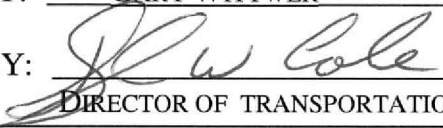


CITY OF TUCSON, ARIZONA
DEPARTMENT OF TRANSPORTATION

ENGINEERING DIVISION
ACTIVE PRACTICES GUIDELINES

UPDATED 08/06/13

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APPROVED BY:  DATE: 08-06-13

DIRECTOR OF TRANSPORTATION

SUBJECT: GREEN STREETS

A. DEFINITIONS:

1. **Basin:** The area footprint which identifies the total area of detained or retained runoff.
2. **Bottom of Basin:** The flat area of the basin or the basin area minus the side slopes.
3. **Green Infrastructure:** Landscape and engineering features that utilize soils and vegetation to manage stormwater for multiple environmental and community benefits. These features, as described in *Pima County and City of Tucson Guidance Manual for Low Impact Development and Green Infrastructure* (in process), include but are not limited to, curb scuppers, curb depressions, core drills, water harvesting basins, swales, bio-retention basins, berms, check dams, infiltration trenches, and active water harvesting/storage systems.
4. **Green Streets:** Roadways that incorporate the use of Green Infrastructure.
5. **Mature Tree Canopy:** The estimated diameter of leafy vegetation of a given tree.
6. **Project Manager:** The City of Tucson, Department of Transportation individual who is appointed to oversee the project.
7. **Shrub, Grass and Groundcover Requirement:** A minimum 25% recommended vegetative coverage of the bottom of basin area.
8. **Tree Canopy Area:** The area that can be planted with trees without sight visibility or utility conflicts. The shade for each tree shall be calculated at an average of 18' mature diameter in order to provide the recommended minimum 25% coverage of the tree shade area.

B. INTENT:

The intent of these guidelines is to require the incorporation of green infrastructure features into Tucson roadways wherever possible. The costs and benefits of green infrastructure shall be evaluated and determined for all new projects and shall be included within the project budget.

C. APPLICABILITY:

These guidelines apply to new construction and reconstruction (including widening, realignment, etc.) of publicly funded roadways or drainage projects including neighborhood roadways, drainage or Stormwater management projects, within the City of Tucson that include a landscaping element. These guidelines shall not apply to roadway maintenance projects such as pavement preservation, resurfacing or landscape and irrigation maintenance.

D. GREEN STREET PERFORMANCE GOALS:

These guidelines create the following performance GOALS for roadways within the City of Tucson wherever possible:

- Stormwater runoff from the roadway should be directed through green infrastructure features in parkways and medians before entering storm drains or natural drainage ways.
 - Green infrastructure features should encourage maximum dispersal and infiltration of stormwater across the pervious area of the project.
- Landscape areas are designed to retain at least the first ½” of rainfall falling on the roadway and public right-of-way (not including run-on from other streets and properties).
 - In areas where the ½” goal cannot be met due to site constraints, green infrastructure features should be incorporated into as much of the landscaped area as possible.
 - The volume shall be calculated as the “Project Site Area x ½.”
- Green infrastructure basins are designed to accept a maximum final pooling depth of eight inches of stormwater.
- All green infrastructure basins must drain within 24 hours of the latest rain event.
 - In areas without adequate infiltration rates to meet this goal, stormwater should be routed through vegetated areas before discharge to storm drains.
- Stormwater runoff is directed to provide supplemental irrigation to the landscape.
- Landscape planting criteria shall generally be as follows:
 - The bottom of basins are planted with a minimum 25% cover of groundcovers, bunch grasses, and/or shrubs less than 3’ in height.
 - Mature tree canopy covers a minimum of 25% of the Tree Canopy Area.
 - Within five years of planting, the vegetation survives on harvested rainwater, or with infrequent supplemental irrigation.
 - Trees are located to provide shade on sidewalks.
 - All basin planting areas shall be ripped to a minimum depth of 12” prior to planting.

E. REQUIREMENTS:

All projects meeting the APPLICABILITY (C.) definition shall be considered to be Green Street projects. The Performance Goals can be met in a variety of ways. All reasonable efforts should be made to meet or exceed these goals.

TDOT shall develop a permanent project review team to include planning, engineering, landscape, and the design/construction project manager. This team shall review the project documents at each stage including Early Planning, Design Concept Report (DCR), Design Consultant scope of work, 30%, 60%, 75%, 90%, 100% plans, and Construction to determine if the APG intent has been met. The Landscape Architect shall review the as-builts, to determine that the intent has been met.

Design: During the creation of the DCR and/or 30% plans, the consultants and the TDOT project review team shall agree on a set of Performance Goals appropriate to the project. In the event that these goals are less stringent than those outlined in the APG, the Director of Transportation shall be apprised by Memorandum outlining reasons why the goals cannot be met.

Construction: If at any stage in the construction process a modification to the proposed design is determined to be necessary, plans for the modifications shall be reviewed by the Project Manager, who will notify the reviewers of the changes proposed and the impacts to the original Performance Goals established during the design. The reviewers shall review and offer input as to possible alternatives to be used to meet the original standard.

A report shall be made by the Project Manager and submitted to the Engineering Administrator describing each project's green infrastructure, the cost, and ability to achieve compliance.

F. PRINCIPLES:

The design concept and intent for green infrastructure is to retain, detain, infiltrate, and/or filter runoff from the street and sidewalk in landscaped areas behind existing or proposed curbs (parkways and medians). Water is retained or detained in depressions (basins, swales) or back of mounding (berms). This runoff is to be used for supplemental watering of plant materials within the public right-of-way. Where runoff exceeds retention and infiltration capacity, it should be slowed, spread, and/or filtered through vegetation to remove debris and sediment from the water before it returns to natural watercourses. Civil and landscape design shall include infrastructure to meet the intent of this process and incorporate materials, grading, and amenities to be compatible with both this effort and the project functions for street, drainage, pedestrian, and landscape.

G. GREEN INFRASTRUCTURE PLANNING:

The purpose of the APG shall be met through the implementation of Green Infrastructure Planning for qualifying roadway projects.

The Green Infrastructure Planning procedure shall follow this process:

- 1) The design contract scope of work shall indicate an objective to integrate and maximize green infrastructure opportunities in the areas to be landscaped:
 - a) The COT Project Manager shall receive input from the civil and landscape designers identifying the locations of potential green infrastructure opportunities. The intent is that drainage planning, grading and landscaping will be planned in an integrated fashion.

- b) The Design Consultants shall be required to coordinate with utility companies on determining utility locations during the early design stages to identify potential opportunities.
 - c) The Project Manager shall review all submittals to be sure that the APG intent is met. The Project Manager shall solicit the help of staff engineers and landscape architects to review all pertinent contract documents to ensure this policy is followed.
- 2) At the 30% submittal/design concept report, the Consultants shall include:
- a) Series of figures indicating the green infrastructure methods that are proposed along the roadway
 - b) Conceptual roadway cross-sections that demonstrate:
 - i) Optimal grading of roadway surfaces to direct runoff into adjacent landscape areas
 - ii) Placement of trees and vegetation to maximize shading and water quality improvement
 - iii) Placement of curb opening/flush curb and catch-basin conceptual details.
 - c) Utility plan, created in coordination with utility company representatives, that includes:
 - i) Plan view map of preferred locations (including joint trenching where appropriate) for underground and aboveground utilities to minimize conflicts with streetscape and basins.
 - ii) Indication of each affected utility's compatibility of existing utilities with potential green infrastructure areas.
 - d) Plan view and Landscape Plans for roadway that demonstrate:
 - i) Conceptual type of green infrastructure features
 - ii) Conceptual details for water ingress to and egress from basin areas (such as scuppers, curb openings, flush curbs, and overflows)
 - iii) Landscape concept showing placement and type of vegetation to maximize utilization of stormwater runoff and provide shade..
- 3) At the 60% submittal, the Consultants shall include:
- a) Preliminary sections indicating extent and depth of retention areas, slopes, and areas of stormwater flow and overflow
 - b) Preliminary planting plan, indicating specifically how plants are utilized within and around basins
 - c) A defined utility corridor for potential modifications
 - d) Irrigation plan outlining types or methods of watering such as Dri water, temporary systems used for establishment only, quick coupler and conversion to long term systems.
- 4) The Project Manager shall enlist the help of civil engineer and landscape architect reviewers to determine the feasibility of proceeding as proposed and to modify green infrastructure features as needed to meet the project budget.
- 5) At the 75% and 90% plan submittal, the Consultant shall provide construction documents. Said documents should be detailed and explanatory enough to allow contractors to build. The Project Manager shall review to make sure all incorporated comments have been addressed with the help of the review team.

- 6) At the 90% submittal the Landscape Consultant shall provide:
 - a) Calculations on the detail sheets documenting the following:
 - i) ½" rain volume for the total project site
 - ii) Total retention (final pooling) volume of green infrastructure features within the project area
 - iii) Estimated volume of water to be retained by green infrastructure features annually
 - iv) Annual irrigation requirements for the proposed planting plan at maturity
 - b) Estimated water and maintenance cost based upon a scope described in the design contract.
- 7) At the 100% stage, the utility companies shall be notified of the upcoming construction and its proposed start date. Utility conflicts will be addressed by each utility company at this time, through final design and construction, making use of the utility corridor provided on the plans, where possible.
- 8) The Project Manager, Landscape Architect and the Project Inspector team shall meet to review the green infrastructure elements prior to the pre-bid meeting. The team shall identify and review the element with the General Contractor at the pre-construction meeting and during the weekly construction meetings as needed to ensure the correct installation and development.
- 9) The Landscape Architect shall monitor the maintenance of the green infrastructure elements during the two-year Landscape Establishment period.
- 10) The Landscape Architect shall review the green infrastructure elements with the Streets Maintenance Section prior to turn over and final acceptance.