CHAPTER 8

SUSTAINABILITY

8.1 OVERVIEW

Green infrastructure—also known as low impact development (LID) and environmental or sustainable site design—is an environmentally sustainable way to manage and treat stormwater at its source by mimicking natural systems. It is used for public and private projects, both new and retrofitted, including infrastructure (e.g., streets, sidewalks, streetscape, and stormwater management facilities) and site design for any types and scale of development (from a single-family house to a college campus). As highlighted in the sidebar, green infrastructure provides significant environmental, social, and economic benefits beyond those of traditional (also known as "grey") stormwater and flood management techniques. The South Centre City Specific Plan promotes implementation of green infrastructure elements in public and private projects whenever possible.

This section includes an overview of common types of green infrastructure that have been implemented successfully in both public and private infrastructure and development throughout the country. It also provides recommendations for how green infrastructure can be implemented in both public and private projects within the South Centre City area.

KEY BENEFITS

Environmental:

- ✓ Reduces stormwater treatment needs
- ✓ Improves water quality
- ✓ Reduces flooding
- ✓ Recharges the aquifer
- ✓ Provides additional habitat
- ✓ Improves air quality and reduces atmospheric CO2
- ✓ Reduces urban heat island
- ✓ May reduce energy use

Social:

- ✓ Enhances aesthetics
- ✓ Improves community health
- ✓ Increases recreational opportunities
- ✓ Improves safety
- ✓ Provides educational opportunities

Economic:

- ✓ Stimulates reinvestment
- ✓ Improves property values
- ✓ Reduces cost to construct & maintain grey stormwater facilities
- ✓ Reduces private development costs

8.2 TYPES AND USES

8.2.1 Bio-Retention and Infiltration.

Bio-retention and infiltration methods of green infrastructure use the natural function of soil, plants, and mulch to slow, absorb, and clean stormwater runoff by mimicking the natural processes that occur in nature before water reaches storm drains and waterways. They can be small or large—from individual tree wells and planter boxes to open areas that are concurrently used as natural open space, passive and active parkland, etc., and every scale in between.

8.2.1.1 Types.

- Tree wells
- Planter boxes
- Rain gardens
- Rock gardens
- Bioswales
- Vegetated filter strips
- Open spaces

8.2.1.2 Uses.

- Street trees and streetscape
- Parkways
- Medians
- Curb extensions
- Bulb-outs at intersections
- Traffic circles/round-abouts
- Greenways along trails/linear parks
- In parks, from large and small, including urban, suburban, and rural
- Landscaping islands in parking lots
- On-site landscaping for all types of development, including residential, commercial, industrial, public, institutional.

8.2.2 Permeable Pavement.

Permeable pavement, also known as pervious and porous pavement, is a paving material or paving system that allows water to be absorbed into the underlying soil while still providing a hard or supportive surface for activities such as walking, bicycling, parking, and driving in low traffic volume areas.

8.2.2.1 Types.

- Porous asphalt
- Pervious or porous concrete
- Interlocking permeable pavers
- Grasscrete
- Porous rubber
- Decomposed granite (DG)
- Boardwalk

8.2.2.2 Uses.

- Sidewalks and pathways
- Bike lanes
- Multi-use trails
- Parking (on-street parking lanes, parking spaces, and parking lots)
- Driveways and drive aisles
- Alleys
- Fire access lanes
- Private streets

8.2.3 Green Roofs and Vertical Gardens

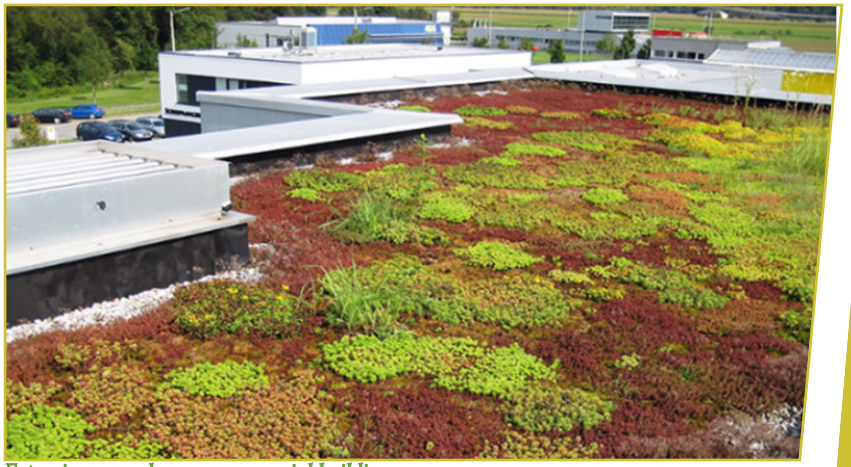
Green roofs are vegetated rooftops. They consist of a waterproof membrane, growing medium or soil, and vegetation overlaying a traditional roof. Green roofs intercept rainwater that otherwise would flow off rooftops (often flowing into gutters that direct it into driveways and streets). Developers of new multi-family and/or mixed-use projects may receive partial open space credit for use of sustainable treatments such as green roofs and vertical gardens based on utility and value.

8.2.3.1 Basic Types

- Extensive—lightweight, shallow systems for low-growing plants; they are usually not accessible to the public, low maintenance and typically do not require specially engineering structural support)
- Semi-Intensive—intermediate type between extensive and intensive
- Intensive—deeper landscape systems that are designed for human use and can include shrubs, trees, pathways, water features, benches, and other similar features; they usually require as much maintenance as a typical garden and need to be engineered to conform to load requirements

8.2.3.2 Uses.

- Residential, from single-family residences to multi-family development
- Commercial, industrial, and institutional buildings. Intensive systems are especially appropriate for those that have large, flat, expansive roof areas
- Parking garages



Extensive example on a commercial building

Extensive example on a carport

Intensive example on a commercial building

8.2.4 Water Harvesting

Water harvesting is the direct capture of rainwater that is collected and stored. While bio-retention and infiltration methods (described above) capture rainwater and recharge it into the groundwater, the methods in this section store it for direct use, typically for on-site irrigation.

8.2.4.1 Types.

- Above-ground cisterns, including individual rain barrels and multiple interconnected containers
- Below-ground storage tanks

8.2.4.2 Uses.

- All scales and types of development (e.g., from a single-family residence to a shopping center)

Water Harvesting Examples: Source: barrplastics.com

8.3 GREEN INFRASTRUCTURE IN PUBLIC PROJECTS IN SOUTH CENTRE CITY

8.3.1 Overview

Implementation of the South Centre City Specific Plan includes recommendations for making improvements to the City's infrastructure for many reasons, including:

- Stimulating revitalization and investment;
- Implementing "road diets" to provide additional right-of-way for sidewalks and bike lanes;
- Calming traffic;
- Filling in gaps in the sidewalk and bikeway network;
- Expanding and making improvements in the recreational network;
- Enhancing crosswalks; and
- Turning excess right-of-way over to property owners.

8.3.2 Conceptual Recommendations

Due to the significant benefits discussed earlier in this Chapter, incorporating green infrastructure techniques in all these public improvements should be a priority. Green infrastructure techniques should be included whenever possible when making improvements to existing infrastructure, and in all cases should be incorporated into design and construction of new public improvements. Conceptual recommendations are highlighted below.

8.3.2.1 Green Alleys.

The South Centre City Specific Plan recommends placing a priority on retrofitting existing alleys into "green alleys" as part of the Plan's implementation. Alleys are an integral part of the public infrastructure in portions of the West Mercado District, the Quince Street District, the Orange Avenue District, the 9th Street Commercial Corridor District, and portions of the Escondido Boulevard District north of 11th Street

Due to the current condition of many of these alleys, they are ripe for improvement. With limited maintenance funds, alleys often are not priority capital improvement projects. In addition to the many benefits already discussed, key benefits of retrofitting alleys into green alleys are highlighted in the sidebar.

Recommendation:
Establish a Green Alley Improvement Program in South Centre City

The conceptual Green Alley Improvement Program is to update existing alleys with the following green Infrastructure features:

- Remove impermeable asphalt and replace it with light-colored, permeable interlocking pavers (and associated infiltration beds);
- Add landscaping utilizing bio-retention and infiltration techniques, such as tree wells; and
- Add other features that will contribute to increased use and safety, such as lighting, public art, and wayfinding.

Due to the number of alleys with South Centre City, and the need for funding, the first step in implementing a Green Alley Improvement Program is to develop a demonstration or pilot project. This successful technique has been used in other cities throughout the country. (Examples: Avalon Green Alley Network Demonstration Project, Los Angeles, CA; Green Alley Pilot Project, Austin, Texas; Green Alley Program, Chicago, IL; Green/Porous Alley Demonstration Projects, Boston, MA; Martha Gardens Green Alleys Pilot Project, San Jose, CA; 12th Street Green Alley Project, Richmond, VA; Green Alleys, Dubuque, IA)

KEY BENEFITS of GREEN ALLEYS

Improved appearance results in many community benefits, including:

- ✓ People are more likely to use improved alleys for active transportation—results in increased health, reduction in use of the personal automobile
- ✓ People are more likely to build new residential units & accessory buildings for home occupations that face onto improved alleys
- ✓ Increased use of the alleys will result in putting more "eyes on the alley"—results in a reduction in crime and illegal dumping.
- ✓ Provides a stimulus for revitalization & investment in both residential neighborhoods & commercial areas
- ✓ Community involvement in the process builds stewardship & provides public education
- ✓ Positions the City to qualify for public & private funding not available for grey infrastructure

8.3.2.2 Infrastructure Improvements in the Quince Street District

The "road diet" for Quince Street and other recommendations to reconfigure streets within the Quince Street District (see the Mobility Chapter) provide opportunities to incorporate many green infrastructure features.

Recommendation:
Incorporate Green Infrastructure Features into the Proposed Infrastructure Improvements in the Quince Street District

The proposed improvements in the Quince Street District should utilize as many green infrastructure features as possible, including, but not limited to, the following:

- Install permeable paving (such as porous asphalt or concrete) for sidewalks and bike trails
- Use interlocking pavers that match the pavers used in the Green Alley Improvement Program (described above) and/or grasscrete for on-street parking
- Utilize bio-retention and infiltration landscaping techniques for streetscape, such as tree wells, planter boxes, and vegetated garden strips.
- Encourage private property owners to update their landscaping that abuts the new infrastructure improvements to green landscaping as well; consider providing incentives.
- Incorporate other features, such as wayfinding signage, lighting, and public art.

8.3.2.3 Other Infrastructure Improvements in South Centre City

Over the course of time, additional infrastructure improvements are expected to be made in South Centre City by the City as part of its Capital Improvement Plan. Additionally, the City requires developers who construct new buildings and projects to construct or provide their fair share of funds to install or upgrade the public infrastructure.

Recommendation:
To the extent feasible, incorporate green infrastructure techniques when making improvements to the public infrastructure

Active Mobility Network. Utilize permeable paving when constructing sidewalks, bike lanes, trails, and pathways. When appropriate, use permeable pavers for improved aesthetics. (See the Parks and Recreation Chapter for a discussion of the Pine Street Pathway.)

Bulb-Outs & Curb Extensions. Incorporate rain gardens in bulb-outs and curb extensions on South Escondido Boulevard.

Streetscape. Incorporate green infrastructure features into streetscape design throughout South Centre City:

- For locations with limited rights-of-way, use tree wells, planter boxes, and rain gardens.
- For locations with wider rights-of-way (e.g., on Centre City Parkway in the Felicita District and the Southern Entry District), add additional bio-retention and infiltration techniques, such as bioswales and vegetated filter strips. Ensure that the required landscaping on the abutting private property is designed to coordinate with the public improvements in both function and aesthetics.

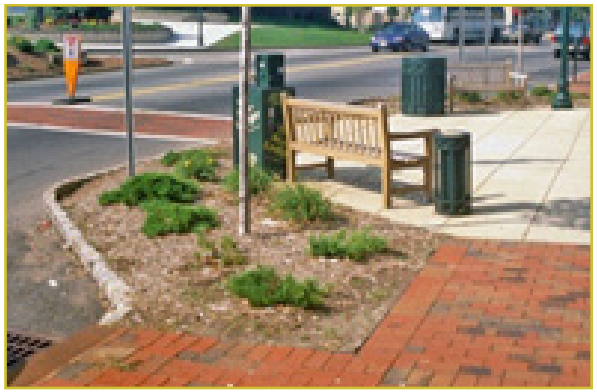
Crosswalks. The South Centre City Specific Plan proposes enhancements to many crosswalks within the area. Utilize permeable paving for crosswalks where the traffic volumes permit it.

- When appropriate, use permeable pavers for improved aesthetics. Incorporate green infrastructure landscaping techniques where possible.
- Include benches, wayfinding, trash receptacles, and lighting when possible.

Medians and Parkways. Utilize a wide range of bio-retention and infiltration techniques depending on the setting and available right-of-way

- Centre City Parkway provides an exciting opportunity to both upgrade the existing medians to include green infrastructure features, such as bioswales, and contribute to defining different identities for the district through which it runs. For example:Include benches, wayfinding, trash receptacles, and lighting when possible.
    - The median for Centre City Parkway north of W. Felicita Avenue should be designed to complement the Pine Street Pathway and the enhanced crosswalks at 5th Street, 9th Street, 13th Street, and W. Felicita Avenue.
    - Within the Southern Entry District, the median should reflect a more rural theme. The extensive right-of-way of the parkways between Centre City Parkway and the two access roads that parallel it (South Centre City Parkway on the west and South Escondido Boulevard on the east) provide additional opportunities to function as both green infrastructure and open space.

Public Parking. In addition to the proposed improvements in the Quince Street District that involve on-street parking, implementation of the South Centre City Specific Plan may involve making changes to existing on-street parking. If the opportunity arises, consideration should be given to utilizing permeable paving whenever possible. If it is not cost-effective to use permeable pavers, other materials should be used to receive environmental benefits of sustainable stormwater management.



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