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# Green Streets



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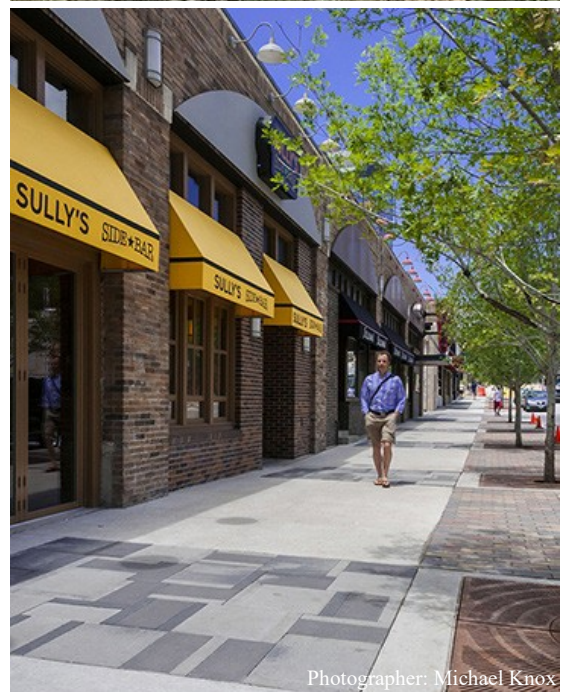
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# AN INTRODUCTION

In June 2014, Austin City Council adopted a robust Complete Streets Policy, which is seen as an important step toward realization of Imagine Austin Comprehensive Plan vision of a healthy, green, vibrant, compact and connected community. The term “Green Streets” is specifically called out in the resolution as an integral part of Complete Streets. The resolution states, *“in the design, operation, and maintenance of its transportation system, the City shall seek opportunities to integrate best-practice ‘Green Street’ principles, features and metrics...”* Over the last year, stakeholders from multiple City departments have come together to better understand the components and potential of Green Streets and to formulate next steps in integrating green street elements into Complete Streets policy implementation.

This Green Streets Introduction is the result of collaboration among City staff from several departments including Transportation, Public Works, Parks and Recreation, Planning and Development Review, Watershed Protection, and the Office of Sustainability. The document is intended to serve as an informational resource to assist in the implementation of the City’s Complete Streets policy. It does not purport to be a comprehensive or exhaustive analysis of the components or elements of Green Streets nor does it establish a process to incorporate Green

Streets nor does it establish a process to incorporate Green Streets elements into the planning and design of City streets. The information contained in this document was developed as a start of ongoing collaboration amongst an array of internal stakeholders. This information is not a substitute for community input or professional advice of utilities,



Photographer: Michael Knox

# GREEN STREET DEFINITION

*“A Green Street incorporates landscape, stormwater controls, and sustainability elements to improve ecological and human health.”*

More specifically, a Green Street is a public street right-of-way that is context-sensitive and that incorporates landscape features, engineered stormwater controls, and sustainability principles and practices to enhance non-motorized transportation options (e.g., walking and biking), mitigate the Urban Heat Island effect, improve water and air quality, and conserve ecological resources.

Common elements of a Green Street include: healthy street trees and functional, drought-tolerant landscapes; Green Stormwater Infrastructure (GSI), such as rain gardens and bio-swales; Low Impact Development (LID) techniques that minimize impervious cover (e.g. porous pavement); and materials and construction techniques that minimize life-cycle costs, greenhouse gas emissions, and waste byproducts.

Additionally, Green Streets will provide a proving ground for new and emerging technologies and techniques to address specific environmental concerns (e.g., air and water quality) and advance sustainable design and maintenance practices.

Consistent with the City of Austin’s policy on Complete Streets, all public streets and right-of-way should include the aforementioned elements of Green Streets to the extent practicable given the many uses and functions of the public right-of-way.



*The “Keep Waller Wild” entry, Austin’s Waller Creek, Roger Marvel Architects*

# GREEN STREET PRINCIPLES

## **Streets as Ecosystem**

Streets are part of the natural landscape. Streets should be considered as green corridors within a larger ecological system. How we design streets can increase climate resilience, influence urban ambient temperatures, promote stormwater quality and protect native species. Because of this, special attention should be given to the interface between man-made systems and natural systems. Understanding this relationship is critical to the health of our community – both human and natural.

## **Streets as Public Space**

Within urbanized areas street right-of-way provide a significant amount of public space and, because of this, should be accessible to all members of the community. Streets serve as both gathering places, and as paths connecting activity areas. Streets should provide for different mobility functions beyond the movement of motorized vehicles. This means designing streets so people can walk, park, sit, bicycle and recreate within the right-of-way. Other elements that enhance street design can include parklets, bike share, traffic calming, and pedestrian scaled street lights and other amenities.

## **Streets as Community Identity**

Streets should provide an attractive and context sensitive space for pedestrians, bicyclists,

and transit patrons. Streets can also promote interpersonal activities and include design improvements to create community and cultural identity. The redevelopment of streets will enhance the neighborhood through the addition of plant material, creating an inviting pedestrian-friendly atmosphere.

## **Streets as Economic Benefit**

Green Streets can reduce a community's street costs, promote economic growth, and create construction and maintenance jobs. By utilizing green infrastructure in construction and increasing vegetation and tree cover, green infrastructure can increase property values, benefiting both developers and homeowners. In addition to reducing local temperatures and shading building surfaces, green infrastructure cuts cooling and heating demand for buildings, reducing energy needs and decreasing emissions from power plants.

## **Streets as Climate Change Resiliency**

As our region becomes drier, wetter, and hotter, Green Streets can help communities improve their resiliency to climate change. By increasing the capacity of drainage systems to handle large storms, increasing the resilience of water supply systems in times of drought, and mitigating the urban heat island effect, communities can protect themselves from potential harm.



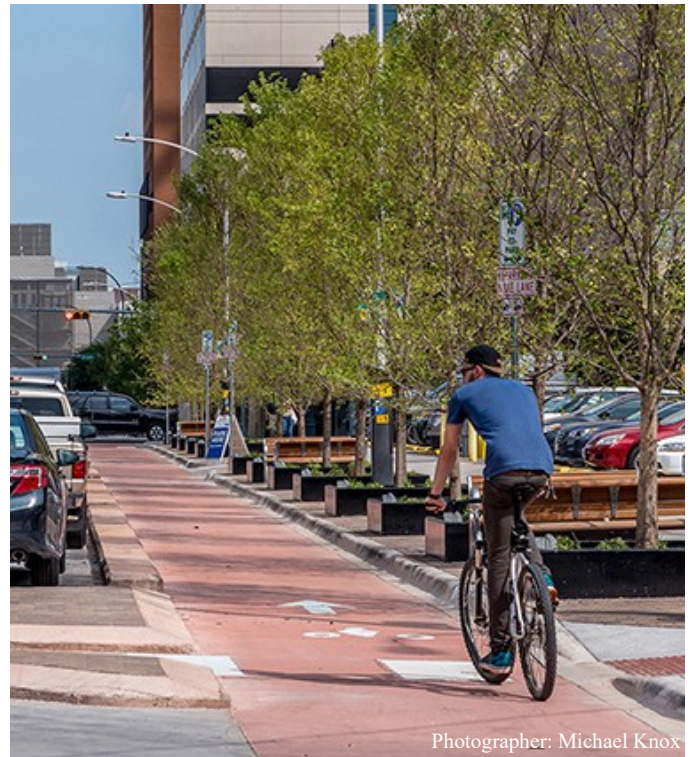
## **Streets as Integrated Public Policy and Practice**

Aggressive coordination of utility construction with street maintenance and activities within the right of way will continue to be crucial. The use of minimally invasive and trenchless technologies for utility construction within the street area will also continue to be encouraged by policy and practice. And, by incorporating collaborative maintenance techniques such as joint trenching, shared conduits, coordinated manhole/vault placements, etc., we can better plan for future ROW interruptions, minimize the impact to the public and existing utilities, and reduce unnecessary excavations. Another aspect of effective asset management is the consideration of a Life Cycle Cost Analysis (LCCA). In a LCCA all of the anticipated costs throughout the entire life of an asset are modeled to calculate a single, total, present value cost. The first cost of installation or construction is rarely the total cost of ownership. Oftentimes, operating and maintenance costs are substantial and should be considered when comparing alternatives. Using a LCCA several feasible options can be systematically evaluated to find the lowest cost option for the agency.

## **Streets as Public Health**

Green space and parks encourage outdoor physical activity, reduce obesity, and help prevent associated chronic diseases such as heart disease, high blood pressure, strokes, Type II diabetes, arthritis, and certain kinds of cancer. Breathing ground level ozone and particulate pollution can cause respiratory ailments including chest

pain, coughing, aggravation of asthma, and even premature death. Studies have shown that an increased tree canopy will reduce ozone and particulate pollution levels enough to significantly reduce mortality, hospital admissions, and work loss days.



## **Streets as Materials and Resource Management**

The materials used to build roads, such as concrete, asphalt, pavers, vegetation, etc., can have a significant impact over the life cycle of the product. A material's Life Cycle Assessment (LCA) includes impacts from the extraction of the material from the earth, processing of the material, shipping the material to the site, maintenance of the product over its useful life, and impacts of extraction and disposal. Effort should be made to reduce this impact at all phases of the life of the product.

# GREEN STREET ELEMENTS

## Existing Ecosystem

An ecosystem is a community of living organisms (fauna and flora) and non-living (abiotic) components (like air, water and soil) all are linked together through nutrient cycles and energy flows generated from air from the atmosphere, light from the sun and nutrients from soil, flora and plant interaction, microbial biomass and decomposition.



Streets ecosystems are created artificially and include softscapes (trees, shrubs and ground cover) and hardscape which includes paving, structural elements like drainage culverts, utilities and subsurface soils that are often compacted and highly alkaline and nutrient depleted and has limited microbial biomass. In street ecosystems, abiotic components are derived from irrigation, precipitation and the resulting street run-off which (carries an array of pollutants). In addition to these somewhat altered abiotic components, sunlight can be blocked or altered by buildings and reflected light from surrounding pavement

resulting in increases temperature. This creates a unique and challenging micro environment for trees and plant communities.

Street ecosystems are created artificially by hardscape and structural elements, subsurface soils which are often compacted, highly alkaline base materials and feed by water from rain and drainage, light or shade from buildings and increased temperatures from impervious surfaces all of which creates a unique and challenging micro environment for trees and plant communities.

## Streets Trees

A street tree is located along streets, alleys and public easements and when planted continually, and in association with other plants and amenities, provides a green and shaded linkage to businesses, neighborhoods, schools and parks.





Trees separate vehicular and pedestrian traffic, reduce and cleanse street run-off after rain events through root absorption, transpiration and the interception of precipitation through leaves and branches.

Street Trees are good for the economy as they add significant value to residential and commercial property and provided opportunities for all members of the community to plant, maintain and care for a shared community asset.

Austin's tree canopy occupied roughly 38% of Austin's land area as of 2010, and this is considered within the range of that recommended by American Forests for humid and arid regions.

### Rain gardens



Photographer: Michael Knox

Rain gardens are shallow, vegetated basins that collect and absorb stormwater runoff from rooftops, sidewalks, and streets. Rain gardens mimic natural hydrology through infiltration and evapotranspiration (passage of water from the soil, through a plant, and into the atmosphere). Rain gardens are versatile features that can be installed in almost any unpaved space.

### Bio-swales/ vegetated bump-outs



Photographer: Michael Knox

Bioswales are vegetated channels that slow, infiltrate, and filter stormwater flows as they move stormwater from one place to another. As linear features, vegetated swales are particularly suitable along streets and parking lots. A stormwater bumpout is a vegetated curb extension that protrudes into the street either mid-block or at an intersection, creating a new curb some distance from the existing curb. It slows traffic while also slowing and infiltrating runoff.

### Porous pavement



Photographer: Michael Knox

Porous, or permeable, pavements are paved surfaces that infiltrate, treat, and/or store stormwater where it falls. Porous pavements may be constructed from pervious concrete, asphalt,

interlocking pavers, and several other materials. These pavements are particularly cost effective where land values are high and where flooding is a problem.

### **Below-ground cistern**

A below-ground cistern is an underground container that is used for collecting and storing stormwater

### **Planter boxes**

Planter boxes are urban rain gardens with subsurface vertical walls and open or closed bottoms that collect and absorb runoff from sidewalks, parking lots, and streets. Planter boxes are ideal for space-limited sites in dense urban areas and as a streetscaping element.

### **Pocket parks**



Pocket parks provide small gathering areas, particularly in more urbanized parts of town,

where large parks are difficult to create. They are particularly appropriate for small irregular pieces of land that result from multiple intersecting streets and can provide shade and the many benefits of vegetation in an urbanized setting.

### **Native/drought tolerant vegetation**



A native species is one that occurs naturally with respect to a particular ecosystem, rather than as a result of an accidental or deliberate introduction into that ecosystem by humans. A drought tolerant plant is one that will survive in the typical - or somewhat less than typical - amount of rainfall in one's region.



# EXISTING EFFORTS

**“Green Streets” is not an official or separate program within current regulations for the city. However, the following are components that contribute:**

## **Great Streets Development Program and Master Plan**

- A component of the Great Streets Master Plan, the standards include wide sidewalks, planting of shade trees at 22’ O.C. (to provide a continuous canopy at maturity), street furnishings and other streetscape elements.
- The Great Streets Development Program provides partial reimbursement to private developers that implement the Great Streets standards voluntarily. The standards are also typically required for CURE zoning.

## **Land Development Code Commercial Design Standards Subchapter E**

- Subchapter E regulates the design of commercial and mixed-use sites and structures throughout the city except in areas with their own specific regulating plan (Transit Oriented Development districts, East Riverside Corridor, and so on).
- Subchapter E of Chapter 25-2 of the Land Development was amended in 2007, to add Subchapter E. Design Standards and Mixed Use provisions. One of the primary purposes of amendment was to provide appropriate *standards to ensure a high quality appearance for Austin and promote pedestrian friendly design*

*while allowing flexibility, individuality and artistic expression.*

- The design standards vary according to adjoining roadway type and include requirements for building placement, multi-modal connectivity, open space, and pedestrian amenities. Streetscape requirements include planting/furniture zones and minimum clear walking zones, with trees required for core transit corridors and suburban roadways types.

## **Green Alley Demonstration Project**

- This demonstration project to reconstruct an alley in the Guadalupe Neighborhood using green infrastructure elements was done in partnership with UT Center for Sustainable Development.

## **Standards of Care for Public Trees and Plants in the ROW**

- The Urban Forester is responsible for developing Standards of Care for Trees and Plants in the public ROW as required by City Code Section 6-3-6. These standards apply interdepartmentally, wherever public trees or plants are being considered.

## **Green Streets Program and Regulation Development**

- Pilot projects with Green Streets elements have been completed or are in progress around city and can provide a detailed framework for incorporation into Green Streets criteria:
  - Traffic roundabouts and bump-outs that



include drought resistant and/or water cleansing landscaping features

- Rain gardens and other features – Todd Lane, JJ Seabrook.
- Green constructed roads using regional and or recycled materials
- 32nd and 34th Streets drought resistant landscape replacement pilot projects

### **Community Forest Program**

- A Community Forest Division integrates regulatory and planning efforts related to private and public trees that make up Austin’s Urban Forest. Regulatory requirements come from Chapter 6-3-4 and 6-3-5 of the City Code and requires that the Environmental Commission develop a Comprehensive Urban Forestry Plan and tasks the Urban Forester with managing and administering the plan.

- In addition it has a supervision and coordinating provision over other city departments involved in plant or removing trees on public street ROW and in developing Standards of Care for trees in the Urban Forest. Chapter 25-8- Trees and Natural Area Protection of the Land Development Code covers protected trees on public and private properties. In this new capacity, the division will expand its collection and analysis of critical information on Austin’s trees on private as well as public property in order to assess trends in growth, mortality, and sustainability of the Urban Forest. The data will provides a solid foundation for a comprehensive management plan, a platform for estimating and quantifying the benefits the urban forest brings

to the Austin community and inform policy and regulatory requirements.



*Community members who live near the Green Alley Demonstration Project*

### **SUMMARY**

A Green Streets initiative can provide sustainable, regenerative solutions for the urban challenges we face now and into the future. As stated, this document is intended to start the conversation on the incorporation of the Green Streets concept into the planning, implementation, and maintenance of the public Right of Way. This conversation will include stakeholders from all sectors of the city and greater community. A shift, toward embedding Green Streets elements into spatial planning and to view it as part of the wider infrastructure of urban, suburban, natural, and agricultural areas is beginning to take shape. Now is the time to expand the conversation to the greater community.