SMARTSCAPE

Maintenance Manual For Sustainable Landscaping

Version 1.0

Adapted by

University of Arizona | Pima County Cooperative Extension

Smartscape Program

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CITY OF TUCSON | TUCSON WATER | THE UNIVERSITY OF ARIZONA Cooperative Extension

photo: Kirti Mathura

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1. General Information

1.1. Purpose of Manual

This Manual is a tool intended to be used by associations (Associations), such as multi-family apartments and single-family Homeowner Associations (HOAs), for maintaining community landscape resources. These entities may use it as a reference in developing Requests for Proposals (RFPs) and for negotiating and managing scopes of work for landscape maintenance contracts (Contractor).

It can also be used as a training guide for on-the-ground personnel who perform the actual field work on these contracts. As such, it will also be an in-the-truck reference guide for the work performed by these individuals.

It should be noted that this landscape maintenance manual is intended for maintaining new or existing landscape assets and is not intended for the planning, design, budgeting, or implementation of new improvements. Although this manual is not a part of these processes, it is an integral part of the strategic planning and budgeting processes necessary to enhance the landscape environment.

1.2. Guiding Principles

Smartscape has adapted the core principles of Xeriscape and modified them for application in the Sonoran Desert.

- Good planning and design
    - The right plant in the right place
    - Use of rainwater harvesting, both active and passive, and green storm water infrastructure
    - Drainage control
- Low water-use plants
    - Native or desert-adapted plant pallets
    - No invasive species
    - Correctly installed
- Efficient irrigation
    - WaterSense labeled irrigation controllers - Weather-based; or Soil Moisture-based
    - Plants with similar water requirements zoned together
    - Drip emitter irrigation, correctly designed and placed
- Appropriate turf areas
    - Minimal turf areas
    - Efficiently irrigated
- Soil improvements
    - Minimal use of amendments
    - When used, appropriate for the soil type and plant
- Use of mulches
    - Use for moisture retention and temperature control

    - Do not use D.G. (Decomposed Granite)
- Appropriate maintenance
    - Correct tree pruning. No stubs, toppings, lion tails
    - Correct shrub pruning. No shearing
    - Regular inspection and repair of the irrigation system
    - Seasonally adjust irrigation schedules

1.3. Administrative

- Communication Protocols
    - Single points of contact for both the Contractor and the Association should be clearly established for both routine and emergency situations.
    - Agreement between the parties for on-site personnel, routines, safety procedures, schedules, meetings, and reporting shall be clearly stated. Since every contractor and every Association is different these exact requirements cannot be pre-determined.
- Training
    - It is expected that the Contractor's field personnel will be trained in the smart practices detailed in this manual that lead to sustainable landscapes.
    - At a minimum, the field foreman and the contract manager will have completed the Smartscape program and will provide their Certificates of Completion on request.
    - Appropriate maintenance
        - Correct tree pruning. No stubs, toppings, lion tails
        - Correct shrub pruning. No shearing
        - Regular inspection and repair of the irrigation system
        - Seasonally adjust irrigation schedules

- Record Keeping
    - Requirements for Contractor recordkeeping will be clearly defined. Depending on the Association’s facilities and needs. This could include:
        - Map with site design and planting plan of areas being maintained
        - Watering schedules
        - Regular water usage reports
            - This can be viewed at the supply meter, at any demand/use meters that may exist for dedicated zones within the Association’s irrigation system, or on monthly account bills.
        - Appropriate pruning frequency and technique
        - Inspection reports. This can include the irrigation system, vegetation, and damage due to storms or vandalism.
        - Irrigation repair reports

2. Irrigation [1,2]

Maintenance of a properly designed landscape irrigation system that delivers water directly to the root zone of the target plants will create healthy, thriving functional urban desert landscapes. The heart of this system is the use of dedicated irrigation hydrozones/valves and associated controllers for each specific plant type (trees, shrubs, groundcovers, turf). Any irrigation system needs to be inspected regularly, at a minimum annually, for leaks and blockages and the proper functioning of the control valves and controller.

2.1. Smart Practices – Irrigation

- Emitters
    - Placed where they cover the root zone, placement at the trunk is inefficient and not effective in promoting root growth.
        - For trees and shrubs, the root zone begins in the area below the edge of the plant's canopy, much like an umbrella.
        - The root zone grows outward and 1.5 to 3 times beyond the canopy.
        - Locations should be reviewed annually to ensure the emitters are moved appropriately.
- Inspection and Repair
    - Schedule annual inspections for leaks, blockages, line restrictions, and damage from weather or rodents.
    - Repair leaks as soon as they are discovered.
    - Periodically test the depth of moisture penetration and adjust the watering frequency if needed.
    - Periodically flush the distribution lines. Flush the lines after a repair is made where soil can enter the lines and when the system has been shut down for a length of time.
    - Annually replace controller and valve batteries, where you have them.

2.2. Controllers

- Annually replace controller and valve batteries.
- Controller should have capacity for the appropriate number of (hydro)zones that can be scheduled independently, i.e.
    - Trees
    - Shrubs
    - Groundcovers/vines
    - Turf
- Program controller to reflect seasonal weather changes.
- The duration of the watering period within a hydrozone and for the plant type within is determined by the depth of water penetration as determined by using a soil probe.
    - Trees, 3 feet; shrubs, 2 feet; groundcovers and vines, 12 inches; turf, 8-10 inches
- Once the ***duration*** is determined, it does not change. Seasonal adjustments to the watering schedule are made by altering the ***frequency*** to keep the root zone moist.

- Frequencies can also be altered for weather events or also to reflect the age and changing requirements of the plant type within the zone.

3. Green Stormwater Infrastructure [3]

Green stormwater infrastructure (GSI) describes practices that use natural systems (or engineered systems that mimic or use natural processes) to support vegetation, such as capturing stormwater runoff, and passive rainwater harvesting.

3.1. Basins

- Description
    - Generally shallow with gently sloped edges
    - Basin bottoms are mulch, rock, or gravel
- Primary maintenance requirements
    - Trash removal
    - Clearing inlets
    - Removing built-up sediment to allow volume capacity for water to enter
        - Removed sediment may be useful in nearby low areas or eroded rivulets
        - Better to leave some than disturb rock
    - Weed removal
        - Leave wildflowers and non-invasive volunteers
        - Broad use of herbicides highly discouraged

3.2. Vegetation

- Description
    - Native or native-adapted trees, shrubs, groundcovers
    - Should be allowed to take their natural form
- Requirements
    - Non-compacted soil
    - Sunlight
    - Water
        - Water new plants to establish (one to two years, via timed irrigation or hand/truck).
        - Once plant root systems have become established, they may be able to adapt to rainfall and survive on rainwater alone.
        - Supplemental watering may be required during periods of lack of rainfall.
        - Deep water whenever possible to encourage downward growth of roots.
- Maintenance (see sections on Trees, Shrubs, Groundcovers, and Vines, below).

4. Trees

Regular and periodic maintenance using smart practices will, over time, improve the overall health, sustainability, and function of the tree canopy within the Association, and prevent premature failures and/or replacements of plant materials that have become assets within the overall landscape. This section should be used as a general guide for the specific requirements for the various tree types and species in each landscape area.

4.1. Selecting, Planting and Staking [4,5]

Selecting and planting new trees correctly will ensure their long-term health and longevity, and staking them properly (and only if needed) will allow them to grow sturdy trunks and roots that will support them for their lifetimes.

- Select desert-adapted trees that are appropriate for the site and climate, will fit the space when mature, and serve the intended purpose (e.g. shade).
- Select vigorous, healthy trees with strong trunks that are wider at the soil level and taper up, and have well-developed, non-circling root balls.
- Trees should be placed and planted within the designated areas as per the design and planting plan.
- Planting holes should be dug with the appropriate depth and width for the tree being installed, no deeper than the root ball and generally twice the width of the root ball.
- It is preferable not to stake trees because the movement from wind helps the trunk grow stronger.
- If required, staking should be performed correctly to avoid girdling the trunk, which prevents proper trunk development.
    - Place two stakes around the tree, outside of the root ball.
    - Use soft, flexible ties to secure the tree to the stakes.
    - Ensure that the ties are loose enough to allow movement but tight enough to provide support.
    - Remove stakes once the tree is established and can stand on its own.

4.2. Smart Practices – Pruning Trees [6]

Proper pruning techniques will ensure tree health, safety, and aesthetics.

- Pruning should be done during the appropriate season for the tree species.
- Use clean, sharp tools to make precise cuts.
- Remove dead, diseased, or damaged branches first.
- Avoid excessive pruning, which can stress the tree and make it vulnerable to pests and diseases.
- Make cuts just outside the branch collar, leaving the branch bark ridge intact.
- Avoid leaving stubs or making flush cuts.

4.3. Shaping and Training

Young trees should be shaped and trained to develop strong structures and desirable forms.

- Select a central leader and remove competing leaders.
- Remove any crossing or rubbing branches.
- Ensure that branches are evenly spaced along the trunk.

4.4. Practices that Weaken/Compromise Tree Health

Avoid practices that can harm trees and compromise their health.

- Avoid topping or heading cuts, which remove large portions of the canopy and can lead to decay and weak regrowth.
- Do not use tree wraps, paint, or sealants on pruning cuts.
- Avoid compacting soil around the tree's root zone.

4.5. Tools

Use the appropriate tools for tree maintenance tasks.

- Pruning shears for small branches
- Loppers for medium-sized branches
- Pruning saws for larger branches
- Pole pruners for high branches
- Chainsaws for large cuts (use with caution and proper training)

4.6. Smart Irrigation – Trees [7,8,9,10]

Irrigation practices should promote deep root growth and water efficiency.

- Water trees deeply and infrequently.
- Do not overwater or underwater the tree.
- Apply water at the drip line, where roots are actively growing.
- Use a soil probe to check moisture levels and adjust irrigation accordingly.
- Put mulch on top of the soil, around the tree and out to the root zone, to retain soil moisture and regulate temperature.

5. Shrubs

Proper maintenance of shrubs enhances their health, appearance, and function within the landscape.

5.1. Smart Practices – Pruning Shrubs [11]

Pruning shrubs correctly encourages healthy growth and desirable shapes.

- Prune during the appropriate season for the shrub species.
- Use clean, sharp tools to make precise cuts.
- Remove dead, diseased, or damaged branches first.
- Thin out crowded branches to improve air circulation and light penetration.
- Avoid excessive shearing, which can lead to dense outer growth and bare inner branches.
- Shape shrubs to their natural form.

5.2. Practices that Weaken/Compromise Shrub Health

Avoid harmful practices that can weaken shrubs.

- Do not over prune or shear shrubs excessively.
- Avoid compacting soil around the root zone.
- Do not overwater or underwater the shrubs.
- Avoid using herbicides or pesticides that can harm shrubs.

5.3. Tools

Use the appropriate tools for shrub maintenance tasks.

- Pruning shears for small branches
- Loppers for medium-sized branches
- Pruning saws for larger branches
- Hedge shears for shaping

5.4. Smart Irrigation – Shrubs [7,8,9,10]

Efficient irrigation practices promote healthy shrub growth.

- Water shrubs deeply and infrequently.
- Apply water at the drip line, where roots are actively growing.
- Use a soil probe to check moisture levels and adjust irrigation accordingly.
- Mulch the soil around shrubs to retain soil moisture and regulate temperature.

6. Groundcovers and Vines

Groundcovers and vines provide coverage and reduce erosion. Proper maintenance ensures their health and effectiveness.

6.1. Smart Practices – Groundcovers and Vines

- Choose appropriate species for the climate and soil conditions.
- Plant at the correct spacing to allow for growth and coverage.
- Regularly check for and remove weeds.
- Prune and train vines to support structures as needed.
- Use mulch to retain soil moisture and suppress weeds.
- Monitor and adjust irrigation to ensure adequate water.

7. Horizontal Coverage - Hardscape and Groundcovers

Proper maintenance of hardscape and groundcovers ensures functionality and aesthetics.

7.1. Hardscape

- Regularly inspect for and repair any damage to walkways, patios, and other hardscape elements.
- Clean surfaces to remove debris and stains.
- Ensure proper drainage to prevent water pooling and erosion.

7.2. Groundcovers

- Regularly inspect for and remove weeds.
- Prune to maintain coverage and prevent overgrowth.
- Apply mulch to retain soil moisture and suppress weeds.

7.3. Drainage and Erosion

- Ensure proper grading and drainage to prevent erosion and water damage.
- Where needed, use erosion control measures, such as retaining walls or erosion blankets.

8. Mulches (material placed on top of soil) [12,13]

Mulches help retain soil moisture, regulate temperature, and suppress weeds.

- Apply a layer of mulch around plants, keeping it away from the trunk or stems.
- Replenish mulch as needed to maintain a consistent depth.
- Use organic mulches, such as manure, compost, or wood chips for best results.
- Do not use DG (decomposed granite).

9. Soil Amendments (material mixed into soil) [12,13]

Do not incorporate organic amendments, such as mulch, manure, compost, or wood chips, into the soil when planting *native* plants. Use *only* on top of soil surface.

- Roots may not cross from organically amended soil into mineral soil causing poor rooting and a pot-in-the-soil effect.
- Organic matter in warm, moist conditions breaks down, creating gaps in soil backfill. This can lead to leaning and poor anchoring of trees, affecting their stability.
- Recommended only for vegetable beds and annual flowering plants.

10. Turf

Proper maintenance of turf promotes healthy growth and reduces water usage.

10.1. Aeration and Cutting/Mowing

- Aerate turf regularly to improve soil structure and root growth.
- Mow at the appropriate height for the turf species.
- Leave grass clippings on the lawn to return nutrients to the soil.

10.2. Smart Practices – Turf Irrigation [7,8,9,10,14]

- Water turf deeply and infrequently to encourage deep root growth.
- Use a soil probe to check moisture levels and adjust irrigation accordingly.
- Apply water in the early morning to reduce evaporation and fungal growth.

10.3. Overseeding – Not Considered a Smart Practice

- Overseeding is generally not recommended as it can lead to excessive water use and maintenance requirements.

11. Fertilizers

Fertilizers are not recommended to add to desert-adapted woody plants growing in landscapes and should only be used to correct a nutrient deficiency that has been properly diagnosed.

- Adding fertilizers to trees can result in excessive fast growth and poor structure, making the tree vulnerable to storm throw.

- Mulch added to the soil surface will slowly decompose, release some nutrients, and improve the chemical and physical soil conditions.
- Avoiding over-irrigation will prevent leaching (loss of nutrients from the root zone).

12. Herbicides/Pesticides [15,16]

Herbicides and pesticides should be used sparingly and with caution.

- Use integrated pest management (IPM) practices to minimize chemical use.
- Apply herbicides and pesticides according to label instructions.
- Monitor for pests and weeds regularly and treat as needed.
- Use non-chemical methods, such as hand-pulling weeds or introducing beneficial insects, whenever possible.

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This Smartscape Maintenance Manual for Sustainable Landscaping has been adapted to provide comprehensive guidelines for maintaining community landscapes sustainably and effectively. By following these practices, Associations can ensure the health and longevity of their landscape assets while conserving water and promoting environmental stewardship.