital Project List includes development of those new parks where PP&R has acquired property and created a master plan. If all the parks and park facilities on the 20-year Capital Project List were implemented, there would still be some level of service gaps. Additional acquisition is necessary to continue to address those level of service needs, and that acquisition is represented on the 20-year Capital Project List, though until development plans are in place for those future properties, development expenditures are not represented.

Recommended System Improvements

As described in 00.00.06, the Portland Parks & Recreation park system has existing areas that do not meet service level goals. To resolve these deficiencies and to meet goals established in Parks 2020 Vision, Portland Parks & Recreation has identified a need for:

- Approximately 150 acres of new parkland throughout the City, and the development existing park properties, to meet the goal of providing a park within ½ mile of all city residents;
- 75 miles of multi-use trails within the City to connect people and places;
- Civic spaces in dense urban centers;
- Community centers to serve recreation needs in inner southeast, central and outer northeast and distant southeast.
- Additional pools, particularly in outer northeast Portland.
- Play areas, particularly in central northeast and outer east;

- Additional facilities, including skateparks, courts, fields, and community gardens in areas throughout the city.
- 33% tree canopy cover city-wide, canopy increase in low canopy and low-income areas, and tree species composition of no more than 10% of any one species, 20% of any one genus, and 30% of any one family.

Portland Parks & Recreation also continually looks to expand the system to respond to new and emerging recreational trends, and meet changing community needs.

Investment Strategy

Process

Portland Parks & Recreation gathers requests for capital projects from various sources including staff-identified needs, policy documents such as Parks 2020 Vision, park master plans, technical papers, asset register reports as well as from residents and other public agencies. Potential projects are screened and reviewed against community priorities and system-wide needs annually by a review committee, per the criteria outlined on the next page. Each project is given a Capital Project score.

The review committee recommends projects for either the 1 to 5 year Capital Forecast track for implementation, or for the long-range 20 Year Forecast for future consideration. Projects needed to fulfill the bureau's strategic direction or take advantage of project-specific funding opportunities go to the 1-5 Year Capital Project list. Projects with lower priorities and uncertain funding are put on the 20-Year Long-Range Planning Master List. The 20-Year list is reviewed annually and projects are advanced to the 1 to 5-Year list if they are deemed necessary, have funding, and there is sufficient staff to manage and implement the projects. Both lists are adjusted annually based on changing needs, funding, resource availability and priorities. The final list of recommended projects is considered by the Parks Budget Committee (in 2012-2013 this was the Portland Parks Board), the public and the mayor during the annual budget process. A summary of all projects currently on full 20 year Capital Project list is provided in the Table 9.5. The full list is available in Appendix A.

Once projects are completed, they will be entered into the Bureau Asset Register (under development). Once assets are built, the Bureau tracks asset condition, value, and maintenance of replacement needs. These needs are then submitted as capital requests in ensuing years.

Contributing Plans

Projects added to the Portland Parks & Recreation Capital Project List come from many different sources. Plans referenced include Parks 2020 Vision, Master Plans, Technical Papers, System Plans, and Asset Management Plans. Other sources include field staff requests, community-initiated requests through the Park Proposal Process, or projects that originate through specific funding opportunities like grants, gifts, or sponsorships.

Alternatives Analysis/Prioritization Process

Portland Parks & Recreation has developed prioritization criteria for its capital projects. The criteria are included in the Portland Parks & Recreation Capital Planning Manual (2008). Each project is rated and given a score, based on the following considerations:

- **Legal Compliance**: Project is necessary to meet a legal mandate, directive by Council, condition of Land Use Review, contractual obligation, etc.
- **Public Support**: Project has documented or anticipated public support.
- **Conforms to City or Portland Parks & Recreation Plans**: Project is vital to Portland Parks & Recreation mission and Vision 2020 goals, is part of a Portland Parks & Recreation master plan, City plan, Urban Renewal Area plan, or continues a prior project.
- **Improves Level of Service**: Provides new service or improves existing service for identified need to a significant population.
- **Human Health & Safety**: Project alleviates significant, minor or potential existing health or safety hazard; improves general health and safety.
- **Protects Capital Assets or Facilities**: Project is critical to save structural integrity of existing facility or repair significant structural deterioration, or repairs important systems/deters major future expenditure, or increases life expectancy of the asset.
- **Environmental Quality**: Improves environmental quality of a large area, facility, or neighborhood, or improves local environmental quality or prevents environmental damage.
- **Financing/Business Opportunity**: Project has outside financing, donation, or business opportunity that covers 50% or more of the cost.

Investment Strategy

Portland Parks & Recreation has identified many infrastructure needs over the next 20 years to meet the level of service goals outlined in the Parks 2020 Vision, including necessary expansions to the system, and maintenance of existing assets. The Portland Parks & Recreation 20-year CIP list illustrates the identified CIP projects at this time. Where Portland Parks & Recreation has not yet acquired property or developed a master plan for a site, those projects are not reflected on the Portland Parks & Recreation CIP list. Tree maintenance and canopy expansion investment amounts have yet to be identified.

Examples of projects and programs PP&R will be working to implement are summarized below.

Acquisition Program

- Acquisition for developed parks, natural areas, trails, recreation and maintenance facilities. Priorities would include acquisition of land to:
  - Accommodate growth by maintaining a relatively equivalent city wide level of service in areas where growth is occurring
  - Correct deficiencies by providing parks in park-deficient areas
  - Connect to and complete trail systems

  - Protect and enhance natural resource systems
  - Eliminate park in-holdings or expand existing park land, and
  - Effectively operate and maintain Portland's park system.

Maintenance of Existing Parks, Natural Areas, Trails, and Facilities

- Maintenance or replacement of assets that have reached the end of their useful life

Development of New Community Centers

- Washington-Monroe
- Additional Community Centers in areas not currently within 3 miles of an existing full service community center

Development of New Parks

- Beech Park
- Cherry Park
- Chimney Park
- Clatsop Butte Park
- Errol Heights Park
- Floyd Light Property
- Gates Property
- Gateway Green
- Gateway (urban plaza)
- Gilbert Primary Park
- Hazeltine Property
- Hillsdale Park
- Lynchwood Park
- Mill Park
- Mock's Crest
- North Powellhurst Park
- Parklane Park
- Spring Garden Park
- SW Thomas & 53rd Property
- Thomas Cully Park
- Thompson park
- Werbin Property
- Wilkes Headwaters Property
- Development of additional new parks or natural areas in areas not currently within ½ mile of an

existing park or natural area

Improvements at Existing Developed Parks

- Cathedral Park
- Columbia Children's Arboretum
- Couch Park
- Crystal Springs Rhododendron Garden
- East Holladay Park
- Hillsdale Park
- Leach Botanical Garden
- Lents Park
- Mt. Tabor Park and Yard
- Spring Garden Park
- Washington Park
- Waterfront Park
- Westmoreland Park
- Willamette Park

New Trails / Improvements to Existing Trails

- Columbia Slough/ Columbia South Shore Slough Trail
- Marine Drive / Bridgeton Trail
- Mt Scott Scouters Mountain Trail
- North Portland Greenway
- Red Electric Trail
- Sullivan's Gulch

Natural Area Parks

- April Hill Natural Area
- Beggars Tick Natural Area
- Buttes Natural Area Complex (Clatsop Butte, Buttes NA, Mitchell Creek Natural Area, Kingsley D. Bundy)
- Elk Rock Island Natural Area
- Errol Heights
- Forest Park
- Deardoff Creek and Wahoo Creek Natural Areas
- Lower Powell Butte Floodplain
- Marshall Park (including Jensen and Foley Balmer properties)

- Oaks Bottom/ Ross Island/ Oaks Crossing
- River View Natural Area
- Stephens Creek Nature Park
- Southwest Waterfront Parks (Powers Marine, Willamette Moorage, Butterfly and Cottonwood Bay)
- West Portland Park Natural Area
- Whitaker Ponds
- Woods Park Natural Area

Financial Strategy

Existing Financing Strategies

Definition and Use

The primary sources of revenue to the Parks Capital Improvement Program Fund include service charges and fees from the System Development Charges (SDC) program, Metro Bond local match, General Fund discretionary, local, state & federal grants, and the Portland Development Commission. The Portland Parks & Recreation system has also grown and replaced assets when necessary due to the passage of a bond or levy approximately every decade.

As Portland Parks & Recreation creatively seeks alternative funding sources to respond to priority needs, some types of projects are more readily funded than others. The System Development Charge (SDC) and tax increment financing in urban renewal areas are sources of funding for land acquisition and project development. This is especially true where population growth and capacity-driven needs are the underlying premise to development, since SDC funds are specifically intended to be used to build new parks and facilities to respond to increased park demand that results from new development and growth, and urban renewal area funds are required to be used in those specific geographic urban renewal areas. However, for most existing infrastructure these types of resources are not available. Finding alternative solutions to fund major capital improvements for existing infrastructure as well as improved ongoing operations and maintenance are major challenges. However, options are being explored to meet these challenges.

Anticipated Revenues

On average, Portland Parks & Recreation has been receiving approximately $1M annually from General Fund discretionary to address major maintenance, and approximately $5M from System Development Charges (SDC), Portland Development Commission (PDC), and grants/donations. These figures fluctuate and will change over time. As more development occurs, Portland Parks & Recreation will receive more SDC funds. PDC funding has been reduced as Urban Renewal Areas expire and PDC shifts its investment focus from community infrastructure development to economic development.

Financial Challenges, Unmet Needs and Risks

Portland Parks & Recreation does not receive adequate capital revenues annually to address identified capital needs. Portland Parks & Recreation reported an estimated $83.9 million annual capital funding gap in 2012, including both maintenance to existing assets and expansions of the system to address deficiencies in service. This funding gap represents the total of projects on Portland Parks & Recreation's 1-10 year Capital Improvement Project list, minus anticipated annual revenues for capital projects, amortized over 10 years.

PP&R has an expected total capital annual funding need of $89.9 million for each of the next 10 years. PP&R receives an average of $5 million annually in System Development Charge funds, plus grants and donations. Additionally, City Council has been able to provide about $1 million annually to address some of the most urgent needs for repair, rehab and replacement and mandated work. This totals an average of $6 million annually available for capital, leaving a funding gap of $83.9 million. This includes $48.7 million for expanding the system to provide standard levels of service for all residents, in addition to $35.2 million in funding needed to maintain existing assets. Where Portland Parks & Recreation has not yet acquired properties to fill service level gaps, there will be additional need to acquire and develop those properties, which are not currently represented on the Capital Improvement Project list. This would further increase the funding gap.

Table 9.6. Portland Parks & Recreation Annual Funding Gap, 2012

	Value* (in millions)			
Capital asset type	**R/R/R**	**Mandate**	**Capacity**	**Total**
Amenities	$0.1	$0.1	$0.1	$0.3
buildings and pools	$10.3	$3.8	$20.5	$34.6
recreation features	$6.0	$2.4	$4.4	$12.8
developed park	$4.8	$0.0	$16.7	$21.5
built infrastructure	$5.6	$0.4	$6.3	$12.3
green infrastructure	$1.7	$0.0	$0.6	$2.4
Subtotal	$28.5	$6.7	$48.7	
Total Current Assets	**$35.2**			
Total Parks				**$83.9**

R/R/R: (Repair, Rehabilitation, Replacement): Additional funding necessary to repair, rehabilitate and replace existing assets to bring them up to established service levels. Also includes replacement of assets considered functionally obsolete (not meeting established service levels).
Mandate: Additional funding necessary to improve existing assets to meet regulatory requirements, exclusive of improvements that fall under R/R/R or Capacity
Capacity: Additional funding necessary to meet the demands of existing customers, based on established levels of service.

Alternative Strategies

Portland Parks & Recreation will need to examine options to increase available funding for expansion and maintenance of its park system. Some options could include:

Park Bonds

Continue working with City Council and Portland taxpayers to periodically pass park bonds to address capital maintenance and system expansion. Historically, Portland Parks & Recreation's park system has developed with the assistance of a park bond approximately every decade.

Dedicated Funding for the Urban Forest

The Urban Forest Management Plan calls for the establishment of sustainable funding for the urban forest. Funding sources considered in a 2009 study by Davey Resources Group includes a property frontage fee, among other options.

Increasing Partnerships

Portland Parks & Recreation continues to look for opportunities to develop public-private partnerships to help expand the park system.

Maximizing public use of sports fields

Portland Parks & Recreation has developed a joint-use agreement with Portland Public Schools regarding use of some sports fields, and continues to work with surrounding school districts and organized sports groups to look for mutually beneficial joint use opportunities. A recent partnership in the enhancement of Buckman Field is a good example.

Summary

Portland Parks & Recreation will need to continue to be aware of and implementing best practices and innovative funding techniques used in other jurisdictions may yield other alternative strategies.

If Portland Parks & Recreation is not able to increase funding to address its funding gap, the condition of its assets will worsen, and Portland Parks & Recreation will need to either:

- Reduce levels of service (remove some assets from the system) or;
- Manage a system of assets that is operated with higher levels of risk to the user and organization.

Chapter 10
Civic Facilities

Future drafts of the Citywide Systems Plan may include more detailed inventory and investment information for civic facilties, including police, fire, technology and public buildings and spectator facilities, to provide a more comprehensive plan for the City's infrastructure assets. These assets are provided by the Office of Management and Finance, Portland Police Bureau, and Portland Fire and Rescue.

Facility planning for civic facilties is not a required component of periodic review, Oregon Goal 11, or Oregon Revised Statute 197.

Appendix A
Investment Strategy

This appendix contains a draft Investment Strategy for the Bureau of Environmental Services, Portland Water Bureau, Bureau of Transportation and Portland Parks & Recreation. The projects and programs included in the Investment Strategy are intended to maintain existing assets, comply with regulatory mandates, and provide key levels of service to existing and future residents and businesses.

More information on how each Bureau's draft Investment Strategy was developed can be found in the relevant section of this appendix.

As part of the update to the Comprehensive Plan and to meet public facility planning requirements, the City must also adopt a List of Significant Projects. The List of Significant Projects is intended as a long-term plan for meeting the infrastructure needs of residential and employment growth allowed and planned for by a city's land use designations. The List of Significant Projects will include a subset of projects included in the Citywide System Plan's Investment Strategy. A List of Significant Projects for transportation, water, sewer and stormwater will be included in the proposed draft of the Citywide Systems Plan in 2014.

Project Maps

Explore and comment on interactive maps of the infrastructure projects included in Appendix A through the online **Comprehensive Plan Map App** at
http://www.portlandoregon.gov/bps/pdxcompplan/mapapp/

Bureau of Environmental Services

The draft Bureau of Environmental Services (BES) project list is organized programmatically rather than by individual projects. It is based on existing system plans and includes programs for treatment plant upgrades for capacity and regulatory compliance; programs for maintenance of the treatment plants, pump stations, collection system pipes; pipe capacity projects by sanitary and combined sewer basins; watershed programs for each of the major watersheds; a stormwater program area to address system connectivity and water quality; and a sanitary sewer extension program.

The Bureau focuses efforts on comprehensive, multi-purpose solutions in the highest priority areas for work in all four program areas of the Investment Strategy. The Bureau anticipates approximately $2 billion in investment in these programs over the next twenty years. The list assumes that rates are set at a level that is sufficient to meet agreed upon levels of service.

Bureau	Project ID	Capital Program	Project Title	Project Description	Location	Area	Project Objective	Driver	Estimated Cost by Time Period FY 2013-14	FY 2014-15	FY 2015-16	FY 2016-17	FY 2017-18	Total FY 2014-18	FY 2018-22	FY 2022-32	Grand Total FY 2014-32	Funding Source(s)	Facility Provider (Partners)
BES	E10245	Sewage Treatment	CBWTP Improvements	This program includes a number of mid-size improvements at the Columbia Boulevard Wastwater Treatment Plant. CBWTP such as: Seismic Improvements, Outfall Diffuser Extension, Access / Egress Improvements, Bio-Solids Dryer, Dewatered Sludge Hopper, TWAS Piping Ugrade, Centrifuge. Also includes expansion to Secondary Treatment, if required. All are consistent with the Facilities Plan and the Conditional Use Master Plan.	Columbia Blvd Wastewater Treatment Plant	All	Efficiency & Expansion	Populati on growth/ regulatio ns	10,950,000	4,325,000	11,513,000	10,540,000	8,516,000	45,844,000	45,964,000	40,000,000	131,808,000	Bonds	BES
BES	E10234	Sewage Treatment	TCWTP Improvements	Improvements, as identified in the facilities plan - update due by January 2014. Anticipated projects include upgrade to the headworks/screenhouse, upgrades to the primary clarifier, and construction of an additional secondary clarifier.	Tryon Creek Wastewater Treatment Plant, Lake Oswego	SW	Efficiency & Expansion	Populati on growth/ regulatio ns	216,000	210,000	172,000	6,291,000	6,854,000	13,743,000	32,632,000	10,000,000	56,375,000	Bonds	BES
BES	E04661	Sewage Treatment	Pump Station Improvement Program	Program to refurbish or upgrade pump stations not in compliance with current codes, not operating reliably, need improvements because of growth in the receiving sewage basin, and/or are over 20 years old with out-of-date equipment. The Pump Station Improvement Plan guides the selection of projects. This program was developed to ensure the 98 pump stations are maintained in accordance with a scheduled plan to increase pump station reliability.	Citywide	All	Maintenance & Efficiency	Level of Service	13,810,000	12,091,000	4,000,000	4,000,000	4,000,000	37,901,000	20,000,000	40,000,000	97,901,000	Bonds	BES
BES	E04891	Sewage Treatment	Rehab, Repair, and Modifications	This project provides for annual reinvestment in the treatment facilities to protect capital investment and enhance system reliability. It provides best management practice to prevent probable violations of NPDES permit. The aging Columbia and Tryon Creek plants require regular investment. Projects include equipment replacement, capacity upgrades, restoration of a facility to its original condition and renewal of useful life for more than 10 years, and regulatory mandates.	Columbia Blvd and Tryon Creek Wastewater Treatment Plants	All	Maintenance & Efficiency	Level of Service	2,000,000	2,000,000	2,000,000	2,000,000	2,000,000	10,000,000	10,000,000	20,000,000	40,000,000	Bonds	BES
BES		Maintenanc e & Reliability	Sewage Pipe Rehabilitation	Based on regular inspection, this program rehabilitates the highest risk pipes.	Citywide	All	Maintenance	Level of Service	41,413,000	51,869,000	42,924,000	31,285,000	19,583,000	187,074,00 0	144,700,00 0	250,000,000	581,774,000	Bonds	BES

Bureau	Project ID	Capital Program	Project Title	Project Description	Location	Area	Project Objective	Driver	Estimated Cost by Time Period FY 2013-14	FY 2014-15	FY 2015-16	FY 2016-17	FY 2017-18	Total FY 2014-18	FY 2018-22	FY 2022-32	Grand Total FY 2014-32	Funding Source(s)	Facility Provider (Partners)
BES		Maintenance & Reliability	Holladay/Stark/ Sullivan - capacity upgrades	Based on the Systems Plan, program adds capacity by upsizing pipes and/or adding surface infiltration facilities. Projects are prioritized base on risk and benefit/cost. Work also includes high priority pipe rehabilitation, if located within the project area.	Spans NE Broadway, narrowly to 24th, then north to Fremont and south to Stark. Below I-84, extends to I-205.	NE/SE	Capacity	Level of Service	500,000	1,000,000	3,000,000	3,000,000	3,200,000	10,700,000	12,000,000	12,000,000	34,700,000	Bonds	BES
BES		Maintenance & Reliability	Beech/Essex - capacity upgrades	Based on the Systems Plan, program adds capacity by upsizing pipes and/or adding surface infiltration facilities. Projects are prioritized base on risk and benefit/cost. Work also includes high priority pipe rehabilitation, if located within the project area.	Willamette River east to Grand between Knott and Alberta.	NE	Capacity	Level of Service	0	100,000	900,000	4,500,000	4,000,000	9,500,000	9,000,000			Bonds	BES
BES		Maintenance & Reliability	Oak - capacity upgrades	Based on the Systems Plan, program adds capacity by upsizing pipes and/or adding surface infiltration facilities. Projects are prioritized base on risk and benefit/cost. Work also includes high priority pipe rehabilitation, if located within the project area.	Willamette River to NE 24th, between Irving and Stark.	NE/SE	Capacity	Level of Service	2,000,000	100,000	0	0	500,000	2,600,000	20,000,000			Bonds	BES
BES		Maintenance & Reliability	Taggart/Insley - capacity upgrades	Based on the Systems Plan, program adds capacity by upsizing pipes and/or adding surface infiltration facilities. Projects are prioritized base on risk and benefit/cost. Work also includes high priority pipe rehabilitation, if located within the project area.	Willamette River to NE 60th between Stark and the south city limit.	SE	Capacity	Level of Service	7,700,000	6,200,000	2,200,000	900,000	3,800,000	20,800,000	5,000,000	15,000,000		Bonds	BES
BES		Maintenance & Reliability	Wheeler - capacity upgrades	Based on the Systems Plan, program adds capacity by upsizing pipes and/or adding surface infiltration facilities. Projects are prioritized base on risk and benefit/cost. Work also includes high priority pipe rehabilitation, if located within the project area.	Willamette River, Grand, Prescott, 24th, Hancock.	NE	Capacity	Level of Service	400,000	1,300,000	4,300,000	4,300,000	0	10,300,000	0	0		Bonds	BES
BES		Maintenance & Reliability	Alder - capacity upgrades	Based on the Systems Plan, program adds capacity by upsizing pipes and/or adding surface infiltration facilities. Projects are prioritized base on risk and benefit/cost. Work also includes high priority pipe rehabilitation, if located within the project area.	Willamette River to SE 42nd between Stark and Hawthorne; south to include Ladds Addition.	SE	Capacity	Level of Service	0	100,000	1,600,000	5,200,000	11,600,000	18,500,000	22,500,000	0		Bonds	BES
BES		Maintenance & Reliability	NE 13th Ave Basin - capacity upgrades	Based on the Systems Plan, program adds capacity by upsizing pipes and/or adding surface infiltration facilities. Projects are prioritized base on risk and benefit/cost. Work also includes high priority pipe rehabilitation, if located within the project area.	Vancouver, Columbia Blvd, NE 42nd, Prescott	NE	Capacity	Level of Service	500,000	1,300,000	1,400,000	5,000,000	8,000,000	16,200,000	1,200,000	0		Bonds	BES

Bureau	Project ID	Capital Program	Project Title	Project Description	Location	Area	Project Objective	Driver	Estimated Cost by Time Period FY 2013-14	FY 2014-15	FY 2015-16	FY 2016-17	FY 2017-18	Total FY 2014-18	FY 2018-22	FY 2022-32	Grand Total FY 2014-32	Funding Source(s)	Facility Provider (Partners)
BES		Maintenance & Reliability	Northwest Neighborhoods - capacity upgrades	Based on the Systems Plan, program adds capacity by upsizing pipes and/or adding surface infiltration facilities. Projects are prioritized base on risk and benefit/cost. Work also includes high priority pipe rehabilitation, if located within the project area.	NW including hills to ridgeline, excluding downtown	NW	Capacity	Level of Service	2,700,000	2,100,000	1,300,000	3,400,000	3,500,000	13,000,000	23,000,000	5,000,000		Bonds	BES
BES		Maintenance & Reliability	North Portland - capacity upgrades	Based on the Systems Plan, program adds capacity by upsizing pipes and/or adding surface infiltration facilities. Projects are prioritized base on risk and benefit/cost. Work also includes high priority pipe rehabilitation, if located within the project area.	West of Peninsular Ave.	N	Capacity	Level of Service	0	0	0	0	0	0	0	5,000,000		Bonds	BES
BES	E10034 E10035 E10474	Maintenance & Reliability	Sanitary Sewer Collection System Capacity (Infiltration & Inflow)	A series of projects are proposed to address infiltration and inflow in the sanitary sewer system in SW Portland. Projects typically involve rehabilitation of main lines and laterals and disconnecting storm inlets from the sanitary sewer.	SW	SW	Capacity	Level of Service / Regulatory mandate	2,425,000	1,955,000	4,695,000	7,015,000	7,150,000	23,240,000	18,100,000	15,000,000	56,340,000	Bonds	BES
BES	E07466	Surface Water Management	Johnson Creek	High priority projects along the main stem of Johnson Creek to mitigate flooding, improve water quality and wildlife habitat, and address stormwater outfalls and culverts. Projects include land acquisition from willing sellers in the floodplain, construction of stream enhancements, and partnership projects with other agencies to meet the objectives of the 2001 Johnson Creek Restoration Plan. Projects address TMDL requirements, ESA plans and other regulations.	Johnson Creek Watershed	SE	Water quality, flood management, habitat	Level of Service	1,876,000	5,526,000	4,984,000	4,817,000	4,257,000	21,460,000	8,315,000	6,000,000	35,775,000	Bonds	BES
BES	E05564	Surface Water Management	Columbia Slough	Projects to improve water quality, sediment quality, habitat and hydrology. Projects address TMDL requirements, DEQ Sediment Order, ESA plans and other regulations, and may include partnership with other agencies. Includes in-stream restoration and enhancement as well as stormwater system improvements (outfalls, culverts, etc.).	Columbia Slough Watershed	N/NE	Water quality, habitat	Level of Service	4,162,000	100,000	1,000,000	1,000,000	2,000,000	8,262,000	10,000,000	6,000,000	24,262,000	Bonds	BES

Bureau	Project ID	Capital Program	Project Title	Project Description	Location	Area	Project Objective	Driver	Estimated Cost by Time Period FY 2013-14	FY 2014-15	FY 2015-16	FY 2016-17	FY 2017-18	Total FY 2014-18	FY 2018-22	FY 2022-32	Grand Total FY 2014-32	Funding Source(s)	Facility Provider (Partners)
BES	E07622	Surface Water Manageme nt	Fanno/Tryon	Projects to improve water quality, habitat and hydrology. Projects address TMDL requirements, ESA plans and other regulations, and may include partnership with other agencies. Includes in-stream restoration and enhancement as well as stormwater system improvements (outfalls, culverts, etc.).	Fanno/Tryon Watershed	SW	Water quality, habitat	Level of Service	2,947,000	2,351,000	4,107,000	3,383,000	2,380,000	15,168,000	1,052,000	2,000,000	18,220,000	Bonds	BES
BES	E10498	Surface Water Manageme nt	Willamette River	Projects to improve water quality, habitat and hydrology along the main stem river and tributaries (subwatersheds) to address TMDL requirements, ESA plans and other regulations. Includes in-stream and floodplain restoration and enhancement.	Willamette River Watershed	All	Water quality, habitat	Level of Service	897,000	3,401,000	3,399,000	0	0	7,697,000	0	0	7,697,000	Bonds	BES
BES	E10488	Surface Water Manageme nt	Stormwater Management Program Implementation	Improvements to the stormwater management system beginning with the Stephens Creek subwatershed. Other areas of particular concern include elsewhere in SW, outer east, and the Columbia Slough. Specific improvements have not been identified.	Various	Variou s	Protection of property, water quality	Level of Service	675,000	975,000	800,000	800,000	200,000	3,450,000	10,200,000	35,000,000	48,650,000	Bonds	BES
BES		Systems Developme nt	Sewer Extensions	Sewer extensions are proposed to relieve septic systems at risk of failure, to correct party sewer situations, and to provide service where development will be occuring soon and service is currently not available.	See Map	NW	Replacement ; Efficiency	Level of Service	2,950,000	918,000	1,925,000	2,675,000	2,300,000	10,768,000	16,872,000	30,000,000	57,640,000	Bonds	BES
				TOTALS					98,121,000	97,921,000	96,219,000	100,106,000	93,840,000	486,207,000	410,535,000	491,000,000	1,191,142,000		

Portland Water Bureau

The draft Portland Water Bureau (PWB) project list is based on existing system plans and includes projects and programs to address longer term infrastructure replacement and maintenance needs, while addressing short-term water system infrastructure needs to ensure compliance with drinking water regulations. The project list focuses on regulatory compliance, improving the condition of aging infrastructure, and addressing operations and maintenance needs.

The Bureau anticipates approximately $1.6 billion in investment in these projects and programs over the next twenty years. The list assumes that rates are set at a level that is sufficient to meet agreed upon levels of service.

Bureau	Project ID	Capital Program	Project Title*	Project Description*	Location*	Area	Project Objective	Driver	Estimated Cost by Time Period FY 2013-14	FY 2014-15	FY 2015-16	FY 2016-17	FY 2017-18	Total FY 2013-18	FY 2018-23	FY 2023-33	Grand Total FY 2013-33	Funding Source(s)	Facility Provider
PWB		Customer Service	Automated Meter Reading (AMR) Implementation	This project provides for the Installation of automatic water meter reading equipment throughout the City.	Various	All	Efficiency	Service Level	0	0	0	0	0	0	45,000,000	0	45,000,000	Bonds	PWB
PWB		Customer Service	Dodge Park	Improvements will continue to address security and visitor amenities at the site, trespass/hazard warning signs, alternative park management arrangements, and visitor management. The bureau is committed to improving the maintenance of the park including preservation of existing infrastructure, repairs, replacements and upgrades. New uses for the park include an amphitheater, camping, training area, facility upgrade to the existing building, and special needs assistance for using the park amenities.	See Map	E	Expansion	Service Level	0	0	0	0	0	0	400,000	800,000	1,200,000	Bonds	PWB
PWB	W01401	Customer Service	Emergency Coordination Center	This project designs and constructs the City's Emergency Coordination Center. The bureau will locate its emergency response and security staff at the location. The project location is adjacent to the City's 911 Call Center at SE 99th Ave and Powell Blvd. The total project cost is $19.85M and PWB is a contributing bureau.	See Map	E	Maintenance	Service Level	1,807,000	0	0	0	0	1,807,000	0	0	1,807,000	Bonds	PWB (POEM)
PWB	WBCSSE	Customer Service	Security and Emergency Management	The bureau is committed to increasing flexibility and preparedness to meet future security challenges, to enhance security throughout the water system and to modernize security practices and infrastructure. Projects funded by this budget will include physical security improvements to major and smaller facilities as well as improved security in the overall water distribution system and control/communications system.	Various	All	Maintenance	Service Level	0	0	250,000	500,000	500,000	1,250,000	2,500,000	5,000,000	8,750,000	Bonds	PWB (BTS)

Bureau	Project ID	Capital Program	Project Title*	Project Description*	Location*	Area	Project Objective	Driver	Estimated Cost by Time Period FY 2013-14	FY 2014-15	FY 2015-16	FY 2016-17	FY 2017-18	Total FY 2013-18	FY 2018-23	FY 2023-33	Grand Total FY 2013-33	Funding Source(s)	Facility Provider
PWB	W01632	Distribution	Bertha Service Area Improvements	This project will connect the Bertha 962 pressure zone with the 937 pressure zone with new 8-inch and 4-inch main and a new regulator. This work will allow for the abandonment of the existing main that passes through steep, unimproved right-of-way while maintaining an adequate level of service to the Bertha Service Area.	See Map	SW	Replacement ; Efficiency	Service Level	430,000	426,000	0	0	0	856,000	0	0	856,000	Bonds	PWB
PWB		Distribution	Burnside Pump Station Replacement	This project will decommission the old undersized pump station and modify the nearby Verde Vista pump station to serve the Burnside pumping needs for the next 50 years. The project will also acquire property for the future Burnside pump station to be built 50 years from now.	See Map	NW	Maintenance	Service Level	0	0	0	0	0	0	2,000,000	0	2,000,000	Bonds	PWB
PWB	W01674	Distribution	Carolina Pump Main Extension, Phase II	This project will connect the existing Carolina Pump Main (Westwood Tanks) and the Fulton Pump Main (Burlingame Tanks) together. This will be a pump main from the intersection of SW Capital Hwy and SW Terwilliger Blvd to the Burlingame Tank site.	See Map	SW	Expansion	Service Level	690,000	2,494,000	0	0	0	3,184,000	0	0	3,184,000	Bonds	PWB
PWB	WBDIDM	Distribution	Distribution Mains	This program includes rehabilitation and replacement of substandard mains, expansion due to applications from private developers, increasing supply for fire protection, improving water quality and water system upgrades due to local improvement districts (LIDs), and street improvements. Water main replacements also include appurtenances such as fire hydrants, valves, pressure regulators, service branches, and other facilities.	Various	All	Replacement	Service Level	11,717,000	13,911,000	15,875,000	16,775,000	17,460,000	75,738,000	75,000,000	150,000,000	300,738,000	Bonds	PWB

Bureau	ID	Capital Program	Project Title*	Project Description*	Location*	Area	Project Objective	Driver	Estimated Cost by Time Period FY 2013-14	FY 2014-15	FY 2015-16	FY 2016-17	FY 2017-18	Total FY 2013-18	FY 2018-23	FY 2023-33	Grand Total FY 2013-33	Funding Source(s)	Facility Provider & (Partners)
PWB	WBDIPT	Distribution	Pump Stations and Tanks	This program maintains a large variety of infrastructure consisting of water storage tanks, pumps, and pump and control facilities. The bureau uses a reliability centered maintenance (RCM) analysis to prioritize projects in these areas. A key focus of the next five years will be to replace the remote telemetry units at over 140 remote sites. The existing units are over 15 years old, and are becoming obsolete. The servers are at the end of their service cycle, and must also be replaced.	Various	All	Replacement Efficiency; Growth	Service Level	500,000	510,000	1,480,000	1,098,000	1,415,000	5,003,000	5,000,000	10,000,000	20,003,000	Bonds	PWB
PWB	W01581	Distribution	Rose City Sewer Rehabilitation	The project will install 1207 feet of 8 inch DI, 2 new hydrants and 39 new water services 2 inches or smaller.	See Map	NE	Replacement	Service Level	2,000	0	0	0	0	2,000	0	0	2,000	Bonds	PWB
PWB	W01651	Distribution	Raymond Tank Supply Improvements	This project will design and construct improvements at Raymond Tank Site and at an intersection of SE Holgate Boulevard and SE 136th Avenue.	See Map	SE	Efficiency	Service Level	125,000	410,000	0	0	0	535,000	0	0	535,000	Bonds	PWB
PWB		Distribution	Sam Jackson Pump Station	This project will add multiple capital improvements including seismic improvements, replacement of RTU and motor controllers, installation of pump control and check valves, extension of the crane rail, a concrete pad, and installation of a security fence and gate.	See Map	SW	Replacement ; Efficiency	Service Level	0	0	0	0	0	0	1,400,000	0	1,400,000	Bonds	PWB
PWB	WBDISV	Distribution	Services	This project constructs replacement and customer requested water services. A water service is the connection between the water main and any given customer's service meter. Service connections are always performed by Water Bureau crews directed by a certified Water Service Mechanic. An ongoing budget of approximately $4 million per fiscal year provides for installation of about 1,000 water service connections annually and other upgrades to existing water services.	Various	All	Expansion	Service Level	4,000,000	4,000,000	4,000,000	4,000,000	4,000,000	20,000,000	20,000,000	40,000,000	80,000,000	Bonds	PWB

Bureau	ID	Capital Program	Project Title*	Project Description*	Location*	Area	Project Objective	Driver	Estimated Cost by Time Period FY 2013-14	FY 2014-15	FY 2015-16	FY 2016-17	FY 2017-18	Total FY 2013-18	FY 2018-23	FY 2023-33	Grand Total FY 2013-33	Funding Source(s)	Facility Provider & (Partners)
PWB	W01590	Distribution	Willamette River Pipe Crossings	The project replaces major pipelines to strengthen the transmission link between Powell Butte and the service areas west of the Willamette River, including downtown and the storage reservoirs at Washington Park. It includes construction of a new seismically strengthened river crossing to replace the first one of potentially two Willamette River crossings, and new transmission piping on both sides of the river.	See Map	CC	Expansion	Service Level	460,000	2,600,000	5,000,000	20,000,000	28,540,000	56,600,000	0	55,000,000	111,600,000	Bonds	PWB
PWB	W01355	Regulatory Compliance	Bull Run Dam 2 Tower	The Water Bureau plans to install steel multi-level intake structures onto the North Dam 2 Tower located in the Bull Run watershed. Modifications are designed to allow selective water withdrawal, proper operation during flood conditions, and enable the towers to better withstand seismic loadings.	See Map	Bull Run Water shed	Maintenance	Service Level	5,975,000	475,000	0	0	0	6,450,000	0	0	6,450,000	Bonds	PWB
PWB	W01534	Regulatory Compliance	HCP Alder Creek Fish Passage	This project will design and install two fish passage facilities as planned in the Habitat Conservation Plan (HCP). The project is in Alder Creek, a tributary to the Sandy River. There will be a fish ladder at the waterfall and a fish ladder at a water diversion.	See Map	Bull Run Water shed	Maintenance	Service Level	458,000	0	0	0	0	458,000	0	0	458,000	Bonds	PWB
PWB	WBRCRC	Regulatory Compliance	Water Quality and Regulatory Compliance	The bureau recognizes the Bull Run watershed as a diverse ecosystem. The bureau is committed to preserving this habitat and complying with federal regulations using practical, locally driven solutions. Many of the projects in this subprogram respond to the Endangered Species Act (ESA), including the implementation of the Bull Run Habitat Conservation Plan (HCP) as adopted by City Council and approved by the National Marine Fisheries Service. Consistent with HCP commitments, this program funds easements, purchases land, and also supports projects jointly conducted with other watershed partners.	Various	Bull Run Water shed	Efficiency	Service Level	1,304,000	3,642,000	9,300,000	2,350,000	2,000,000	18,596,000	10,000,000	20,000,000	48,596,000	Bonds	PWB (EPA, OHHS)

Bureau	ID	Capital Program	Project Title*	Project Description*	Location*	Area	Project Objective	Driver	Estimated Cost by Time Period FY 2013-14	FY 2014-15	FY 2015-16	FY 2016-17	FY 2017-18	Total FY 2013-18	FY 2018-23	FY 2023-33	Grand Total FY 2013-33	Funding Source(s)	Facility Provider & (Partners)
PWB	WBSUBR	Supply	Bull Run Watershed	The bureau is committed to updating the Bull Run watershed protection and maintenance procedures and agreements based on the 2007 Bull Run Agreement with the Mt. Hood National Forest. The function of this program is to allocate funds for the capital projects necessary to maintain, improve, and protect the watershed facilities that are not directly related to the water supply system facilities. This includes Bull Run Watershed road reconstruction to ensure continuous, reliable, and safe access to all facilities, as well as maintenance of other city-owned infrastructure within the watershed.	See Map	Bull Run Water shed	Maintenance	Service Level	380,000	780,000	2,500,000	2,750,000	2,000,000	8,410,000	10,000,000	20,000,000	38,410,000	Bonds	PWB (USFS)
PWB		Supply	Dams and Headworks Repair and Rehabilitation	This program provides for assessment of the condition and rehabilitation of dams and other facilities at Headworks. As many of these facilities are between 50 and 70 years old, their safe and reliable operation requires ongoing investment. The program includes preliminary engineering and design of needed repairs, rehabilitation of these facilities, and actual repair work.	See Map	Bull Run Water shed	Maintenance	Service Level	0	0	0	0	0	0	1,000,000	2,000,000	3,000,000	Bonds	PWB
PWB	WBSUG W	Supply	Groundwater Improvements	The Columbia South Shore Wellfield (CSSW) is Portland's alternative supply of water should the Bull Run watershed supply be interrupted for any reason. Projects funded in this program improve the maintenance of this aging infrastructure, including repairs, selective replacements and upgrades.	See Map	NE	Maintenance	Service Level	300,000	450,000	450,000	500,000	500,000	2,200,000	2,500,000	5,000,000	9,700,000	Bonds	PWB

Bureau	ID	Capital Program	Project Title*	Project Description*	Location*	Area	Project Objective	Driver	Estimated Cost by Time Period FY 2013-14	FY 2014-15	FY 2015-16	FY 2016-17	FY 2017-18	Total FY 2013-18	FY 2018-23	FY 2023-33	Grand Total FY 2013-33	Funding Source(s)	Facility Provider & (Partners)
PWB		Supply	Groundwater Collection Main Hardening	Much of the piping connecting the wells to the Groundwater Pump Station is located in liquefiable soils which are vulnerable during a seismic event. This project would design and install measures to “harden” the piping and reduce this vulnerability.	See Map	NE	Maintenance	Service Level	0	0	0	0	0	0	0	20,000,000	20,000,000	Bonds	PWB
PWB	W01371	Supply	Groundwater Electrical Supply Improvements	This project designs and constructs a new 115kV/4160V transformer and other components to complete a double-ended electrical substation at the Groundwater Pump Station. It will also design and construct a 5kV main breaker replacement and purchase selected spare components.	See Map	NE	Efficiency	Service Level	79,000	1,992,000	0	0	0	2,071,000	0	0	2,071,000	Bonds	PWB
PWB		Supply	Groundwater Pump Station Expansion	As water demand increases, the bureau will need to increase the available flows from the groundwater system. The system expansion will include upgrade of the Groundwater Pump Station to provide additional capacity.	See Map	NE	Expansion	Populati on	0	0	0	0	0	0	0	10,000,000	10,000,000	Bonds	PWB
PWB		Supply	Groundwater Wellfield Expansion	As water demand increases, the bureau will need to increase the available flows from the groundwater system. The system expansion will include additional well development and collection mains in the Columbia South Shore area.	See Map	NE	Expansion	Growth	0	0	0	0	0	0	2,000,000	10,000,000	12,000,000	Bonds	PWB

Bureau	ID	Capital Program	Project Title*	Project Description*	Location*	Area	Project Objective	Driver	Estimated Cost by Time Period FY 2013-14	FY 2014-15	FY 2015-16	FY 2016-17	FY 2017-18	Total FY 2013-18	FY 2018-23	FY 2023-33	Grand Total FY 2013-33	Funding Source(s)	Facility Provider & (Partners)
PWB		Supply	Groundwater Wellfield Reliability Enhancements	The bureau is attempting to increase the flexibility and preparedness to meet the future challenge of an interruption of Bull Run water. The bureau is improving its emergency preparedness by evaluating electrical vulnerability for the pumping system, reviewing the flood inundation vulnerability of the site, and development of a Groundwater Intertie that would reduce transmission system vulnerability. The inundation review may be partially completed through a partnership with Multnomah County Drainage District.	See Map	NE	Efficiency	Service Level	0	0	0	0	0	0	1,000,000	2,000,000	3,000,000	Bonds	PWB
PWB		Supply	Powell Valley Well Improvements	The project includes upgrade of the facilities in the previous Powell Valley Road Water District area and connection and integration of these facilities to the PWB water system.	See Map	NE	Efficiency	Growth	0	0	0	0	0	0	1,000,000	2,000,000	3,000,000	Bonds	PWB
PWB	W01669	Supply	Road 1008	This project will design and construct an overlay for the Bull Run 1008 road.	See Map	Bull Run Water shed	Maintenance	Service Level	60,000	650,000	0	0	0	710,000	0	0	710,000	Bonds	PWB
PWB	W01670	Supply	Road 10 MP 0.6-1.8	Design and construct walls, widening, culverts and repave this portion of the Bull Run 10 road.	See Map	Bull Run Water shed	Maintenance	Service Level	60,000	840,000	0	0	0	900,000	0	0	900,000	Bonds	PWB

									Estimated Cost by Time Period								Grand Total		
Bureau	ID	Capital Program	Project Title*	Project Description*	Location*	Area	Project Objective	Driver	FY 2013-14	FY 2014-15	FY 2015-16	FY 2016-17	FY 2017-18	Total FY 2013-18	FY 2018-23	FY 2023-33	FY 2013-33	Funding Source(s)	Facility Provider & (Partners)
PWB		Support	Building Maintenance	The bureau maintains hundreds of structures from the Bull Run watershed to Downtown Portland. These structures range in size from small pump houses to the maintenance hub on Interstate Avenue. The necessary work involves structural repairs and maintenance.	Various	All	Maintenance	Service Level	0	0	0	0	0	0	1,000,000	2,000,000	3,000,000	Bonds	PWB (OMF)
PWB	WBASPL	Support	Planning	This project funds general planning studies for projects that the Water Bureau encounters during operation of the water system. These include pressure zone adjustments, facility modifications, and system element studies. The bureau attempts to employ efficient and effective management practices when evaluating the need for new facilities.	Various	All	Efficiency; Maintenance	Service Level	1,500,000	1,500,000	2,000,000	2,500,000	2,500,000	10,000,000	12,500,000	25,000,000	47,500,000	Bonds	PWB
PWB		Support	Sandy River Station Upgrade	This project consists of upgrades to the Sandy River Station facilities including an evaluation of a potential move to a different site.	See Map	E	Efficiency; Maintenance	Service Level	0	0	0	0	0	0	0	5,000,000	5,000,000	Bonds	PWB (OMF)
PWB		Support	West Side Maintenance Facility	A hub is needed on the west side of the Willamette River for maintenance and construction crews, vehicles, equipment and materials, and emergency operations. This project includes construction of the facility within the next 20 years.	See Map	W	Efficiency; Maintenance	Service Level	0	0	0	0	0	0	5,000,000	0	5,000,000	Bonds	PWB (OMF)

Bureau	ID	Capital Program	Project Title*	Project Description*	Location*	Area	Project Objective	Driver	Estimated Cost by Time Period FY 2013-14	FY 2014-15	FY 2015-16	FY 2016-17	FY 2017-18	Total FY 2013-18	FY 2018-23	FY 2023-33	Grand Total FY 2013-33	Funding Source(s)	Facility Provider & (Partners)
PWB		Transmission/Terminal Storage	Conduit 5	This project would include installation of sections of a new Conduit 5 as growth occurs and the condition of the existing conduits worsens.	Various	E	Maintenance; Expansion	Service Level; Growth	0	0	0	0	0	0	0	75,000,000	75,000,000	Bonds	PWB
PWB	WBTTCT	Transmission/Terminal Storage	Conduits and Transmission Mains	The conduits that bring water to Portland from the Bull Run watershed are pipes 56 to 72 inches in diameter. This program funds repairs, replacements and upgrades to these key pipelines. Reliable service to the City and the City's wholesale customers is the key reason for the bureau's commitment to improve maintenance of this aging infrastructure.	Various	E	Maintenance	Service Level	425,000	8,500,000	12,600,000	5,000,000	7,000,000	33,525,000	10,000,000	20,000,000	63,525,000	Bonds	PWB
PWB	W01424	Transmission/Terminal Storage	Kelly Butte Reservoir	The purpose of this project is to increase storage capacity from 10MG to 25MG by replacing the existing tank with a buried reservoir. This includes site access, construction access and easements, staging areas, and on-site storage areas. This project establishes Kelly Butte as the key facility that will be used for system pressure equalization and in-town terminal storage in lieu of the Mt. Tabor open reservoirs.	See Map	SE	Replacement	Service Level; Growth	35,000,000	27,000,000	4,970,000	0	0	66,970,000	0	0	66,970,000	Bonds	PWB
PWB		Transmission/Terminal Storage	New Conduit Intertie	This project would address concerns about the capability of the conduit system to withstand hazards and deliver an uninterruptible supply to the City. The project will improve reliability of flow during emergency conditions and for maintenance by providing additional isolation and interconnectivity.	See Map	E	Maintenance; Efficiency	Service Level	0	0	0	0	0	0	0	10,000,000	10,000,000	Bonds	PWB

Bureau	ID	Capital Program	Project Title*	Project Description*	Location*	Area	Project Objective	Driver	Estimated Cost by Time Period FY 2013-14	FY 2014-15	FY 2015-16	FY 2016-17	FY 2017-18	Total FY 2013-18	FY 2018-23	FY 2023-33	Grand Total FY 2013-33	Funding Source(s)	Facility Provider & (Partners)
PWB	W01343	Transmission/Terminal Storage	Powell Butte Reservoir 2	This LT2 project is being constructed in 2 phases – Phase 1 is complete. The project is currently in Phase 2, the construction of a 50 million gallon buried reservoir at Powell Butte. It includes a short section of Conduit 5, construction of a maintenance and storage facility, replacing the caretaker's house, construction of an interpretive center and restrooms, reservoir overflow, park improvements and mitigation requirements as part of the conditions for approval in the 2003 LUR Type III CUMP.	See Map	SE	Replacement	Service Level; Growth	27,520,000	7,700,000	0	0	0	35,220,000	0	0	35,220,000	Bonds	PWB
PWB		Transmission/Terminal Storage	Powell Butte Reservoir 3	This project constructs a third reservoir at Powell Butte and possible bypass piping around the Butte.	See Map	SE	Expansion	Growth	0	0	0	0	0	0	0	100,000,000	100,000,000	Bonds	PWB
PWB		Transmission/Terminal Storage	Sandy River Conduit Relocation, Phase II	The bureau is committed to increasing the flexibility and preparedness to meet the future challenge of a natural disaster. This project will relocate the Sandy River crossings of Conduit 3. The crossings of Conduit 2 and 4 have already been completed. These conduits were identified in the system vulnerability study as vulnerable to seismic, volcanic, flooding, and other natural and manmade hazards.	See Map	E	Replacement	Service Level	0	0	0	0	0	0	5,000,000	0	5,000,000	Bonds	PWB
PWB	W01524	Transmission/Terminal Storage	Tabor Reservoir Adjustments	This project includes adjustments to piping, structures and other features at Mt. Tabor in order to move storage elsewhere and physically disconnect the open reservoirs from the public water system for compliance with LT2. Project does not include disposition of the reservoirs after they have been disconnected from the public water system.	See Map	SE	Replacement	Service Level	225,000	1,140,000	1,990,000	0	0	3,355,000	0	0	3,355,000	Bonds	PWB

Bureau	ID	Capital Program	Project Title*	Project Description*	Location*	Area	Project Objective	Driver	Estimated Cost by Time Period FY 2013-14	FY 2014-15	FY 2015-16	FY 2016-17	FY 2017-18	Total FY 2013-18	FY 2018-23	FY 2023-33	Grand Total FY 2013-33	Funding Source(s)	Facility Provider & (Partners)
PWB	W01402	Transmission/Terminal Storage	Washington Park Reservoir 3	The project will plan, design and construct a new buried reservoir to replace open reservoir No. 3. This project is one solution toward compliance with LT2 replacement of the open reservoirs. It is assumed that Reservoir # 4 will be used as the overflow detention structure. We envision that the buried reservoir would be topped with a reflecting pond and historical features would be protected to retain its visual appeal.	See Map	SW	Replacement	Service Level	3,600,000	2,300,000	2,900,000	19,300,000	24,000,000	52,100,000	0	0	52,100,000	Bonds	PWB
PWB		Transmission/Terminal Storage	West Side Transmission Main Improvements	These mains include the Sam Jackson to Downtown Pipeline and the Jefferson Street Supply mains. These large transmission mains are needed to strengthen the supply to terminal storage located on the west side of the Willamette River.	Various	E	Maintenance; Expansion	Service Level; Growth	0	0	0	0	0	0	10,000,000	10,000,000	20,000,000	Bonds	PWB
PWB		Transmission/Terminal Storage	Wholesale Connections	This project provides for facilities servicing wholesale customers including repairs, replacements, and upgrades of pump stations and meters. Additional interties may be needed in the future.	Various	All	Efficiency	Service Level; Growth	0	0	0	0	0	0	0	2,000,000	2,000,000	Bonds	PWB
PWB	W01582	Treatment	Headworks Flow Meters	This project would install new flow meters on the Primary Intake conduits; install new flow meters and flow control valves on Screen house #3 conduits; and, address the sump pump drainage system in Bailey PRV vault.	See Map	Bull Run Water shed	Maintenance	Service Level	2,500,000	0	0	0	0	2,500,000	0	0	2,500,000	Bonds	PWB

Bureau	ID	Capital Program	Project Title*	Project Description*	Location*	Area	Project Objective	Driver	Estimated Cost by Time Period FY 2013-14	FY 2014-15	FY 2015-16	FY 2016-17	FY 2017-18	Total FY 2013-18	FY 2018-23	FY 2023-33	Grand Total FY 2013-33	Funding Source(s)	Facility Provider & (Partners)
PWB		Treatment	Treatment Facilities Improvements	Treatment of Portland's drinking water is the most complex activity the bureau engages in while operating the water system. This project would include several related projects for the Bull Run water supply, at Bull Run Headworks and the Lusted Hill Facility. Projects would likely be driven by State and Federal regulations	See Map	Bull Run Water shed; Lusted Hill	Maintenance	Service Level; Growth	0	0	0	0	0	0	50,000,000	100,000,000	150,000,000	Bonds	PWB (EPA, OHHS)
				TOTALS					125,209,600	110,949,890	76,092,322	81,943,138	96,524,338	490,719,288	309,050,000	767,300,000	1,567,069,288		

Bureau of Transportation

The draft Portland Bureau of Transportation project list includes planned transportation projects, based on the current Transportation System Plan. These multi-modal projects address the needs of pedestrian, bicyclists, transit users, freight movers, and motorists. Investments in the City's transprotation system are needed to maintain existing facilities and to ensure the system meets the needs of Portlanders for decades to come.

The City is updating the Transportation System Plan along with the Comprehensive Plan Update. This update of the Transportation System Plan will include refining the list of projects included here to reflect recent plans, like the Bicycle Plan for 2030, reflect new goals and policies, and support proposed centers, corridors, and greenways.

Bureau	ID	Project Title*	Project Description*	Location*	Project Objective	Driver	Estimated Local Cost by Time Period Total FY 2013-18	FY 2018-23	FY 2023-33	Total FY 2013-33	Funding Source(s)	Lead Agency
PBOT	10001	Banfield LRT Stations, NE/SE: Pedestrian Improvements	Retrofit existing streets along eastside MAX and at intersecting streets to include better sidewalks and crossings, curb extensions, bus shelters, and benches at 82nd, 148th, and 162nd stations.	NE/SE			$0	$0	$0	$0		Portland
PBOT	10003	Transit Signal Priority, Citywide: Transit Improvements	Test & refine technological options to provide priority for buses at traffic signals and implement low cost bus solutions such as re-striping at intersections where buses currently experience long delays.	Citywide			$100,000	$0	$0	$100,000		Portland
PBOT	20001	11th/12th Ave, SE (Burnside - Gideon): Multi-modal Street Improvements	Provide pedestrian, bicycle, transit access improvements along 11th and 12th to enhance neighborhood livability.	SE			$0	$0	$215,000	$215,000		Portland
PBOT	20002	14th/16th, NW/SW & 13th/14th, SE, (Glisan - Clay): ITS	Six signals between Clay and Glisan including communications infrastructure; closed circuit TV cameras, variable message signs for remote monitoring and control of traffic flow.	NW/SW			$0	$0	$202,125	$202,125		Portland
PBOT	20003	23rd/Mt Tabor Frequent Bus, NW/SE: Improvements	Provide improvements that enhance new frequent bus service along Belmont connecting to NW 23rd.	NW/SE			$2,490,000	$0	$0	$2,490,000		Tri-Met
PBOT	20005	10th, NW (Overton - Naito Parkway): Pedestrian Bridge	Construct pedestrian bridge along 10th alignment to connect over railroad tracks.	NW			$2,500,000	$0	$0	$2,500,000		Portland
PBOT	20007	Bancroft/Hood/Macadam, SW: Intersection Improvements	The Bancroft/Hood/Macadam intersection is the southern portal of the N. Macadam District. Intersection work includes widening, realignment and signal improvements.	SW			$400,000	$0	$0	$400,000		Portland
PBOT	20008	Belmont Ramp, SE (Eastside of Morrison Bridge): Ramp Reconstruction	Reconstruct ramp to provide better access to the Central Eastside.	SE			$0	$1,500,000	$0	$1,500,000		Portland
PBOT	20009	Bond Ave, SW (River Parkway - Bancroft): Street Improvements	Improve SW Bond to serve as the primary north-south mobility street in the new North Macadam neighborhood.	SW			$5,000,000	$0	$0	$5,000,000		Portland
PBOT	20010	Broadway NE/NW: Bridge Improvements	Broadway Bridge improvements include painting, phase 1 seismic retrofit, sidewalk replacements, and resurface of bridge deck/approaches.	NE/NW			$42,668,000	$0	$0	$42,668,000		Multnomah County
PBOT	20011	Burnside Bridge, W/E: Bridge Improvements	Improvements include deck rehabilitation, mechanical improvements, painting, and phase 1 seismic retrofit.	W/E			$42,668,000	$0	$0	$42,668,000		Multnomah County
PBOT	20012	Burnside Bridge, SE/SW: Pedestrian and Bike Access	Improve bicycle and pedestrian access from the Burnside Bridge to Waterfront Park and Eastbank Esplanade.	SE/SW			$0	$2,140,000	$0	$2,140,000		Multnomah County
PBOT	20013	Burnside/Sandy/12th, E: Intersection Improvements	Redesign intersection to improve safety for all modes of travel. Relocate north-south crosswalk on east side of NE/SE 12th to eliminate safety hazards.	E			$0	$4,620,000	$0	$4,620,000		Portland
PBOT	20014	Burnside, W (NW 15th to NW 23rd): Boulevard Improvements	Boulevard design improvements including pavement reconstruction, wider sidewalks, curb extensions, safer crossings, traffic signals at 20th Plan and 22nd, and traffic management to limit motorist delays.	W			$10,000,000	$0	$0	$10,000,000		Portland
PBOT	20016	Central City Traffic Management, N, NW, NE, SE, SW: Transportation System Management improvements	Implement Central City TSM improvements to arterials.	CENTRAL			$0	$0	$2,310,000	$2,310,000		Portland/ODOT
PBOT	20017	Clay/2nd, SW: Pedestrian/Vehicle Signal	New signal installation.	SW			$0	$0	$115,500	$115,500		Portland
PBOT	20018	Clay/MLK Jr, SE: Intersection Improvements	Geometric, signalization and channelization improvements to allow transit and general traffic access to westbound Clay street from southbound MLK.	SE			$0	$0	$924,000	$924,000		Portland/ODOT
PBOT	20019	Columbia Street, SW (Naito Parkway - 18th): Street Reconstruction	Rebuild street.	SW			$0	$924,000	$0	$924,000		Portland
PBOT	20020	9th & Park, SW (Burnside - Salmon): Midtown Blocks Streetscape Improvements	Completion of design guidelines and preliminary capital improvements for Midtown Park Blocks.	SW			$0	$141,543	$0	$141,543		Portland

Bureau	ID	Project Title*	Project Description*	Location*	Project Objective	Driver	Estimated Local Cost by Time Period Total FY 2013-18	FY 2018-23	FY 2023-33	Total FY 2013-33	Funding Source(s)	Lead Agency
PBOT	20022	Division Place/9th, SE (7th - Center): Bikeway	Retrofit bike lanes to existing street.	SE			$0	$0	$19,635	$19,635		Portland
PBOT	20023	11th/12th/Railroad Crossing, SE (West of Division): Intersection Improvements	Reconstruct intersection to upgrade traffic signalization and establish bike and ped routes.	SE			$0	$400,000	$0	$400,000		Portland
PBOT	20024	Grand Ave, SE: Bridgehead Improvements	Reconstruct west edge of SE Grand at bridgehead to provide sidewalks and urban standard turn lanes for vehicles and truck safety and access.	SE			$4,100,000	$0	$0	$4,100,000		Portland
PBOT	20027	I-405/US 26/Ross Island Bridge, SW: Access Improvements	Construct new freeway access from Ross Island Bridge to I-405 and US 26.	SW			$0	$57,750,000	$0	$57,750,000		ODOT
PBOT	20028	I-5, SW (South of I-405): Access and Safety Improvements	Construct new off-ramp at NB I-5 to NB Macadam Ave and provide safety and modernization improvements to I-5 S.	SW			$57,750,000	$0	$0	$57,750,000		ODOT
PBOT	20029	I-5 & McLoughlin, SE: Construct Access Ramps	Construct new ramps from McLoughlin to I-5 N at Division.	SE			$0	$0	$23,100,000	$23,100,000		ODOT
PBOT	20030	18th/Jefferson St, SW: ITS	Communications infrastructure including closed circuit TV cameras, variable message signs for remote monitoring and control of traffic flow at SW 18th/Jefferson intersection.	SW			$0	$0	$69,300	$69,300		Portland
PBOT	20031	Light Rail Extension 3, SW/SE (Rose Quarter - Milwaukie TC)	Construct LRT from Rose Quarter to Milwaukie TC.	SW/SE			$0	$515,000,000	$0	$515,000,000		Tri-Met
PBOT	20032	Lloyd District Transportation Management Association, NE	Implement transportation management area program with Lloyd District employers.	NE			$80,000	$0	$0	$80,000		Tri-Met
PBOT	20033	Lloyd District/Rose Quarter, N/NE: Access Improvements	Construction of collector distributor roads serving the freeway to freeway connections and the Broadway/Weidler interchange. Implement TSM project to correct capacity and safety problems. Evaluate Broadway/Flint intersection realignment.	N/NE			$358,050	$0	$0	$358,050		Portland/ODOT
PBOT	20034	Macadam/Curry, SW: Intersection Improvements	Design and construct improvements to the Macadam/Curry intersection.	SW			$900,000	$0	$0	$900,000		Portland/ODOT
PBOT	20035	Grand/MLK Jr, SE/NE: CEID/Lloyd District Streetscape Improvements	Complete boulevard design improvements including street trees, tree grates, ornamental lighting, and curb extensions.	SE/NE			$0	$3,465,000	$0	$3,465,000		Portland/ODOT
PBOT	20037	Morrison Bridge, SE/SW: Pedestrian and Bicycle Improvements	Improve bicycle and pedestrian access on the Morrison Bridge	SW/SE			$0	$0	$1,466,850	$1,466,850		Multnomah County
PBOT	20039	South Waterfront District, SW: Bicycle and Pedestrian Improvements	Implement pedestrian and bicycle district access improvements identified in the North Macadam Framework Plan and retrofit bike lanes to SW Moody from SW Bancroft to Gibbs, including overcrossing of I-5, improvements to Sheridan-Corbett.	SW			$2,316,500	$0	$0	$2,316,500		Portland/ODOT
PBOT	20040	Arthur, Gibbs & Lowell, SW (River Parkway - Moody): Street Improvements	Arthur, Gibbs, and Lowell are the primary connectors between Moody-Bond and River Parkway and will be constructed in phases as development occurs in North Macadam District.	SW			$3,750,000	$0	$0	$3,750,000		Portland
PBOT	20041	South Waterfront District, SW: TMA	Implement transportation management area improvements identified in the North Macadam Framework Plan.	SW			$0	$2,000,000	$0	$2,000,000		Tri Met
PBOT	20042	South Waterfront Transit Improvements, SW	Implement transit improvements identified in the North Macadam Framework Plan, including central city transit hub and local bus service improvements.	SW			$0	$2,000,000	$0	$2,000,000		Portland
PBOT	20043	Old Town/China Town District, NW: Streetscape Improvements	Design and construction public improvements in Old Town/Chinatown to enhance cultural identity, following Chinatown Development Plan. Includes sidewalks, street trees, and redevelopment assistance to private properties.	NW			$6,247,646	$0	$0	$6,247,646		Portland

Bureau	ID	Project Title*	Project Description*	Location*	Project Objective	Driver	Estimated Local Cost by Time Period: Total FY 2013-18	FY 2018-23	FY 2023-33	Total FY 2013-33	Funding Source(s)	Lead Agency
PBOT	20044	Oregon Historical Society Area, SW: Streetscape Improvements	Pedestrian improvements related to future redevelopment of Oregon Historical Society area into mixed use facility.	SW			$0	$549,684	$0	$549,684		Portland
PBOT	20045	5th/6th, NW/SW (Irving - Jefferson): Portland Transit Mall Restoration and reconstruction for Light Rail Transit	Extend mall and reconfigure to accommodate light rail tracks and stations. Repairs to Transit Mall including sidewalk brick work, reconstruction, curbs, gutters, and other pedestrian improvements.	NW/SW			$0	$160,000,000	$0	$160,000,000		Portland
PBOT	20047	Ross Island Bridge Interchange, SW	US 26 Interchange improvement on east approach to Ross Island Bridge.	SW			$0	$0	$5,082,000	$5,082,000		ODOT
PBOT	20048	Salmon/Taylor/Madison/Main, SW (Hawthorne Bridge - Vista): Bikeway	Retrofit bike lanes to existing streets.	SW			$0	$20,000	$0	$20,000		Portland
PBOT	20049	Corbett/Hood/Sheridan, SW: Pedestrian and Bike Improvements	Construct bike and pedestrian improvements under I-5 to the CTLH neighborhood at SW Sheridan St.	SW			$150,000	$0	$0	$150,000		Portland
PBOT	20050	Southern Triangle Circulation Improvements, SE	Improve local street network and regional access routes in the area between the Powell/12th, Willamette River, railroad mainline and Hawthorne Bridge. Improve freeway access route from CEID to I-5 SB via the Ross Island Bridge.	SE			$0	$0	$2,887,500	$2,887,500		Portland
PBOT	20051	Steel Bridge, NE (East Ramps): Seismic Retrofit	Seismic retrofit.	NE			$0	$0	$831,600	$831,600		Portland
PBOT	20054	Water Ave, SE (Caruthers - Division Pl): Street Extension Phase II	Provide new roadway connection with sidewalks, bike lanes, landscaping, access to Willamette Greenway, & reconstruction of existing roadway.	SE			$0	$0	$0	$0		Portland
PBOT	20057	Willamette Greenway, SW: Trail Extension	Develop Willamette Greenway Trail through North Macadam District.	SW			$0	$2,650,000	$0	$2,650,000		Portland
PBOT	20058	Willamette River Bridges, NE/NW/SE/SW: Rehabilitation	Provide for long-term rehabilitation and structural needs of the Broadway, Burnside, Morrison, and Sauvie Island bridges.	CENTRAL			$93,334,395	$0	$0	$93,334,395		Multnomah Co
PBOT	20062	River Parkway, SW: New Street	New north-south local access street in the emerging North Macadam District. This street will have an enhance pedestrian environment and will be built to accommodate future streetcar. It will constructed in four phases beginning FY00/01.	SW			$3,500,000	$0	$0	$3,500,000		Portland
PBOT	20063	Belmont/Morrison, SE (east of Morrison Bridge - 12th): Bikeway	Retrofit bike lanes to existing street. Divison from 7th to 12th complete.	SE			$8,000	$0	$0	$8,000		Portland
PBOT	20064	14/16th Connections, NW	Improve or create connections to W. Burnside, Yeon, and Vaughn and provide directional signage to route non-local traffic to 14th/16th couplet.	NW			$0	$0	$200,000	$200,000		Portland
PBOT	20065	Interstate, N, Bridge at Larrabee: Seismic Retrofit	Seismic retrofit of Interstate overcrossing of Larrabee.	N			$0	$0	$1,455,300	$1,455,300		Portland
PBOT	20066	Cherry St, N (Vancouver - Williams): Street Reconstruction	Reconstruct Cherry St from Vancouver to Williams including sidewalk on Williams, remodeled traffic signal at Vancouver/Weidler, and install landscaping & lighting to improve safety and streetscape environment.	N			$0	$0	$340,000	$340,000		Portland
PBOT	20067	I-5, N (Lloyd District/Rose Quarter): Reconstruction and Widening	Modernize freeway and ramps to improve access to the Lloyd District and Rose Quarter.	N			$106,260,000	$0	$0	$106,260,000		ODOT
PBOT	20068	12th, NE (Bridge at Lloyd Blvd): Seismic Retrofit	Seismic retrofit.	NE			$0	$0	$415,800	$415,800		Portland
PBOT	20069	Marshall, NW (9th - Naito Parkway): Pedestrian Bridge	Construct pedestrian bridge along Marshall alignment to connect over railroad tracks.	NW			$0	$0	$0	$0		Portland

							Estimated Local Cost by Time Period					
Bureau	ID	Project Title*	Project Description*	Location*	Project Objective	Driver	Total FY 2013-18	FY 2018-23	FY 2023-33	Total FY 2013-33	Funding Source(s)	Lead Agency
PBOT	20070	Naito Parkway (Broadway Br - north of Terminal One): Street and Pedestrian Improvements	Construct streetscape improvements include pedestrian amenities.	NW			$0	$0	$0	$0		Portland
PBOT	20071	Morrison Bridge at Water Ave Ramp, SE: Ramp Realignment	Realign and separate the Morrison Bridge off-ramp to Water Avenue from the I-5 off-ramp by moving it north approximately 100' from the Yamhill/Water intersection. Construct a sidewalk and bike lane along the south side of the realigned ramp.	SE			$0	$1,732,500	$0	$1,732,500		Portland
PBOT	20072	1st Ave, SE (Stark - Clay): Railroad Mainline Access Improvements	Construct limited roadway access improvements, such as one-way vehicle circulation loops or loading zones, along the east side of the ROW adjacent to, but protected from, the railroad mainline.	SE			$0	$0	$750,000	$750,000		Portand
PBOT	20073	Stark St, SE (2nd - Grand): Safety & Capacity Improvments	Improve safety and capacity at the Stark/Grand intersection by restriping street to add eastbound lane, revising Stark to one-way eastbound between King-Grand, or implement a Stark-Oak one-way couplet between 2nd and Grand.	SE			$0	$50,000	$0	$50,000		Portland
PBOT	20074	4th Ave, SE (Caruthers - Ivon): Multi-modal Street Improvements	Construct urban standard street improvements for traffic, and pedestrian and bike facilities connecting the Springwater Corridor to Caruthers.	SE			$250,000	$0	$0	$250,000		Portland
PBOT	20075	Water Ave, SE (Stark - Clay): Reconstruction	Reconstruct street and provide pedestrian enhancements.	SE			$0	$900,000	$0	$900,000		Portland
PBOT	20076	Broadway and Weidler, NE (Larabee - MLK, Jr): Multimodal Improvements, Phase IV	Construct multimodal improvements including sidewalks, bike lanes, lighting, trees, and signals.	NE			$0	$0	$4,200,000	$4,200,000		Portland
PBOT	20077	7th/I-84 & 9th/I-84, NE: Pedestrian and Bike Bridges	Construct pedestrian/bike bridges at 7th and/or 9th along I-84.	NE			$0	$0	$1,200,000	$1,200,000		Portland
PBOT	20078	7th & 9th, NE (Broadway - Lloyd Blvd): Pedestrian Improvements	Construct an enhanced pedestrian street.	NE			$0	$5,500,000	$0	$5,500,000		Portland
PBOT	20080	Union Station, NW: Facility Renovation	Renovate Union Station to meet seismic and functional requirements.	NW			$0	$0	$30,000,000	$30,000,000		Portland
PBOT	20081	6th Ave, SW (Sheridan - Broadway): Roadway Improvements	Widen street.	SW			$679,000	$0	$0	$679,000		Portland
PBOT	20083	Russell Street Improvements, N	Construct improvements to Russell (Williams - Interstate), Albina & Mississippi (Russell - Interstate) to enhance ped connections from Eliot neighborhood and Lower Albina dist to the LRT station. Improve the N williams at N Stanton intersection.	N			$0	$3,300,000	$0	$3,300,000		Portland
PBOT	20091	Burnside, W/NW Couch \ (Burnside Bridge - W 15th): Couplet and Street Improvements, Phase II	Implements a one-couplet design including new traffic signals, widened sidewalks, curb extensions, bike lanes, on-street parking and street trees.	W/NW			$0	$7,500,000	$0	$7,500,000		Portland
PBOT	20092	Steel Bridge, N/NE: Rehabilitation	Major bridge maintenance	N/NE			$0	$0	$0	$0		Railroad
PBOT	20093	Graham Line Connection, N: South of Steel Bridge	Reestablish a connection in the southeast quadrant in East Portland between UP's Brooklyn and Graham rail lines (Explanation: This and other rail project came out of the I-5 Transportation and Trade Partnership Rail Capacity Analysis adopted by the regio	N			$11,000,000	$0	$0	$11,000,000		UPRR
PBOT	20095	Graham Line Siding, N: Graham rail line	Add controlled siding on the UP Graham line	N			$0	$0	$0	$0		UPRR

Bureau	ID	Project Title*	Project Description*	Location*	Project Objective	Driver	Estimated Local Cost by Time Period Total FY 2013-18	FY 2018-23	FY 2023-33	Total FY 2013-33	Funding Source(s)	Lead Agency
PBOT	20097	Flanders, NW (Steel Bridge to Westover): Bicycle Facility	Add bike boulevard from NW 24th Ave to the Steel Bridge, new bike/pedestrian bridge over I-405 on Flanders, connections to bikeways on Vista, 18th, 14th, 13th, Broadway, 3rd, 2nd, Glisan and Everett.	NW			$2,000,000	$0	$0	$2,000,000		Portland
PBOT	30001	Ainsworth Bridge, N (at I-5):Bridge Improvements	Improvements to bridge to create a safe and pleasant crossing for pedestrians and bicyclists over I-5.	N			$0	$0	$1,500,000	$1,500,000		Portland
PBOT	30004	Columbia Blvd, N (Swift - Portland Rd & Argyle Way - Albina): Pedestrian Improvements, Phase I & II	Construct sidewalk and crossing improvements.	N			$0	$0	$3,003,000	$3,003,000		Portland
PBOT	30005	Columbia Blvd, N (Bridge at Taft): Seismic Retrofit	Seismic retrofit of bridge.	N			$0	$0	$415,800	$415,800		Portland
PBOT	30006	Columbia Blvd, N (Oswego - Denver): Noise reduction	Install noise walls on the south side.	N			$0	$0	$1,000,000	$1,000,000		Portland
PBOT	30008	Columbia Blvd, N/NE(I-205 - Burgard): ITS	Communications infrastructure including closed circuit TV cameras, variable message signs for remote monitoring and control of traffic flow for six signals.	N/NE			$310,000	$0	$0	$310,000		Portland
PBOT	30009	Denver, N (Argyle - Winchell): Main Street Improvements	Construct streetscape improvements to revitalize historic downtown Kenton.	N			$0	$1,800,000	$0	$1,800,000		Portland
PBOT	30010	Denver Viaduct and Connections (Argyle-Victoria), N: Roadway Improvements	Replace and modernize the Denver Viaduct and roadway connections to freeway and add pedestrian walkway and bikeway as recommended by the I-5 N, Victory to Lombard project	N			$0	$10,000,000	$0	$10,000,000		ODOT/Portland
PBOT	30011	Force/Broadacre/Victory, N: Bikeway	Signed bikeway connection to I-5 river crossing.	N			$0	$0	$20,000	$20,000		Portland
PBOT	30012	Going, N (Interstate - Basin): Bikeway	Design & implement bike lanes.	N			$0	$0	$90,000	$90,000		Portland
PBOT	30013	Going St Bridge, N: Overcrossing Improvements	Seismic retrofit project will include work to both the substructure and superstructure to help minimize the risk of a structural collapse in a major earthquake.	N			$5,000,000	$0	$0	$5,000,000		Portland
PBOT	30014	Failing St & Bridge, N (Interstate - Mississippi): Street Improvements	Street improvements to provide a safe and pleasant connection between the MAX station and the Mississippi Target Area.	N			$0	$800,000	$0	$800,000		Portland
PBOT	30015	Going, N (Interstate - Greeley): ITS	Communications infrastructure including closed circuit TV cameras, variable message signs for remote monitoring and control of traffic flow.	N			$255,000	$0	$0	$255,000		Portland
PBOT	30016	Going/Greeley, N: Climbing Lane and Interchange Improvements	Redesign Going/Greeley interchange including climbing lane on Going to improve truck movement.	N			$2,000,000	$0	$0	$2,000,000		Portland
PBOT	30018	West Hayden Island, N: Street Network Improvements	Provide a street network plan for improvements that implement the region 2040 connectivity standards and improves multi-modal access for Hayden Island.	N			$0	$0	$2,000,000	$2,000,000		Portland
PBOT	30019	Hayden Island/Rivergate, N: Rail Access	Rail access from Rivergate to Hayden Island development.	N			$0	$0	$2,800,000	$2,800,000		Port
PBOT	30020	I-5, N (Columbia River - Columbia Bl): Bridge Widening	Improve I-5/Columbia River bridge (local share of joint project) based on recommendations in I-5 Trade Corridor Study.	N			$200,000,000	$0	$0	$200,000,000		ODOT
PBOT	30023	I-5/Columbia Bl, N: Interchange Improvements	Construct full direction access interchange based on recommendations from I-5 North Trade Corridor Study.	N			$0	$0	$0	$0		ODOT
PBOT	30026	Kelly Point Park Access Trail/40-Mile Loop Trail, N	Construct multi-use trail for bicycle and pedestrian along the north bank of the Columbia Slough.	N			$115,000	$0	$0	$115,000		Portland/Metro

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PBOT	30027	Kenton Pedestrian District, N: Pedestrian Improvements	Plan & develop improvements to the pedestrian environment to emphasize district identity and make walking the mode of choice for trips within the district.	N			$0	$500,000	$0	$500,000		Portland
PBOT	30028	Killingsworth, N (Interstate - MLK Jr Blvd): Street Improvements	Construct street improvements to improve pedestrian connections to Interstate MAX LRT and to establish a main street character promoting pedestrian-oriented activities. Commentary: Update project to reflect recommendations in the Killingsworth Street Impro	N			$4,900,000	$0	$0	$4,900,000		Portland
PBOT	30029	Killingsworth Bridge, N (at I-5): Bridge Improvements	Improvements to bridge to create a safe and pleasant crossing for pedestrians and bicyclists over I-5.	N			$0	$0	$2,700,000	$2,700,000		Portland
PBOT	30030	Killingsworth, N (Denver to Greeley): Pedestrian Improvements	Plan and develop streetscape and transportation improvements.	N			$0	$0	$1,320,000	$1,320,000		Portland
PBOT	30033	Light Rail Extension, Phase 2, N, Expo Center - Vancouver WA	Extend light rail service from Expo Center to Vancouver, WA.	N			$0	$300,000,000	$0	$300,000,000		Tri-Met
PBOT	30034	Lombard, N/NE (St Johns Bridge - MLK Jr): Bikeway	Stripe bike lanes on existing roadway.	N/NE			$0	$1,155,000	$0	$1,155,000		ODOT
PBOT	30035	Lombard, N/NE (MLK Jr - Philadelphia): ITS	Communications infrastructure including closed circuit TV camera, variable message signs for remote monitoring and control of traffic flow at the intersections with MLK Jr, Interstate, Greeley, Portsmouth, Philadelphia/Ivanhoe	N/NE			$0	$242,550	$0	$242,550		Portland
PBOT	30036	Lombard, N (Rivergate - to T-6): Multi-modal Improvements	Widen N Lombard to include two travel lanes, a non-continuous center turn land, medians, bike lanes, sidewalks and planting strips.	N			$3,610,000	$0	$0	$3,610,000		Portland/ODOT
PBOT	30037	Lombard, N (I-5 - Denver): Street Improvements	Establish a landscaped boulevard to promote pedestrian-oriented uses and to create a safe, pleasant pedestrian link over I-5 w/ new traffic light and road access to Fred Meyer development.	N			$2,800,000	$0	$0	$2,800,000		Portland
PBOT	30038	Marine Dr, N/NE (Portland Rd to 185th): ITS	CCTV at N Portland Rd. Changeable message signs at Portland Rd, Vancouver and 185th	N/NE			$0	$750,000	$0	$750,000		Portland
PBOT	30039	Marine Dr, N (at Rivergate West): Rail Crossing, Phase II	Reroute rail tracks and construct an above-grade rail crossing at Rivergate West entrance to improve safety and reduce vehicle and rail traffic conflicts.	N			$0	$0	$18,000,000	$18,000,000		Port
PBOT	30042	MLK-Lombard, N: Frequent Bus	Provide capital improvements that enhance new frequent bus service along MLK Jr and Lombard from downtown Portland to St. Johns.	N			$0	$0	$2,100,000	$2,100,000		Tri-Met
PBOT	30043	Prescott Station Area Street Improvements, N	Construct improvements to Prescott & Skidmore (Interstate-Maryland) & Maryland (Interstate-Prescott) to provide neighborhood focal point at LRT	N			$0	$3,400,000	$0	$3,400,000		Portland
PBOT	30045	River Ave, N (Port Center Way - River Ave): Street Extension	Secondary access road from Swan Island connecting to the Lower Albina Overcrossing at River. Improvements include roadway, drainage, pedestrian path & bike routes.Study cost only.	N			$0	$165,697	$0	$165,697		Portland
PBOT	30046	Rivergate Bicycle & Pedestrian Trail, N	Construct a 8500' section of 40-mile loop trail on north side of Columbia Slough in Rivergate.	N			$300,000	$0	$0	$300,000		Port
PBOT	30048	Lombard Overcrossing, N	Construct overpass from Columbia/Lombard intersection into South Rivergate entrance to separate rail and vehicular traffic. Project includes motor vehicle lanes, bike lanes, and sidewalks.	N			$21,172,000	$0	$0	$21,172,000		Portland/Port
PBOT	30050	St. Johns Pedestrian District, N	Enhance pedestrian access to transit, improve safety, and enhance the streetscape such as better lighting and crossings. Improvements including realigning the "ivy" island, curb extensions, a new traffic signal at Richmond/Lombard, and pedestrian connecti	N			$0	$0	$0	$0		Portland/ODOT
PBOT	30052	Swan Island, N: TMA	Implements a transportation management association program with employers.	N			$142,500	$0	$0	$142,500		Portland/Tri-Met

Bureau	ID	Project Title*	Project Description*	Location*	Project Objective	Driver	Estimated Local Cost by Time Period Total FY 2013-18	FY 2018-23	FY 2023-33	Total FY 2013-33	Funding Source(s)	Lead Agency
PBOT	30053	West Hayden Crossing, N	New four-lane bridge from Marine Drive to Hayden Island to serve as the primary access to marine terminals on the island.	N			$0	$0	$49,800,000	$49,800,000		Portland/Port
PBOT	30054	Barnes Rail Yard - Bonneville Rail Yard, N: Track Expansion	Construct additional unit train trackage between Bonneville and Barnes Yards to support unit train movement between South Rivergate and the Columbia Corridor.	N			$0	$11,900,000	$0	$11,900,000		Port
PBOT	30055	Penn Junction, N, UP/BNSF Main Line: Track Realignment	Realign track configuration, double track, and upgrade signaling to improve mainline capacity and allow greater train turnaround speed.	N			$0	$3,500,000	$0	$3,500,000		Port
PBOT	30056	Columbia Bl, N/NE (MLK Jr BL - Lombard): Bikeway	Retrofit bike lanes to existing street.	N/NE			$0	$109,725	$0	$109,725		Portland
PBOT	30058	Lombard, N (at Terminal 4): Driveway Consolidation	Consolidate driveways at Terminal 4 and Schnitizer Steel.	N			$1,000,000	$0	$0	$1,000,000		Portland/Port
PBOT	30059	Lombard, N (N Tyler - N Woolsey)	Implement main street improvements along N Lombard consistent with the St. Johns/Lombard Plan, including curb externsions, street lighting and bicycle improvements.	N/NE			$1,002,000	$0	$0	$1,002,000		Portland
PBOT	30060	39th/Lombard Frequent Bus, N/NE	Provide capital improvements that enhance new frequent bus service along Lombard and 39th.	N/NE			$0	$0	$0	$0		TriMet
PBOT	30062	West Hayden Island Rail Yard Expansion, West Hayden Island	Construct seven track rail yard.	N			$0	$0	$0	$0		Port/Railroad
PBOT	30063	BNSF Line at Columbia Bridge, N: Track Improvements	Improve rail track conditions on approaches to movable spans.	N			$0	$8,000,000	$0	$8,000,000		Region
PBOT	30065	N Portland Junction, N: Rail Improvements	Upgrade rail track with revised crossovers, centralized traffic control tie-in and increased turning radius	N			$0	$5,000,000	$0	$5,000,000		Region
PBOT	30066	N Portland Rail Grade Separation, N	Grade speration rail/highway traffic on N Columbia Blvd at Penn Junction at BNSF Rail Bridge and Columbia Slough and N Portland Junction	N			$0	$0	$0	$0		Region
PBOT	30068	Lombard St (Burgard), N: Bridge Replacement	Upgrade structure at Terminal 4.	N			$4,900,000	$0	$0	$4,900,000		Port
PBOT	30069	Slough Rail Bridge, N	Rail connection to sosuth Rivergate from Terminal 6.	N			$0	$0	$4,500,000	$4,500,000		Region
PBOT	30070	Columbia Bl/Portland Rd, N: Intersection Improvments	Redesign intersection.	N			$700,000	$0	$0	$700,000		Portland
PBOT	30072	Rivergate ITS, N	Connect real-time information to ODOT's Highway ITC systems.	N			$200,000	$0	$0	$200,000		Portland
PBOT	30073	Heineman, N: Road Connection	New street to provide access to developing property.	N			$570,000	$0	$0	$570,000		Port
PBOT	30074	Vancouver Bridge, N (at Columbia Slough): Bridge Replacement	Replace weight-restricted bridge	N			$8,500,000	$0	$0	$8,500,000		Portland
PBOT	30075	Lombard, N/NE (MLK Jr - Philadelphia): ITS	CCTV at various intersections; changeable message signs.	N/NE			$0	$0	$210,000	$210,000		Portland
PBOT	30077	Barnes to Terminal 4, N: Track Expansion	Add dedicated track for Terminal 4 through Barnes Yard and add new track from Barnes Yard to Terminal 4.	N			$1,000,000	$0	$0	$1,000,000		Port
PBOT	30080	Burgard-Lombard, N: Street Improvements	Widen street to include 2 12-foot travel lanes, center left turn lane, bike lanes, sidewalks, and intersection improvements.This project also includes replacing the existing 1930 Union Pacific Railroad Bridge.	N			$0	$0	$0	$0		Portland
PBOT	30081	Argyle, N (Columbia - Denver): Roadway Improvements	Construct a new arterial roadway north of existing street alignment and reconstruct existing street as a local street in a Pedestrian District as recommended by the I-5 North, Victory to Lombard project	N			$0	$4,000,000	$0	$4,000,000		ODOT/Portland

Bureau	ID	Project Title*	Project Description*	Location*	Project Objective	Driver	Estimated Local Cost by Time Period Total FY 2013-18	FY 2018-23	FY 2023-33	Total FY 2013-33	Funding Source(s)	Lead Agency
PBOT	30082	Schmeer, N (Denver - Whitaker): Roadway Improvements	Realign and reconstruct roadway as an arterial street and add full-service signalized intersection at Denver as recommended by the I-5 North, Victory to Lombard project.	N			$0	$2,000,000	$0	$2,000,000		ODOT/Portland
PBOT	40001	11th/13th, NE (at Columbia Bl): Roadway Connector	New 3-lane roadway and bridge over rail line to connect Lombard and Columbia. Provides space for double tracking of rail line.	NE			$8,000,000	$0	$0	$8,000,000		Portland
PBOT	40003	26th/Regents, NE: Intersection Improvements	Reconstruct intersection including pedestrian refuge to improve traffic flow and safety.	NE			$0	$0	$115,000	$115,000		Portland
PBOT	40004	33rd, NE (Columbia Slough - Lombard): Bikeway	Retrofit bike lanes to existing street.	NE			$0	$0	$7,000	$7,000		Portland
PBOT	40006	33rd/Marine Drive, NE: Intersection Improvements	Signalize intersection for freight movement.	NE			$0	$250,000	$0	$250,000		Portland
PBOT	40007	42nd Bridge, NE (at Lombard): Bridge Replacement	Replace 42nd bridge over Lombard to remove weight restriction..	NE			$0	$0	$3,000,000	$3,000,000		Portland/ODOT
PBOT	40008	47th/42nd, NE (Cornfoot - Siskiyou): Bike Lanes	Provide bike lanes. Involves shoulder paving and drainage work.	NE			$0	$0	$160,000	$160,000		Portland
PBOT	40009	47th, NE (Columbia - Cornfoot):Roadway & Intersection Improvements	Widen and reconfigure intersections.	NE			$2,800,000	$0	$0	$2,800,000		Portland
PBOT	40010	60th Ave, NE(Killingsworth - Going/Cully): Pedestrian Improvements	Construct walkway.	NE			$0	$0	$400,000	$400,000		Portland
PBOT	40011	60th MAX Station, NE: Pedestrian Access to Transit	Improve sidewalks, pedestrian crossing, and install curb extensions at transit stops.	NE			$0	$500,000	$0	$500,000		Portland
PBOT	40012	72nd, NE (Killingsworth - Prescott): Pedestrian Improvements	Construct sidewalk, curb, storm drainage improvements along 72nd and improve pedestrian crossings at 72nd/Prescott & 72nd/Killingsworth.	NE			$0	$0	$750,000	$750,000		Portland
PBOT	40013	82nd Ave, NE/SE, (Killingsworth -Clatsop): Pedestrian to Transit Improvements	Improve sidewalks, lighting, crossings, street trees, bus shelters and benches.	NE/SE			$1,500,000	$0	$0	$1,500,000		ODOT/Tri-Met
PBOT	40016	82nd, NE (Airport Way - Columbia Bl): Bike & Pedestrian Improvements	Retrofit bike lanes to existing street (Airport Way - Columbia) (Airport to Alderwood completed) and construct sidewalks (Airport Way - Alderwood Rd).	NE			$510,000	$0	$0	$510,000		Port
PBOT	40017	Killingsworth Frequent Bus, NE/SE	Provide capital improvements that enhance new frequent bus service along Killingsworth St from Swan Island to the Clackamas regional center.	NE/SE			$0	$4,540,000	$0	$4,540,000		Tri-Met
PBOT	40020	92nd Ave, NE (Fremont - Halsey): Bicycle & Pedestrian Improvements	Retrofit bike lanes to existing street. Construct sidewalk to provide access to transit & schools.	NE			$0	$360,000	$0	$360,000		Portland
PBOT	40022	Airport Way, NE: Access Road	Construct Airport Way East Terminal access road.	NE			$0	$0	$8,000,000	$8,000,000		Port
PBOT	40023	Airport Way, NE: Return and Exit Roads	Relocate Airport Way exit road and construct new return road.	NE			$0	$16,170,000	$0	$16,170,000		Port
PBOT	40025	82nd/Airport Way, NE: Overcrossing	Construct grade-separated overcrossing.	NE			$0	$0	$11,000,000	$11,000,000		Port
PBOT	40027	Alderwood St, NE, (Alderwood Trail - Columbia Bl): Bikeway	Provide bike lanes. Project includes some shoulder widening.	NE			$0	$400,000	$0	$400,000		Portland/Port
PBOT	40028	Argyle, NE (14th - MLK): Street Extension	Extend NE Argyle to provide better street grid. Will serve as a collector/distributor for industrial businesses & reduce traffic congestion at MLK/Columbia intersection.	NE			$0	$0	$480,000	$480,000		Portland
PBOT	40029	Boise Pedestrian District, N	Plan & develop improvements to the pedestrian environment to emphasize district identity and make walking the mode of choice for trips within the district.	N			$0	$0	$600,000	$600,000		Portland

							Estimated Local Cost by Time Period					
Bureau	ID	Project Title*	Project Description*	Location*	Project Objective	Driver	Total FY 2013-18	FY 2018-23	FY 2023-33	Total FY 2013-33	Funding Source(s)	Lead Agency
PBOT	40030	Broadway/Weidler, NE (15th - 28th): Multi-modal Improvements, Phases II & III	Boulevard retrofit of street including street trees, traffic signals, curb extensions, and wider sidewalks (15th - 24th) and stripe bike lanes (24th-28th).	NE			$6,456,450	$0	$0	$6,456,450		Portland
PBOT	40031	Cascades Parkway, NE (Cascades Parkway - Alderwood Rd): Street Extension	Construct two-lane road extension.	NE			$1,732,500	$0	$0	$1,732,500		Portland/Port
PBOT	40032	Alderwood/Columbia Blvd/Cully, NE: Intersection Improvements	Reconstruct intersection to provide left turn pockets, enhancing turning radii and improving circulation for trucks serving expanding air cargo facilities south of Portland.	NE			$350,000	$0	$0	$350,000		Portland
PBOT	40033	Columbia Corridor, N/NE: TMA	Implements a transportation management association program with employers.	N/NE			$142,500	$0	$0	$142,500		Tri Met
PBOT	40036	Cornfoot, NE (47th - Alderwood): Road Widening & Intersection Improvements	Road widening project including lighting and landscaping, left turn lanes, and bike lanes (47th - Airtrans Way). Signalize Cornfoot/Airtrans intersection and reconfigure traffic flow. Stripe bike lanes (Airtrans - Alderwood).	NE			$2,000,000	$0	$0	$2,000,000		Portland
PBOT	40037	Cully, NE (Columbia Bl - Fremont): Multi-modal Improvements	Road reconstruction (Prescott-Killingsworth) including Intersection improvements at Prescott. Bike lanes (Prescott-Columbia). Sidewalks and crossing improvements (Killingsworth -Fremont).	NE			$0	$3,780,000	$0	$3,780,000		Portland
PBOT	40038	Eliot Pedestrian District: NE	Construct improvements to the pedestrian environment within the Ped District including ornamental lighting, gateways and signs to reinforce identity.	NE			$0	$1,700,000	$0	$1,700,000		Portland
PBOT	40039	Fremont St, NE (42nd-52nd): Pedestrian and Safety Improvements	Construct streetscape and transportation improvements (42nd to 52nd).	NE			$0	$288,750	$0	$288,750		Portland
PBOT	40040	Fremont, NE, (Vancouver - 7th): Bikeway	Retrofit bike lanes to existing street.	NE			$0	$0	$5,000	$5,000		Portland
PBOT	40041	60th/Going/Cully, NE: Intersection Improvements	Realign intersection.	NE			$0	$0	$250,000	$250,000		Portland
PBOT	40042	Halsey, NE (Bridge at I-84): Seismic Retrofit	Seismic retrofit bridge.	NE			$0	$0	$92,400	$92,400		Portland/ODOT
PBOT	40045	Hollywood Pedestrian District, NE: Multi-modal Improvements	Multi-modal street improvements including traffic signals, restriping, improved pedestrian crossings and connections to transit center.	NE			$0	$7,680,750	$0	$7,680,750		Portland/ODOT
PBOT	40046	I-84/I-205, NE: Auxiliary Lane	New auxiliary lane from I-84 to I-205 NB before Columbia Blvd.	NE			$0	$0	$5,000,000	$5,000,000		ODOT
PBOT	40049	I-84 Off-ramp, NE (at 68th): Traffic Improvements	Improve lane merge & turning radius of off-ramp.	NE			$0	$0	$500,000	$500,000		ODOT
PBOT	40051	Killingsworth Pedestrian District, NE	Plan and develop improvements to the pedestrian environment including sidewalks, lighting, crossings, bus shelters and benches.	NE			$0	$773,850	$0	$773,850		Portland
PBOT	40052	Killingsworth, NE (42nd-72nd): Pedestrian Improvements	Construct sidewalks and crossing improvements for pedestrian travel and access to transit.	NE			$0	$0	$420,000	$420,000		Portland
PBOT	40053	Killingsworth, NE (33rd - Williams): Pedestrian Improvements	Develop streetscape and transportation improvements to increase opportunities to walk and enhance the main street character of this corridor.	NE			$0	$900,000	$0	$900,000		Portland
PBOT	40057	MLK Jr, NE (Ainsworth - Tillamook): Street Improvements	Street improvement project including on-street parking, new sidewalks, curb extensions, and small medians. Stripe bike lanes between Broadway and Lombard.	NE			$5,000,000	$0	$0	$5,000,000		Portland/ODOT
PBOT	40058	MLK Jr, N (Columbia Bl - CEID): ITS	CCTV at various locations & traffic monitoring stations at Clay and Burnside.	N			$0	$550,000	$0	$550,000		Portland/ODOT

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PBOT	40030	Broadway/Weidler, NE (15th - 28th): Multi-modal Improvements, Phases II & III	Boulevard retrofit of street including street trees, traffic signals, curb extensions, and wider sidewalks (15th - 24th) and stripe bike lanes (24th-28th).	NE			$6,456,450	$0	$0	$6,456,450		Portland
PBOT	40059	MLK Jr, NE (Columbia - Lombard): Widen Street	Expand roadway to provide better connection between streets for improved freight movement in and through the area.	NE			$0	$0	$12,605,000	$12,605,000		ODOT/Portland
PBOT	40060	Marx Dr, NE (82nd-87th): Street Extension	Extend NE Marx Dr west from 87th and signalize at 82nd Ave to provide better street connectivity.	NE			$0	$0	$315,000	$315,000		Port/ODOT
PBOT	40061	Columbia Blvd/MLK Jr & Lombard/MLK Jr, NE: Intersection Improvements	Widen turn lanes at MLK Jr intersections with Columbia and Lombard.	NE			$700,000	$0	$0	$700,000		Port/ODOT
PBOT	40062	Mississippi, NE (Fremont - Skidmore): Street Improvements	Construct street improvements to enhance the area as a Pedestrian District.	NE			$0	$0	$0	$0		Portland
PBOT	40063	Portland Bl/Vancouver, NE: Intersection improvements	Revise intersection for safer merging.	NE			$0	$0	$200,000	$200,000		Portland
PBOT	40064	PDX terminal, NE (Frontage to Terminal Building): Pedestrian and Bicycle Access	Provide pedestrian and bicycle access between end of NE Frontage Rd and the terminal building.	NE			$600,000	$0	$0	$600,000		Port
PBOT	40065	Prescott, NE (47th - I-205): Pedestrian and Bicycle Improvements	Construct bike lanes, sidwalks, and crossing improvements for pedestrian and bike safety and to improve access to transit.	NE			$0	$630,000	$0	$630,000		Portland
PBOT	40067	57th/Sacramento, NE: Intersection Improvements	Add left turn lane from 57th to Sacramento.	NE			$0	$0	$350,000	$350,000		Portland
PBOT	40068	Sandy Bl, NE (47th - 101st): Multi-modal Improvements, Phase II	Retrofit existing street with multi-modal street improvements including bike lanes, redesign of selected intersections to improve pedestrian crossings, streetscape, and safety improvements.	NE			$0	$4,620,000	$0	$4,620,000		Portland/ODOT
PBOT	40069	Sandy Bl, NE (82nd - Burnside): ITS	CCTV at various locations; variable signs, changeable signs; monitoring stations.	NE			$0	$0	$340,000	$340,000		Portland/ODOT
PBOT	40070	Sandy Bl, NE (12th - 47th): Multi-modal Improvements	Retrofit existing street with multi-modal boulevard improvements including redesign of selected intersections to add turn lanes and improve pedestrian crossings, bike lanes, on-street parking, and safety improvements.	NE			$17,325,000	$0	$0	$17,325,000		Portland/ODOT
PBOT	40071	Skidmore, N/NE, (Interstate - Cully): Bikeway	Design & implement bike boulevard including traffic calming techniques and intersection improvements.	N/NE			$0	$75,075	$0	$75,075		Portland
PBOT	40073	Southwest Quad, NE (at 33rd): Access to PDX Properties	Provide street access from 33rd into the SW Quad property.	NE			$0	$2,500,000	$0	$2,500,000		Port
PBOT	40074	Twenties Bikeway, NE/SE (Lombard - Clinton)	Design & implement bikeway from NE Lombard to SE Clinton using bike blvds & bike lanes.	NE/SE			$0	$0	$760,000	$760,000		Portland
PBOT	40076	Woodlawn Pedestrian District, NE	Plan & develop improvements to the pedestrian environment.	NE			$0	$0	$200,000	$200,000		Portland
PBOT	40079	Marine Dr, NE: Intersection Improvements	Intersection improvements at NE Bridgeton Rd and NE Faloma/6th.	NE			$0	$2,035,000	$0	$2,035,000		Portland
PBOT	40080	Marine Dr, NE (6th - 33rd & Gantenbein - Vancouver Way): Bikeway	Retrofit bike lanes to existing street and complete off-street paths in missing locations.	NE			$519,750	$0	$0	$519,750		Portland
PBOT	40081	Airport MAX, NE: Light Rail Track Realignment	Realign light rail track into airport terminal building to accommodate terminal expansion plans.	NE			$0	$0	$14,000,000	$14,000,000		Port
PBOT	40082	Seventies Greenstreet and Bikeway, NE (Killingsworth - I-84)	Develop a combined pedestrian greenway and bike boulevard including crossing improvements at arterials, streetlighting, and public art from Killingsworth to Clatsop (Also see 70052).	NE			$0	$244,500	$0	$244,500		Portland
PBOT	40083	Albina/Skidmore, NE: Intersection Improvement	Straighten intersection.	NE			$0	$0	$150,000	$150,000		Portland
PBOT	40084	I-405/Kerby, N: Interchange Improvement	Improve I-405/Kerby interchange to calm traffic at off-ramp.	N			$0	$515,000	$0	$515,000		Portland/ODOT

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PBOT	40085	Kenton Rail Line, NE: Additional RR Tracks	Upgrade single track to double track; new sidings; staging tracks	NE			$0	$0	$0	$0		Port
PBOT	40086	Halsey, NE (39th - I-205): Bikeway	Retrofit bike lanes to existing street.	NE			$115,000	$0	$0	$115,000		Portland
PBOT	40088	PDX ITS, NE	CCTV, variable message signs, traveler information system.(done except for commerical vehicle system which will be done in 2014)	NE			$11,895,000	$0	$0	$11,895,000		Port
PBOT	40090	PDX Pedestrian & Bicycle Improvements	Bicycle & pedestrian connection between airport terminal and NE 82nd south of Airport Way	NE			$0	$350,000	$0	$350,000		Port
PBOT	40091	PDX PIC Pedestrian & Bicycle Improvements	Bicycle & pedestrian connection between Alderwood and Mt Hood LRT station.	NE			$140,000	$0	$0	$140,000		Port
PBOT	40093	Airtrans/Cornfoot, NE: Intersection Improvement	Provide channelization, construct new traffic signal	NE			$250,000	$0	$0	$250,000		Port
PBOT	40094	I-205, NE (I-205/Airport Way) Interchange Improvement at NB On-ramp	New I-205 NB on-ramps at Airport Way. (will be complete in 2014)	NE			$23,000,000	$0	$0	$23,000,000		ODOT
PBOT	40096	I-205, NE (Columbia Bl - Airport Way): Auxiliary Lane	New auxilliary lane from Airport Way to Columbia Bl and Airport Way ramps.	NE			$0	$0	$20,000,000	$20,000,000		ODOT
PBOT	40097	Airport Way, NE: Braided Ramps	Braided ramps between I-205 interchange and Cascade interchange.	NE			$0	$0	$30,000,000	$30,000,000		ODOT
PBOT	40100	33rd Ramps, NE (at Columbia Bl/Lombard: New Ramps	New ramp system connecting Columbia & Lombard at 33rd.	NE			$0	$0	$12,000,000	$12,000,000		Portland
PBOT	40102	Columbia BL, NE (60th - 82nd): Road Widening	Widen to 5 lanes.	NE			$0	$15,000,000	$0	$15,000,000		Portland
PBOT	40103	82nd Ave/Columbia, NE: Intersection Improvements	Widen and reconfigure intersection.	NE			$2,000,000	$0	$0	$2,000,000		ODOT/Portland/Port
PBOT	50001	Parkrose Connectivity Improvements, NE	Supplement access route for commercial properties in Parkrose by creating a loop road connection (102nd and 109th, NE, Killingsworth - Sandy; Killingsworth, NE, 109nd - 102nd) serving truck access functions, pedestrian, and bike connections.	NE			$0	$0	$578,524	$578,524		Portland
PBOT	50002	102nd Ave, NE (Weidler - Glisan): Gateway Plan District Multi-modal Improvements, Phase I	Implement Gateway Regional Center plan with boulevard design retrofit, new traffic signals, improved pedestrian facilities and crossings, street lighting, bicycle lanes, and multi-modal safety improvements.	NE			$3,234,000	$0	$0	$3,234,000		Portland
PBOT	50003	102nd Blvd & Cherry Blossom, NE/SE (Glisan - Market): Gateway Plan District Multi-modal Improvements, Phase II	Implement Gateway regional center plan with boulevard design retrofit, new traffic signals, improved pedestrian facilities and crossings, street lighting and new bicycle facilities on NE 102nd/Cherry Blossom between Glisan & Market.	NE/SE			$7,091,700	$0	$0	$7,091,700		Portland
PBOT	50004	102nd, N (Sandy - Brazee): Pedestrian Improvements	Construct a sidewalk to provide access to transit & schools.	N			$0	$0	$720,000	$720,000		Portland
PBOT	50005	122nd, NE/SE (Airport Way - Powell): ITS	CCTV at various loacations; changeable message signs; traffic monitoring stations.	NE/SE			$0	$200,000	$0	$200,000		Portland
PBOT	50006	122nd, NE (Sandy Dr - Prescott): Pedestrian Improvements	Construct sidewalks along existing street.	NE			$0	$120,000	$0	$120,000		Portland
PBOT	50008	138th, NE (Marine Dr - Sandy): Street Improvements	Address traffic flow and widen from 2 to 4 lanes.	NE			$0	$0	$2,000,000	$2,000,000		Portland
PBOT	50009	148th, NE (Marine Dr - Glisan): Bicycle & Pedestrian Improvements	Retrofit bike lanes to existing street (Marine Dr - I-84) and construct sidewalk and safety improvements including signal/ intersection improvements at 148th/Sandy (Airport Way-Glisan).	NE			$0	$1,831,000	$0	$1,831,000		Portland
PBOT	50012	162nd Ave, NE (Sandy - Halsey): Bikeway	Retrofit bike lanes to existing street. Completed from Thompson to Halsey	NE			$0	$0	$20,000	$20,000		Portland

Bureau	ID	Project Title*	Project Description*	Location*	Project Objective	Driver	Estimated Local Cost by Time Period Total FY 2013-18	FY 2018-23	FY 2023-33	Total FY 2013-33	Funding Source(s)	Lead Agency
PBOT	50014	99th Ave & Pacific Ave, NE: Gateway Plan District Street Improvements, Phase I	Reconstruct primary local main street network in Gateway Regional Center on NE 99th from Weidler to 300' south of Glisan and NE Pacific from 97th to 102nd.	NE			$4,042,500	$0	$0	$4,042,500		Portland
PBOT	50015	99th & 96th, NE/SE (Glisan-Market: Gateway Plan District Street Improvements, Phase II & III	Reconstruct primary local main street in Gateway Regional Center. Phase II - 99th (Glisan - Washington). Phase III - 96th (Washington to Market).	NE/SE			$0	$3,500,000	$0	$3,500,000		Portland
PBOT	50016	Airport Way, NE (I-205 - 158th): ITS	CCTV at I-205 & 122nd; variable sign at I-205; monitoring stations at 122nd & 158th.	NE			$220,000	$0	$0	$220,000		Port/Portland
PBOT	50018	Gateway Regional Center, NE/SE: Local Street Improvements, Phase I	High priority local street and pedestrian improvements in regional center	NE/SE			$0	$3,000,000	$0	$3,000,000		Portland
PBOT	50019	Gateway Regional Center, NE/SE: Local Street Improvements, Phase II	High priority local street and pedestrian improvements in regional center.	NE/SE			$0	$6,000,000	$0	$6,000,000		Portland
PBOT	50020	Gateway Regional Centert, NE/SE: Local Street Improvements, Phase III	High priority local street and pedestrian improvements in regional center.	NE/SE			$0	$0	$6,000,000	$6,000,000		Portland
PBOT	50021	Gateway Plan District, NE/SE: TMA	Implement a transportation management association program with employers in the regional center.	NE/SE			$0	$0	$200,000	$200,000		Tri Met
PBOT	50022	Gateway District Plan, NE/SE: Traffic Management	Implement a comprehensive traffic management plan throughout the regional center to reduce cut-through traffic on residential streets and improve traffic flow on regional streets. Project includes utility improvements.	NE/SE			$1,386,000	$0	$0	$1,386,000		Portland
PBOT	50023	Glisan St, NE (106th - 122nd): Bikeway	Retrofit bike lanes to existing street.	NE			$0	$57,750	$0	$57,750		Portland
PBOT	50024	Glisan St, NE (I-205 - 106th): Gateway Plan District Multi-modal Improvements	Implement Gateway regional center plan with boulevard design retrofit, new traffic signals, bike facilities, improved pedestrian facilities and crossings, and street lighting.	NE			$0	$0	$2,310,000	$2,310,000		Portland
PBOT	50025	Glisan St, NE (122nd - City Limits): Multi-modal Improvements	Construct bike lanes, sidewalks, crossing improvements, and install street trees (122nd-162nd) Add new signal at Glisan/131st to improve pedestrian and vehicular access to Glisan St.	NE			$0	$2,140,000	$0	$2,140,000		Portland
PBOT	50027	Halsey to San Rafael & 118th to 132nd, NE: Pedestrian Improvements	Improve pedestrian access to San Rafael Shopping Center including street trees.	NE			$0	$0	$250,000	$250,000		Portland
PBOT	50028	Halsey St, NE (122nd-162nd): Pedestrian Improvements	Construct sidewalks, crossing improvements for ped travel and access to transit.	NE			$0	$1,100,000	$0	$1,100,000		Portland
PBOT	50030	Marine Drive/122nd, NE: Intersection Improvements	Signalize and widen dike to install left turn lane on Marine Drive.	NE			$1,683,000	$0	$0	$1,683,000		Portland
PBOT	50032	105th & Prescott, NE: Parkrose Pedestrian Enhancements	Construct sidewalk and crossing improvements to provide access to transit and schools on NE Prescott (92nd-122nd) & NE 105th (Sandy-Skidmore).	NE			$0	$1,200,000	$0	$1,200,000		Portland
PBOT	50033	Prescott St, NE (122nd - I-205): Bikeway	Retrofit bike lanes to existing street.	NE			$0	$0	$1,000,000	$1,000,000		Portland
PBOT	50035	Sandy Bl, NE (122nd - City Limits): Multi-modal Improvements	Widen street to three or five lanes with sidewalks and bike lanes.	NE			$0	$0	$5,750,000	$5,750,000		ODOT
PBOT	50036	Shaver St, NE (116th to 122nd): Pedestrian Improvements	Construct sidewalks and crossing improvements for pedestrian travel and access to transit and schools.	NE			$0	$0	$210,000	$210,000		Portland
PBOT	50037	San Rafael/Tillamook, NE (102nd - 148th): Bikeway	Retrofit bike lanes and/or bicycle boulevard on Tillamook/San Rafael from Gateway regional center to 148th.	NE			$0	$1,300,000	$0	$1,300,000		Portland

Bureau	ID	Project Title*	Project Description*	Location*	Project Objective	Driver	Estimated Local Cost by Time Period Total FY 2013-18	FY 2018-23	FY 2023-33	Total FY 2013-33	Funding Source(s)	Lead Agency
PBOT	50038	Woodland Park, NE: Pedestrian Improvements	Construct sidewalks and crossing improvements on San Rafael (111th-122nd), Sacramento (111th-117th), & 111th (San Rafael-Sacramento) to provide access to transit & schools.	NE			$0	$0	$500,000	$500,000		Portland
PBOT	50039	Halsey/Weidler, NE (I-205 - 114th): Multi-modal Improvements	Implement Gateway Regional Center Plan boulevard design including new traffic signals, improved pedestrian facilities and crossings and street lighting.	NE			$0	$0	$12,127,500	$12,127,500		Portland
PBOT	50040	Airport Way/122nd, NE: Intersection Improvement	Add NB LT lanes, modify signal, reconstruct island.	NE			$490,000	$0	$0	$490,000		Portland
PBOT	50041	Marine Dr, NE:(I-205 - 122nd) Multi-Use Path	Add multi-use path along Marine Dr.	NE			$1,100,000	$0	$0	$1,100,000		
PBOT	60002	18th/19th Ave, NW: Decouple Streets	Analysis of design options, engineering and construction of 18th/19th decoupling.	NW			$0	$0	$180,000	$180,000		Portland
PBOT	60004	Bridge Ave, NW (St Helens Rd - St Helens Rd): Pedestrian/Bicycle trail at St. Johns Bridge	Construct asphalt trail along east side of Bridge Avenue between both St. Helens Rd intersections.	NW			$0	$0	$346,500	$346,500		ODOT
PBOT	60005	Barnes/Burnside, NW: Intersection/Access Improvements	Install signal or 4-way stop near Wildwood Trail and entrance to Pittock.	NW			$0	$0	$500,000	$500,000		Portland
PBOT	60006	Burnside, W (23rd - Skyline): Multi-modal Improvements	Retrofit bikeway to existing street, improve sidewalks, lighting, crossings and provide traffic signal & left-turn lane at Burnside/Skyline.	W			$0	$0	$1,100,000	$1,100,000		Portland
PBOT	60007	Cornell, NW (30th - City Limits): Bikeway	Retrofit bike lanes to existing street.	NW			$0	$0	$1,000,000	$1,000,000		Portland
PBOT	60008	Everett St, NW, (Broadway - 23rd): Corridor Safety Improvements	Install flashing beacon & additional signing at NW Park Ave, remodel traffic signal and improve overhead signing at 16th Ave and provide additional minor improvements along corridor to improve safety at high accident locations.	NW			$0	$0	$175,000	$175,000		Portland
PBOT	60009	Everett/Glisan, NW (Front - 14th & 18th - 24th): Bikeway	Retrofit bike lanes to existing street.	NW			$0	$0	$60,000	$60,000		Portland
PBOT	60010	Everett/Glisan, NW, (14th - 23rd): Decouple	Analysis of design options, engineering and construction of Everett/Glisan decoupling or other appropriate alternative.	NW			$0	$0	$680,000	$680,000		Portland
PBOT	60012	Kittridge, NW (Bridge at Yeon): Seismic Retrofit	Seismic retrofit.	NW			$0	$0	$623,700	$623,700		Portland
PBOT	60013	US 30, NW: Linnton Transit Service Improvements	Develop transit amenities within Linnton area and construct ADA pads at bus stops between NW 29th/Yeon and Sauvie Island Bridge.	NW			$0	$0	$900,000	$900,000		Tri-Met
PBOT	60014	Northwest Pedestrian District, NW	Plan & develop improvements to the pedestrian environment to emphasize district identity and make walking the mode of choice for trips within the district.	NW			$0	$0	$500,000	$500,000		Portland
PBOT	60015	Skyline, NW (Hwy 26 - City Limits): Bikeway	Retrofit bike lanes to existing street. Completed from Hwy 26 to SW 57th.	NW			$0	$0	$5,000,000	$5,000,000		Portland
PBOT	60016	St. Helens Rd (US 30), NW (106th - 112th): Linnton Community Pedestrian & Bike Improvements	Replace 2 traffic signals at 105th, 107th; curb bulbouts, sidewalks, and pedestrian crossings.	NW			$0	$0	$550,000	$550,000		ODOT
PBOT	60017	St. Helens Rd (US 30), NW (at 108th): Pedestrian Overcrossing	Construct a pedestrian overcrossing at NW 108th Avenue.	NW			$0	$0	$350,000	$350,000		ODOT
PBOT	60018	St. Helens Rd (US 30), NW (at Saltzman & Balboa): Intersection Realignment	Realign intersections to correct two offset intersections.	NW			$0	$0	$600,000	$600,000		ODOT

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PBOT	60019	St. Helens Rd (US 30), NW (105th - Kittridge): Bicycle & Pedestrian Improvements	Construct sidewalks and bicycle facilities.	NW			$0	$1,746,000	$0	$1,746,000		ODOT
PBOT	60020	St Helens Rd (US 30), NW: Linnton Traffic Calming	Visually narrow roadway, including landscaping, pedestrian bulb outs, and median at various locations within Linnton.	NW			$400,000	$0	$0	$400,000		ODOT
PBOT	60021	West Bikeways, NW	Construct curb extensions on Johnson at 21st and 23rd; (Some corners built) Contraflow lane on 24th (Glisan - Flanders); Bike lanes on Couch (Broadway - 10th).	NW			$0	$10,000	$0	$10,000		Portland
PBOT	60022	St Helens Rd (US 30), NW, (in Willbridge area): Traffic Improvements	Install center turn lane to NW Front.	NW			$0	$0	$0	$0		ODOT
PBOT	60023	Yeon/St. Helens, NW: ITS	CCTV at various locations; changeable signs; monitoring stations at Nicolai and Kittridge.	NW			$193,000	$0	$0	$193,000		Portland/ODOT
PBOT	60024	Wildwood Trail Bridge, NW/SW	Construct pedestrian overcrossing where Burnside intersects the Wildwood Trail to eliminate at-grade crossing.	NW/SW			$0	$0	$700,000	$700,000		Portland
PBOT	60025	Fairview, SW (Kingston - City Limits): Bikeway	Retrofit bike lanes to existing street.	SW			$0	$0	$2,000,000	$2,000,000		Portland
PBOT	60026	Champlain, SW: Viaduct Replacement	Replace existing viaduct with retaining wall and geofoam fill.	SW			$282,269	$0	$0	$282,269		Portland
PBOT	60027	23rd/Vaughn, NW: Intersection Improvements	Reduce congestion, improve pedestrian access, gateway into NW district.	NW			$0	$540,000	$0	$540,000		Portland/ODOT
PBOT	60029	Miller, NW (Stark - Cornell): Multimodal Improvements	Add bicycle and pedestrian facilities.	NW			$0	$0	$261,000	$261,000		Mult Co/Portland
PBOT	70001	13th Ave, SE(Malden - Tacoma): Streetscape Improvements	Plan and develop streetscape and transportation improvements to increase opportunities to walk and enhance the main street character.	SE			$0	$0	$180,000	$180,000		Portland
PBOT	70002	17th Ave, SE (Powell - City Limits): Bikeway	Retrofit bike lanes to existing street.	SE			$0	$100,000	$0	$100,000		Portland
PBOT	70004	26th/Holgate, SE: Intersection Improvements	Intersection improvement to facilitate traffic circulation.	SE			$0	$0	$82,000	$82,000		Portland/Port
PBOT	70005	39th Ave, NE/SE (Sandy - Woodstock): Safety & Pedestrian Improvements	Reconstruct street (Burnside-Holgate). Construct sidewalks and crossing improvements (Stark - Schiller). Upgrade three pedestrian signals to full signals, remodel two full signals, and provide channelization improvements to three other signals to improve	NE/SE			$2,200,000	$0	$0	$2,200,000		Portland
PBOT	70006	60th Ave, NE/SE (Glisan - Belmont): Corridor Safety Improvements	Signal improvements, modifications, and realignment to improve safety at high accident locations. Includes the intersections with Belmont, Glisan, and Stark.	NE/SE			$0	$0	$380,000	$380,000		Portland
PBOT	70007	82nd Ave, SE (Schiller - City Limits), SE: Street Improvements	Expand into fully curbed, 4-lane, 60-foot wide roadway w/ continuous left-turn lane, sidewalks, street trees, storm drainage improvements, street lighting, & ROW acquisition.	SE			$0	$1,445,000	$0	$1,445,000		ODOT/ Portland
PBOT	70008	92nd Ave, SE (Powell - City Limits): Bicycle & Pedestrian Improvements	Construct sidewalks, crossing improvements and bike lanes.	SE			$3,500,000	$0	$0	$3,500,000		Portland
PBOT	70009	Belmont St, SE (25th - 43rd): Street and Pedestrian Improvements	Identify improvements along Belmont to enhance pedestrian access to transit, improve safety, and enhance streetscape such as traffic signals, lighting, bus shelters, benches, and crossings.	SE			$2,310,000	$0	$0	$2,310,000		Portland
PBOT	70010	Burnside, E (28th - 82nd): Bicycle & Pedestrian Improvements	Retrofit bike lanes to existing street (28th - 74th), develop streetscape improvements (28th - 33rd) and improve pedestrian crossings to provide access to schools and transit (60th to 82nd).	SE			$1,010,000	$0	$0	$1,010,000		Portland

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PBOT	70013	Division St, SE (Grand -60th): Multi-modal Improvements, Phase I	Construct improvements that enhance access to transit, improve safety and enhance streetscape such as traffic signals, alt lane and on-street parking config, stormwater mgmt, lighting, bus shelters, benches, and crossings. Add bike lanes (52nd - 60th).	SE			$2,786,000	$0	$0	$2,786,000		Portland
PBOT	70014	Division St, SE (60th - I-205): Multimodal Improvements, Phase II	Construct improvements that enhance access to transit, improve safety and enhance the streetscape such as traffic signals, lighting, bus shelters, benches, and crossings. Add bike lanes (60th - 73rd).	SE			$0	$0	$2,000,000	$2,000,000		Portland
PBOT	70017	Ellis St, SE (92nd - Foster): Bikeway	Retrofit bike lanes to existing street.	SE			$0	$0	$462,000	$462,000		Portland
PBOT	70018	Fifties Bikeway, NE/SE (Tillamook to Woodstock)	Identify & implement small-scale bikeway improvements such as grating replacement, street surface repairs, modify signals, signage upgrade, restripe streets, curb ramps, and sweep bike lanes.	SE			$0	$0	$677,500	$677,500		Portland
PBOT	70019	Flavel Dr, SE (45th - Clatsop): Pedestrian Improvements	Construct sidewalks.	SE			$0	$0	$630,000	$630,000		Portland
PBOT	70020	Flavel St, SE (82nd - 92nd): Pedestrian Improvements	Construct sidewalks and crossing improvements.	SE			$0	$0	$340,000	$340,000		Portland
PBOT	70021	Foster Rd, SE (Powell - 90th): Pedestrian/Bicycle/Safety Improvements	Improve sidewalks, lighting, crossings, bus shelters & benches on Foster and improve pedestrian crossing at Foster/82nd intersection to benefit pedestrian access to transit.	SE			$0	$0	$3,850,000	$3,850,000		Portland
PBOT	70022	Foster Rd, SE (82nd - 87th): Lents Town Center Street Improvements	Implement Lents Town Center Business District Plan with new traffic signals, pedestrian amenities, wider sidewalks, pedestrian crossings, street lighting, and on-street parking as appropriate.	SE			$2,320,000	$0	$0	$2,320,000		Portland
PBOT	70024	Foster & Woodstock, SE (94th - 101th): Street Improvements, Phase II	Implement Lents Town Center Business District Plan with new traffic signals, pedestrian amenities, wider sidewalks, pedestrian crossings, and street lighting.	SE			$5,775,000	$0	$0	$5,775,000		Portland
PBOT	70027	Harney Dr, SE (52nd - Flavel): Bikeway	Retrofit bike lanes to existing street.	SE			$0	$0	$1,252,000	$1,252,000		Portland
PBOT	70028	Harold St, SE (52nd - Foster): Bikeway	Retrofit bike lanes to existing street.	SE			$0	$0	$200,000	$200,000		Portland
PBOT	70030	McLoughlin (99E), SE (Ross Island Bridge - Clatsop): Multi-modal Improvements	Provide access management, reversible travel lane from Ross Island Bridge to Harold and widen to six lanes from Harold to I-205. Inlcude pedestrian and bike facilities.	SE			$0	$0	$96,500,000	$96,500,000		ODOT
PBOT	70031	Holgate Bl, SE (52nd - I-205): Bikeway, Phase I	Retrofit bike lanes to existing street.	SE			$0	$0	$30,000	$30,000		Portland
PBOT	70032	Holgate Bl, SE (39th - 52nd): Street Improvements	Reconstruct SE Holgate pavement structure, stormwater drainage facilities, corner curb ramps to ADA standards, improve pedestrian crossings, and add bike lanes.	SE			$797,000	$0	$0	$797,000		Portland
PBOT	70033	Holgate Bl, SE (McLoughlin - 39th): Bikeway, Phase II	Retrofit bike lanes to existing street.	SE			$0	$19,635	$0	$19,635		Portland
PBOT	70034	I-205 Multi-Use Path Crossings, SE	Improve crossings and access to I-205 multi-use path at arterials street intersections (Halsey, Glisan, Stark-Washington, Division, Powell, Foster-Woodstock).	SE			$275,000	$0	$0	$275,000		ODOT
PBOT	70038	Lafayette St, SE (18th - 20th): Pedestrian Overpass	Construct new pedestrian overpass to replace existing decrepit structure.	SE			$0	$0	$580,000	$580,000		Portland
PBOT	70039	Lents Pedestrian District, SE	Pedestrian facility improvements to key links accessing the Foster-Woodstock couplet.	SE			$0	$861,000	$0	$861,000		Portland
PBOT	70040	McLoughlin Blvd, SE (at Ross Island Sand and Gravel signalized entrance): Brooklyn Neighborhood Access Improvements	Upgrade intersection at Ross Island Sand and Gravel entrance to accommodate safe pedestrian crossing of McLoughlin Blvd. Alternative crossing opportuntities will be considered if location is found to be infeasibile or unsafe.	SE			$0	$0	$0	$0		Portland

							Estimated Local Cost by Time Period					
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PBOT	70041	Milwaukie, SE (Gideon - Mall): Bicycle & Pedestrian Improvements	Plan and develop streetscape and pedestrian/bike improvements.	SE			$0	$350,000	$0	$350,000		Portland
PBOT	70042	Milwaukie, SE (Yukon - Tacoma): Bicycle & Pedestrian Improvements	Plan and develop streetscape and pedestrian/bike improvements.	SE			$0	$993,300	$0	$993,300		Portland
PBOT	70043	Montavilla Pedestrian District, SE	Plan & develop improvements to the pedestrian environment to emphasize district identity and make walking the mode of choice for trips within the district.	SE			$0	$360,000	$0	$360,000		Portland
PBOT	70044	Mt. Scott Bl, SE (92nd - 112th): Pedestrian Improvements	Build a continuous walkway for pedestrian travel and access to transit with crossing improvements at transit stop locations.	SE			$0	$0	$1,900,000	$1,900,000		Portland
PBOT	70045	Powell, SE (Ross Island Bridge - 50th): Multi-modal Improvements	Plan and develop streetscape and transportation improvements to increase opportunities to walk and enhance the pedestrian character of the corridor including intersection improvements at 8th, 26th, and Milwaukie.	SE			$1,000,000	$0	$0	$1,000,000		ODOT/Portland
PBOT	70046	Powell, SE (71st - I-205): Bikeway	Retrofit bike lanes to existing street.	SE			$0	$0	$4,500,000	$4,500,000		ODOT
PBOT	70047	Powell - Foster Rapid Bus, SE	Construct improvements that enhance Rapid Bus service along the Powell-Foster corridor between downtown Portland and Damascus.	SE			$0	$0	$0	$0		Tri Met
PBOT	70048	River Access Transportation Study, SE: River Dock, Phase III	Construct recreational/commercial dock at Oaks Pk (Ph III). It will provide future river taxi stop.	SE			$0	$0	$814,663	$814,663		Portland
PBOT	70049	Reedway St, SE (McLoughlin - 29th): Multi-Use Path	Construct pedestrian/bike path between McLoughlin and SE 26th Avenue.	SE			$0	$0	$250,000	$250,000		Portland
PBOT	70050	Sellwood Bridge, SE/SW: Bridge Replacement	Replace weight-restricted bridge.	SE/SW			$75,000,000	$0	$0	$75,000,000		Multnomah County
PBOT	70052	Seventies Greenstreet and Bikeway, SE (I-84 - Clatsop)	Develop a combined pedestrian greenway and bike boulevard including crossing improvements at arterials, streetlighting, and public art from Killingsworth to Clatsop (Also see 40082).	SE			$0	$244,500	$0	$244,500		Portland
PBOT	70053	Springwater Corridor Trail, SE (Sellwood Bridge - Springwater Trailhead): Access Improvements	Construct multi-use path designed for bicycle and pedestrian use from trailhead to Sellwood Bridge including access connector over McLoughlin (99E) and undercrossing ramps at Sellwood Bridge .	SE			$7,010,000	$0	$0	$7,010,000		Portland
PBOT	70055	Tacoma St, SE (Sellwood Bridge - McLoughlin): Multi-modal Improvements	Implement boulevard design based on Tacoma Main Street study recommendations and incorporate McLoughlin Neighborhoods Project recommendations.	SE			$0	$1,400,000	$0	$1,400,000		Portland
PBOT	70056	Spokane & Umatilla, SE (7th - Tacoma Overcrossing): Bikeway	Implement bike boulevard improvements	SE			$0	$0	$250,000	$250,000		Portland
PBOT	70057	Tacoma, SE (Sellwood Bridge - 45th/Johnson Creek): ITS	Communications infrastructure; closed circuit TV cameras, variable message signs for remote monitoring and control of traffic flow for four signals.	SE			$0	$115,000	$0	$115,000		Portland
PBOT	70059	Glisan St, NE (47th - I-205): Bikeway	Retrofit bike lanes to existing street.	NE			$57,750	$0	$0	$57,750		Portland
PBOT	70060	92nd, SE (Stark - Lincoln): Bikeway	Retrofit bike lane to existing street.	SE			$0	$0	$21,000	$21,000		Portland
PBOT	70061	Stark, SE (75th - I-205): Bikeway	Retrofit bike lanes to existing street.	SE			$173,250	$0	$0	$173,250		Portland
PBOT	70063	UP Line Upgrade, Albina Yard - East Portland	Upgrade track to 2nd main track.	SE			$8,800,000	$0	$0	$8,800,000		UPRR
PBOT	70064	Foster Rd, SE/FSE: ITS	CCTV at various locations; changeable signs; monitoring stations	SE			$0	$0	$145,000	$145,000		Portland
PBOT	70065	McLoughlin/SE: ITS	CCTV at various locations; variable sign; monitoring stations.	SE			$250,000	$0	$0	$250,000		ODOT

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PBOT	70066	Powell Bl, SE/FSE (Milwaukie - 122nd): ITS	CCTV at various locations; variable signs.	SE			$0	$395,000	$0	$395,000		ODOT
PBOT	80001	111th/112th Ave, SE (Market - Mt. Scott Bl): Bicycle & Pedestrian Improvements	Retrofit bike lanes to existing street (Market - Mt. Scott Bl) and construct sidewalks (Holgate - Mt. Scott Bl).	SE			$0	$0	$1,475,500	$1,475,500		Portland
PBOT	80003	122nd, SE (at Morrison): Pedestrian Overcrossing	Connect library and park with pedestrian overcrossing.	SE			$0	$0	$1,000,000	$1,000,000		Portland
PBOT	80004	136th Ave, SE (Division - Foster): Bikeway	Provide bike lanes from Division to Foster. Project involves shoulder widening and drainage work.	SE			$0	$0	$1,500,000	$1,500,000		Portland
PBOT	80005	148th Ave, SE (Burnside - Powell): Pedestrian Improvements	Construct sidewalks, curbs, ADA ramps.	SE			$0	$980,000	$0	$980,000		Portland
PBOT	80006	162nd, SE (Stark - Powell): Multi-modal Improvements	Install bike lanes (Stark - Powell), sidewalks, curbs, ramps, and capacity improvements.	SE			$0	$0	$980,000	$980,000		Portland
PBOT	80007	174th & Jenne Rd , SE (Foster - Powell): Multi-modal Improvements	Roadway improvements to increase safety and capacity to accommodate increased residential development. Widen roadway to 3 lanes and provide bike lanes, sidewalks to provide better transportation links in this vital north/south link.	SE			$0	$5,100,000	$0	$5,100,000		Portland
PBOT	80008	Barbara Welch Rd, SE (Foster - City Limits):Multimodal Improvements	Widen travel lanes; sidewalk improvements; intersection improvements at Foster. Retrofit bike lanes to existing roadway.	SE			$0	$0	$2,700,000	$2,700,000		Portland
PBOT	80009	Division St, SE (I-205 - 174th): Multimodal Improvements, Phase II	Improve sidewalks, lighting, crossings, bus shelters & benches. Add bike lanes (148th - 162nd).	SE			$0	$4,070,500	$0	$4,070,500		Portland
PBOT	80010	Foster Rd, SE (102nd - Foster Pl): Pedestrian Improvements	Construct walkway and crossing improvements to facilitate pedestrian travel and access to transit.	SE			$0	$670,000	$0	$670,000		Portland
PBOT	80011	Foster Rd, SE (136th - Jenne): Multi-modal Improvements	Widen street to three lanes to provide two travel lanes, continuous turn lane, bike lanes, sidewalk, and drainage. Replace Foster Rd bridge over Johnson Creek. Reconstruct Foster/Barbara Welch & Foster/162nd intersections.	SE			$8,300,000	$0	$0	$8,300,000		Portland
PBOT	80012	Holgate Bl, SE (92nd - 142nd): Pedestrian Improvements	Construct bike lanes, sidewalks and crossing improvements to facilitate pedestrian travel and access to transit.	SE			$0	$1,260,000	$0	$1,260,000		Portland
PBOT	80014	Mill Park Pedestrian Improvements, SE	Construct sidewalks & crossing improvements to improve pedestrian travel and access to transit and schools on Market (96th - 112nd), 101st (Market - Division), 117th (Stark - Division).	SE			$0	$0	$1,185,000	$1,185,000		Portland
PBOT	80015	Powell, SE (I-205 - 174th): Multi-modal Improvements	Widen street to four lanes with sidewalks and bike lanes.	SE			$0	$48,000,000	$0	$48,000,000		ODOT
PBOT	80016	Powellhurst/Gilbert Pedestrian Improvements, SE	Construct sidewalks & crossing improvements to enhance pedestrian travel and access to transit and schools on Harold (102nd-128th), 122nd (Bush-Harold), 110th (Harold-Foster); 103rd/104th (Powell-Foster).	SE			$0	$0	$1,200,000	$1,200,000		Portland
PBOT	80017	Stark, SE (111th - City Limits): Bikeway	Retrofit bike lanes to existing street (excluding 92nd - 111th).	SE			$0	$173,250	$0	$173,250		Portland
PBOT	80018	Stark & Washington, SE (92nd - 111th): Gateway Plan District Street Improvements	Implement Gateway regional center plan with boulevard design retrofit including new traffic signals, improved pedestrian facilities and crossings, and street lighting.	SE			$0	$0	$4,389,000	$4,389,000		Portland
PBOT	80019	Ventura Park Pedestrian District, NE/SE	Improve sidewalks, lighting, crossings, bus shelters & benches to improve ease of crossing and install curb extensions at transit stops.	SE			$0	$600,600	$0	$600,600		Portland
PBOT	80020	Market/Mill/Main, SE (72nd - 175th): Bikeway	Retrofit bike lanes to existing street.	SE			$0	$0	$600,000	$600,000		Portland

							Estimated Local Cost by Time Period					
Bureau	ID	Project Title*	Project Description*	Location*	Project Objective	Driver	Total FY 2013-18	FY 2018-23	FY 2023-33	Total FY 2013-33	Funding Source(s)	Lead Agency
PBOT	80021	Clatsop, SE (Deardorf/132nd - 162nd): Multimodal Improvements	Multimodal improvements based on PV Implementation Plan.	SE			$0	$2,000,000	$0	$2,000,000		Portland/Clackamas Co
PBOT	80022	I-205, SE (Division - Powell Blvd): Interchange Improvements	Add full access ramps to I-205 at Powell	SE			$0	$0	$12,000,000	$12,000,000		ODOT
PBOT	80023	162nd/Clatsop, SE: Intersection Improvements	Install signal at intersection.	SE			$250,000	$0	$0	$250,000		Portland
PBOT	80024	Clatsop, SE (162nd - City Limits): Street Extension	Extend street east into PV based on PV Implementation Plan.	SE			$0	$0	$3,870,000	$3,870,000		Portland/Clackamas County
PBOT	80025	Foster Rd, SE (162nd - Giese Rd): Multi-modal Street Improvements	Multimodal improvements based on PV Implementaiton Plan.	SE			$0	$0	$1,800,000	$1,800,000		Portland/Gresham
PBOT	80026	162nd, SE (Foster Rd - Clatsop): Street Improvements	Multimodal improvements based on PV Implementation Plan.	SE			$7,000,000	$0	$0	$7,000,000		Portland
PBOT	90001	12th, Broadway, Cardinell & Davenport, SW (Montgomery - Vista): Bikeway	Retrofit bike lanes to existing street.	SW			$0	$0	$4,508,000	$4,508,000		Portland
PBOT	90002	19th, SW (Barbur - Spring Garden): Bikeway	Retrofit bike lanes to existing street.	SW			$0	$0	$200,000	$200,000		Portland
PBOT	90003	25th Ave & Kanan, SW (23rd - B-H Hwy): Pedestrian Improvements	Construct a walkway for pedestrian travel and access to transit.	SW			$0	$0	$450,000	$450,000		Portland
PBOT	90004	26th Ave, SW (Spring Garden - Taylors Ferry): Pedestrian Improvements	Construct a walkway for ped travel and access to transit and install street lighting.	SW			$0	$350,000	$0	$350,000		Portland
PBOT	90005	30th Ave, SW (Vermont to B-H Hwy): Bicycle & Pedestrian Improvements	Retrofit bike lanes to existing street, construct sidewalks, and improve pedestrian crossing at Beaverton-Hillsdale Hwy/30th.	SW			$0	$1,311,000	$0	$1,311,000		Portland
PBOT	90006	35th Ave, SW (Vermont - Barbur): Bicycle & Pedestrian Improvements	Add bike lanes (Vermont - Barbur), sidewalks, and crossing improvements (Multnomah to Barbur).	SW			$0	$0	$690,000	$690,000		Portland
PBOT	90007	35th Ave, SW (Taylors Ferry - Stephenson): Bicycle & Pedestrian Improvements	Bike lanes (Taylors Ferry - Stephenson), sidewalks, crossing improvements, and median islands (Taylors Ferry - Dickinson) to improve safety for school children.	SW			$0	$1,570,000	$0	$1,570,000		Portland
PBOT	90008	45th Ave, SW (B-H Hwy to Taylors Ferry): Bicycle & Pedestrian Improvements	Stripe bike lanes (Cameron - Taylors Ferry), provide sidewalk and crossing improvements (east side of Cullen - Iowa) and construct path/stairway (Cullen to B-H Hwy).	SW			$0	$0	$5,644,000	$5,644,000		Portland
PBOT	90009	48th/Alfred, SW (Taylors Ferry - 55th): Bikeway	Retrofit bike lanes to existing street.	SW			$0	$500,000	$0	$500,000		Portland
PBOT	90011	55th/Pasadena/ Pomona, SW (Taylors Ferry - Barbur): Bikeway	Retrofit bike lanes to existing street.	SW			$0	$0	$2,000,000	$2,000,000		Portland
PBOT	90012	61st/62nd, SW (Taylors Ferry - Pomona): Bikeway	Retrofit bike lanes to existing street.	SW			$0	$0	$1,000,000	$1,000,000		Portland
PBOT	90013	Arnold, SW (Boones Ferry - 35th): Bicycle & Pedestrian Improvements	Construct bikeway and pedestrian facilities.	SW			$0	$0	$3,479,000	$3,479,000		Portland
PBOT	90014	Barbur Blvd, SW: ITS	Install intelligent transportation system infrastructure to improve safety and enhance traffic flow.	SW			$550,000	$0	$0	$550,000		Portland/ODOT
PBOT	90017	Barbur Blvd, SW (Terwilliger - City Limits): Multi-modal Improvements	Complete boulevard design improvements including sidewalks and street trees, safe pedestrian crossings, enhance transit access and stop locations, traffic signal at Barbur/30th, and bike lanes (Bertha - City Limits).	SW			$15,000,000	$0	$0	$15,000,000		Portland/ODOT

Bureau	ID	Project Title*	Project Description*	Location*	Project Objective	Driver	Estimated Local Cost by Time Period: Total FY 2013-18	FY 2018-23	FY 2023-33	Total FY 2013-33	Funding Source(s)	Lead Agency
PBOT	90018	Barbur Blvd, SW: Rapid Bus	Construct improvements to enhance Rapid Bus.	SW			$0	$0	$0	$0		Tri-Met
PBOT	90019	Beaverton-Hillsdale Hwy, SW: ITS	CCTV at Terwilliger, Berth, shattuck; changeable signs.	SW			$0	$0	$0	$0		Portland
PBOT	90020	Beaverton-Hillsdale Hwy, SW (Capitol Hwy - 65th): Multi-modal Improvements	Retrofit existing street to include better sidewalks and crossings, bike lanes and other improvements to enhance access to transit. Install median refuge to improve pedestrian crossing at SW 62nd.	SW			$0	$0	$2,541,000	$2,541,000		Portland
PBOT	90021	Beaverton-Hillsdale Hwy, SW: Frequent Bus	Construct improvements to enhance Frequent Bus service.	SW			$0	$0	$0	$0		Tri-Met
PBOT	90022	Bertha, SW (B-H Hwy - Barbur): Multi-modal Improvements	Design and implement bike lanes on missing piece of Bertha Blvd (Vermont-B-H Hwy), construct walkway for pedestrian travel and access to schools (Barbur-B-H Hwy); and improve street to City standards (Vermont-Capitol).	SW			$0	$1,500,000	$0	$1,500,000		Portland
PBOT	90023	Boones Ferry Rd, SW (Terwilliger - City Limits): Bikeway	Retrofit bike lanes to existing street.	SW			$0	$0	$5,000,000	$5,000,000		Portland
PBOT	90024	Broadway Dr, SW (Sherwood - Grant): Pedestrian Improvements	Construct a sidewalk and crossing improvements (at Hoffman and Sherman/830 Broadway).	SW			$0	$0	$1,100,000	$1,100,000		Portland
PBOT	90025	Cameron Rd, SW (45th - Shattuck): Multi-modal Improvements	Retrofit bike lanes to existing street, construct sidewalks, and provide safety improvements at Cameron/Shattuck intersection.	SW			$0	$0	$3,068,000	$3,068,000		Portland
PBOT	90026	Capitol Hwy, SW (Multnomah Bl - Taylors Ferry): Bicycle & Pedestrian Improvements	Retrofit bike lanes to existing street, construct sidewalks,and improve crossings.	SW			$1,386,000	$0	$0	$1,386,000		Portland
PBOT	90027	Capitol Hwy, SW (West Portland Town Center - 49th): Pedestrian Improvements	Complete curb extensions and medians recommended in the Capitol Hwy Plan.	SW			$0	$750,000	$0	$750,000		Portland
PBOT	90028	Beaverton-Hillsdale /Bertha/Capitol Hwy, SW: Intersection Improvements	Redesign intersection to improve safety.	SW			$975,975	$0	$0	$975,975		Portland
PBOT	90029	Capitol Hwy, SW (Terwilliger - Sunset): Multi-modal Improvements	Construct sidewalks, crossing improvements for access to transit and bike improvements, and install left turn lane at the Capitol/Burlingame intersection.	SW			$0	$910,000	$0	$910,000		Portland
PBOT	90031	Dosch Rd, SW (Patton - B-H Hwy): Bicycle & Pedestrian Improvements	Construct bikeway, and walkway for pedestrian travel and access to transit.	SW			$0	$5,745,000	$0	$5,745,000		Portland
PBOT	90033	Garden Home Rd, SW (Capitol Hwy - Multnomah): Multi-modal Improvements	Reconstruct road to three lanes with signal improvements at Multnomah intersection, drainage, bike lanes, sidewalks and curbs.	SW			$6,475,000	$0	$0	$6,475,000		Portland
PBOT	90034	Hamilton St, SW (Dosch - Scholls Ferry): Bicycle & Pedestrian Improvements	Retrofit bike lanes to existing street and construct sidewalks to provide access to transit and schools.	SW			$0	$6,000,000	$0	$6,000,000		Portland
PBOT	90035	Hillsdale Pedestrian District, SW	Pedestrian improvements on town center streets including Capitol, Beaverton-Hillsdale Hwy, Bertha, and neighborhood streets. Provide a Bike Central facility.	SW			$0	$3,465,000	$0	$3,465,000		Portland/ODOT
PBOT	90037	Huber St, SW (Barbur - 35th): Pedestrian Improvements	Construct a walkway for pedestrian travel and access to transit.	SW			$0	$480,000	$0	$480,000		Portland
PBOT	90038	Humphrey Bl, SW (Patton - Scholls Ferry): Bicycle & Pedestrian Improvements	Construct bike facilities and sidewalks.	SW			$0	$0	$4,000,000	$4,000,000		Portland
PBOT	90040	Illinois, SW (45th - Shattuck): Bikeway	Retrofit bike lanes to existing street.	SW			$0	$0	$1,000,000	$1,000,000		Portland

Bureau	ID	Project Title*	Project Description*	Location*	Project Objective	Driver	Estimated Local Cost by Time Period: Total FY 2013-18	FY 2018-23	FY 2023-33	Total FY 2013-33	Funding Source(s)	Lead Agency
PBOT	90041	Johns Landing Pedestrian District, SW	Plan & develop improvements to the pedestrian environment to emphasize district identity and make walking the mode of choice for trips within the district.	SW			$0	$360,000	$0	$360,000		Portland
PBOT	90042	South Portland Pedestrian District, SW: Future Pedestrian Improvements	Plan & develop improvements to the pedestrian environment to emphasize identity and make walking the mode of choice for trips within the neighborhoodt.	SW			$0	$0	$400,000	$400,000		Portland
PBOT	90043	Lancaster Rd, SW (Taylors Ferry - Stephenson): Pedestrian Improvements	Construct walkway.	SW			$0	$0	$1,000,000	$1,000,000		Portland
PBOT	90044	43rd & Lee, SW: Pedestrian Bridge & Path	Construct a bridge and path to connect SW Lee to SW 43rd within the existing ROW.	SW			$0	$0	$90,000	$90,000		Portland
PBOT	90045	Macadam Ave, SW: Frequent Bus	Construct improvements that enhance Frequent Bus service.	SW			$2,015,000	$0	$0	$2,015,000		Tri Met
PBOT	90046	Macadam, SW (Bancroft - Sellwood Br): ITS	CCTV at various locations; variable sign; monitoring station.	SW			$0	$294,525	$0	$294,525		Portland
PBOT	90047	Macadam, SW (Bancroft - County line): Multi-modal Improvements	Complete bikeway connection in the N. Macadam corridor and improve pedestrian crossings (Bancroft, Boundary,Hamilton, Nebraska, and Nevada), and address circulation at west approach to Sellwood Bridge.	SW			$0	$2,530,000	$0	$2,530,000		ODOT/Portland
PBOT	90048	Pedestrian Overpass near Markham School, SW	Construct pedestrian path and bridge over Barbur Bl and I-5 to connect SW Alfred and SW 52nd to the rear of Markham School.	SW			$0	$0	$3,465,000	$3,465,000		Portland/ODOT
PBOT	90049	Marquam Hill, SW (13th/Gibbs - 11th/Curry): Pedestrian Improvements	Construct a walkway and crossing improvements.	SW			$0	$0	$2,800,000	$2,800,000		Portland
PBOT	90050	Multnomah Bl, SW (Barbur - 45th): Street Improvements	Reconstruct street to urban standards including curb, sidewalks, storm sewers and upgraded street lights.	SW			$0	$0	$2,120,000	$2,120,000		Portland
PBOT	90051	Nevada St/Ct, SW: Path & Stair/Bridge	Construct a path and bridge over Stevens Creek to connect Nevada Ct to Capitol Hill Road & Bertha Blvd at Chestnut.	SW			$0	$0	$400,000	$400,000		Portland
PBOT	90052	Palatine Hill Rd, SW (Boones Ferry - City Limits): Bikeway	Retrofit bike lanes to existing street.	SW			$0	$0	$10,000,000	$10,000,000		Portland/Mult Co
PBOT	90053	Palatine St, SW (27th-Lancaster): Street Extension	Complete neighborhood collector to provide multi-modal access to Lancaster Rd.	SW			$0	$672,228	$0	$672,228		Portland
PBOT	90054	Patton Rd, SW (Vista - Scholls Ferry): Bicycle & Pedestrian Improvements	Construct bikeway (Vista - Scholls Ferry) and walkway (Homar to Shattuck).	SW			$0	$1,220,000	$0	$1,220,000		Portland
PBOT	90055	Pomona St, SW (35th - Barbur): Bicycle & Pedestrian Improvements	Provide bike lanes (35th - Capitol) and sidewalks (35th - Barbur).	SW			$0	$0	$2,700,000	$2,700,000		Portland
PBOT	90059	Shattuck Rd, SW (Patton - Vermont): Bicycle & Pedestrian Improvements	Provide bike lanes and sidewalks.	SW			$0	$6,405,000	$0	$6,405,000		Portland
PBOT	90060	South Portland Improvements, SW	Reconstruct Naito Pkwy as two-lane road w/bike lanes, sidewalks, left turn pockets, & on-street parking. Includes realignment/regrading at intersecting streets; removal of Barbur tunnel, Ross Is Br ramps, Arthur/Kelly viaduct & Grover ped bridge.	SW			$0	$28,293,000	$0	$28,293,000		Portland/ODOT
PBOT	90061	Spring Garden, SW (Taylors Ferry - Capitol Hwy): Bikeway	Provide bike lanes on existing street.	SW			$0	$4,165,000	$0	$4,165,000		Portland
PBOT	90062	Stephenson, SW (Boones Ferry - 35th): Multi-modal Improvements	Install bikeway, pedestrian facilities, and improve safety at Stephenson/Boones Ferry Road intersection.	SW			$0	$0	$3,479,000	$3,479,000		Portland
PBOT	90063	Sunset Bl, SW (Dosch - Capitol): Bicycle & Pedestrian Improvements	Construct bike lanes, sidewalks and crossing improvements.	SW			$0	$0	$1,200,000	$1,200,000		Portland

Bureau	ID	Project Title*	Project Description*	Location*	Project Objective	Driver	Estimated Local Cost by Time Period: Total FY 2013-18	FY 2018-23	FY 2023-33	Total FY 2013-33	Funding Source(s)	Lead Agency
PBOT	90064	Taylors Ferry, SW (Capitol Hwy - City Limits): Bicycle & Pedestrian Improvements	Provide bicycle lanes, including shoulder widening and drainage, and construct sidewalk for access to transit (40th - 60th).	SW			$0	$3,000,000	$0	$3,000,000		Portland
PBOT	90065	Taylors Ferry, SW (Macadam - 35th): Bicycle & Pedestrian Improvements	Widen shoulder in uphill direction on SW Taylors Ferry Rd from Macadam to Terwilliger to provide bicycle climbing lane and stripe bike lanes from Terwilliger to 35th. Construct sidewalks for pedestrian travel and access to transit.	SW			$0	$1,800,000	$0	$1,800,000		Portland
PBOT	90066	Terwilliger, SW, (Troy - County line): Pedestrian Improvements	Provide pedestrian improvements including missing sidewalks and improved pedestrian crossings at Lewis & Clark and Maplecrest.	SW			$0	$1,280,000	$0	$1,280,000		Portland/Mult Co
PBOT	90067	Vermont St, SW, (30th - Oleson): Bicycle and Pedestrian Improvements	Retrofit bike lanes to existing street (45th - Oleson) and construct sidewalk (30th - Shattuck), and redesign intersection at 25th.	SW			$0	$6,600,000	$0	$6,600,000		Portland
PBOT	90068	West Portland Town Center, SW: Pedestrian Improvements	Improve sidewalks, lighting, crossings, bus shelters & benches on Barbur, Capitol Hwy & neighborhood streets.	SW			$0	$0	$5,000,000	$5,000,000		Portland
PBOT	90069	Barbur/Capitol/Huber/Taylors Ferry, SW: Intersection Improvements	Construct safety improvements, including traffic signals, at the intersection of Capitol Hwy, Taylors Ferry, Huber, and Barbur. Provide better sidewalks and crossings.	SW			$0	$610,000	$0	$610,000		Portland/ODOT
PBOT	90070	Capitol Hwy, SW (Vermont - Florida): Intersection Improvements	Realign the Capitol/Vermont/30th intersection and provide sidewalks, bike lanes, and drainage improvements.	SW			$0	$450,000	$0	$450,000		Portland
PBOT	90071	Willamette Greenway, SW: Trail Extension	Extend Greenway Trail from Sellwood Bridge to the County line..	SW			$0	$0	$500,000	$500,000		Portland/Mult Co
PBOT	90072	Capitol Hwy & Lesser, SW (49th - Kruse Ridge): Bicycle & Pedestrian Improvements	Retrofit bike lanes to existing roadway and construct sidewalks.	SW			$0	$1,400,000	$0	$1,400,000		Portland
PBOT	90073	Dolph Ct, SW (26th - Capitol Hwy): Pedestrian Improvements	Construct a walkway.	SW			$0	$0	$640,000	$640,000		Portland
PBOT	90074	Spring Garden, SW (Taylors Ferry - 26th): Pedestrian Improvements	Construct a walkway to provide access to transit and schools.	SW			$0	$830,000	$0	$830,000		Portland
PBOT	90075	35th and Stephenson, SW: Pedestrian Improvements	Construct a walkway for pedestrian travel and access to schools on 35th (Stephenson- Dickenson) and on Stephenson (27th - 35th).	SW			$850,000	$0	$0	$850,000		Portland
PBOT	90076	Capitol Hwy/26th, SW: Intersection Signalization	Construct ped crossing & traffic safety improvements with intersection signal or alt. improvements if a signal is not possible. Consider alt. crossing improvement locations in the immediate vicinity, such as SW 25th/Vermont, as part of project development	SW			$120,000	$0	$0	$120,000		Portland
PBOT	90077	Capitol Hwy, SW (Barbur): Ramp Seismic Retrofit	Seismic retrofit.	SW			$0	$0	$1,039,000	$1,039,000		ODOT
PBOT	90078	Scholls Ferry, SW (Humphrey - County line): Multimodal Improvements	Add bicycle and pedestrian facilities; intersection improvements at Patton.	SW			$0	$0	$2,300,000	$2,300,000		Mult Co/Portland
PBOT	90079	55th Dr, SW (South of Patton Road): Pedestrian Improvements	Add sidewalks to both sides of street.	SW			$0	$0	$211,000	$211,000		Mult Co/Portland
						TOTAL	$918,330,735	$1,363,701,912	$553,902,697	$2,835,935,344		

Portland Parks & Recreation

Portland Parks & Recreation has identified many infrastructure needs over the next 20 years to meet the level of service goals outlined in the Parks 2020 Vision, including necessary expansions to the system, and maintenance of existing assets. The Portland Parks & Recreation 20-year capital improvement plan (CIP) list includes projects that have been identified at this time. Examples of projects and programs PP&R will be working to implement are summarized below.

The CIP list does not yet include projects for locations where Portland Parks & Recreation has not yet acquired property or developed a master plan for a site, or projects for tree maintenance and canopy expansion investments.

Acquisition Program

- Acquisition for developed parks, natural areas, trails, recreation and maintenance facilities. Priorities would include acquisition of land to:
    - Accommodate growth by maintaining a relatively equivalent city wide level of service in areas where growth is occurring
    - Correct deficiencies by providing parks in park-deficient areas
    - Connect to and complete trail systems
    - Protect and enhance natural resource systems
    - Eliminate park in-holdings or expand existing park land, and
    - Effectively operate and maintain Portland’s park system.

Maintenance of Existing Parks, Natural Areas, Trails, and Facilities

- Maintenance or replacement of assets that have reached the end of their useful life

Development of New Community Centers

- Washington-Monroe
- Additional Community Centers in areas not currently within 3 miles of an existing full service community center

Development of New Parks

- Beech Park
- Cherry Park
- Chimney Park
- Clatsop Butte Park
- Errol Heights Park
- Floyd Light Property
- Gates Property

- Gateway Green
- Gateway (urban plaza)
- Gilbert Primary Park
- Hazeltine Property
- Hillsdale Park
- Lynchwood Park
- Mill Park
- Mock's Crest
- North Powellhurst Park
- Parklane Park
- Spring Garden Park
- SW Thomas & 53rd Property
- Thomas Cully Park
- Thompson park
- Werbin Property
- Wilkes Headwaters Property
- Development of additional new parks or natural areas in areas not currently within ½ mile of an existing park or natural area

Improvements at Existing Developed Parks

- Cathedral Park
- Columbia Children's Arboretum
- Couch Park
- Crystal Springs Rhododendron Garden
- East Holladay Park
- Hillsdale Park
- Leach Botanical Garden
- Lents Park
- Mt. Tabor Park and Yard
- Spring Garden Park
- Washington Park
- Waterfront Park
- Westmoreland Park
- Willamette Park

New Trails / Improvements to Existing Trails

- Columbia Slough/ Columbia South Shore Slough Trail
- Marine Drive / Bridgeton Trail
- Mt Scott Scouters Mountain Trail
- North Portland Greenway
- Red Electric Trail
- Sullivan's Gulch

Natural Area Parks

- April Hill Natural Area
- Beggars Tick Natural Area
- Buttes Natural Area Complex (Clatsop Butte, Buttes NA, Mitchell Creek Natural Area, Kingsley D. Bundy)
- Elk Rock Island Natural Area
- Errol Heights
- Forest Park
- Deardoff Creek and Wahoo Creek Natural Areas
- Lower Powell Butte Floodplain
- Marshall Park (including Jensen and Foley Balmer properties)
- Oaks Bottom/ Ross Island/ Oaks Crossing
- River View Natural Area
- Stephens Creek Nature Park
- Southwest Waterfront Parks (Powers Marine, Willamette Moorage, Butterfly and Cottonwood Bay)
- West Portland Park Natural Area
- Whitaker Ponds
- Woods Park Natural Area

Appendix B
Urban Service Agreements

The Proposed Draft of the Citywide Systems Plan will include Urban Service Agreements, as required to comply with Oregon Revised Statutes 195 and 197.

Appendix C
Referenced Plans

Document	Date	Source
Bicycle Plan for 2030 (Bicycle Master Plan)	2010	PBOT
Bull Run Water Supply Habitat Conservation Plan	2008	PWB
Bureau of Environmental Services Strategic Plan	2011	BES
BES Capital Improvement Plan	Annual	BES
Climate Action Plan	2009	BPS
Columbia Boulevard Wastewater Treatment Plant Conditional Use Master Plan	2010	BES
Columbia Boulevard Wastewater Treatment Plant Facilities Plan	2008	BES
Combined Sewer System Plan		BES
Comprehensive Plan	1980-2010	BPS
CSO Facilities Plan	2011	BES
Distribution System Master Plan	2007	PWB
Fanno and Tryon Creeks Watershed Management Plan	2005	BES
Freight Master Plan	2006	PBOT
Infrastructure Master Plan	2000	PWB
Johnson Creek Restoration Plan	2001	BES
Metro 2040 Growth Concept	1995/2012	Metro
Metro Regional Framework Plan	1997/2005	Metro
Metropolitan Greenspaces Master Plan	1992	Metro
Mt. Hood National Forest Land and Resource Management Plan	1990	USDA Forest Service

Natural Area Acquisition Strategy	2006	PP&R
Natural Areas Restoration Plan	2010	PP&R
Northwest Forest Plan	1994	USDA Forest Service
Oregon Highway Plan (OHP)	1999	ODOT
Oregon Transportation Plan (OTP)	2006	ODOT
Parks 2020 Vision	2001	PP&R
Pedestrian Master Plan	1998	PBOT
Portland Parks & Recreation Strategic Plan	2012	PP&R
Portland Plan	2012	BPS
Portland Watershed Management Plan (PWMP)	2006	BES
Powell Valley Road Water District Wellhead Protection Plan	1998	PVRWD
PWMP 5-Year Implementation Strategy 2012-2017	2012	BES
Regional Transportation Plan (RTP)	2013	Metro
Regional Water Supply Plan	1996/2004	RWPC
Seasonal Water Supply Augmentation and Contingency Plan, also referred to as the Summer Supply Plan (SSP)	Annual	PWB
Statewide Comprehensive Outdoor Recreation Plan (SCORP)	2008	OPRD
Stephens Creek Stormwater System Plan	2012	BES
Stormwater Discharge Monitoring Plan	2012	BES
Stormwater Management Manual	2008	BES
Stormwater Management Plan	2011	BES
Streetcar Concept Plan	2009	PBOT
Transportation System Plan	2006	PBOT
Tryon Creek Wastewater Treatment Plant Facilities Plan	1999	BES
UIC Corrective Action Plan	2006	BES

Underground Injection Control (UIC) Management Plan	2012	BES
Urban Forest Action Plan	2007	PP&R
Urban Forestry Management Plan	2004	PP&R
Urban Growth Management Functional Plan	1996/2013	Metro
Water Management and Conservation Plan	2010	PWB

Appendix D
Glossary

Bureau abbreviations

- BES - Bureau of Environmental Services
- BES - Bureau of Environmental Services
- BPS - Bureau of Planning and Sustainability
- PBOT - Portland Bureau of Transportation
- PBEM - Portland Bureau of Emergency Management
- PPB - Portland Police Bureau
- PP&R - Portland Parks & Recreation
- PWB - Portland Water Bureau

Local, State and Federal Agencies

- DEQ: Oregon Department of Environmental Quality: The state regulatory agency responsible for the protection of Oregon's environment
- EPA: U.S. Environmental Protection Agency: An independent federal agency established to coordinate programs aimed at reducing pollution and protecting the environment.
- MCDD: Multnomah County Drainage District
- Metro: Elected regional government for the Portland metropolitan area.
- ODOT: Oregon Department of Transportation
- ORPD: Oregon Parks and Recreation Department
- RWPC: Regional Water Providers Consortium
- USDA: U.S. Department of Agriculture

Portlanders: People who live, work, do business, own property, or visit Portland, including people of any race, ethnicity, sex, gender or gender identity, sexual orientation, belief system, political ideology, ability, socioeconomic status, educational status, veteran status, place of origin, language spoken, age or geography.

Active transportation: Transportation that involves physical activity, including walking, biking, and using transit (because usually one must walk or roll to the bus or train).

Adaptive management: A dynamic planning and implementation process that applies scientific principles, methods, and tools to improve management activities incrementally as decision makers learn from experience and better information and as analytical tools become available. Involves frequent modification of planning and management strategies, goals, objectives and benchmarks. Requires frequent monitoring and analysis of the results of past actions and application of those results to current decisions.

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.

Best practice: An activity that has proven its effectiveness in multiple situations and may have applicability in another situation.

Center: Places with concentrations of commercial and community services, housing, gathering places, and transit connections. Centers provide services to surrounding neighborhoods and are intended to be enhanced as places that are a focus of growth, where increasing numbers of people will live, work, and visit. There are three types of centers of varying function, levels of activity, and scale and intensity of development:

Central City: Corresponds to the Central City plan district, which serves as the region's premier center, anchoring an interconnected system of centers.

Centers and corridors: When used together, "centers and corridors" refers generally to places where development is concentrated, including centers and a range of corridors, including Civic Corridors, High-Capacity Transit corridors, Transit Station Areas, and neighborhood business districts.

Civic Corridors: These are a prioritized subset of the city's most prominent transit and transportation streets. They connect centers, provide regional connections, and include segments where commercial development and housing are focused. Civic corridors are intended to become places that continue their important transportation functions while providing livable environments for people and evolving into distinctive places that are models of ecological design.

Clean Water Act (CWA): A law passed by the U.S. Congress in 1972 that makes the discharge of pollution into surface or ground waters without a permit illegal, and that encourages the use of the best achievable pollution control technology to reduce the impact of discharged effluent.

Combined sewer overflow (CSO): In areas with combined sewers that convey both sewage and stormwater in a single pipe, stormwater runoff fills sewer pipes to capacity during rainstorms, causing overflow of sewage and stormwater into a waterbody.

Corridor: When an area is designated as a corridor (such as a Civic Corridor), it may be in the form of a single major street or in the form of a broad mobility corridor that provides connections for a range of modes (transit, pedestrians, cyclists, freight, motor vehicles, and so forth), not necessarily on the same street.

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.

Ecological function: The physical, chemical, and biological functions of a watershed such as flow conveyance and storage, channel dynamics, nutrient cycling, microclimate, filtration, control of pollution and sedimentation, water quality, terrestrial and aquatic habitat, and biodiversity.

Ecosystem services: The contribution of ecosystem conditions and processes to human well-being, including the production of goods and processes that control variability, support life, enrich cultural life, and preserve options. Examples include pollination of trees and plants, climate regulation, flood mitigation, stormwater management, clean air and water, recreational opportunities, and satisfaction of aesthetic and spiritual needs.

Endangered Species Act (ESA): A law passed by the U.S. Congress in 1973 that established programs for the conservation of threatened and endangered plants and animals and the habitats in which they are found. The U.S. Fish and Wildlife Service maintains the list of threatened and endangered species.

Green infrastructure: Public or private assets—either natural resources or engineered green facilities—that protect, support, or mimic natural systems to provide stormwater management, water quality, public health and safety, open space, and other complementary ecosystem services. Examples include tress, ecoroofs, green street facilities, wetlands, and natural waterways.

Greenways: A system of accessible pedestrian- and bike-friendly green streets and trails that link neighborhood centers, parks, schools, natural areas, and other key community destinations. The city Greenways system is a prioritized subset of pedestrian and bicycle connections that makes use of opportunities for multi-objective, distinctive design approaches that draw on and contribute to Portland's pedestrian, bicycle, green street, and parks and open space systems.

Habitat Corridors: Stream and/or vegetation connections that provide habitat values and allow for wildlife movement between habitats.

Habitat-friendly development: Strategies to provide habitat for and prevent harm to native resident and migratory wildlife. Examples include habitat-oriented ecoroofs, bridges, buildings and sites, including features such as nest platforms and bat boxes. Strategies also involve development designs and practices that limit the amount of light, noise, vibration, and other disturbance that affect wildlife and wildlife habitat, especially during vulnerable wildlife life cycles (such as mating/nesting season and migration), improve wildlife access and passage, limit fencing, roads, culverts and other barriers between important habitats (between desirable feeding and watering sites, for example), and limit impacts related to construction in rivers.

High-Capacity Transit Corridors: The system of light rail and other high-capacity transit stations. Some of these stations are located along streets that serve as Civic Corridors (such as Interstate Avenue), but others are located along freeways or other locations where the primary focus of activity and development is in Transit Station Areas.

High-risk infrastructure: Infrastructure assets that have a high risk of failure, based on the likelihood and consequence of that failure.

Hydrologic, hydrologic cycles: The movement of water on, in, and above the earth.

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

Level of service standard: 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.

Low-impact development: Strategies to reduce the environmental impact of development on natural systems, including hydrology and vegetation. Strategies include using paving and roofing materials that reduce effective impervious area, clustered or small lot development that reduces disturbance area, the use of vegetated stormwater management to mimic pre-development site hydrology, alternative road layout and narrower streets, natural area protection, and landscaping with native plants.

Municipal Separate Storm Sewer System (MS4): A publicly-owned conveyance or system of conveyances that discharges to waters of the U.S. and is designed or used for collecting or conveying stormwater, but is not a combined sewer, or part of a publicly-owned treatment system.

National Pollutant Discharge Elimination System (NPDES): Wastewater and Surface water quality program authorized by Congress as part of the 1987 Clean Water Act, and administered by the state Department of Environmental Quality. NPDES provides guidance to municipalities and state and federal permitting authorities on how to meet wastewater and stormwater pollution control goals as flexibly and cost-effectively as possible.

Total Maximum Daily Loads (TMDLs): A calculation of the maximum amount of a pollutant that a waterbody can receive and still meet water quality standards.

Underground Injection Controls (UIC): An injection system that distributes or injects fluids such as stormwater runoff or wastewater below the surface of the ground.