IMPLEMENTATION STRATEGIES and REGULATIONS 6

INTRODUCTION

The Transportation System Plan (TSP) is a set of policies, strategies, projects, and procedures that guide the development and management of the transportation infrastructure. This chapter describes the existing and new tools that help implement the TSP policies and strategies. The chapter includes amendments to City codes, amendments to the City's Comprehensive Plan, project development procedures, street standards and guidelines, and practices that support sustainable infrastructure.

Amendments to City Codes and the Comprehensive Plan

Amendments to several City codes and the Comprehensive Plan help implement the TSP policies and strategies. Three City codes are amended – Title 16: Vehicles and Traffic, Title 17: Public Improvements, and Title 33: Planning and Zoning. In the Comprehensive Plan, minor word changes are being made to a few policies and objectives and three terms are being deleted to ensure that references and terms are consistent with the TSP. A summary of the code amendments and Comprehensive Plan amendments are included in this chapter. The text of the amendments is incorporated into the respective documents.

Project Development

Following the code and Comprehensive Plan amendments, this chapter summarizes the project development guidelines the Portland Office of Transportation (PDOT) uses to develop transportation projects; street standards and guidelines used to construct streets; and excerpts from a report on PDOT's approach to sustainable infrastructure.

Street improvements evolve from conceptual plans to final engineered construction plans through the final plan review process. Streets are designed to meet both street standards (number of lanes, width of sidewalk, pavement thickness) and traffic design criteria. The considerations for traffic design include driveway access, design speed, street grades, design vehicles/intersection geometry, guardrail design, street lighting, and traffic signals. The Design Guide for Public Street Improvements includes the City's traffic speeds policy. That policy elaborates on Policy 6.11, Street Design Classification Descriptions; Policy 6.13, Traffic Calming; and Policy 6.15, Transportation System Management (contained in Chapter 2 of this document).

Street Standards and Guidelines

Street standards and guidelines are derived from a number of documents, including:

- Pedestrian Design Guide
- Bicycle Master Plan—Appendix A
- Design Guide for Public Street Improvements
- Standard Construction Specifications

- Title 16: Vehicles and Traffic
- Title 17: Public Improvements
- Green Streets Handbook
- Oregon Department of Transportation (ODOT) Standard Specifications for Highway Construction
- American Association of State Highway and Transportation Officials (AASHTO) Guide for Design of Pavement and Structures
- AASHTO Roadside Design Guide

The City's street standards are summarized in a new document called Creating Public Streets and Pedestrian Connections through the Land Use and Building Permit Process. The content of that document is provided in this chapter, but is not adopted as part of the Comprehensive Plan or City codes.

Sustainable Infrastructure

PDOT, the Bureau of Water Works, the Bureau of Environmental Services, and the Office of Sustainable Development have identified the elements of 'sustainable infrastructure'. This chapter's section on sustainable infrastructure summarizes sustainable practices relating to the transportation system.

CODE AMENDMENTS

This section contains a summary of code amendments for Title 16: Vehicles and Traffic, Title 17: Public Improvements, and Title 33: Planning and Zoning. The majority of the amendments make changes to terms and definitions to bring them into consistency with the TSP and the State Transportation Planning Rule (TPR).

The TPR directs local jurisdictions to:

> adopt land use or subdivision regulations for urban areas to provide for safe and convenient pedestrian, bicycle and vehicular circulation consistent with access management standards and the function of affected streets, to ensure that new development provides on-site streets and accessways that provide reasonably direct routes for pedestrian and bicycle travel in areas where pedestrian and bicycle travel is likely . . . and which avoids wherever possible levels of automobile traffic which might interfere with or discourage pedestrian or bicycle travel.

Title 33 was amended in 2001 and 2002 to revise land division regulations that had previously been in Title 34: Subdivision and Partitioning Regulations. The changes to Title 17 mirror the connectivity regulations for land divisions and apply to land as it develops or redevelops, but not subdivided. The beginning of the section on Title 33 summarizes other code revisions to address TPR requirements. Some of these regulations are being modified to better accomplish the TPR and TSP goals of improving opportunities for alternatives to the automobile by providing convenient pedestrian and bicycle circulation and access to transit.

The combination of previous code changes and the changes summarized in this chapter fulfill the requirements of the TPR and Metro's 2000 Regional Transportation Plan (RTP) for regulatory changes.

Title 16: Vehicles and Traffic Amendments

The definitions in Title 16 use many different words to describe the concept of transportation within the context of what PDOT does. The intent of the amendments is to provide some simplification by reducing the number of words or phrases used. Reliance is placed most heavily on the term 'movement' as a function, modified by 'access' or 'through' when necessary; on terms applying to facilities, such as 'way', 'street', and 'road', and upon terms applying to the user of a facility, such as 'traffic', 'vehicle' (including bicycle), 'pedestrian', and 'goods'.

The definitions modified, deleted, or added to Title 16 are listed below:

16.90 Definitions
Alley (revised)
Bicycle Boulevard (new)
Bicycle Lane (revised)
Bicycle Path (deleted)
Bicycle Trail (deleted)
Bikeway, Shoulder (new)
Bikeway, Extra Width Curb Lane (new)
Bikeway, Off-Street Path (new)
Bikeway, Signed Connection (new)
Pedestrian (revised)
Pedestrian Way (revised)
Public Right-of-Way (revised)
Roadway (revised)
Street or Highway (revised)
Traffic (revised)
Traffic Lane (revised)
Vehicle (revised)
Way (new)

Title 17: Public Improvements Amendments

Title 17 gives the City Engineer authority to regulate activities in the right-of-way and to require new streets. Changes to Title 17 were made to ensure that as areas develop or redevelop, new street connections will be created and street improvements will be made to support the development. The requirements for connectivity mirror the language in the land division chapters of Title 33: Planning and Zoning.

The amendments to Title 17 are listed below:

Minor Wording Revisions
The changes listed below generally do not include major content change. For example, it updates zoning designations consistent with those in use in Title 33.

17.08.030 Scope of Improvements
17.24.230 Design Standards
17.26 Sidewalk Vendors
17.92.030 Designation of Streets, Avenues, Boulevards and Drives

Content Changes

The changes listed below involve technical changes, for example, expanding the transit mall to include the area north of Burnside, and content changes, for example, adding connectivity standards.

17.25 Sidewalk Cafes
- 17.25.020 Definitions – Change mall boundaries
- 17.25.030 Permit Fee – Take fees for sidewalk cafes out of Title 17

17.27 Kiosks
- 17.27.020 Definitions – Change mall boundaries

17.28 Sidewalks, Curbs and Driveways
- 17.28.065 Bicycle Parking – City Engineer may require bike parking as part of frontage improvements
- 17.28.110 Driveways – Permits and Conditions –Reduce driveway widths to match Title 33; City Engineer may require shared driveways

17.45 Banner Standards – Change mall boundaries
17.52 Trees – Update street types
17.72 Parking Lots – Delete entire chapter
17.88 Street Access
- 17.88.100 Purpose – Purpose statement added
- 17.88.010 Definitions – Add definitions for 'Exceptional Habitat Quality', 'Mixed-Use Area', Significant Alterations'
- 17.88.020 For Buildings and Planning Actions – City Engineer may require frontage improvements for 'significant alterations'
- 17.88.030 Through Streets – Add connectivity standards to match Title 33; modified connectivity in areas of 'exceptional habitat quality'
- 17.88.050 Transportation Impact Study – Add section to allow City Engineer to require transportation impact studies and establish thresholds for an impact study (previously in the 1996 TE and Title 33);

Title 33: Planning and Zoning, Amendments

Title 33: Planning and Zoning, is intended to implement Portland's Comprehensive Plan and related land use plans in a manner that protects the health, safety, and general welfare of the citizens of Portland. Title 33 applies to all land and water within the City, with some exceptions.

A number of changes to Title 33 have been made in the years since the TPR was first adopted in 1991. The changes in this chapter refine those changes as needed and include additional amendments to address requirements that were added to the TPR and RTP since that time.

The previous Title 33 amendments include:

1996 Amendments

- Setbacks from transit streets
- Main entrance orientation
- Ground floor window requirements
- Short-term and long-term bicycle parking
- Carpool parking
- Onsite pedestrian circulation
- Transit-supportive plazas substituting for required parking
- Limiting parking between buildings and transit streets

2000 Amendments

- Minimum and maximum parking ratios

2001-2002 Amendments

- Street connectivity in land divisions
- Pedestrian connectivity in land divisions

The amendments to Title 33 are listed below:

Update Terms

The changes made to provisions listed below typically update terms to match terms in Chapter 2 of this document. For example, the term 'light rail stop' changes to 'Transit Station' and 'pedestrian path' changes to 'City Walkway'.

33.120.030 Characteristics of the Zones
33.120.100 Primary Uses
33.130.230 Ground Floor Windows
33.130.260 Drive-Through Facilities – CN2 zonze
33.218.140 Community Design Standards
Table 266-3
33.410.030 Buffer Zone
33.505 Albina Community Plan District
33.510 Central City Plan District
33.526 Gateway Plan District
33.535 Johnson Creek Plan District
33.815.100 Uses in the Open Space Zone
33.840 Hazardous Substances Review
33.855.050 Zoning Map Amendments

Minor Changes

The changes made to provisions listed below typically are minor change to content but not to the policy intent of the provision. For example, the list of functions for open space zones is expanded to include providing pedestrian and bicycle connections consistent with pedestrian and bicycle classifications in parks.

33.100 Open Space Zone – Add new function to list
33.110.245 Development Standards for Institutions – Delete transit setback and refer to 33.130 for regulations

33.120.275 Development Standards for Institutions – Delete transit setback and use base zone standards in 33.130 for regulations
33.130 Characteristics of the Zones – Add orientation to pedestrians along transit streets and in Pedestrian Districts consistent with existing regulations
33.254.050 Mining and Waste-Related Uses – Add 'hours of operation' to information for a traffic study
33.258 Nonconforming Situations – Refer to applicable 'pedestrian standards' rather than 'base zone' standards
Map 510-9 Parking Access Restricted Streets - Delete SW Columbia between SW 5th and Jefferson
33.654 Rights-of-Way - Add reference to consider master street plans in connectivity requirements
33.805 Adjustments – Add consideration of classification of adjacent streets for adjustments in non-residential zones
33.815 Conditional Use Master Plans – Add events and TDM strategies to transportation impacts
33.830 Excavations and Fills – Add truck routing plan to approval criteria
33.910.030 Definitions

- Arterial (revised)
- Bus Stop (new)
- Light Rail Line (revised)
- Light Rail Alignment (revised)
- Preferred Alternative Light Rail Alignment (revised)
- Transit Station (new)
- Transit Street (revised)

33.930.030 Measuring Distances – Add how to measure distance from bus stop or transit station

Substantive Changes

Transit and Pedestrian District Setbacks (33.110.245, Table 110-7, 33.120.220, Table 120-3, Figures 120-2, Figure 120-4, Table 120-5, 33.130.215, Table 130-3, Table 130-5, Figure 130-2, Figure 130-4, 33.140.215, Table 140-3, Table 140-5, Figure 140-2, Figure 140-4)

- No minimum setback
- Measure from property line rather than curb
- Add second standard to be met to have 100% of building facade within the maximum setback in some circumstances
- Add orientation to City Walkway where there are two non-intersecting transit streets and a street classified as a City Walkway
- 'Create' corners in Pedestrian Districts with orientation to intersecting streets

Alternative Maximum Setback Option for Large Retailers (33.130.215, 33.140.215)

- Add to purpose statement
- Create 'street-like features' rather than driveways

Pedestrian Standards (33.130.240, 33.140.240)

- Clarify that area between building and lot line be landscaped or hard-surfaced for pedestrian use in all C and EG1 and EX zones (except for parking areas)

Transit Street Main Entrance (33.130.242, 33.140.242)

- Require each tenant within transit street or Pedestrian District setback to have main entrance facing street

Drive-Through Facilities (33.130.260)
- Prohibit drive-through facilities in the CX zone (outside the Central City)
- Prohibit drive-through facilities in the EX zone (citywide)

Connectivity in Manufactured Homes and Mobile Home Parks (33.251.030)
- Require pedestrian circulation system in mobile home parks

Parking and Loading (33.266.110, 33.266.115, 33.266.130, 33.266.220)
- Eliminate minimum parking on sites within 500 feet of streets with 'high-quality' transit service (20-minute peak hour or better service)
- Add specificity to substitution of transit-supportive plazas for required parking (i.e., access easement; 5 feet of linear seating area; Tri-Met approval of shelter design)
- Small amount of motorcycle parking can substitute for some required auto parking
- Treat bus service and streetcar service the same for exceptions to maximum parking ratios
- Create 'street-like features' in parking lots over three acres in size in R, C, E, and IR zones
- Allow a connecting driveway between two sites in lieu of landscaping
- Change distance long-term bicycle parking can be located from site to 300 feet to same as auto parking

Park-and-Ride Facilities (33.10, Table 266-6, 33.815.222, 33.920)
- Treat park-and-ride facilities the same for land use review purposes whether on private property or in right-of-way
- Add approval criteria to conditional use chapter for park-and-ride facilities (33.815.222)
- Move park-and-ride facilities from Basic Utility to Community Service use category

Superblocks (33.293)
- Increase width of walkways to 12 feet
- Require access easement

Transportation Impacts (33.641)
- Move transportation impact study thresholds and elements to Title 17

Conditional Use Approval Criteria
- Revise approval criteria for transportation adequacy to be consistent and add in consideration of performance measures; connectivity; impacts on pedestrian, bicycle, and transit circulation; and demand management strategies (33.815.100, .105, .120, .121, 125, 126, .127, .128, .130, .140, .200, .205, .215, .220, .223, .230, .300, .301, .302, .303, .305, .310)
- Add transportation adequacy as approval criterion (33.815.110, .115)

Impact Mitigation Plans (33.848)
- Add requirement for on-site circulation system that meets connectivity standards
- Add parking mitigation requirement

Other Changes

Since 1992, the Transportation Goal (Goal 6) and its policies, district policies, the classification descriptions, and the classification maps have been used as approval criteria in the adoption, amendment or repeal of legislative land use decisions and in land use reviews processed as Goal Exceptions, Comprehensive Plan Map amendments, zone changes in compliance with the Comprehensive Plan, conditional uses and master plans. The TSP updates the approval criteria for adjustments, conditional uses, conditional use master plans, excavation and fill reviews, hazardous substances review, impact mitigation plans, and zoning map amendments to incorporate relevant transportation criteria. The relevant approval criteria for each review now incorporate the appropriate transportation policy issues.

The Transportation Goal, policies and objectives will continue to be used as approval criteria in legislative Comprehensive Plan text and map amendments, amendments to the zoning code (Title 33), neighborhood and area plans, and Statewide Planning Goal exceptions.

COMPREHENSIVE PLAN AMENDMENTS

Minor text changes were made to a limited number of Comprehensive Plan objectives. The intent of the changes is to update and clarify terms.

Chapter 2: Transportation Element of the Comprehensive Plan of the TSP documents the major changes being made to the Comprehensive Plan. Goals 6 and 11B are substantially rewritten, consistent with the TPR and the 2000 RTP. The Central City Transportation Management Plan (CCTMP) goal, policies, and objectives are not being rewritten at this time, but are included in Chapter 2. The CCTMP classification descriptions and maps are being revised and are also included in Chapter 2.

Other parts of the Comprehensive Plan, particularly the adopted neighborhood plans, contain references to Transportation Element classifications and terms. Changes to those plans are not being made as part of the TSP.

The amendments are listed below:

Goal 2 Urban Development

- Policy 2.12 Transit Corridors (update terms)
- Policy 2.13 Auto-Oriented Commercial Development (update terms)
- Policy 2.17 Transit Stations and Transit Centers (update terms)

Goal 5 Economic Development

- Policy 5.4 Transportation System, Objective D (update terms)
- Policy 5.7 Business Environment Within Designated Commercial Areas Objective E (update terms)
- Policy 5.10 Columbia South Shore, Objective F (change wording to make the objective consistent with the zoning code and the TSP)

Goal 12 Urban Design

- Policy 12.1 Portland's Character, Objective A (update terms)
- Policy 12.8 Community Planning, Objective A (update terms)

Appendix B Glossary

- Arterial Streets Classification Policy (delete)
- Local Improvement Districts (delete)
- Major City Traffic Streets (delete)

PROJECT DEVELOPMENT

Development and implementation of transportation improvement projects within Portland's boundary falls into three categories of responsibility: private, regional, and local. Private development builds a substantial share of Portland's transportation system through the permit process. PDOT approves and oversees construction of these projects, but is not directly responsible for the project development process. ODOT or Tri-Met manages transportation improvements to the regional system, such as freeways, highways and light rail. PDOT participates in the project development process, but does not directly manage these projects. Local projects occur in right-of-way owned by the City. PDOT is responsible for the implementation of these projects.

This section describes PDOT's process for developing and implementing local projects. PDOT formalized a project delivery system to provide a consistent process for implementing capital transportation improvement projects. The benefits include a well-understood process that engages citizens, improves communication, and ensures a project that meets the needs of its users. The process described below applies to major transportation projects and may be modified for smaller projects or those that do not have a planning component.

Policy Review

Transportation improvement projects are intended to support the City's Comprehensive Plan and the region's 2040 Growth Concept. It is therefore important for the project development process to be undertaken as a policy implementation tool. A project scope refers to the range of issues the project will be designed to address. A project's initial scope is guided by the existing policies specific to the facility being planned for improvement and to the project's study area. These policies either provide the desired functional and basic design characteristics of the study area's transportation system, or identify specific issues that need to be addressed through the project development process.

Policies 6.4 through 6.11 (Street Classification and Description policies) of the Transportation Element of the Comprehensive Plan establish the functional design characteristics of each street within the study area. The project must be consistent with the functional intent of the street classifications. It may also be necessary to fulfill some or all of the provisions of the 2000 RTP's Project Development Requirements section.

Other adopted policies, contained within either the Transportation Element, neighborhood plans, plan districts, or area planning documents, often require a specific issue, or set of issues, to be resolved as part of the project development process. Together, these street classifications and area-specific policies establish the preliminary scope of the project and a preliminary set of objectives for the plan development process to consider.

A number of planning documents also serve as guidelines for developing specific project design recommendations. These guidelines and standards refine the range of design options the project should consider. Documents that provide design guidance for project development include:

- Pedestrian Design Guide
- Bicycle Master Plan- Appendix A

- Design Guide for Public Street Improvements
- Transit Preferential Streets Sourcebook
- Creating Livable Street: Street Design for 2040
- Green Streets: Innovative Solutions for Stormwater and Street Crossings
- Trees for Green Streets: an Illustrated Guide
- AASHTO Traffic Engineering Design Guidelines
- Design Guide for Public Street Improvements

Project Development Process

PDOT's Transportation Planning and the Project Management Divisions share responsibility for project development, based primarily on the project's lifecycle stage. The Transportation Planning division is responsible for developing the basic plan framework from which specific projects are identified. These include planning projects that cover large subareas of the City's transportation system. The plans establish a comprehensive policy and conceptual design framework for the transportation system and its relationship to the land uses it serves. This planning process also identifies the need for specific transportation improvement projects.

Once a specific transportation improvement project has been identified, the Project Management Division is responsible for 'cradle-to-grave' implementation. This includes all subsequent steps necessary to complete the project: developing specific design recommendations, design engineering, and final construction through a single project manager or management team.

Key elements of a successful project development process include:

- Comprehensiveness

  The project development process uses a multidisciplinary approach that typically draws from the fields of economics, urban design, and transportation engineering to better understand the relationships between land use and transportation issues. The process is also based on a multimodal approach that seeks to develop an overall balanced transportation system that provides choices and serves all users.

- Coordination

  Interagency coordination is ensured through a technical advisory committee made up of State, regional, and local agency representatives. The technical advisory committee (TAC) is responsible for monitoring the project development process. TAC participation depends on the scale of the project, types of issues to be addressed, and potential impacts that extend beyond the operation of the transportation system.

- Public involvement

  The project development process heavily relies on public involvement to ensure the project meets the needs of the residents and businesses it is intended to serve. A variety of public involvement approaches is used throughout the project development process. The citizens advisory committee (CAC) is a fundamental component. Along with the TAC, the CAC directly oversees the project development process and assists in decision making.

Project Delivery System Process

The Project Management Division uses a basic five-step process for delivering projects to a successful completion. The process can take anywhere from 6 months to over 2 years of study and deliberation with the community. The process varies, based on the needs and complexity of each project. The five basic steps include chartering, planning, endorsement, selection of a preferred alternative, and project approval, as described below.

1. Chartering

   Chartering refers to the initial process of building consensus with all the key stakeholders around the project's specific goal and objectives. The initial foundation for building consensus relies on existing policies contained within the Transportation Element of the Comprehensive Plan, neighborhood plans, and other policy documents that define transportation issues and preferred courses of action. The process expands on the level and detail of knowledge about the issues specific to the study area by collecting and analyzing technical data, such as traffic volumes, turn counts, and accident histories. The public involvement process provides an understanding of how the existing system relates to the community's desires and expectations of how the system should function.

   These inputs are then refined into a set of project-specific goals and objectives, which serve as the basic guiding design directives for all subsequent steps in the process. Chartering is complete when the project objectives have been established, a project team with the requisite skills has been assembled, with the team's roles and responsibilities within the project development process have been defined.

2. Planning the Project

   Once the project has been chartered, the next step is develop a detailed work program for successfully completing the project. The work program outlines all the essential inputs needed for decision making along the way and the roles and responsibilities of the project team. The work program traditionally includes three general products:

   - Existing Conditions Report

     Typically, an existing conditions report is prepared to document land use, environmental, demographic, and economic conditions, as well as the physical and operational conditions of the transportation system within the study area. The data provide a common technical understanding of how the transportation system currently functions and relates to the physical and social environment around it.

   - Alternatives Development

     With an understanding of the issues and objectives established, a broad range of conceptual design alternatives is developed. The alternatives development step allows consideration of creative and innovative design solutions to address the project objectives. The range of alternatives is refined to create a core set of design options that merit more detailed evaluation.

- Alternatives Evaluation

  This step evaluates the relative performance of each alternative, using policy and the project objectives as evaluation criteria. A 'No Build' alternative is also analyzed for comparison purposes. The multidisciplinary approach continues to be used to look at how each alternative addresses land use and multimodal transportation issues. Traffic operations are typically modeled, using 20-year traffic volume forecasts. Economics and urban design perspectives look at how each alternative potentially supports the land use vision for the project's study area. The evaluation also reviews compliance with applicable policies, impacts to the transportation system that surrounds the study area, potential environmental impacts, and, in many cases, order-of-magnitude cost comparisons.

3. Endorsement

Endorsement secures the collective commitment of stakeholders to actively support the project work program and work towards its successful completion. It is an ongoing process of developing and maintaining working relationships with stakeholders, the community, and staff. The public involvement process is a key component of project endorsement. It ensures the delivered project meets the needs of its users and the community it is intended to serve. Special attention is given to reaching out to those portions of the community that usually do not participate or have unique needs. PDOT uses a variety of forums and techniques to encourage broad public participation and comment on the development of its projects. These techniques generally include:

- Citizen Advisory Committee (CAC)

  The CAC plays a central role in overseeing the project development process. Made up out of a broad range stakeholders from the community (e.g., residents, businesses, neighborhood and business associations, special interest groups), the CAC regularly meets with staff throughout the project development process to offer input and help guide decision making.

- Public Events (e.g., open houses, workshops)

  To gather public input from beyond the CAC, most projects typically hold events, such as open houses and workshops, where the general public is invited to learn more about the project and offer feedback. The design and function of these events can vary from purely informational to very hands-on. The purpose is to both raise awareness about the project and give people a chance for meaningful participation without the time and energy commitment to a CAC. Notification is often through direct mail to residents and businesses within the project's study area and press releases to community organizations and local media outlets. Most projects hold a number of these public events at key decision-making points throughout the project development process.

- Surveys

Surveys are another tool for expanding the range of public comment and participation. People who do not typically have the time to attend a public open house or workshop appreciate the ability to comment without leaving their homes or businesses. Surveys are typically used in the early stages of the plan development process to gauge public consensus on issues. Options include direct mail and door-to-door surveys.

- Neighborhood and Business Associations

The City's network of neighborhood and business associations serves as an important working link between PDOT and the community and facilities broad dissemination of project information. PDOT regularly briefs the relevant associations and asks them to participate on the CAC. .

- Other

Press releases and project newsletters are other tools used to disseminate project information and updates to the public. PDOT is increasingly using the internet to provide easy access to project information, documents, and schedules of upcoming events and to obtain public comment.

4. Selection of a Preferred Alternative

Based on the results of the alternatives evaluation and public comment, a preferred alternative is recommended. The preferred alternative is then further refined to resolve or mitigate remaining issues identified in the evaluation process. A cost estimate is then developed. An implementation strategy is typically also included, along with recommended priorities and timing (phasing) of individual project elements as the project is constructed.

5. Project Approval

For most projects, the preferred alternative is presented at a public hearing before City Council for approval by some form of action, such as adoption by resolution or report to Council. Projects developed from previously adopted plans (e.g., the Bicycle Master Plan or Pedestrian Master Plan) are not presented to City Council. The City Engineer can approve smaller, less complex projects for construction.

Implementation

The final steps in the project development process lead to construction of the adopted project recommendations. Once construction funding has been secured, preliminary and final design engineering of the project occurs before actual construction. The engineering phases prepare the construction-ready plans and documentation necessary for contracting and final construction.

- Construction Funding

  A variety of potential funding sources exist for implementation of a transportation improvement project. Some funding sources are limited to certain types of projects. For example, urban renewal funds may be applied only to projects that support designated urban renewal districts. Given the current fiscal climate, projects typically need to rely on a phased approach and more than one source of funding before they are completed. Chapter 14:Financial Plan, of the TSP describes the sources of funding available for transportation improvement projects.

  The Capital Improvement Program (CIP) developed by PDOT is the primary organizing document for the allocation of funds for transportation capital improvement projects. In most cases, projects must be identified in the CIP to be eligible for funding.

- Preliminary and Final Design Engineering

  Detailed civil engineering drawings are prepared at this step. The project street is surveyed, and many of the final design details, such as storm drainage, landscaping, signage, and striping, are resolved. A traffic management plan for the construction phase, bid documents (if necessary), and final cost estimates are also prepared.

- Construction

  Two basic options exist for constructing transportation improvement projects: using a private contractor or the City's Bureau of Maintenance (BOM). Most projects go to public bid for private contractors, using a competitive bidding process. BOM usually constructs smaller capital improvement projects (typically under $100,000), such as speed bumps and related traffic calming devices. PDOT's Project Management Division continues to oversee construction until the project is completed.

- Monitoring and Evaluation

  If the project could potentially have significant impacts on adjacent streets, PDOT may conduct performance monitoring over several months. For example, PDOT typically takes traffic counts for traffic calming projects to assess changes in traffic patterns and the potential for diversion. Adjustments to signal timing, striping, and signage can be made to fine-tune operations and safety on the project street.

- Closeout

  PDOT conducts a final inspection of the constructed project to close out the construction contract. 'As built' drawings are prepared and entered into the City's geographic information system (GIS) database. Final costs and billings are reconciled. Finally, the project files are archived.

STREET STANDARDS AND GUIDELINES

Private development in the City of Portland may improve existing streets and/or create new streets. The Development Services division of the Bureau of Transportation, Engineering, and Development has the task of ensuring that the transportation network is developed appropriately.

The handbook, Creating Public Streets and Pedestrian Connections through the Land Use and Building Permit Process, provides design information and practices that support public street design through the land use and building permit process. The Development Services division uses this information to establish street improvement requirements for land use reviews and building permits. Information in the handbook is based largely on existing documents and adopted practices. The documents and practices referenced in the handbook are the basis for decision making.

The handbook contains the following four sections:

- Section I – Connectivity and street improvements
- Section II - Criteria for determining street/pedestrian width and improvements
- Section III – Documents Summary
- Section IV – Administrative review process for technical decisions made under the authority of the City Engineer

The handbook contains street standards that meet or exceed the TPR and 2000 RTP requirements for incorporating 'skinny streets' into local ordinances. 'Skinny streets' are local streets that are narrower (especially in width of pavement) than is common in most parts of this country. According to the 2000 RTP, 'skinny streets' include no more than 46 feet of total right-of-way, with pavement widths of no more than 28 feet. Most streets built in Portland in the RF through R5 zones meet the 'skinny street' requirements. Some streets in other zones are also built with pavement widths of 28 feet or less. The density and intensity of development, as well as emergency access needs, are taken into consideration.

Connectivity and Street Improvements

Connections should create short blocks, particularly in mixed-use areas of planned high-density development. Streets and pedestrian/bicycle accessways (where streets are not feasible) should connect to transit routes, schools, parks, and between and within residential neighborhoods and other activity centers. Metro's adopted spacing standards are a maximum of 530 feet for streets and 330 feet for pedestrian/bicycleways where streets are not possible. In some parts of the City, street master plans provide further guidance on connectivity.

Connectivity is considered when a site is reviewed through the land use or building permit process. A new street or street extension may be required as a condition of approval.

In addition, a site may have frontage on a street that is not improved to current standards. Adjacent properties are responsible for their frontage improvements (per Title 17.88.010). Where the right-of-way width is not sufficient, a dedication may be required. Where improvements are not up to standard, the developer may be required to obtain a street improvement permit and complete frontage improvements prior to building occupancy.

Street Improvements and Right-of-Way Width for Public Streets

The following tables summarize the most common criteria affecting street design elements. Elements are those items that require horizontal space, and therefore, establish the amount of width needed for the public right-of-way. The public right-of-way is land dedicated to the public for street purposes. Right-of-way widths shown in the tables are the needed width for the full street improvement.

Information is presented based on land use zoning. Zoning is identified in the City's Official Zoning Maps. Classifications (traffic, pedestrian, bicycle) are listed in the Transportation Element of the Comprehensive Plan.

The following tables cover only the most common cases. Exceptions may be made where there are topographic or existing development constraints, or where proposed improvements should match or transition to existing facilities. The City Engineer makes the final determination of elements and widths within the public right-of-way, but such determinations are not intended to support pavement widths that are wider than described in the handbook.

Table 6.1
Through-Street Street Standards: RF – R7 Zones
(OR *d*ead-end less than 300' in length)

Traffic Classification	*On-street Parking*	*Roadway Width*[1]	*Pedestrian Classification*	*Sidewalk Corridor Width*	*Right-of-way Width**
Local Service Street	None or one lane	20'	Local Service Street **not** in a Pedestrian District	10' each frontage	40'
Local Service Street	None or one lane	20'	City Walkway -OR- Local Service Street in a Pedestrian District	12' each frontage	44'
Local Service Street	Two lanes	26'	Local Service Street **not** in a Pedestrian District	10' each frontage	46'
Local Service Street	Two lanes	26'	City Walkway -OR- Local Service Street in a Pedestrian District	12' each frontage	50'

[1] Additional width for bicycle lanes in the roadway

Traffic Classification	*Bicycle Classification*	*ADT*	*Additional Right-of-way Needed*
Local Service Street	City Bikeway	< 3000	No additional width
Local Service Street	City Bikeway	≥ 3000	5' each bike lane

Additional pavement width to accommodate bicycle lanes shall be determined on a case-by-case basis. Existing parking patterns and street width, and the extent to which additional offsite right-of-way may be obtained, will be considered.

*For cases in which swales are required for stormwater management, a greater right-of-way width dedication will be needed. See the section, Other Technical Information.

Other cases not listed above are designed on an individual basis.

Table 6.2
Dead-End Street Standards: RF – R7 Zones
(300' or more in length)

Traffic Classification	*On-street Parking*	*Roadway Width*	*Pedestrian Classification*	*Sidewalk Corridor Width*	*Right-of-way Width**
Local Service Street	No on-street parking	20'	Local Service Street **not** in a Pedestrian District	10' each frontage	40'
Local Service Street	No on-street parking	20'	City Walkway -OR- Local Service Street in a Pedestrian District	12' each frontage	44'
Local Service Street	One lane	28'	Local Service Street **not** in a Pedestrian District	10' each frontage	48'
Local Service Street	One lane	28'	City Walkway -OR- Local Service Street in a Pedestrian District	12' each frontage	52'
Local Service Street	Two lanes	32'	Local Service Street **not** in a Pedestrian District	10' each frontage	52'
Local Service Street	Two lanes	32'	City Walkway -OR- Local Service Street in a Pedestrian District	12' each frontage	56'

*For cases in which swales are required for stormwater management, a greater right-of-way width dedication will be needed. See the section, Other Technical Information.

Other cases not listed above are designed on a case-by-case basis.

Table 6.3
Cul-de-Sac Street Standards: RF – R7 Zones
(turnaround on a dead-end street)

Traffic Classification	*Connecting Street Length*	*Pavement Diameter*	*Pedestrian Classification*	*Sidewalk Corridor Width*	*Right-of-way Width (diam.)**
Local Service Street	300' or greater	70'	Local Service Street **not** in a Pedestrian District	6.5' combination curb/sidewalk with 5' clear zone at the back of walk	83'
Local Service Street	300' or greater	70'	Local Service Street in a Pedestrian District	12' sidewalk corridor	94'
Local Service Street	Less than 300'	Typ. 36' in diameter, but designed on a case-by case basis	Local Service Street **not** in a Pedestrian District	6.5' combination curb/sidewalk with 5' clear zone at the back of walk	49'**
Local Service Street	Less than 300'	Typ. 36' in diameter, but designed on a case-by case basis	Local Service Street in a Pedestrian District	12' sidewalk corridor	60'**
*For cases in which swales are required for stormwater management, a greater right-of-way width dedication will be needed. See the section, Other Technical Information.					
** Width is determined on a case-by-case basis					
Any other case not listed above is designed on a case-by-case basis.					

Table 6.4
Alleys and Other Street Types: RF – R7 Zones

Alley			
Travelways	*Parking*	*Full Alley Width*	*ROW Width**
Two-way	No parking allowed	18' + 1' for curbs and/or buffer on each side	20'
One-way	No parking allowed	10' + 1' for curbs and/or buffer on each side	12'

Other Street Types
Public streets, including but not limited to substandard improvements, scenic drives, and green streets, are designed on a case-by case basis, with elements and widths determined by the City Engineer.

Partial Width Streets
Partial width streets typically occur when only a single frontage or portion of frontage can be developed at one time. The partial width street components and resulting right-of-way width should be based on the appropriate parts of tables above. Exceptions may occur where portions of the partial width street have already been built or where widths should more appropriately reflect adjacent existing street segments (as determined by the City Engineer).

Pedestrian Connections			
Zone	*Sidewalk (Walkway) Width*	*Buffer width (edge of walkway to property line)*	*Right-of-Way Width**
RF– R7	6'	4.5' each side	15'
For all zoning categories, care must be taken to ensure that the proposed alignment for a public pedestrian connection provides clear visibility through the length of the connection.			
*For cases in which swales are required for stormwater management, a greater right-of-way width dedication will be needed. See the section, Other Technical Information.			

Table 6.5
Through-Street Street Standards: R5 Zone
(OR dead-end less than 300' in length)

Traffic Classification	*Onstreet Parking*	*Road-way Width*[1]	*Pedestrian Classification*	*Sidewalk Corridor Width*	*Right-of-way width**
Local Service Street	None or one lane	20'	Local Service Street **not** in a Pedestrian District	11' each frontage	42'
Local Service Street	None or one lane	20'	City Walkway –OR- Local Service Street in a Pedestrian District	12' each frontage	44"
Local Service Street	Two lanes	26'	Local Service Street **not** in a Pedestrian District	11' each frontage	48'
Local Service Street	Two lanes	26'	City Walkway –OR- Local Service Street in a Pedestrian District	12' each frontage	50'

[1] Additional width for bicycle lanes in the roadway

Traffic Classification	*Bicycle Classification*	*ADT*	*Additional Right-of-way needed*
Local Service Street, Neighborhood Collector, District Collector, Major City Traffic Street			
Neighborhood Collector, District Collector, Major City Traffic Street	City Bikeway	< 3000	No additional width
Neighborhood Collector, District Collector, Major City Traffic Street	City Bikeway	≥ 3000	5' each bike lane
Additional pavement width to accommodate bicycle lanes shall be determined on a case-by-case basis. Existing parking patterns and street width and the extent to which additional off-site right-of-way may be obtained will be considered			

*For cases in which swales are required for stormwater management, a greater right-of-way width dedication will be needed. See the section, Other Technical Information.

Other cases not listed above are designed on a case-by-case.

Table 6.6
Dead-End Street Standard: R5 Zone
(300' or more in length)

Traffic Classification	*On-street Parking*	*Roadway Width*	*Pedestrian Classification*	*Sidewalk Corridor Width*	*Right-of-way width**
Local Service Street	No on-street parking	20'	Local Service Street **not** in a Pedestrian District	11' each frontage	42'
Local Service Street	No on-street parking	20'	City Walkway -OR- Local Service Street in a Pedestrian District	12' each frontage	44'
Local Service Street	One lane	28'	Local Service Street **not** in a Pedestrian District	11' each frontage	50'
Local Service Street	One lane	28'	City Walkway -OR- Local Service Street in a Pedestrian District	12' each frontage	52'
Local Service Street	Two lanes	32'	Local Service Street **not** in a Pedestrian District	11' each frontage	54'
Local Service Street	Two lanes	32'	City Walkway -OR- Local Service Street in a Pedestrian District	12' each frontage	56'
*For cases in which swales are required for stormwater management, a greater right-of-way width dedication will be needed. See the section, Other Technical Information.					
Other cases not listed above are designed on a case-by-case basis.					

Table 6.7
Cul-de-Sac Street Standard: R5 Zone
(turnaround on a dead-end street)

Traffic Classifi-cation	*Connecting Street Length*	*Pavement Diameter*	*Pedestrian Classification*	*Sidewalk Corridor Width*	*Right-of-way Width (diam.)*
Local Service Street	300' or greater	70'	Local Service Street **not** in a Pedestrian District	11'	92'
Local Service Street	300' or greater	70'	Local Service Street in a Pedestrian District	12'	94'
Local Service Street	Less than 300'	Typ. 36' in diameter, but designed on a case-by case basis	Local Service Street **not** in a Pedestrian District	11'	58'**
Local Service Street	Less than 300'	Typ. 36' in diameter, but designed on a case-by case basis	Local Service Street in a Pedestrian District	12'	60'**
*For cases in which swales are required for stormwater management, a greater right-of-way width dedication will be needed. See the section, Other Technical Information.					
Any other case not listed above is designed on a case-by-case basis.					
****Width is determined on a case-by-case basis					

Table 6.8
Alleys and Other Street Types: R5 Zone

Alley			
Travel Direction	*Parking*	*Full Alley Width*	*ROW Width**
Two-way	No parking allowed	18' + 1' for curbs and/or buffer on each side	20'
One-way	No parking allowed	10' + 1' for curbs and/or buffer on each side	12'
Other Street Types			
Public streets, including but not limited to substandard improvements, scenic drives and green streets, are designed on a case-by case basis, with elements and widths determined by the City Engineer			
Partial Width Streets			
Partial width streets typically occur when only a single frontage or portion of frontage can be developed at one time. The partial width street components and resulting right-of-way width should be based on the appropriate parts of charts above. Exceptions may occur where portions of the partial width street have already been built or where widths should more appropriately reflect adjacent existing street segments (as determined by the City Engineer).			
Pedestrian Connections			
Zone	*Sidewalk (Walkway) Width*	*Buffer Width (edge of walkway to property line)*	*Right-of-Way Width**
R5	6'	4.5' each side	15'
For all zoning categories, care must be taken to ensure that the proposed alignment for a public pedestrian connection provides clear visibility through the length of the connection.			
*For cases in which swales are required for stormwater management, a greater right-of-way width dedication will be needed. See the section, Other Technical Information.			

Table 6.9
Through-Street Street Standards: R3 – RX Zones
(OR dead-end street)

Traffic Classification	*On-street Parking*	*Roadway Width*[1]	*Pedestrian Classification*	*Sidewalk Corridor Width*	*Right-of-way Width*****
Local Service Street	None	28' **	Local Service Street **not** in a Pedestrian District	11' each frontage***	*
Local Service Street	One lane	28'	Local Service Street **not** in a Pedestrian District	11' each frontage***	50'
Local Service Street	Two lanes	32'	Local Service Street **not** in a Pedestrian District	11' each frontage***	54'
Local Service Street	None	28'**	City Walkway -OR- Local Service Street in a Pedestrian District	12' each frontage	*
Local Service Street	One lane	28'	City Walkway -OR- Local Service Street in a Pedestrian District	12' each frontage	52'
Local Service Street	Two lanes	32'	City Walkway -OR- Local Service Street in a Pedestrian District	12' each frontage	56'

[1] Additional width for bicycle lanes in the roadway

Traffic Classification	*Bicycle Classification*	*ADT*	*Additional Right-of-way Needed*
Local Service Street	City Bikeway	< 3000	No additional width
Local Service Street	City Bikeway	≥ 3000	5' each bike lane

Additional pavement width to accommodate bicycle lanes shall be determined on a case-by-case basis. Existing parking patterns and street width and the extent to which additional offsite right-of-way may be obtained will be considered.

*****Width is determined on a case-by-case basis.

**In some cases, it may be feasible to reduce the listed street width if parking is not needed and the Fire Bureau requirements are accommodated.

*** For RH, RX, CN1, CM, CS, CX or EX zoning where the site has frontage on a Neighborhood Collector, District Collector, or Major City Traffic street, **and** the Local Service Street intersects with the Traffic Street listed here, the sidewalk corridor width on the Local Service Street frontage is 12'.

****For cases in which swales are required for stormwater management, a greater right-of-way width dedication will be needed. See the section, Other Technical Information.

Other cases not listed above are designed on a case-by-case basis.

Table 6.10
Cul-de-Sac Street Standards: R3 – RX Zones

Traffic Classifi-cation	*Connecting Street Length*	*Pavement Diameter*	*Pedestrian Classification*	*Sidewalk Corridor Width*	*Right-of-way Width (diam.)**
Local Service Street	300' or greater	70'	Local Service Street **not** in a Pedestrian District	11'	92'
Local Service Street	300' or greater	70'	Local Service Street in a Pedestrian District	12'	94'
Local Service Street	Less than 300'	Typ. 36' in diameter, but designed on a case-by case basis	Local Service Street **not** in a Pedestrian District	11'	58'**
Local Service Street	Less than 300'	Typ. 36' in diameter, but designed on a case-by case basis	Local Service Street in a Pedestrian District	12'	60'**
*For cases in which swales are required for stormwater management, a greater right-of-way width dedication will be needed. See the section, Other Technical Information.					
**Any other case not listed above is designed on a case-by-case basis.					

Table 6.11
Alleys and Other Street Types: R3 – RX Zones

Alleys			
Travel ways	*Parking*	*Full Alley Width*	*ROW Width**
Two-way	No parking allowed	18' + 1' for curbs and/or buffer on each side	20'
One-way	No parking allowed	10' + 1' for curbs and/or buffer on each side	12'

Other Street Types
Public streets, including but not limited to substandard improvements, scenic drives and green streets, are designed on a case-by case basis, with elements and widths determined by the City Engineer.

Partial Width Streets
Partial width streets typically occur when only a single frontage or portion of frontage can be developed at one time. The partial width street components and resulting right-of-way width should be based on the appropriate parts of charts above. Exceptions may occur where portions of the partial width street have already been built or where widths should more appropriately reflect adjacent existing street segments (as determined by the City Engineer).

Pedestrian Connections			
Zone	*Sidewalk (Walkway) Width*	*Buffer Width (edge of walkway to property line)*	*Right-of-Way Width**
R3 – RH	6'	4.5' each side	15'
RX	Generally 8' – 20' but designed on a case-by-case basis	Minimum 5' each side	18' – 30'
For all zoning categories, care must be taken to ensure that the proposed alignment for a public pedestrian connection provides clear visibility through the length of the connection.			
*For cases in which swales are required for stormwater management, a greater right-of-way width dedication will be needed. See the section, Other Technical Information.			

Table 6.12
Through-Street Street Standard: Zones other than RF – RX
(OR dead-end)

Traffic Classification	*On-street Parking*	*Roadway Width* [1]	*Pedestrian Classification*	*Sidewalk Corridor Width*	*Right-of-way width***
Local Service Street	None	28' **	Local Service Street **not** in a Pedestrian District	11' each frontage***	*
Local Service Street	One lane	28' minimum	Local Service Street **not** in a Pedestrian District	11' each frontage***	*
Local Service Street	Two lanes	32' minimum	Local Service Street **not** in a Pedestrian District	11' each frontage***	*
Local Service Street	None	28' **	City Walkway -OR- Local Service Street in a Pedestrian District	12' each frontage	*
Local Service Street	One lane	28' minimum	City Walkway -OR- Local Service Street in a Pedestrian District	12' each frontage	*
Local Service Street	Two lanes	32' minimum	Local Service Street **not** in a Pedestrian District	12' each frontage	*

[1] Additional width for bicycle lanes in the roadway

Traffic Classification	*Bicycle Classification*	*ADT*	*Additional Right-of-Way Needed*
Local Service Street	City Bikeway	< 3000	No additional width
Local Service Street	City Bikeway	≥ 3000	5' each bike lane*

Additional pavement width to accommodate bicycle lanes shall be determined on a case-by-case basis. Existing parking patterns, street width, and the extent to which additional off-site right-of-way may be obtained, will be considered.

Other cases not listed above are designed on a case-by-case basis.

***** Width is determined on a case-by-case basis.

****** In some cases, it may be feasible to reduce the listed street width if parking is not needed and the Fire Bureau requirements are accommodated.

*** For RH, RX, CN1, CM , CS, CX or EX zoning where the site has frontage on a Neighborhood Collector, District Collector, or Major City Traffic street, **and** the Local Service Street intersects with the Traffic Street listed here, the sidewalk corridor width on the Local Service Street frontage is 12'.

****For cases in which swales are required for stormwater management, a greater right-of-way width dedication will be needed. See the section, Other Technical Information.

Table 6.13
Cul-de-Sac Street Standards: Zones other than RF – RX

Traffic Classifi-cation	*Connecting Street Length*	*Pavement Diameter*	*Pedestrian Classification*	*Sidewalk Corridor Width*	*Right-of-way Width (diam.)**
Local Service Street	300' or greater	70'	Local Service Street **not** in a Pedestrian District	11'	92'
Local Service Street	300' or greater	70'	Local Service Street in a Pedestrian District	12'	94'
Local Service Street	Less than 300'	Typ. 36' in diameter, but designed on a case-by case basis	Local Service Street **not** in a Pedestrian District	11'	58'*
Local Service Street	Less than 300'	Typ. 36' in diameter, but designed on a case-by case basis	Local Service Street in a Pedestrian District	12'	60'*
*For cases in which swales are required for stormwater management, a greater right-of-way width dedication will be needed. See the section, Other Technical Information.					
Any other case not listed above is designed on a case-by-case basis.					

Table 6.14
Alleys and Other Street Types: Zones other than RF – RX

Alleys			
Travel ways	*Parking*	*Full Alley Width*	*ROW Width**
Two-way	No parking allowed	18' + 1' for curbs and/or buffer on each side	20'
One-way	No parking allowed	10' + 1' for curbs and/or buffer on each side	12'
Other Street Types			
Public streets, including but not limited to substandard improvements, scenic drives and green streets, are designed on a case-by case basis, with elements and widths determined by the City Engineer.			
Partial Width Streets			
Partial width streets typically occur when only a single frontage or portion of frontage can be developed at one time. The partial width street components and resulting right-of-way width should be based on the appropriate parts of charts above. Exceptions may occur where portions of the partial width street have already been built or where widths should more appropriately reflect adjacent existing street segments (as determined by the City Engineer).			
Pedestrian Connections			
Zone	*Sidewalk (Walkway) Width*	*Buffer width (edge of walkway to property line)*	*Right-of-way Width**
CN1, CM CS, or CX	Generally 8' – 20', but designed on a case-by-case basis	Minimum 5' each side	18' – 30'*
Other	Designed on a case-by-case basis		
*For cases in which swales are required for stormwater management, a greater right-of-way width dedication will be needed. See the section, Other Technical Information.			

Other Technical Information

If swales are required for stormwater management, the actual right-of-way dedication requires specific review. To determine the additional approximate width needed, take the swale width minus 4 feet. Swales may or may not be allowed and must receive approval from

the City Engineer and Bureau of Environmental Services before they are incorporated into the right-of-way.

Codes, Manuals, and Documents Used in the Street Design Process

The following codes, manuals, and documents are used in the street design process:

- A Policy on Geometric Design of Highways and Streets (American Association of State Highway and Transportation Officials)
  Geometric design policy for streets, considering function, design controls, design and cross section elements, and intersections.

- AASHTO Guide for Design of Pavement Structures (American Association of State Highway and Transportation Officials)
  Design policy for determining pavement sections for roadways.

- Bicycle Master Plan (City of Portland, 1998)
  City policies and objectives regarding bicycles, recommended bikeway network, and end-of-trip facilities.

- Central City Transportation Management Plan (City of Portland, 1995)
  Transportation goals and policies for the Central City, including district strategies and street classifications.

- Design Guide for Public Street Improvements (City of Portland, 1993)
  Guide for consulting engineers, containing basic design and submittal information for street improvements, including review process, traffic design, street design, and cost estimates.

- Manual on Uniform Traffic Control Devices (Federal Highway Administration)
  Design and usage guide for traffic signs signals and pavement markings. This document is supplemented with the City of Portland Sign Library.

- Pedestrian Master Plan (City of Portland, 1998)
  Policies for pedestrian travel, improvement projects, and priorities.

- Pedestrian Design Guide (City of Portland, 1998)
  Guidelines for public sidewalk corridors, crosswalks, pathways, and stairs.

- Standard Construction Specifications (City of Portland)
  Standard construction specifications for use when designing and constructing civil infrastructure, including contract and technical requirements, streets, sewer and water, and standard drawings.

- Title 17 of the City Code – Public Improvements
  Authority for various regulations and improvements under the City Engineer (and the Chief Engineer for Environmental Services), including local improvements; permits; sidewalks, curbs, and driveways; street improvements; sewer and stormwater regulations; public utilities; and others.

- Transportation Element of the Comprehensive Plan (City of Portland)
  Part of the City's Comprehensive Plan, it includes transportation policy, street classifications, and district policies.

- Creating Livable Streets: Street Design Guidelines for 2040 (Metro, 2nd edition 2002)
  A handbook developed to implement the Street Design classifications in the RTP. Local jurisdictions must consider the guidelines for regionally-significant streets and they are optional for locally funded projects.

- Green Streets: Innovative Solutions for Stormwater and Street Crossings (Metro, 2002)
  Recently completed handbook that provides guidance for incorporating sustainable practices into the design and construction of all types of streets. Local jurisdictions must consider the guidelines for regionally-significant streets and they are optional for locally funded projects.

- Trees for Green Streets: an Illustrated Guide (Metro, 2002)
  Recently completed guide to appropriate street trees for Green Streets. Local jurisdications must consider the guide for regionally-significant streets and it is optional for locally funded projects.

- Others

  Various street master plans and street improvement plans, including but not limited to:
  - SW and Far SE Master Street Plans
  - River District Right-of-Way Framework Plans
  - Barbur Boulevard Streetscape Plan
  - NE Martin Luther King Jr. Boulevard Transportation Project
  - Capitol Highway Plan
  - Multnomah County Street Plans
  - Airport Way Secondary Infrastructure Plan
  - Lloyd District Transportation Design Criteria
  - Russell Street Improvements Planning Project
  - Killingsworth Improvements Planning Project
  - South Waterfront District Street Plan, Criteria and Standards
  - Foster Road Transportation and Streetscape Plan

Administrative Review Process for Technical Decisions for Street Design

This section of the Creating Public Streets and Pedestrian Connections through the Land Use and Building Permit Process handbook describes the process for commenting on technical decisions made by PDOT's Development Review staff. The Development Services Manager reviews comments. The City Engineer has the authority to make final determinations on the application of street standards to specific development projects.

SUSTAINABLE INFRASTRUCTURE

The following discussion is taken from two recent documents: Sustainable Infrastructure Report (prepared by PDOT, the Bureau of Environmental Services, and the Water Bureau, December 2001) and Sustainable Infrastructure Supplemental Report (December 2001). The excerpts below focus on PDOT's efforts to achieve the City's goals for sustainability. The other participating bureaus' efforts are described in the documents cited above.

Developing infrastructure that is sustainable means thinking differently about how we build, what we build, and whether we build at all. It means designing and maintaining buildings, structures, and streets with an eye to resource conservation over the life of the project. It means testing new materials and practices that leave lighter impacts on the environment, yet are effective.

The goal is to encourage the bureaus to take advantage of opportunities for greener ways of doing business, and to create a place where new ideas, materials, and methods can be discussed and tested and where experts in sustainable practices can participate and help the City make good decisions.

The City's 'green building policy' directed the three infrastructure bureaus to document current and ongoing practices that minimize the use of natural resources and review opportunities for improvement in sustainable practices. The bureaus were also asked to determine the need for a rating system or set of guidelines that would provide for greener practices for infrastructure improvements.

The following text identifies actions and changes that PDOT bureaus and sections have implemented in order to operate more sustainably.

Bureau of Maintenance (BOM)

Catch Basin Inserts

While working in the street, maintenance crews are now using catch basin inserts and other products to keep asphalt grindings and other debris from entering the sewer system. Catch basin inserts are placed in the catch basins, and bio-bags are placed around the inlets. Both of these products reduce the need to clean the catch basins, and reduce harm to fish. In the past, clogged basins would need to be cleaned out by the sewer cleaning crews. BOM cleans the asphalt grinder several times per week and captures about 50 cubic yards of grinding debris per year.

Environmentally Friendly Releasing Agents

Instead of using petroleum-based diesel, crews now use environmentally friendly releasing agents to keep hot asphalt from sticking to truck beds and hand tools. The releasing agents are biodegradable and much safer for the environment.

Erosion Control

In response to the City Code Title 10, the federal listing of salmonids as endangered species, and the City's passage of Title 10, BOM has developed erosion control measures when doing any ground-disturbing activities. These measures are intended to reduce the amount of sediment that runs off the banks into streams, where it negatively affects water quality and harms fish habitat. BOM continues to test new products, try new techniques, and implement best management practices. Examples include applying various types of mulch, installing straw waddles, and using bio-bags to prevent sediment from leaving the worksite.

Reuse of Cold Milled Asphalt Grindings

Crews currently cold mill streets to remove the excessive crowns, restore curb exposure, or simply remove the deteriorated asphalt and resurface the street. In the past, BOM disposed of a large amount of this material in landfills. BOM now sells the grindings back to the asphalt plants instead of landfilling them and using up ever-decreasing landfill space. Approximately 75,000 cubic yards of grindings are recycled and sold back to the asphalt plants. The asphalt plants use the grindings as part of their new asphalt mix. City trucks are able to deliver grindings to the plants and immediately pick up fresh asphalt to take back to the job, reducing hauling and fuel costs.

Spill Response Measures

The Clean Water Act mandates that spills be cleaned up to protect fish and water quality. Crew trucks are now equipped with spill kits to respond to emergency spills and leaks. The most common fluids are antifreeze, hydraulic fluid, oil, and brake fluid. The spill kits contain absorbent materials, plastic ties, drip pans, goggles, and gloves.

Turning Off Truck Engines

In the past, drivers would routinely drive to jobs, park, and leave the engines running, causing unnecessary gas emissions and fuel consumption. With the development of practices for clean air action days, crews are now more aware of their impact on air quality, and turn engines off when possible.

Aerosol Can Recycling

BOM has implemented a program to recycle the approximately 18,000 aerosol cans it uses per year. A special area has been set up with a puncturing device to drain any remaining can contents. The contents are collected in a barrel. When the barrel is full, it is manifested and disposed of properly. The fully aspirated can may then be crushed and recycled as scrap metal.

Use Of Environmentally Safe Cleaning Products

Instead of using heavy-duty institutional cleaning products, BOM now uses citrus-based cleaners. In addition, BOM has been working with the custodial contractor to use less caustic and more environmentally preferable cleaners. BOM uses unbleached towels with high-recycled fiber content.

Use Of Environmentally Safe Oils And Fluids

BOM uses vegetable-based oil instead of WD-40 to facilitate sewer repair work in its use of trenchless technology. The vegetable oil eases the inversion of the sewer pipe liner into the old sewer pipes. It is environmentally preferable to petroleum-based oil products because it is less toxic, renewable, and biodegradable.

No-Dig Pipe Maintenance

Crews now have the option to use trenchless technologies to repair sewer lines. The method BOM currently employs uses oil to slip a polyurethane-impregnated felt liner into a broken pipe. Once inverted and cured, the liner becomes a permanent part of the pipe. This eliminates the need to excavate the sewer and saves time, money, and materials. It also reduces the amount of ground-disturbing activity.

BOM Buildings and Grounds

BOM regularly sweeps and maintains the areas around Albina yard and the Kerby building. This minimizes the amount of airborne dust, stormwater pollution, and runoff into the sewer system.

Reuse Of Barricades

Various sections within BOM use barricades in their daily operations. When possible, BOM repairs and reuses the several thousand barricades it owns. About 500-600 of the barricades are repaired and reused per year. Some of the flashing barricades now have solar-powered light heads, reducing the demand for conventional power and disposing of fewer batteries.

Reuse Of Concrete Form Lumber

BOM's Sidewalk section creates concrete forms from lumber when installing or repairing sidewalks. BOM now reuses these forms. When the forms can no longer be reused, the wood is recycled and used for fuel at a nearby paper mill.

Dechlorinated Water For Bridge Washing

BOM is responsible for maintaining and washing bridges and other structures, such as stairs, retaining walls, and pedestrian overpasses. It now uses dechlorination tablets to reduce the chlorine in the discharge water. This reduces the negative impact on water quality.

Concrete and Asphalt Recycling

Each year, crews remove tons of cement and asphalt concrete from street maintenance and sidewalk repair projects. In the past, all this material was disposed of in landfills. Now, all concrete and asphalt rubble is screened, crushed, and recycled into an aggregate base material. This material is reused for a variety of purposes, such as base aggregate for street

maintenance activities, backfill in sewer trenches, and road shoulder maintenance. During 2000, almost 16,000 cubic yards of concrete and asphalt were crushed and reused.

Recycling Aluminum Signs

Most of the traffic control signs BOM uses are made of aluminum. When signs become dented or need to be replaced, they are sold back to the sign manufacturer for reuse instead of being put into the dumpster for disposal. This reduces both the amount and cost of disposal. About 2.6 tons of damaged aluminum signs were recycled during 2000.

Paint

BOM tries to use low volatile organic compound (VOC) paint and less toxic solvents. BOM also has a sand blasting booth and a paint booth, where items can be painted or sand blasted in a controlled environment. This prevents the spread of noxious fumes and paint chips. BOM is also using more brushes instead of sprayers to control paint flow. Some items, such as bridge rails, that used to be painted in the field are now brought to the yard for painting.

Sidewalk Repair Work

In the past, BOM and its contractors would dry-sawcut areas to be repaired. This process would generate a lot of dust. BOM crews now make wet cuts, and contractors are asked to adapt a wet cut and slurry sediment capture process. This includes using bio-bags, rock socks, catch basin inserts, and wet/dry vacuuming. Contractors are also asked to put up silt fences along the outer edge of the sidewalks to contain sediment and reduce runoff of dirt-laden water. Where possible, crews are also recycling bricks.

Slurry Recovery System

BOM staff has developed a slurry recovery system for handheld chainsaws while cutting concrete. The system includes a hydraulic power unit, a pump-vacuum system to provide water for cooling and lubricating, and a vacuum hose to vacuum slurry-laden water. Instead of draining into the stormwater system, the water is vacuumed into a metal bucket and filtered. The filtered water can be reused in the concrete cutting saw. This system has significantly decreased total water usage and the amount of concrete slurry going to the storm sewer system.

Plantings

Where possible, BOM crews save native plantings and replant them after digs. Crews are also moving toward using native species in new roadside plantings. BOM is using more drip irrigation systems and conservation-type watering systems in order to reduce water usage. Crews are also doing more handwork instead of using large pieces of equipment, resulting in less ground disturbance. Invasive plants, such as blackberry vines and ivy, are removed when possible.

Solar-Powered Investigation Van

BOM has five environmental emergency investigation trucks, one of which is equipped with solar power. The truck engine still runs on gas, but the truck is 100 percent solar powered once onsite. Solar panels replace the old gas-powered generator. Solar energy powers the onboard equipment, including the robotic cameras used to investigate sewer lines, computer monitors, printers, VCR, van flashers, vehicle lighting, heating, and air conditioning system. While conducting investigations, the vehicle has no emissions and makes no sound. It is plugged into an electrical outlet at the end of the day. The truck is taken out of service for one day a year for servicing and preventative maintenance.

Solar-Powered Meter Truck

BOM has designed and put into service a parking meter repair truck with a solar-powered generator.The truck continues to use gasoline to get to the job site, but once it arrives on the job, crews can turn off the engine to reduce emissions and noise. Crews can run electrical tools, lighting, and a heating and cooling system with the solar generator.

Ice Prevention Program

BOM now uses calcium magnesium acetate (CMA) to prevent ice from bonding to the road surface during inclement weather. CMA is a non-hazardous material and has few of the negative environmental impacts associated with salt.

Absorbent Blankets To Contain Leaks

At job sites, crews now place absorbent blankets under trailers to contain and control the spread of equipment leaks. In the past, any leaking fluid would be washed down the storm sewer. Leaking fluids are now captured and kept out of the storm sewer system.

Erosion Control Trailer

BOM's Stormwater Maintenance Section has an erosion control trailer that is taken to sites as needed. The trailer carries everything needed to control erosion, and allows crews to take enough products to deal with any problem immediately. Without the trailer in the past, the supervisor would need to send someone back to the yard to retrieve materials, delaying response to the erosion problem.

Shoring

In the past, crews used wood to shore up sewer excavations. They would need to cut timbers to fit and could use them only one or two times, per OSHA regulations. Crews now use reusable aluminum hydraulic shoring (shields) to reinforce the trenches for most projects. The shields come in many sizes and can be reused repeatedly. Crews have reduced the amount of wood used on larger, deeper projects with reusable steel beams and hydraulic cross bracing. The shields are placed in the trench and hydraulically energized until the shield sides make solid contact with the trench walls. In addition, the crews mix environmentally friendly antifreeze with shoring fluid to prevent freezing in the winter.

Retrofitting Injection Wells

Crews are adding injection wells with sediment manholes. The manholes separate oil and debris from stormwater that flows into the inlets. The sediment manholes keep the sumps cleaner and reduce the amount of oil and other debris that may permeate back into the groundwater aquifer.

Sump Debris

Debris removed from ditches, culverts, and sumps is taken to a facility where it is screened and separated into rock, sand, and foreign matter. The material is then burned, effectively removing any petroleum-based products. Once burned, the material is safe enough for reuse and can serve as medium-grade fill for certain projects.

Recycled Meter Parts

BOM manages and maintains 7,000 parking meters around the City. Each meter is powered by a 9-volt battery, which is replaced each year. BOM recycles these batteries as part of its battery recycling program. Spare meter parts are also cleaned and reused.

Street Sweeping

Frequent sweeping decreases street degradation and reduces the amount of debris that goes into the storm and sanitary sewer systems. BOM uses a type of street sweeper that makes less noise and has a regenerative air flow system (vacuum). With this system of sweeping and flushing, debris is removed with fewer particulates becoming airborne.

Composting Street Sweeping Debris

Instead of disposing street sweeping debris into a landfill, the debris is put through a trommell screen. This separates trash such as paper and plastic from the sand and dirt. The organic sweeper debris is separated after screening and taken to a composting facility. This reduces the amount of organic material that goes into the landfill. About 4,200 cubic yards of screened street sweeping debris is diverted for composting each year.

Leaf Recycling

Historically, BOM landfilled any leaves it swept up. BOM now begins its annual leaf recycling program in the fall. It collects leaves from streets in heavy leaf areas around the City. In addition, it has a leaf collection program and designates depots where the public can bring its leaves. The leaves are taken to a facility off NE Sunderland Avenue where they are processed during the winter months and turned into compost. During fiscal year 1999-2000, 13,000 cubic yards of leaves generated over 4,000 cubic yards of compost for use on BOM projects or resale to the public.

Flusher Using Recycled Water

The flusher is a truck with a water tank that washes dirt up against the curb before the street sweeper cleans along the curb. The flusher provides a high-pressure water spray across the

road to ensure that debris is moved to the curb. BOM has developed a flusher water conservation plan to be implemented during times of drought. The plan states that instead of using clean water from a hydrant, crews will fill the flusher with non-chlorinated, non-potable water from the wastewater treatment plant.

Office Recycling

BOM has set up several areas for recycling of various types of office paper, newspaper, plastic, glass, cardboard, and computer parts. BOM also donates pop cans and obsolete office supplies to neighboring schools. It has set up a recycling program for both rechargeable and non-rechargeable batteries, and recycled almost 1,000 pounds of batteries during 2000. BOM recently added a program to recycle styrofoam packing peanuts.

Lamp Recycling

BOM sells its fluorescent lamps and high intensity discharge (HID) lamps containing mercury to a vendor who separates the metals. These include building lights and street lamps. The mercury and other metals are kept out of the landfill. BOM recycled over one ton of lamps and lights during 2000.

Metals Recycling

BOM has made an extensive effort to implement recycling programs for many types of metals. Much of this material used to end up in the landfill. BOM now has designated drop-boxes and drums around the maintenance yard for recycling. The recycled metals include aluminum, aluminum guardrails and handrails, yellow brass, light copper and copper wire, mixed non-ferrous metals, steel, and cast iron. During 2000, BOM saved and recycled almost 50 tons of metals.

Portable Sewer Pump Station

BOM is in the process of designing a portable solar-powered pump station to use when assisting with sewer repairs in business or residential areas. This solar-powered system would improve on using a noisy pump or diesel generator by reducing fueling requirements and send noise upwards, reducing noise pollution.

Docking Station

BOM is designing a docking station for the solar-powered generators used on the portable sewer pump station, parking meter truck, and inspection van. During non-work hours, these pieces of equipment would be attached to the docking station and provide green power to the building and the utility grid.

Wind Turbine

BOM is preparing a permit application to the Federal Aviation Administration to construct a wind turbine at the Sunderland Recycling Facility. Adequate power would be generated to power the Sunderland office building, with excess power going to the grid. In addition to the

solar-powered machinery described previously, BOM plans to continue evaluating the use of solar power for other applications.

Yard Cleanup

BOM is looking into the installation and maintenance of catch basin inserts around the BOM yard. These inserts would reduce the amount of debris and materials that flow into the stormwater system. In addition, BOM would like to install a truck-washing facility that uses bioswale technology to capture and filter the flow of sediment-laden water and keep it out of the stormwater system.

Use of Recycled Paint

BOM currently paints over graffiti on concrete structures, bridge abutments, and columns. Instead of buying new paint for this purpose, BOM is evaluating the use of recycled latex paint available through Metro's paint program. Metro collects surplus latex paints from households and businesses and blends the leftover paints. This would make use of an otherwise useless product and cost less money.

Use Of Environmentally Friendly Products

BOM continues to explore the use of environmentally friendly products in its day-to-day operations. As more products become available, BOM will continue to test and try them.

Signals and Street Lighting

Refurbishment and Reuse Of Signals and Street Lighting Hardware

Electrical maintenance crews bring old, used equipment that is removed from the field back to the maintenance facility. . Staff members analyze each item and determine if it can be refurbished/reused, recycled, or (as the last resort) thrown away. This program has kept many tons of material out of the dumpster over the years it has been in place.

Street Lighting Energy Savings

The City converted nearly all streetlights from mercury vapor to high-pressure sodium light sources in the mid-1980s. The sodium vapor lights are basically twice as energy efficient as mercury vapor. This conversion is currently saving an estimated 40 million kilowatts of energy per year.

Retiming Traffic Signals

Retiming traffic signals reduces stops and delays for vehicles, which in turn reduces fuel usage and harmful air emissions. The following examples of retiming projects over the last 10 years show the annual savings that are achieved.

ARTERIAL	NUMBER OF SIGNALS	FUEL SAVED (gal/year)	CO_2 REDUCTION (tons/year)	CO REDUCTION (tons/year)
W Burnside St.	11	41,000	362	35
SW Front Ave.	15	50,000	443	44
NE MLK Blvd.	14	20,000	181	39
SE/NE 82nd Ave.	27	136,000	1,197	100
SE/NE 122nd Ave.	9	86,000	757	

Traffic Signal Energy Savings

Most pedestrian signals have been converted from incandescent to neon light sources. The annual energy savings are estimated at more than 3 million kilowatt-hours. The savings from converting traffic signals from incandescent to LED light sources is saving the City an estimated 5.3 million kilowatt hours of energy per year.

Transportation Options

PDOT's Transportation Options section works to increase biking, walking, taking transit, carpooling, teleworking, and smart use of the car. Many Transportation Options programs support sustainable infrastructure. These programs are detailed in Chapter 5: Transportation Demand Management, of the TSP.

Summary

Achieving 'sustainable infrastructure' is an ongoing process and a long-term commitment. Identifying the most sustainable product, practice, or policy takes time and changes as new information becomes available. Changes range from the type of infrastructure projects the City invests in (such as the Portland Streetcar rather than new road capacity) to small, but ecologically significant, changes in products used to clean equipment.

In conjunction with local jurisdictions, Metro has produced a Green Streets handbook that incorporates many sustainable concepts for building streets. The City will use this handbook for public and private street projects. Pilot projects are now underway to test the concepts of the Green Streets handbook.