

GREEN STREETS Cross-Bureau Team Report

Phase 2

March 2007

working for
clean rivers,
healthy
watersheds,
and a livable
sustainable
community

Prepared by
the City of
Portland
Oregon



Acknowledgements

Sam Adams, Commissioner

Dean Marriott, Director, Bureau of Environmental Services

Green Streets Cross-Bureau Team:

Linda Dobson, Project Manager
Bureau of Environmental Services

Core Members:

Susan Anderson, Office of Sustainable Development
Mark Braun, Bureau of Environmental Services
Lana Danaher, Bureau of Environmental Services
Rhetta Drennan, Bureau of Environmental Services
Eric Engstrom, Bureau of Development Services
Sue Keil, Office of Transportation
Gil Kelley, Bureau of Planning
Mark Lear, Office of Transportation
Tom Miller, Commissioner Adams' Office
Mike O'Brien, Office of Sustainable Development
Bill Ryan, Bureau of Environmental Services
Zari Santner, Parks and Recreation
David Shaff, Portland Water Bureau
Maria Thi Mai, Commissioner Adams' Office
Dawn Uchiyama, Bureau of Environmental Services
Dan Vizzini, Bureau of Environmental Services
Mary Wahl, Bureau of Environmental Services
Bruce Warner, Portland Development Commission

Steering Committee Members:

Byron Estes, Portland Development Commission
Susan Hartnett, Portland Water Bureau
Liz Moorhead, Office of Transportation
Dave McAllister, Parks and Recreation
Steve Townsen, Office of Transportation
Joe Zehnder, Bureau of Planning

Participation from:

Andrew Aebi, Office of Transportation
Don Gardner, Office of Transportation
Bob Glascock, Bureau of Planning
Marni Glick, Bureau of Maintenance
Sandi Hansen, Bureau of Environmental Services
Mike Stuhr, Portland Water Bureau

Consultants:

Julie Wilson and Libby Smith, EnviroIssues



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Executive Summary

The City of Portland is an urban area that realizes the benefits of comprehensive thinking and planning. Provisions for urban design, multi-modal transportation systems, watershed health, parks and open spaces, and infrastructure systems all benefit when planning, design, and budgeting are integrated.

The City is a leader in implementing sustainable stormwater facilities such as Green Streets. City staff and residents promote the use of green street facilities for the protections they afford to valuable water resources and public health, as well as for the multiple community benefits they provide, including green space and habitat connectivity, enhancement of the bicycle and pedestrian environment, and neighborhood livability and vitality. For the purposes of this report, a Green Street is a street that uses vegetated facilities.

A two-phase effort was initiated in the fall of 2005 to create a citywide Green Streets Program ensuring the integration of Green Streets in City plans and projects. During Phase 1, a variety of opportunities and solutions were identified to address multi-bureau and site-specific challenges to green streets implementation. Much of this Phase 1 work is ongoing. A second phase was initiated in July 2006 synthesizing the Phase 1 work into a citywide programmatic approach. Five tasks were the focus of development in Phase 2 and their recommendations are as follows:

Table 1: Phase 2 Tasks and Recommendations

Task Development	Recommendations
Draft and approve a new citywide policy that establishes overarching multidisciplinary goals for a Green Streets Program.	(1) City Council adopt the proposed binding Green Streets Policy. (2) City Council adopt language incorporating this policy into Portland Office of Transportation's (PDOT) Transportation System Plan. (3) Bureau staff evaluate this policy for integration into other essential City planning documents such as the City Comprehensive Plan and the Citywide Systems Plan (CSP).
Evaluate bureau Capital Improvement Program (CIP) and the CSP as mechanisms for integrated, comprehensive planning of green street projects.	(1) Short Term: Develop process to shift CIP Planning Group emphasis towards opportunity identification and evaluation. Short term coordination opportunities may include upcoming water supply and storm/sanitary line replacement projects and PDOT maintenance repair and improvement projects. (2) Mid Term: Develop a more integrated cross-bureau programmatic project planning process, involving all planned and projected CIP projects, Geographic Information Systems (GIS) data, etc. (3) Long Term: Integrate green street objectives into the 20-year CSP facility planning process. Coordinate mid term work with intermediate CSP discussion drafts.
Recommend implementation of a multi-bureau project to demonstrate integrated planning, and provide a showcase for green street facilities.	(1) City bureaus and agencies pursue the Central Eastside SE Clay Street "Route to the River" concept incorporating green street facilities. (2) Develop a new green streets "chicane" facility prototype through the PDOT Bicycle Master Plan process.

<p>Evaluate and address the needed flexibility to implement Green Streets successfully in the urban environment with accompanying considerations such as parking, utilities, street trees, etc.</p>	<p>(1) Create a Green Street Profile Notebook (a “portfolio”) of green street facilities that is used to catalogue various designs and considerations, and update frequently to include continually evolving designs. (2) Produce a video that showcases and discusses specific projects to accompany the Notebook. (3) Continue to identify new designs that can lower costs, and dovetail with other bureau priorities.</p>
<p>Develop a funding proposal for green street projects and maintenance.</p>	<p>(1) Office of Management and Finance convene an intra-bureau task force to analyze existing funding and recommend new sources of funding. (2) Establish a “Percent for Green” Street fund from 1% of construction costs for certain categories of right of way projects. (3) Re-evaluate and re-submit an incremental cost funding proposal to the appropriate entities for consideration. (4) Re-apply for an Environmental Protection Agency (EPA) appropriation to continue broad-scale implementation. (5) Continue to identify opportunities to cooperatively plan infrastructure work across bureaus, using funds saved through this cooperative effort as a means of financing green streets facility work.</p>

These five tasks and associated recommendations are discussed in greater detail in this Phase 2 report.

Ongoing organizational structures for the Green Streets Program were discussed during Phase 2. It is recommended that the program remain a cross-bureau effort guided by the Green Streets Policy directive. This approach will ensure thorough integration of the policy into each respective bureau’s operations and development programs.

During Phase 1 and 2, important cross-bureau partnerships have been strengthened, visions for integrated planning have been solidified, funding mechanisms to ensure implementation have been proposed, and a citywide policy directive has been crafted. The Green Streets Program has been launched. It is critical that the momentum established during Phases 1 and 2 is maintained in order to realize the programmatic charge of this pioneering effort. Annual progress reports and recognition of program leaders and innovators are recommended to track and encourage progress toward successfully integrating Green Streets into Portland’s landscape.

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Chapter 1

Introduction

The City of Portland is a leader in implementing sustainable stormwater management techniques. This position has arisen in response to the need to manage Portland's average annual rainfall (37 inches) in a manner that protects surface and groundwater resources and public and watershed health. One of the key tools in the sustainable stormwater toolbox is the Green Street. The Green Street was first applied as a single-purpose stormwater facility in the right of way. It has evolved into an integrated, innovative application that provides multiple benefits, such as green space and habitat connectivity, enhancement of the bicycle and pedestrian environment, and neighborhood livability. With each new green streets facility that is constructed, new compelling environmental and community benefits become apparent.



Vegetated filter box at SW 12th and Montgomery

A Green Street¹ performs the following functions:

- Handles stormwater on site through use of vegetated facilities;
- Provides water quality benefits and replenishes groundwater (if an infiltration facility);
- Creates attractive streetscapes that enhance neighborhood livability by enhancing the pedestrian environment and introducing park-like elements into neighborhoods;
- Meets broader community goals by providing pedestrian and, where appropriate, bicycle access; and
- Serves as an urban greenway segment that connects neighborhoods, parks, recreation facilities, schools, mainstreets, and wildlife habitats.

Background

In fall 2005, Commissioner Sam Adams charged City bureaus with creating a programmatic approach to implementing green street elements as a component of street projects wherever feasible, and to increase feasibility by identifying solutions to planning and implementation challenges. This charge was divided into two phases. The charge for Phase 1 was to identify opportunities and challenges to implementation and to recommend solutions for key issues. This phase was concluded in January 2006. Work products and the opportunities and challenges discussed during Phase 1 are presented in the March 2006 Green Streets Cross-Bureau Team Report - Phase I, available on-line at: <http://www.portlandonline.com/bes/index.cfm?c=34602&>.

¹ For the purposes of this study effort, a Green Street is defined as a vegetated facility and does not, at present, include porous paving. While porous paving is not yet approved for widespread use in the vehicle travel lanes of the public right of way, and maintenance and installation issues are still being resolved, the City continues to test various types and applications of porous paving as a potential stormwater management tool on public streets.

Moving Forward

Phase 2 of the Green Streets Program was initiated in July 2006. The charge of this second phase was to evaluate potential options for implementing a broader Green Streets Program. Most of the options evaluated were recommendations suggested during Phase 1 that were more programmatic in nature or required additional time to scope and develop. The recommendations evaluated during Phase 2 included:

- Develop a new comprehensive citywide Green Streets Policy to connect the program across bureau boundaries and define how all bureaus will apply this policy;
- Formalize a process to overlay existing bureau plans and Capital Improvement Program (CIP) projects to identify and prioritize green street development opportunities;
- Launch a green streets implementation project to demonstrate how an on-the-ground, multi-bureau effort might be planned and executed with community involvement; and
- Develop flexible street standards to meet the needs of multiple interests in the right of way, including pedestrians, bikes, cars, utilities, stormwater, and green linkages.

The need to identify potential sources of additional funding to facilitate the use of Green Streets has been a recurring theme in both Phase 1 and Phase 2. Therefore, a proposal for identifying ongoing funding for construction and maintenance was also evaluated.

Work products identified in Phase 1 that needed additional time and consideration were advanced in Phase 2. The status of these Phase 1 efforts as well as of the Phase 2 options identified above, are summarized in this Phase 2 report.

As in Phase 1, the Green Streets Cross-Bureau Team (Green Streets Team) provided oversight and approval of work products. A core six-member Steering Committee representing key City bureaus was also utilized in Phase 2. The Steering Committee developed and reviewed all of the work products and formulated the recommendations included in this report.

Chapter 2

Phase 1 Update

Phase 1 identified key opportunities for increasing implementation of green street facilities and recommended solutions for issues that inhibited use of Green Streets. During Phase 1, the Green Streets Team discussed ways to enhance current use of Green Streets and to develop a conceptual path forward to address identified issues. Work products developed between August 2005 and January 2006 are summarized in the Phase 1 report. The following sections provide an update on the Phase 1 work accomplished since the report was issued in March 2006.



Vegetated swale at NE Sandy and Davis

Develop a green street-specific technical guidance document

An outline for a green street-specific guidance document was developed during Phase 1. This outline provided placeholders for details for green street designs and identified specifications for minimum permissible construction. The purpose of this guidance is to assist developers and City staff in understanding what is expected, what may be permitted, and what can be approved for development, redevelopment, and enhancement. The benefits of completing this effort are a more effective and transparent green streets design development and permitting process, and potentially, a more efficient implementation process leading to a greater number of facilities in the ground.

Since March 2006, the technical City Stormwater Advisory Team (SWAT) has been developing the following cross-sections, or “standard details” for the proposed guidance document:

Standard Details for Vegetated Stormwater Facilities in the Public Right of Way

- Planter without parking
- Planter with parking
- Swale (with and without parking)
- Curb Extension

Supplemental Details

- Concrete Inlet for Local Service Streets
- Concrete Inlet for Neighborhood Collector and Higher Volume Streets
- Inlet Channel and Grate
- Check Dam
- Street Tree Details
- Planting Template
- Meter and Hydrant Location for Planter without parking and Swale (with or without parking)
- Meter and Hydrant Location for Planter with parking
- Facility Marker and Monitoring Port

These standard details are available to the general public. Specifications such as soil and planting requirements are being reviewed. All green street technical information developed during this effort will be included in the revised Stormwater Management Manual, which will be available in fall 2007.

Provide outreach concerning Green Streets

An outreach plan was proposed during Phase 1 to provide specifically requested green streets information to three different target groups: the professional designer/developer/contractor community, internal city staff, and neighborhood associations. Several tools were proposed in the outreach plan to disseminate information, including presentations, forums, and a website to access both existing information and new materials as they are developed.

Several of these tools have been developed over the course of the Phase 2 timeframe. A “Green Streets Overview” Microsoft PowerPoint presentation has been developed and is being presented by the Bureau of Environmental Services (BES) to other City bureaus, public agencies, and community groups.

Forums will provide follow-up to the presentations, with each forum addressing different green street-specific technical issues. Potential topics will include: designing specific facilities (one forum per facility type), permitting, Green Streets and the Stormwater Management Manual, and addressing challenges in facility design. A forum schedule will be finalized in 2007.

In addition, a green streets tour schedule is being developed to take interested parties to completed facilities to discuss the projects and their site-specific considerations. BES will offer tours on a regular basis, and additional tours may be requested for specific audiences.

Another communication tool, a green streets doorhanger, has been developed to provide a means of regularly communicating with private property owners living in the vicinity of green street facilities. Carried out on a regular basis, this communication is intended to remind the public about the purpose of the facility and their role in its preservation and maintenance, as well as to help provide continuity in understanding as residents move in and out of homes located nearby. A final doorhanger design has been completed (Figure 1), and a protocol has been developed for distribution. When City staff complete maintenance on a facility, or right of way maintenance such as trash and leaf removal, they will leave an outreach doorhanger at nearby homes to let the public know maintenance has been performed and provide basic information on the facility purpose and function.

Green streets facility site markers were identified as another outreach tool for educating the public about facilities located in the vicinity of their homes. These facilities are often integrated into landscaping, and new residents may not be aware of their presence or function. In the past, City staff have observed facilities unintentionally degraded (e.g., filled with bark dust or other debris) because this outreach communication has not been established. The facility markers would identify the site as a green streets stormwater facility and establish its unique location.

Figure 1
Green Streets Maintenance Doorhanger

**DIE CUT
DOORHANG**

Stormwater Management

Today a crew visited the stormwater facility near your property. We evaluated the general condition of the facility and performed routine maintenance. Throughout the year we visit your facility to:

- Remove litter and /or leaf debris
- Maintain plants
- Remove sediment
- Replace damaged plants
- Perform testing

What's a Green Street?
A green street is a landscaped curb extension or infiltration planter that reduces the negative impacts of street stormwater runoff. Green streets slow and filter stormwater runoff and allow water to soak into the ground to reduce the amount of stormwater that flows into sewers or streams. Green streets also provide wildlife habitat and green space, cool the air, and improve neighborhood livability.

Taking Care of Green Streets
Green street projects use low-growing plants adaptable to a variety of conditions. The City is responsible for maintenance but welcomes help from neighbors. Please don't use the facility as a storage space.

For questions about plants or how the facility functions call 503-823-2335.


Other Ways You Can Help

- ✓ Weed and water the facility during summer months. The City performs routine quarterly maintenance, but the facility benefits from help between visits.
- ✓ Control prohibited or nuisance plants in and around stormwater facilities. To view prohibited and nuisance plant lists online go to www.portlandonline.com/planning/index.cfm?c=34251.
- ✓ Limit use of fertilizers and weed control chemicals in your landscaping. They can contribute to high levels of nutrients and salts in ground and surface waters through run-off.
- ✓ Remove litter and debris that can clog the facility, especially around inlets and outlets.
- ✓ Do not dump grass clippings or yard debris in stormwater facilities.

Report any facility damage or operating problems 24 hours a day, 7 days a week at 503-823-1700.

Learn more about Portland's Green Streets at www.portlandonline.com/bes/index.cfm?c=34601

Notes:



**ENVIRONMENTAL SERVICES
CITY OF PORTLAND**
working for clean rivers

Sam Adams, Commissioner Dean Marriott, Director

For disability accommodation requests call 503-823-7740.
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Develop the concept for a stormwater master planned district (Gateway)

A stormwater master plan for the Gateway Urban Renewal Area will facilitate green streets development by analyzing existing conditions and developing protocols, thereby setting expectations to provide certainty for the development community. This work will demonstrate integration of green streets design and right of way configurations where multi-block development activity, including retrofit opportunities, is occurring in the Gateway district. The scope for the stormwater master plan for the Gateway district was completed during Phase 1.

A Request for Proposals for consultant support to develop the stormwater management master plan was issued during Phase 2, and a consultant was selected. The plan is envisioned to include:

- Appropriate green streets design proposals for new development and retrofit opportunities including right of way configurations, facility dimensions, elevations, set backs, and number of facilities per block;
- Recommendations for prioritization of master plan elements and implementation, as well as for funding;
- A summary of attributes, feasibility, and constructability of master plan elements, as well as data collected and analyzed; and
- Identification of ongoing facility maintenance requirements.

The plan will assure developers and the City that recommendations for Gateway green street facilities are realistic and that goals are achievable. It will also thoroughly illustrate integration of green streets design with right of way use and standards. The final plan is due to the City in spring 2007.

Clarify green street maintenance issues and responsibilities

A policy clarifying bureau responsibilities for maintaining green street facilities was completed in Phase 1. This policy has since been adopted by Bureau of Environmental Services (BES) and is currently being implemented. Additional maintenance details and issues are being identified for resolution, such as resource and funding needs (See Phase 1 Report).

Identify issues related to locating green street facilities near existing infrastructure

During Phase 1, discussions were initiated to identify conditions where Portland Water Bureau (PWB) water utility and service lines could safely co-exist with green street facilities. Details regarding this work and specific challenges are discussed in the Phase 1 report. Continued discussions regarding appropriate integration with water infrastructure and other underground utilities have occurred throughout Phase 2.



Curb extension at NE Siskiyou and 35th

Investigate options for green street funding and resources

Four strategies were identified during Phase 1 to increase the likelihood of securing public and private funding for green street projects. Three follow-up actions were derived from these strategies:

- Expansion of Portland Office of Transportation's (PDOT) subsidized Residential Speed Bump Purchase Program to include a green street curb extension purchase program. The expanded program would add stormwater management value to an existing successful public safety program. A current Traffic Calming white paper will be expanded to summarize the goals, project elements, qualifications, public process, decisionmaking process, and implementation of the "Green Street Traffic Calming Purchase Program." This paper will be reviewed by a committee that includes representatives from the Bicycle and Pedestrian advisory committees, BES, PDOT, Commissioner Adams' office, and the Stormwater Advisory Committee, after which time public outreach will commence. An ordinance will be developed for eventual presentation to City Council. (This work has been delayed.)
- BES and PDOT coordination and prioritization of opportunities to add curb extension facilities based upon both stormwater management and traffic safety values - the SE 21st and Tibbetts project at People's Food Co-op has just been completed. A joint feasibility study at SE 55th and SE Belmont is in progress. Other projects are being identified on an ongoing basis.
- Evaluation of the potential for green street chicanes for traffic calming and stormwater management. This action has evolved into the Neighborhood Initiative element of Phase 2, and its progress is presented later in this report.

Balance the multiple interests that use the right of way

This challenge has been addressed through other work items developed in Phase 2.

Chapter 3

Phase 2

The charge for the Green Streets Team in Phase 2 was to synthesize the opportunities and recommended solutions identified in Phase 1 into a citywide Green Streets Program. Under the direction and oversight of the Green Streets Team, the cross-bureau Steering Committee developed the products and recommendations encompassed here.

Possible organizational structures for the Green Streets Program were discussed in Phase 2. The most promising of these structures was for the program to remain a cross-bureau effort, guided by a policy directive. This approach will assure thorough integration of the policy into each respective bureau's operations and development programs. Developing this policy directive was integral to Phase 2, as was evaluating mechanisms for future cross-bureau collaboration and planning, and identifying potential sources of funding. The following tasks originated during Phase 1 discussion and were the focus of development in Phase 2:

- Draft and approve a new citywide policy that establishes overarching multi-disciplinary goals for a Green Streets Program;
- Evaluate bureau Capital Improvement Program (CIP) and the Citywide Systems Plan (CSP) as mechanisms for integrated, comprehensive planning of green street projects;
- Recommend implementation of a multi-bureau project to demonstrate integrated planning and provide a showcase for green street facilities;
- Develop a Green Streets Profile Notebook to catalogue various designs and considerations such as parking, utilities, street trees, etc., that accommodate site-specific conditions; and
- Develop a funding proposal for green street projects.

These five tasks are discussed in greater detail in the following sections.



Curb extension at NE 131st and Fremont

1. Citywide Policy

Assignment

One of the primary Green Streets Team recommendations made during Phase 1 was to develop a policy to establish the development of Green Streets as a citywide priority, and define how all bureaus would apply this policy. The City’s Stormwater Management Manual requires on-site stormwater infiltration through the use of surface facilities (unless specific conditions exist). However, the Green Streets Team recognized the need for a programmatic context that could be achieved through adoption of a citywide Green Streets Policy. Scoping and preparing a binding policy for City Council approval was a principal focus of Phase 2.



Rain garden at NE Sandy and 22nd

Discussion/Work Product

A citywide policy initiative was determined to be critical to integrating sustainable stormwater values and implementing a successful Green Streets Program with multiple benefits. The result of this Phase 2 effort was the development of an overarching, comprehensive, cross-bureau Green Streets Policy (Figure 2).

A Resolution will bring the Policy forward to City Council for approval. It cites the technical information, as well as the relevant local and regional measures (e.g., the Portland Watershed Management Plan, the Stormwater Management Manual, the City’s Comprehensive Plan, and Metro Title 3), and related state and federal regulations (e.g., Underground Injection Control and Municipal Separate Storm Sewer System permits) to support adoption of the Policy. The Policy establishes that:

- City Council will accept and endorse the Policy to promote the multiple and varied benefits of Green Streets;
- City Council will direct City bureaus and agencies to cooperatively plan and implement Green Streets as a part of public infrastructure programs, and will integrate the Policy into the City’s Comprehensive Plan, Transportation System Plan, and Citywide Systems Plan (CSP);
- The Green Streets Policy is binding City policy; and
- The Office of Management and Finance will convene an inter-bureau task force to analyze existing sources of funding and recommend new sources of funding for green streets implementation and maintenance.

The Policy goal is to promote and incorporate the use of green street facilities in public and private development. Policy directives for City officials and staff were drafted to be intentionally action oriented and assure implementation, and are grouped into five categories: infrastructure projects in the right of way, project planning and design, project and program funding, outreach, and project evaluation. Infrastructure directives include a requirement to incorporate green street facilities into all publicly funded development, redevelopment, and enhancement projects. Otherwise, an off site project or management fee will be required or, in some cases, payment into a “Percent for Green” Street fund. The project evaluation directive requires the ongoing monitoring of green street facilities to evaluate their effectiveness and performance in meeting multiple City objectives. Monitoring will include tracking the number of stormwater gallons

managed, the geographical distribution of facilities by watershed and by neighborhood, and the number of pedestrian and bicycle enhancements achieved through construction of the facilities. Specific performance measures and targets were discussed as a means of evaluating program progress and may be adopted in the future.

The Portland Office of Transportation (PDOT) has recommended new language in the 2006 Transportation System Plan update to reflect language in the Green Street Policy. This language encourages the use of green street techniques for stormwater management to protect watershed health, connect neighborhoods, and enhance livability. Details regarding proposed language are provided in Appendix A.

Recommendations

The Green Streets Team recommends the following actions:

- City Council should adopt the proposed binding Green Streets Policy.
- City Council should adopt language incorporating this policy into PDOT's Transportation System Plan as the first implementation measure.
- Bureau staff should evaluate this policy for integration into other essential City planning documents such as the City Comprehensive Plan and the CSP.

Figure 2
Citywide Green Streets Policy

RESOLUTION No.

Accept and endorse the Portland Green Streets Policy and Green Streets Cross-Bureau Phase 2 Report. (Resolution)

WHEREAS, 60 to 70 % of Portland stormwater is attributable to paved streets and runoff directed from private property and concentrated in the public right of way; and

WHEREAS, Green Streets (streets designed with landscape areas that capture, filter and allow for infiltration of stormwater runoff) are recognized as an effective way to help manage stormwater volume and water quality; and

WHEREAS, 60 million gallons of stormwater will need to be removed from the Combined Sewer System annually by 2011, through implementation of sustainable projects such as Green Streets; and

WHEREAS, the Portland Watershed Management Plan, endorsed by Resolution No. 36384 on March 6, 2006 by City Council (ENN-8.02, Actions for Watershed Health, 2005 Portland Watershed Management Plan Implementation), which implements the Portland Clean River Plan (published in 2000) includes a stormwater management strategy that recommends actions such as construction of green street facilities to protect and improve watershed conditions; and

WHEREAS, the City is required by state and federal government, through its Municipal Separate Storm Sewer System (MS4) Permit and its Underground Injection Control (UIC) Permit, to reduce stormwater pollution, protect groundwater, and develop and manage programs that respond to water quality requirements; and

WHEREAS, a broad range of federal, state, tribal, and regional policies, programs and regulations affect how the City manages stormwater, including but not limited to:

- Federal programs that address water quality, environmental cleanup, sewage overflows, flood management, and endangered species;
- State of Oregon programs that address water quality, wastewater discharge, watershed planning, environmental cleanup, habitat conservation, and salmon recovery;
- Native American tribal programs that address salmon recovery, water quality, and cultural resources;
- Metro's programs that address transportation, greenspace, and natural resource protection and restoration; and

WHEREAS, Metro proposes onsite infiltration of stormwater for transportation facilities in Title 3 of the Urban Growth Management Functional Plan (Water Quality, Flood Management, and Fish and Wildlife Conservation), which was adopted by the Metro Council by Ordinance No. 96-647C, and amended by Ordinance No. 97-691C, prior to being codified as Metro Code Chapter 3.07 by Ordinance No. 97-715B; and

Figure 2
Citywide Green Streets Policy

REVISED DRAFT March 16, 2007

WHEREAS, the City's Stormwater Management Manual (September 2004 or update) ranks onsite infiltration of stormwater with a surface infiltration facility at the top of the stormwater destination/disposal hierarchy, where soil conditions allow; and

WHEREAS, a policy clarifying responsibilities for maintaining green street facilities was developed and adopted as part of the City Green Streets Cross-Bureau Team's Phase 1 work; and

WHEREAS, the Bureau of Environmental Services conducts ongoing evaluation and monitoring of green street facilities to assess their effectiveness; and

WHEREAS, the City's Transportation System Plan (adopted by City Council in 2002 as Ordinance No. 177028, and updated in 2004 by Ordinance No. 178815 and Ordinance No. 178826) supports a transportation system that makes it more convenient for people to walk and bicycle, and to drive less to meet their daily needs while sustaining the City's economic and environmental health; and

WHEREAS, the City's Office of Transportation and Cross-Bureau Task Force in their 2003 Sustainable Infrastructure Committee Streetscape Report identified as a high priority the institutionalization of design standards that allow for stormwater treatment and infiltration, when economically and technically appropriate in all infrastructure projects located in the right of way. These needs can be partially met through green street facilities; and

WHEREAS, City Council and the Portland Development Commission have adopted Green Building Policies which support incorporating sustainable and green building practices in all projects with specific requirements for City-owned buildings and projects receiving public funding or financial incentives; and

WHEREAS, the Portland Development Commission, through its redevelopment efforts in the City's urban renewal areas, is committed to partnering with City Bureaus to incorporate Green Street design principles in new streetscape projects wherever feasible, and the implementation of Green Streets in public infrastructure (such as the Central Gateway planning effort and other areas as they become available) and in private development supported with Commission resources; and

WHEREAS, the City's Comprehensive Plan calls on the City to:

- Protect and manage natural resources, including stream flow, water levels, and groundwater, and maintain and improve the quality of State water resources through design of stormwater drainage facilities (Goal 8);
- Implement a full range of floodplain management measures (Goal 8);
- Conserve linear features (e.g., drainageways, parkways) that have value as wildlife corridors and connectors between habitat areas (Goal 8);
- Coordinate land use planning and capital improvements to ensure the most efficient use of the City's stormwater run-off facilities (Goal 8);

Figure 2
Citywide Green Streets Policy

REVISED DRAFT March 16, 2007

- Plan and develop an efficient arrangement of public facilities and services, including those related to stormwater management (Goal 11);
- Plan, design and develop transportation projects in efficient, innovative, and environmentally responsible ways that consider and minimize impacts on the natural environment (Goal 11);
- Integrate master planning for stormwater management to achieve adequate drainage and minimize pollution and erosion problems (Goal 11);
- Design new development to enhance the natural environment that is so much a part of Portland's character (Goal 12);
- Enhance Portland as a livable city by building quality private developments and public improvements for future generations (Goal 12); and

WHEREAS, the City is required by City Policy ENN-3.01- Sustainable City Principles, to find more sustainable and cost effective approaches that protect the quality of air, water, land and other natural resources; and

WHEREAS, Portland Parks and Recreation encourages, supports, and contributes to the development of greenways and urban treescapes that directly enhance the City's environment and residents' quality of life; and

WHEREAS, the City of Portland Green Streets Cross-Bureau Team recommends that City Council adopt the Green Streets Policy that is provided in Exhibit A and the Green Streets Cross-Bureau Phase 2 Report that is provided in Exhibit B.

WHEREAS, the above are supported by the findings that are provided in the Green Streets Policy (Exhibit A).

NOW, THEREFORE, BE IT RESOLVED, that the City Council accepts and endorses the attached Green Streets Policy (Exhibit A) and Green Streets Cross-Bureau Phase 2 Report (Exhibit B) to promote and incorporate use of Green Streets to manage stormwater, enhance neighborhood livability, improve the function of the right of way, provide habitat corridors, and promote connectivity between Portland neighborhoods.

BE IT FURTHER RESOLVED City Council directs City Bureaus and agencies to cooperatively plan and implement Green Streets as an integral part of the City's maintenance, installation, and improvement programs for its infrastructure located in the public right of way, and to integrate the Green Street Policy into the City's Comprehensive Plan, Transportation System Plan, and Citywide Systems Plan.

BE IT FURTHER RESOLVED, that this resolution and attached Green Streets Policy are binding City policy.

BE IT FURTHER RESOLVED, that the Office of Management and Finance, shall convene a task force composed of representatives of the Bureau of Environmental

Figure 2
Citywide Green Streets Policy

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Services, Portland Office of Transportation and Portland Water Bureau to conduct an analysis of existing funding, and make recommendations for new sources of funding for Green Street project implementation and maintenance.

Adopted by the Council:

GARY BLACKMER
Auditor of the City of Portland
By

Commissioner Sam Adams
Prepared by: Linda Dobson (Bureau of
Environmental Services)

Deputy

(Date prepared: April __, 2007)

Figure 2
Citywide Green Streets Policy

REVISED DRAFT March 16, 2007

Exhibit A

Green Streets Policy

Goal: City of Portland will promote and incorporate the use of green street facilities in public and private development.

City elected officials and staff will:

1. Infrastructure Projects in the Right of Way:

- a. Incorporate green street facilities into all City of Portland funded development, redevelopment or enhancement projects as required by the City's September 2004 (or updated) Stormwater Management Manual. Maintain these facilities according to the May 2006 (or updated) Green Streets Maintenance Policy.

If a green street facility (infiltrating or flow through) is not incorporated into the Infrastructure Project, or only partial management is achieved, then an off site project or off site management fee will be required.

- b. Any City of Portland funded development, redevelopment or enhancement project, that does not trigger the Stormwater Manual but requires a street opening permit or occurs in the right of way, shall pay into a "% for Green" Street fund. The amount shall be 1% of the construction costs for the project.

Exceptions:

- Emergency maintenance and repair projects
- Repair and replacement of sidewalks and driveways
- Pedestrian and trail replacement
- Tree planting
- Utility pole installation
- Street Light poles
- Traffic Signal poles
- Traffic Control Signs
- Fire Hydrants
- Where this use of funds would violate contracted or legal restrictions.

2. Project Planning and Design:

- a. Foster communication and coordination among City Bureaus to encourage consideration of watershed health and improved water quality through use of green street facilities as part of planning and design of Bureau projects.
- b. Coordinate Bureau work programs and projects to implement Green Streets as an integrated aspect of City infrastructure.

Figure 2
Citywide Green Streets Policy

REVISED DRAFT March 16, 2007

- c. Plan for large-scale use of Green Streets as a means of better connecting neighborhoods, better use of the right of way, and enhancing neighborhood livability.
 - d. Strive to develop new and innovative means to cost-effectively construct new green street facilities.
 - e. Develop standards and incentives (such as financial and technical resources, or facilitated permit review) for Green Streets projects that can be permitted and implemented by the private sector. These standards and incentives should be designed to encourage incorporation of green street facilities into private development, redevelopment and enhancement projects.
3. Project and Program Funding:
 - a. Seek opportunities to leverage the work and associated funding of projects in the same geographic areas across Bureaus to create Green Street opportunities.
 - b. Develop a predictable and sustainable means of funding implementation and maintenance of Green Street projects.
 4. Outreach:
 - a. Educate citizens, businesses, and the development community/industry about Green Streets and how they can serve as urban greenways to enhance, improve, and connect neighborhoods to encourage their support, demand and funding for these projects.
 - b. Establish standard maintenance techniques and monitoring protocols for green street facilities across bureaus, and across groups within bureaus.
 5. Project Evaluation:
 - a. Conduct ongoing monitoring of green street facilities to evaluate facility effectiveness as well as performance in meeting multiple City objectives for:
 - Gallons managed;
 - Projects distributed geographically by watershed and by neighborhood; and
 - Pedestrian and bicycle enhancements.

Findings

A “Green Street”:

- Handles stormwater on site through use of vegetated facilities;
- Provides water quality benefits and replenishes groundwater (if an infiltration facility);
- Creates attractive streetscapes that enhance neighborhood livability by enhancing the pedestrian environment and introducing park-like elements into neighborhoods;

Figure 2
Citywide Green Streets Policy

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- Serves as an urban greenway segment that connects neighborhoods, parks, recreation facilities, schools, mainstreets, and wildlife habitats; and
- Meets broader community goals by providing pedestrian and where appropriate bicycle access.

The City has been installing a variety of stormwater facilities and monitoring their performance for 10 years. Monitoring results support the following:

- Green Streets reduce and manage stormwater runoff through interception, evapotranspiration, throughfall, and attenuation.

One of the most closely monitored facilities – the Glencoe Rain Garden – has performed extremely well. Rainfall and facility overflow have been monitored for over two years, and has retained 94% of the runoff.

- Green Streets are effective tools for inflow control of stormwater to the Combined Sewer Overflow (CSO) System.

The Glencoe Rain Garden and the Siskiyou Curb Extension facilities will reduce peak flows that cause basement sewer backups and aid compliance with CSO regulations by reducing volumes sent to the CSO Tunnel system. Through simulation of basement sewer backup design storms, both facilities reduce peak flows from their respective drainage areas to the combined sewer by at least 80-85%. This reduction would be enough to protect the vast majority of homes from basement sewer backups. During the simulation of CSO design storms, both facilities retained at least 60% of the storm volume, which is believed to be a conservative estimate.

- Green Streets improve water quality by filtering stormwater, removing contaminants and cooling the stormwater before it encounters groundwater or surface water bodies, such as rivers, both of which ultimately benefit watershed health.

Facilities that filter stormwater through vegetation and soil have been shown to reduce total suspended solids (TSS) by 90%, organic pollutants / oils by 90%, and heavy metals by more than 90% (numbers taken from EPA fact sheet on bioretention; <http://www.epa.gov/owmitnet/mtb/biortn.pdf>).

- Green Streets can provide cost-effective infrastructure solutions to stormwater management. They can be more cost effective in some circumstances than traditional stormwater structures, when considering the cost:benefit of other issues (such as basement flooding and creek flooding during high precipitation times).

A basement flooding relief project currently in design is projected to cost 60% of what would have been the cost of a traditional pipe upsize and replacement project. This is because the solution, a mix of Green Streets and private

Figure 2
Citywide Green Streets Policy

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system disconnects, intercepts and infiltrates the water before it enters the public storm system thereby reducing the need to dig up and upsize the existing piped infrastructure.

- Green Streets can foster unique and attractive streetscapes that protect and enhance neighborhood livability and integrate, rather than separate, the built and natural environments.
- Green Streets can serve to enhance the pedestrian environment and introduce park-like elements into neighborhoods.
- When planned on a neighborhood scale, Green Streets can serve as urban greenways or pathways and provide a preferred means of connecting neighborhoods and parks/recreation areas in ways that are attractive to pedestrians and bikers.
- Green Streets encourage the planting of landscapes and vegetation. City landscapes and trees contribute environmental benefits such as reduced summer air temperatures, reductions in global warming through carbon sequestration, air pollution screening, and wildlife habitat corridors, in addition to stormwater reduction.

2. Citywide Systems Plan/ Capital Improvement Projects

Assignment

In Phase 1, the Green Streets Team recommended formalizing a process to overlay multi-bureau project plans and scheduled Capital Improvement Program (CIP) projects to identify opportunities for green streets development as a part of these projects. Discussion resulted in the identification of three steps: 1) develop a short term methodology to identify potential projects on an opportunity-driven basis, 2) develop a mid term integrated cross-bureau programmatic process that would use CIP projects, Geographic Information Systems (GIS) data, etc., as a means of planning future opportunities on a more systematic basis, and 3) identify a long term approach to integrate green street objectives with the 20-year comprehensive Citywide Systems Plan (CSP) facility development strategy.



Vegetated filter box at SW 12th and Montgomery

Discussion/Work Product

The City's Comprehensive Plan directs cross-bureau coordination and master planning. It specifies that land use planning and capital improvements are to be coordinated to ensure the most efficient use of the City's stormwater runoff facilities (Goal 8), and that master planning for stormwater management should be integrated to achieve adequate drainage and minimize pollution and erosion problems (Goal 11). A degree of coordination and communication currently occurs between bureaus to identify green street opportunities and plan integrated projects. For example, Portland Office of Transportation (PDOT) and Bureau of Environmental Services (BES) cooperate to implement stormwater management solutions, as required by the Stormwater Management Manual. Once a project has been initiated that requires ongoing bureau collaboration, a PDOT protocol (December 2005, Appendix B) is followed to ensure ongoing project communication and coordination. In addition, some cross-bureau opportunities are identified on an ad hoc basis among project managers. A CIP Planning Group conducts a more formal but limited process. The group discusses budgeted projects for some bureaus and how to resolve potential conflicts in the field using a "conflicts map".

A more formally established communication process, carried out on a citywide basis, could help identify ongoing opportunities to work together to maximize budgets and resources. For example, if the Portland Water Bureau (PWB) has a line replacement in an area that BES has identified as having issues handling stormwater, the identified project could be evaluated with respect to the potential to integrate green street facilities into the overall project plan. Such project planning would derive maximum benefit from project dollars spent. A systematic process to develop and maintain a map to "overlay" the locations of planned projects from all bureaus is proposed for regular communication and planning.

Step 1: Short Term

A specific short term project concept was identified to help initiate a more formalized coordination and planning process. This concept involves shifting the emphasis of the CIP Planning Group from one of "avoiding conflict" to one of "identifying and evaluating opportunities to partner." This can be accomplished in part by specifically adding "evaluation of opportunities" to the assigned tasks of the CIP Planning Group. The adoption of the Green Streets Policy, discussed in the previous section of this report, should further solidify this collaborative process. Additionally,

Portland Parks and Recreation (Parks), Portland Development Commission (PDC), and Bureau of Planning (BOP) need to be brought into the CIP Planning Group process to “layer in” their plans and projects in order to achieve the multiple objectives sought when constructing Green Streets. Additional potential project coordination opportunities are possible in the short-term, such as evaluating the PWB’s and BES’s pipe replacement projects and PDOT’s maintenance, repair, and improvement projects in association with specific watershed priorities or other City priorities for green space development.

Step 2: Mid Term

In the mid term, rather than responding to opportunities where overlap in projects exists, a more integrated cross-bureau process can be developed that would allow for more proactive, programmatic planning. Such a programmatic planning process would include opportunities like street replacement projects, but would also involve layering a more comprehensive level of data and GIS information, including all planned and projected bureau CIP projects, plans and operating projects. These projects could include Green Streets that can provide pedestrian-friendly connections between parks and neighborhoods, bike routes, and Transportation System Plan work elements and data. Other GIS information that might be used in the long term planning effort includes RESTORE data from the Portland Watershed Management Plan and BOP natural resource data.

Step 3: Long Term

The CSP is a unified City facility development strategy that identifies and guides bureau priorities over the next 20 years. Implementation of the CSP occurs through, and will guide, the individual bureau CIP projects. Development of this long term planning instrument with a green streets objective would facilitate a comprehensive approach to development.

Once adopted, the CSP will serve as the primary guide to the annual CIP development. The bureaus will address how their proposed capital projects relate to the plan’s list of significant projects and financial scenarios. The intent is to update the CSP every five years, with the opportunity to refresh themes, system elements, the significant project list, and financial resources.

We anticipate City Council adoption of the CSP by July 2009. Leading up to that date, intermediate products may include discussion drafts on sustainability, asset management, placemaking, and data management (as they relate to the long range infrastructure plan). Work tasks and timelines for the mid term Green Streets work, and these intermediate CSP work products, should be compared and coordinated where appropriate. The CSP will also be informed by vision PDX and the Citywide Strategic Plan (currently in development). As the responsibilities that will be expressed in the Strategic Plan are assigned, the bureaus can help define how Green Streets can be integrated into the effort.

Recommendations

The Green Streets Team recommends the following actions:

- Develop a short term project methodology involving a more formalized coordination and planning process by shifting the emphasis of the CIP Planning Group to one of identifying and evaluating opportunities to partner, and specifically assigning to them the task of evaluating these opportunities. Fully exploit potential opportunities for project coordination as part of PWB and BES pipe replacement projects and PDOT maintenance, repair, and improvement projects.
- Adopt a mid term programmatic planning process that will use existing City data and GIS tools to forecast potential green street facility projects.
- In the long term, identify and use opportunities to shape development of the CSP relative to a green streets objective.

3. Neighborhood Planning Initiative

Assignment

The Neighborhood Planning Initiative grew out of a Phase 1 recommendation to develop a multi-bureau planning effort to demonstrate broadscale sustainable street development. This concept has since evolved into two proposals. The first proposal is to create a multiple-block green streets showcase fulfilling community and City objectives, including improved neighborhood connections and enhanced neighborhood value. The second proposal is to develop a new design prototype for a small-scale bike chicane project. The City of Seattle defines chicanes as a series of curb “bulb-outs”, placed on alternating sides of the street and staggered to create a curved one-lane segment of roadway (http://www.walkinginfo.org/pedsafe/casestudy.cfm?CS_NUM=53).



Curb extension at NE Siskiyou

Discussion/Work Product

City bureaus working as a “unit” can achieve more than their individualized efforts. Green street planning and development provide an excellent forum for combining resources, strategies, and expertise. A planning effort for a multiple-city-block “Route to the River” project (referred to as the “Clay Street project”) is being explored by the Portland Development Commission (PDC), Bureau of Planning (BOP), Portland Office of Transportation (PDOT), Portland Water Bureau (PWB), Portland Parks and Recreation (Parks), Bureau of Environmental Services (BES), and community partners from the Hosford-Abernathy and Buckman neighborhood associations. This project, which is described in more detail in Appendix C, is intended to realize multiple city bureau and community objectives and opportunities, including:

- Dovetail with PDC’s urban renewal goals for the area including business development, streetscape enhancement, and “Routes to the River”;
- Create a linear greenway to connect two park open spaces (Ladd’s Addition and the Willamette Greenway);
- Capitalize on the new private reinvestment at the “foot of Clay Street with connectivity to the Esplanade” through the Holman Building redevelopment project;
- Realize a long term City objective to better connect the eastside neighborhoods to one another and to the river through improved pedestrian and bicycle routes, which supports the River Plan’s River Concept;
- Demonstrate a sustainable stormwater green streets approach; and
- Help advance several River Renaissance vision goals, including a clean and healthy river; vibrant waterfront districts; and partnerships, leadership, and education.

While it is recognized that Green Streets are not appropriate everywhere, several routes have been proposed in SE Portland within the Central Eastside Urban Renewal Area.

A concept has also been identified for a bike chicane project working with PDOT and the Bicycle Transportation Alliance, a community bicycle organization. Chicanes help reduce vehicular speeds, enhance neighborhood appearance, improve pedestrian safety, and create a calming effect (particularly if they are vegetated) by visually narrowing the street (City of Seattle website, http://www.walkinginfo.org/pedsafe/casestudy.cfm?CS_NUM=53). PDOT is starting work to update their Bicycle Master Plan. This is a broad scale effort with a strong community component. This update to the Bicycle Master Plan will include consideration of tools that can be used to develop “bicycle boulevards,” which are a way of developing low auto volume roadways classified as “City Bikeways.” One tool under evaluation for identified corridors is the liberal use of curb extensions designed to allow unhampered bicycle movement, while requiring motorists to yield to oncoming traffic. There is interest in further evolving the green streets approach within the context of this bicycle planning and route enhancement work.

In addition to the ongoing planning work associated with the Bicycle Master Plan, PDOT has applied for regional transportation funds to develop this type of chicaning bikeway along three east Portland corridors. Success in securing this funding, which would be available beginning in 2009, could provide and implement prototype designs for integrating curb extensions with an incorporated bicycle path.

Recommendations

The Green Streets Team recommends the following actions:

- City bureaus and agencies should collaboratively pursue the Central Eastside SE Clay Street “Route to the River” project that incorporates green street facilities for the purposes of planning and design.
- The green street chicane concept should be considered through PDOT’s Bicycle Master Plan process. Ultimately if this design is accepted as a tool for developing Bicycle Boulevards, PDOT will assume responsibility for developing the traffic designs associated with the chicane concept on a project-by-project basis. PDOT will be a partner in funding the green street chicanes working with other agencies, notably BES, for full funding of the designs.

4. Green Street Profile Notebook

Assignment

A Phase 1 recommendation to develop a flexible street standard has evolved into a Green Streets Profile Notebook during Phase 2 discussions. The purpose of the Notebook is to catalog successful green street facility designs with accompanying information on site factors to consider, such as parking, utilities, street trees, etc. Notebook users will be able to identify a broad spectrum of appropriate designs for planning, design, and implementation for their site-specific needs.



Curb extension at NE 35th Place and Siskiyou Street

Discussion/Work Product

There are currently a number of successful green street design variations, which continue to evolve depending upon specific site circumstances. The ability to modify designs in a flexible manner has been demonstrated and documenting this flexibility is important. The Green Streets Profile Notebook is intended to provide a catalog of established green street facility examples to highlight potential options and to guide an individual in preparing for the planning, design, and review process. The enhanced communication provided by the Notebook will promote creativity and encourage innovation to address site-specific challenges and complexity.

The Notebook will illustrate the variety of green street facility approaches that can be used. It will be a general educational tool and is not intended to be a technical document like the standard detail sheets developed by the Stormwater Advisory Team (SWAT) (see Chapter 2, Phase 1 Update: Develop technical guidance). These multi-objective designs are intended to inspire creativity and progress towards continually evolving new and improved green street concepts. The Notebook may include an introductory chapter on “navigating the system” to meet the objectives described above. This introduction would explain the City permitting process, provide a list of common questions and a glossary of Green Streets, permitting, and design terms. A set of case studies, including a map of the facilities with accompanying photos, would also be included.

The emphasis of the Notebook will be to catalog a profile view, plan view, and photos for each facility type. The following facilities will likely be profiled:

- Vegetated area;
- Grassy swale (behind the curb);
- Vegetated swale;
- Vegetated filter box;
- Infiltration rain-garden (vegetated basin); and
- Westside retrofits (“ditch to swale”).

A cost range and a list of physical factors (e.g., drainage, soil, slope, uses of the right of way, existing utilities) and development factors (e.g., new construction versus retrofit, improved versus unimproved street, etc.) to consider will be provided to help illustrate the advantages and limitations for the intended application. An example design page for the Notebook is attached as Figure 3.

Finally, a chapter of case studies will walk the applicant and City staff through the process of identifying these physical and development considerations, as well as many of the specific steps needed to construct the facility. In addition, resources will be listed that can provide more detailed information and ideas for working through these challenges. These case studies will be mapped for reference so that applicants may visit facilities and study designs more closely.

Recommendations

The Green Streets Team recommends the following actions:

- Create a Notebook (a “portfolio”) of green street facilities that may be used as a basis for individual site stormwater management needs, and update it frequently to include continually evolving designs.
- Produce a video that showcases and discusses specific projects to accompany the Notebook.
- Continue to identify new designs that can lower costs, and dovetail with other bureau priorities.

Figure 3
Example Design Page for Green Streets Profile Notebook

GREEN STREETS NOTEBOOK

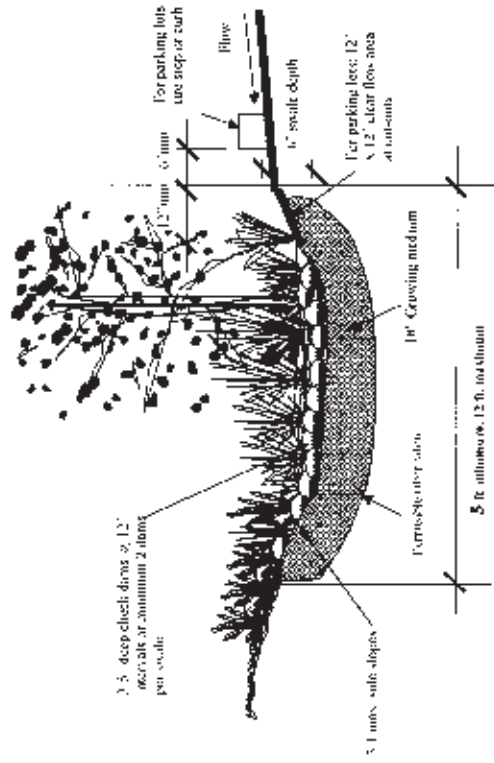
Vegetated Swales

Definition

Swales are gently sloping depressions planted with dense vegetation or grass that treat stormwater runoff from rooftops, streets, and parking lots. As the runoff flows along the length of the swale, the vegetation slows and filters it, and allows it to infiltrate into the ground. Where soils do not drain well, swales are typically lined and convey runoff to a drywell or soakage trench. Swales can include check dams to help slow and detain the flow. A swale can look like or be integrated into a typical landscaped area. (From Stormwater Solutions Handbook)

Typical Design

(from Stormwater Management Manual 09/02)



Considerations for using vegetated Green Street swales



PHYSICAL FACTORS	APPROPRIATE TO USE UNDER THIS FACTOR?	SIGNIFICANCE
Available width >= 7 ft	●	Vegetated swales require a minimum 7' width to provide adequate surface area for infiltration while maintaining gentle side slopes.
Poorly draining soils	⊙	Infiltration can be improved through soil amendments; in severe cases, an underlying rock trench can be used to improve surface drainage.
Mature trees	○	Mature trees have large root systems and excavation may not be possible within the dripline without causing serious harm to the tree; Curb Extensions may be a better option when mature trees are present.
Utilities	⊙	Potential impacts to utilities must be identified and reviewed with the appropriate agency. Many conflicts can be resolved without substantial cost.
Traffic Volumes	●	Vegetated swales are located inside the street curb and do not typically impact existing traffic patterns.
Street Slopes > 6%	○	As the street slope increases, the potential to retain and clean stormwater water diminishes. Check dams can be used to maximize retention, but the number of dams required and grading difficulties increase as the slope steepens.
DEVELOPMENT FACTORS		
New Construction	●	New construction provides the most opportunity to incorporate stormwater facilities. Site grades, utility placement, and facility placement can be optimized to provide the best stormwater management.
Retrofit	⊙	Retrofits require working around existing site conditions and site uses. Conflicts with utilities and street trees are common. Overall difficulty varies significantly from site to site.
Redevelopment	⊙	Similar to New Construction, but some site conditions and site uses may remain and need to be accommodated.
Use of Right of Way	depends on use	

- MOST APPROPRIATE
- ⊙ MODERATELY APPROPRIATE
- LEAST APPROPRIATE


Figure 3
Example Design Page for Green Streets Profile Notebook

Considerations for using vegetated Green Street swales

Maintenance

Start Up		XX XXXX XXXXX XX XXXX XXXXXXXX XX.
Long Term		XX XXXX XXXXX XX XXXX XX XXXX XXXX XX XXXX XX.


Cost

dollar per in/ft		XX XXXX XXXXX XXXX XX XXXX XXXXXXXX XX.
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Permits

- Depending on the size of the ground disturbance, a clearing and grading permit may be required from the Bureau of Environmental Services (BES).
- The stormwater management portion of the facility will need review from BES.
- Stormwater systems on non-residential sites need commercial building permits.


Examples



NE SISKIYOU STREET



SEA STREET



MEDIAN

Green Streets Profile Notebook | Bureau of Environmental Science | City of Portland, Oregon


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Figure 3
Example Design Page for Green Streets Profile Notebook

Types of Green Street Facilities

VEGETATED AREA
 Vegetated areas are planted with grasses, shrubs, trees and ground cover, but do not receive storm water.



GRASSY SWALE
 Grassy swales are similar to vegetated swales, but they are planted only with a dense grass mix.



VEGETATED SWALE
 Vegetated swales are long narrow facilities with gentle side slopes that are planted with a mix of vegetation, such as trees, shrubs, grasses and ground cover. Vegetated swales are designed to infiltrate as much storm water as possible, while safely conveying stormwater to the conventional drainage system. They are not structurally enclosed.



CURB EXTENSION
 Curb extensions are vegetated swales that extend out into the street from the existing curb. They are enclosed by a curb on the street side, which has openings called "curb cuts" that allow street runoff to enter and exit the facility. The curb extension narrows the road width, so it has the added benefit of calming traffic as well.



WESTSIDE RETROFIT
 The westside of Portland has very few curbed streets, and stormwater ditches are used to convey street runoff to a storm sewer or open channel. The ditches are typically channelized and are therefore prone to erosion. They also frequently clog at crossing culverts, and provide little or no room for pedestrians. Converting the deep ditch to a shallower swale provides better filtering of runoff, and potential walking areas for pedestrians. A configuration of soil media on top of an underdrain system consisting of gravel and perforated pipe is typically used.



VEGETATED INFILTRATION RAIN GARDEN
 Vegetated infiltration basins are similar in concept, vegetated swales but are generally deeper and can take on any shape. They may be planted with trees, shrubs, grasses, and ground cover appropriate for periodic inundation. They are designed to emphasize storage and infiltration, but a safe overflow to a separate, approved conveyance/disposal facility is required.



VEGETATED FILTER BOX
 Vegetated filter boxes are typically rectangular-shaped facilities located behind the street curb. They are designed to temporarily store runoff water, and allow it to filter through plants and soil (thus capturing pollutants). Vegetated Filter Boxes can either be flow-through facilities (completely contained in a box with an underdrain system) or infiltration facilities (stormwater then flows through underlying native soils). Overflow during large events typically pass in and out of the facility and continue to an approved stormwater disposal point.



5. Funding

Assignment

Funding is perceived as one challenge that can limit broad scale public green streets implementation. A Phase 2 task was proposed to evaluate additional funding mechanisms.

Discussion/Work Product

When comprehensive, multi-objective planning is used, the costs to implement Green Streets can be reduced. Where stormwater facilities are required, designing and constructing Green Streets over “traditional” underground systems can be less costly or amount to only an “incremental” cost. This incremental cost difference may be due to lack of standardized designs, or to the potentially marginal expense of materials and installation. However, it is expected that these initial upfront costs will be largely offset over time by the following factors:

- Reduced costs for additional infrastructure because, with Green Streets, stormwater is being “taken off the system;” and
- Reduced cost of compliance with stormwater and environmental cleanup regulatory requirements such as Clean Water Act mandates.

A proposal was developed for a one-time provision of \$1 million in funding to help offset any incremental costs of implementing green street facilities when doing City “retrofit” work in the public right of way (Figure 4). Assumptions used to develop the proposal included:

- Funding would be used for one year, after which time green street facility costs would be incorporated into standard project budgeting processes used by all City bureaus;
- Funding would support approximately 15 retrofit projects;
- Viable projects would be identified, prioritized, and selected by a qualified committee of City staff from the key bureaus; and
- Funding would be designated as a “special appropriation” fund within the City’s general fund.

This one-time proposal was not pursued during Phase 2.

Alternate funding mechanisms have been proposed. The Office of Management and Finance has been tasked with convening an inter-bureau task force to conduct an analysis of existing funding, and to make recommendations for new funding sources for green street project implementation and maintenance. The task force will be composed of representatives of Bureau of Environmental Services (BES), Portland Office of Transportation (PDOT), and Portland Water Bureau (PWB).

In addition, the Green Streets Policy establishes a “Percent for Green” Street fund. Where a street opening permit is required (and the Stormwater Management Manual is not triggered), one percent of the construction cost will be collected to help fund other Green Streets.

Finally, BES will re-apply for an Environmental Protection Agency (EPA) appropriation to continue the Green Streets Implementation Program. Approximately \$3 million will be requested for fiscal year 2008.



Vegetated filter box on SW Pennoyer Street

Recommendations

The Green Streets Team recommends the following actions:

- Convene an inter-bureau task force under the Office of Management and Finance to analyze existing funding, and to make recommendations for new sources of funding for project implementation and maintenance.
- Establish a “Percent for Green” Street fund collected from certain right of way projects (that do not trigger the Stormwater Management Manual) to fund creation of Green Streets citywide.
- Re-evaluate and re-submit the incremental-cost funding proposal to the appropriate entities for consideration.
- Re-apply for an EPA appropriation to continue broad-scale implementation.
- Continue to identify opportunities to cooperatively plan infrastructure work across bureaus, using funds saved through this cooperative effort as a means of financing green streets facility work.

Figure 4
Proposal for One-Time Funding**Introduction and background**

Green street facilities have become an important feature in Portland and serve many beneficial functions by helping to manage stormwater and creating attractive streetscapes that enhance neighborhood livability. They can also serve as urban greenway segments that connect neighborhoods, parks, recreation facilities, schools, and mainstreets.

Commissioner Sam Adams convened a Cross-Bureau Green Streets Committee in 2005 to assess the potential barriers and opportunities associated with these features. One of the Committee work products is a citywide Green Streets Policy. This policy calls for increased use of Green Streets and increased coordination and communication between City bureaus to facilitate this goal. It is anticipated that the citywide Policy will be adopted by City Council in spring 2007. This new policy direction will be incorporated into the update of the City Transportation Systems Plan.

The goal of increased green street facilities requires more effective bureau coordination. Initially, this coordination would be enhanced through funding to offset incremental costs of implementing green street facilities (in lieu of more traditional infrastructure) when doing City work in the public right of way. Green street facility costs should be incorporated into standard bureau project budgeting processes.

Use of the funding

The funding that is being requested will be made available to bureaus to help cover any incremental costs between using a green streets facility solution over a more traditional infrastructure solution. Most of these projects will be associated with “retrofits” in already developed areas, where road, storm/sanitary sewer, and water supply infrastructure work involves excavation and replacement of right of way infrastructure.

Green street facilities are not necessarily more expensive than traditional infrastructure. When the cost is higher, the difference may be due to several factors:

- Standardized designs for these facilities are still being developed, and new and innovative types of green street facilities that best fit certain conditions (e.g., the amount of available right of way and the ability of the soil to infiltrate rainwater) are being tested. These factors add to the planning and design costs of green street facilities.
- In some cases, the costs of materials and installation of green street features are marginally more expensive. These initial upfront higher costs will be largely offset over time by reduced long term maintenance costs, the reduced cost of additional infrastructure to handle stormwater by “taking it off the system,” and the reduced cost of compliance with stormwater and environmental cleanup regulatory requirements.

Use of Green Streets will greatly reduce long term costs in terms of moving us closer to meeting regulatory Clean Water Act mandates and achieving the watershed health goals adopted by City Council.

Figure 4
Proposal for One-Time Funding

Greater use of green street facilities will:

- Accelerate their acceptance as the norm for addressing infrastructure upgrades in the City;
- Promote development of standardized facility designs that can be easily and more cost effectively used by both the City and the private sector; and
- Reduce the need for additional funding in the future as these types of projects become more widely understood and accepted.

Projects selected for this funding will be identified, prioritized and selected by qualified staff from the Bureau of Environmental Services, Portland Office of Transportation, and Portland Water Bureau, with staff from other bureaus involved as appropriate. We propose that the committee set project funding goals and selection criteria, to review, and to approve use of the fund for specific projects. We anticipate that the fund would be designated as a “special appropriation” fund within the City’s general fund.

Amount requested

We are requesting \$1 million in funding to support this work. We anticipate that this funding will be used within one year to support at least 15 projects.

Chapter 4

Moving Forward

The recommendations that resulted from the Phase 2 cross-bureau collaboration are summarized in Table 1 of the Executive Summary. A number of these recommendations were developed and are underway, while others remain conceptual and need additional time and work to be realized. Several of the work elements initiated during Phase 1, such as the outreach plans to the development community and city staff, are in progress and once completed, will significantly support the program. In order to continue to track the development of these pieces and the evolution of the overall Green Streets Program, work efforts will be summarized in annual Green Streets Program Progress Reports. It is anticipated that progress reports will be submitted to City Council on a fiscal year basis. Furthermore, in anticipation of the innovation and rapid advancement of the program, it is recommended that annual recognition of completed projects be given concurrently with delivery of the report. This recognition may be given to mark exceptional progress on a work element/task basis, or as work elements/tasks are completed. It is critical that the momentum established during Phase 1 and 2 in developing a Green Streets Program be maintained in order to realize the citywide, programmatic change of this pioneering effort to enhance our community while protecting our valuable water resources and environmental health.



Vegetated filter box at SW 12th and Montgomery

Appendix A
PDOT Recommendations for Transportation System Plan

Attachment D	
<p>TSP Green Street Policy Additions</p> <p>[Commentary is additional information to explain the change. Explanations are adopted as part of the TSP to show legislative intent.]</p>	<p>Policy 6.3 Transportation Education [No change]</p> <p>Objectives:</p> <p>G. Educate citizens and businesses about Green Streets and how they can serve as urban greenways to enhance, improve, and connect neighborhoods to encourage their support, demand and funding for these projects.</p> <p><i>Commentary: Portland City Council established a Green Streets inter-bureau team and adopted a green streets policy in 2009 (December 2009) that stressed the need for encouraging use of green street techniques. The policy called for enhanced education, creation of technical standards and incentives that would allow private development and neighborhoods to finance new and retrofit green street projects.</i></p>
<p>Policy 6.21 Right-of-Way Opportunities [No change]</p> <p>Objectives:</p> <p>A. Evaluate opportunities and the existing and future need for a bikeway, walkway, or other transportation use or potential for use as a stormwater management facility when considering vacation of any right-of-way.</p> <p>C. Acquire or control parcels of land that may be needed in the future for any transportation or transportation-related stormwater management purpose when the opportunity arises through sale, donation, or land use action.</p>	<p>Policy 6.11 Street Design Classification Descriptions [No change]</p> <p>Objectives:</p> <p>H. Greenscape Streets [No change]</p> <ul style="list-style-type: none"> Design Treatment. During improvement projects, consider the use of vegetated stormwater treatment techniques; minimizing impervious surfaces; preservation of existing vegetation, topography, vistas and viewpoints; driver perception; street lighting; and sight distance requirements. Vegetation may be landscaped or native, depending on the existing and desired character. <p><i>Explanation: This new classification replaces the former Beautification Policy classification called Natural Design. It also includes reference to the City's green street policy efforts. Other street classifications that were on the Beautification Map are not now necessary, because their elements are incorporated into other current street design classifications. For example, streets that used to be classified as Parkways on the Beautification Map are now classified as Urban Throughways.</i></p>
<p>Policy 11.8 Environmental Sustainability in Transportation [No change]</p> <p>Objectives:</p> <p>G. Incorporate sustainable and Green Street design solutions for streets and other transportation projects.</p>	<p>Policy 6.20 Connectivity [No change]</p> <p>Objectives:</p> <p>D. Use large-scale Green Streets as a means of connecting neighborhoods, using the right-of-way efficiently, and enhancing neighborhood livability</p>
<p>Policy 11.9 Project Selection [No change]</p> <p>Objectives:</p> <p>G. Address area-wide needs, including access and mobility, environmental protection, Green Street design and quality urban design, in a comprehensive approach to project selection.</p>	<p>Policy 11.10 Street Design and Right-of-Way Improvements [No change]</p> <p>Objectives:</p> <p>E. Use a variety of transportation resources in developing and designing projects for all City streets, such as the City of Portland's Pedestrian Design Guide, Bicycle Master Plan-Appendix A, City of Portland Green Street Policy, and Design Guide for Public Street Improvements.</p>
<p><i>Explanation: This policy was added to comply with the Green Streets Policy resolution passed December 2006.</i></p>	<p><i>Explanation: Other documents used in designing streets are Titles 16 (Vehicles and Traffic) and 17 (Public Improvements) and the Standard Construction Specifications. Manuals and 'toolboxes' have also been developed to address specific design elements, including the Transit Preferential Streets Program Sourcebook and the Traffic Manual, Chapter 11 – Speed Bumps.</i></p>
<p>Policy 11.10 Street Design and Right-of-Way Improvements [No change]</p> <p>Objectives:</p> <p>N. Continue to explore cost-effective methods to finance local street improvements, including green streets projects.</p>	<p>Attachment D Page 2</p>

Appendix A

PDOT Recommendations for Transportation System Plan

O. Consider and minimize impacts on the natural environment and watershed health, consistent with the City and regional response to the Endangered Species Act, the City's Green Streets Policy and stream crossing design guidelines in the Green Streets handbook, in the planning, design, and development of transportation projects.

Q. Develop standards and incentives to encourage Green Streets projects in private development, redevelopment and enhancement projects wherever technically and economically feasible.

Explanation: Portland City Council established a Green Streets inter-bureau team and adopted a green streets policy in 2006 that stressed the need for encouraging use of green street techniques. The policy called for enhanced education, creation of technical standards and incentives that would allow private development and neighborhoods to finance new and retrofit green street projects.

Policy 11.12 Maintenance

[No change]

Objectives:



B. Incorporate retrofitting or removing impervious surfaces and culverts identified in the region's fish passage and watershed management programs into maintenance activities for the transportation system

New Definition for Glossary

Green Street

- A street that:**
- Handles stormwater on site through use of vegetated facilities;
 - Creates attractive streetscapes that enhance neighborhood livability by helping to calm traffic by introducing park-like elements into neighborhoods; and
 - Serves as an urban greenway segment that connects neighborhoods, parks, recreation facilities, schools and main streets.

Appendix B
PDOT Green Streets Protocol

Memorandum

Date: December 14, 2005

To: All PDOT Employees
All BES Employees
Susan Hartnett, Mike Sailing, and Vil Villameva, BWW
Kelly Shepard, BOM

From: Steve Townsen

Re: Transportation's assistance on plan review for greenstreet projects

Greetings-

Attached is the protocol for Transportation's review of greenstreet projects. For this process, Liz Moorhead will be the PDOT contact. Please call Liz at 503-823-7562 if you have any questions or need additional service.

Step 1. First notice

BES will submit information on proposed projects to Liz Moorhead. She will forward it to Steve Townsen (PDOT City Engineer-503-823-7144), Rob Burchfield (PDOT City Traffic Engineer- 503-823-5175) and Susan Hartnett (BWW-503-823-7984) in the concept stage. At this time a plan view and possibly a typical section should be supplied. Liz Moorhead will check to see if any other PDOT projects (permit, capital or LID) conflict and if the project will require a survey. Any survey requests must be sent through Doug Windes in the Civil Design Section of PDOT. Survey will not proceed with survey if it does not go through Doug.

Step 2. Feasibility check

To gather input from the other bureaus and appropriate parties, information will be distributed and a meeting will be scheduled with the people listed below. These people will check the project for location, preliminary design and initial feasibility. At this point, a BES job number should be supplied and time spent on the project may be charged to that number.

City Engineer - Steve Townsen
Greenstreets Contact - Liz Moorhead
BES contact/initiator and/or their supervisor
Bureau of Maintenance - Kelly Shephard (swales), George Bean (optional)
Traffic Design - Lewis Wardrip and/or Wendy Cawley
Traffic Calming - Will Stevens (optional)
Schools - Dakota Inyoswan (optional)
Parking - Ramon Corona (optional)
BWW - Susan Hartnett (optional)
Inspection - Tom Inhoff (optional)

1121 S.W. 5th Avenue, Suite 800 • Portland, Oregon 97204-1014 • 503-823-5585
FAX 503-823-3770 or 823-7571 • TDD 503-823-6868 • www.portlandtransportation.org

Steve Townsen
City Engineer

Step 3. Inform

Liz Moorhead will bring the project to SWAT members for their information.

Step 4. Submit for Review

BES will provide plans, specs and the following information to PDOT for review. (The contact is Liz Moorhead at 503-823-7562.)

- Size, location & depth of planters, swales or other greenstreet features
- Utility locations using resources and utility locates
- Typical sections
- Utilities which are to be relocated for the project (especially water lines)
- Survey if necessary
- Plans should be 11" x 17" .pdf file

Contractor Built Projects - For curb extensions to be constructed by contractors, PDOT will review the curb extension design that BES provides for the appropriate geometry, location and radius. PDOT's Civil Design Section will design the curb ramps. BES will design what is inside the curb extensions.

BOM Construction Note - Any request to have curb extensions constructed by BOM needs to be sent through Todd Liles in the Civil Design Section of PDOT. Please do not expect BOM to construct your facility without prior approval. Again, PDOT's Civil Design Section will design the curb ramps.

Step 5. Design review

PDOT will provide the following services to BES. PDOT is willing to assist you with design work and inquiries as needed.

- Field check the plans including a walk through with BES staff if necessary. (PDOT rep)
- Examine the existing condition of the street.
- Check for conflicts and constructability issues.
- All neighborhood involvement and contacting of adjoining homeowners is the responsibility of BES.
- For BOM constructed projects, PDOT will distribute the plans to the utility companies. The utility coordinator will also check to see if street is on paving list and if other projects exist in the area that may conflict. (Laurin Wild) For capital projects, BES will complete utility checks.
- Review the plans for conformance to transportation and traffic design. (Wendy Cawley/Lewis Wardrip) (For curb extensions to be constructed by contractors, PDOT will review the curb extension design that BES provides for the appropriate geometry and radius. In addition, PDOT will design the curb ramps. BES will design what is inside the curb extensions.)
- Review any associated traffic control plans. (Wendy Cawley/Lewis Wardrip)
- Compare with future traffic calming projects and look for overlaps and/or conflicts. (Will Stevens)
- Review plans for utility conflicts, design and constructability. (PDOT rep)
- Review plans for maintenance issues. (BOM - Kelly Shephard – swales/planters)
- Return comments and recommendations to BES. (PDOT rep through Liz Moorhead)

Appendix B

PDOT Green Streets Protocol

Step 6. Finalize

BES sends revised plans with previous redline comments back to PDOT for finalization. Once final plans are developed, BES supplies PDOT with a set of 11" x 17" plans. A copy is sent to SSM (Rich Eisenhauer) and attached to the street opening permit for the project (for non-BOM contract projects). (The idea is to have the contract specifications match the requirements of the SSM permit.) BES adds the facility to their list of storm water facilities they need to maintain and inputs the facility into GIS. BES will maintain all stormwater facilities. As these are stormwater facilities, BES is responsible for post construction monitoring, inspection and testing.

Step 6. Construction inspection

- Discuss with BES what is expected to happen during construction regarding inspection.
- BES inspector should hold a pre-con and inspect during construction.
- For non-BOM capital projects, PDOT will supply an inspector to work with the BES construction manager.
- For BOM projects, Tom Imhoff will be the inspector.

Step 7. Close out

- Provide As-builts to PDOT mapping.
- Traffic to write work order for striping and signing and send to BOM. These markings are included on GIS by work order. (Wendy Cawley)

Pervious pavers and pervious asphalt or concrete will be considered on a case-by-case basis for local service streets only. Currently, pervious pavers are not to be used in the sidewalk or planter. Use of pervious concrete in sidewalks and planters will be considered.

If you have any questions or comments about what we have agreed to or to what I have outlined above, please let me know at 3-7144. Thank you.

ATTACHMENTS

- Swale details
- Swale tree list
- Detectable warning list of approved materials
- Curb cut detail (2004 Stormwater Management Manual page 2-83)
- Stormwater Management Manual excerpt on vegetated, grass and street swales and their plantings (2004 Stormwater Management Manual page 2-65 to 2-82 and F-5 to F-8)

(Barrier specifications, planter details and others to follow. If you have updates to the above attachments, please send them to me to distribute to everyone. Thank you.)

Appendix C
SE Clay Green Street
Project Description

Sustainable Stormwater Management for Clean Rivers

SE Clay Green Street Project



Green Street Project Area Map

- Bureau of Environmental Services
-
- Portland Development Commission
-
- Portland Office of Transportation
-
- Portland Parks & Recreation
-
- Bureau of Planning
-
- Portland Water Bureau



Imagine a pleasant route to the Willamette River along SE Clay Street from 12th Avenue to a large plaza on Water Avenue and the entrance to the Eastbank Esplanade. Imagine a route that trucks, pedestrians and bicyclists can safely share, and that has environmental benefits.

The proposed SE Clay Green Street Project will sustainably manage stormwater and enhance pedestrian, bicycle and motorist safety, while serving the business needs of the Central Eastside Industrial area. Businesses, residents and the City of Portland are working together to develop this multi-block demonstration project. The city is forming partnerships and building support for the project while exploring funding sources. The SE Clay Street Green Street Project could be a model for similar projects around the city.

A key part of this project is developing Green Street facilities along the route. Green Streets use land-



Planter Collecting Runoff

scaped planters or swales to capture stormwater runoff and allow it to soak into the ground as plants and soil filter out pollutants. Green Streets keep water out of the sewer system, refresh groundwater supplies and add green space. They also create attractive streetscapes and urban greenways that connect business districts, neighborhoods, parks, recreation facilities, schools, main streets and habitats.

Appendix C

SE Clay Green Street Project Description

A Collaborative Project

Forming a public-private partnership to develop the Clay Green Street Project would benefit both the community and the city. The project will:

- improve pedestrian, bicycle and motorist safety, while maintaining the needs of truck traffic;
- create a route to the river supported in neighborhood plans, the Central Eastside Urban Renewal Plan and other planning documents;
- effectively manage stormwater runoff to improve water quality in the Willamette River and ease the burden on the city's sewer system;
- create better bicycle and pedestrian connections to the Eastbank Esplanade, the west side of the Willamette River and the SE Lincoln/Harrison Bicycle Boulevard; and
- complement the Holman Building project and other redevelopment efforts along SE Clay Street and SE Water Avenue.

Funding and Partners

This project is an opportunity to leverage several potential funding sources, including EPA Innovative Wet Weather Program funds.

It will also benefit community and neighborhood groups by:

- Fulfilling the goals of southeast neighborhood associations, including Buckman and Hosford-Abernethy, for a route to the river;
- Creating better connections between neighborhoods and businesses to benefit the Central Eastside Industrial area.
- Supporting City of Portland sustainable stormwater management goals.
- Collaborating with the Portland Office of Transportation on safety improvements for pedestrians and cyclists, and innovative curb design for trucks in industrial areas.
- Supporting the Portland Parks & Recreation goal of more urban greenways connecting neighborhoods, parks, and recreation facilities.

Examples



A Stormwater Planter



A Curb Extension

For More Information

Bureau of Environmental Services,
Rhetta Drennan, 503-823-6006 or
RhettaD@bes.ci.portland.or.us

For disability accommodation
requests call 503-823-7740.

