APPENDIX B

SMARTSCAPE
HOA LANDSCAPE TRANSFORMATION GUIDE

DECEMBER 2021

HOMEOWNER ASSOCIATION LANDSCAPE TRANSFORMATION GUIDE

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DECEMBER 2021

Prepared for:

TUCSON WATER
A proud part of the City of Tucson

CITY OF TUCSON

SMARTSCAP

THE UNIVERSITY OF ARIZONA
Cooperative Extensi

Prepared by:
Kendra D. Potter

ACKNOWLEDGMENTS

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CHAPTER 1

INTRODUCTION

"Water is the driving force of all nature."

~ Leonardo de Vinci

Water in the desert is a precious commodity and an essential element for life of people, plants, and wildlife. Rain fall in the Sonoran Desert, particularly in the metropolitan Tucson, Arizona area is less than a foot a year. Furthermore, climate change producing less rain and hotter drier environments has reduced and continues to reduce both surface and groundwater levels, which results in less water available for human and ecological life. It's important to reduce our water consumption to conserve water for ecological needs, for higher priority use, and lower financial costs of water utility provision.

This guide pertains to water conservation as a whole, especially within the Sonoran Desert, to conserve and use water wisely. Guidelines provided in this manual offer solution in the area of homeowner associations to helping reduce the amount of groundwater used in urban outdoor environments for non-potable use which in turn helps replenish and recharge underground aquifers which supply precious water in arid environments.

The purpose of this document is to provide homeowner associations guidance on transformation of common areas to water wise landscapes necessary to improve HOA landscape water efficiency, maintenance, and costs. This manual serves as supplemental educational material to Pima County Smartscape Training provided homeowner associations in conjunction with the Homeowner Association Landscape Transformation Program. It does not provide specific landscape planting designs. It instead offers tools for HOAs to readily begin assessment and planning landscape conversions, once they've obtained training on Smartscape principles for sustainable landscapes.

The document first explains how to use the material in this guide as a foundation for planning HOA landscape conversion. It then describes homeowner association patterns found in common areas identified from a study of Homeowner Association Landscape Transformations in Arid Environments by a master student in landscape architecture at the University of Arizona 2021. The purpose of the development of the pattern language described and shared in this manual was to provide a basis for HOAs to understand the needs or problems existing in their current spaces, and to provide a common vocabulary by which HOAs may use to converse and collaborate with their communities and landscape professionals for successful landscape conversions. Next, examples of how patterns can be applied to existing spaces is shared within three conceptual design categories to serve as merely examples and inspiration to stimulate ideas for attaining the desired function and aesthetic of their converted spaces. Finally, the guide includes an associated plant list of low-water use native or adapted Southern Arizona Sonoran Desert plants provided as a springboard to begin planning. The plant list is merely a foundation of species to begin work with landscape professionals of all experience levels and not an exhaustive list of all of these species available. They serve as guidance for appropriate plant species of the region that help significantly reduce water consumption in landscape maintenance and increase water efficiency in urban landscapes.

CHAPTER 2

HOW TO USE THIS GUIDE

Note, the steps which follow are meant to be navigated after a homeowner association obtains Smartscape sustainable landscape training to understand the principles of Smartscape. Likewise, it is highly recommended to achieve the best results for water reduction in landscape conversions, that all landscape professionals contracted for design, installation, and maintenance obtain Smartscape Sustainable Landscape training in one or more areas available or attain such before planning and implementation of HOA landscape conversions.

Process

Referencing the Homeowner Association (HOA) Landscape Patterns, HOA leadership and community groups may assess which types of patterns exist in their current common area landscapes. Once identified from the pattern library, combine the patterns which represent the spaces to be converted to establish and show the HOA's goals for the desired or needed function of each space. Then, pick plant lists to achieve the desired aesthetic of each space. Using the identified patterns, combined overview of needed or desired functions, chosen plant lists, goals, and ideas, then hire Smartscape trained landscape professionals to help design, install, and maintain the converted spaces to achieve HOA water reduction goals.

Note: It may be that not all common areas need to be transformed, because their current function or aesthetic does not contribute to high-water use. In other words, don't fix what isn't broken. Start with the spaces which can be identified with problems or needs to address first. This will also assist in planning phased approach conversions impacted by budget and other resource constraints. The goal in some areas may be to either retain a space's existing function with a new or different aesthetic; maintain an existing aesthetic with a new or different function; or both.

Steps Outlined

Examples included for execution of each step

1. Identify patterns of land use in existing common area landscape and pull out the patterns representing each from the pattern library.

2. Combine patterns identified together to represent the spaces to be converted with notes of the functional goals for each space.

3. Pick plant lists for desired aesthetic and function of each space.

4. Contract and work with professionals for design, installation, and maintenance. Note: It is recommended these be Smartscape trained professionals.

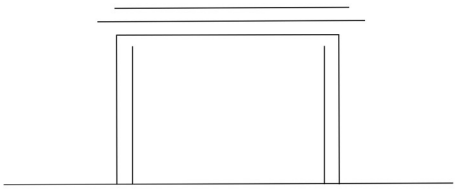
Steps Outlined

Examples included for execution of each step

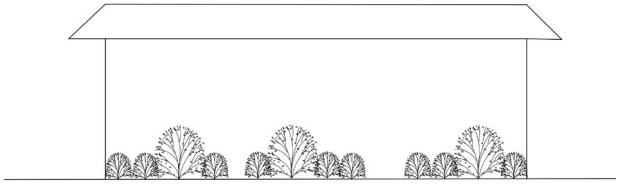
1. Identify patterns of land use in existing common area landscape and pull out the patterns representing each from the pattern library. (Chapter 3 Homeowner Association Landscape Patterns Chapter)

Using this example common area:

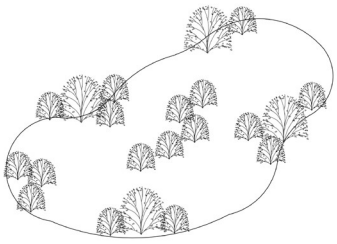
Entry Pattern, Foundation Planting Pattern, Passive Open Space Pattern represent the spaces with solutions needed/desired for landscape conversion.



Entry Pattern

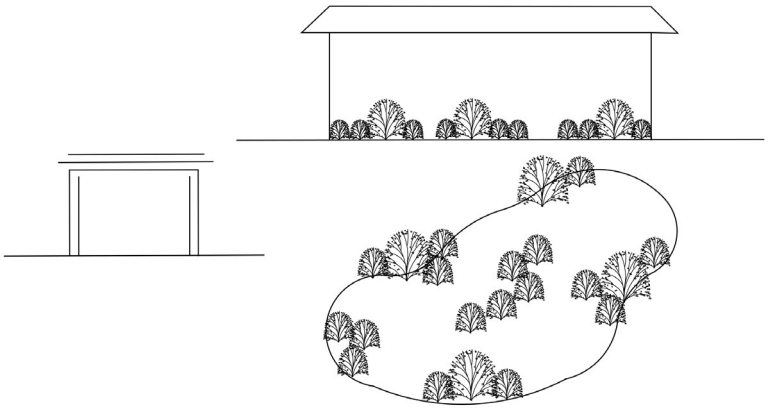


Foundation Planting Pattern



Passive Open Space Pattern

2. Combine patterns identified together to represent the spaces to be converted with notes of the functional goals for each space.



Potential Goals:

Entry	Foundation Planting	Passive Open Space
shade	*layered foliage to mask wall*	*shade*
prevent sidewalk damage	*prevent structural damage*	*attract birds, butterflies*
welcoming aesthetic	*no traditional shrub*	*remove high-water lawn*
noticeable focal point	*little to no pruning to maintain*	

3. Pick plant lists for desired aesthetic and function of each space. (Appendix A Plant List)

Definitions of Plant List Categories For Purposes of This Guide:

Historic/cultural preservation theme *plantings are plants with high biomass associated with deeper green foliage and providing a similar aesthetic which was prevalent in historic Tucson and regional neighborhoods.*

Habitat enhancement theme *plantings are those plants which provide attraction, food, or shelter for various wildlife or open space vegetation enrichment.*

Dynamic desert *theme plantings are those identified as tolerant of heat and arid conditions of the Sonoran Desert, with finer textured shrubs, mostly native species, and cacti/succulents symbolic of natural desert landscapes.*

Plant lists matched to goals:

Entry	Foundation Planting	Passive Open Space
enriching vegetation (Habitat Enhancement Plants)	*traditional desert look (Dynamic Desert Plants)*	*provide wildlife habitat (Habitat Enhancement Plants)*

4. Contract and work with professionals for design, installation, and maintenance.

Note: It is recommended these be Smartscape trained professionals

Smartscape Professionals Directory
https://smartscape.org/smartscape-professionals-directory/

Example aesthetic/function achieved in plant lists combined with pattern solutions:

Entry Pattern using Habitat Enhancement Plants

Open Space Pattern using Habitat Enhancement Plants

Foundation Planting Pattern using Dynamic Desert Plants

Combination of Patterns and Plants

CHAPTER 3

HOMEOWNER ASSOCIATION LANDSCAPE PATTERNS

Figure 3.1 Tongva Park in Santa Monica, California
Designed by James Corner Field Operations
Photo Credit: Tim Street Porter, ASLA

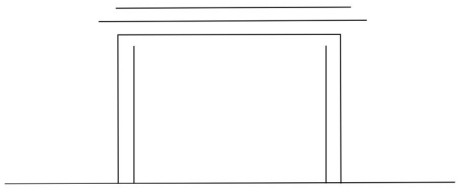
{ "...each part of the environment is given its character by the collection of patterns which we choose to build into it." }

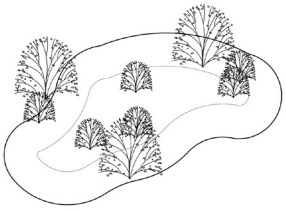
~ ChristopherAlexander, A Pattern Language

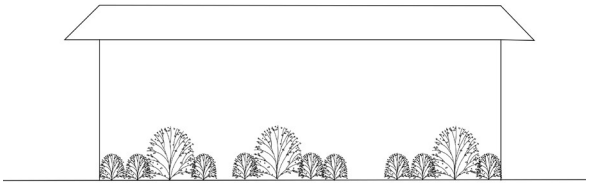
A Pattern Language by Christopher Alexander et. al. written in 1977, introduced the concept of a pattern language as a set of patterns identified by architects and planners which occur repeatedly in the design of towns, building, and structural construction. Compiling the patterns into a master list from largest to smallest scale, an overall language was developed using the patterns with the intent to provide architects, planners, and individuals a common framework by which to communicate design ideas effectively among technical and creative professionals, and layman. Each pattern in the language has an associated set of methods by which its application provides solution(s) to mitigate problems specific to the space in which it is implemented. (see Pattern Language under Literature Review). The network of patterns are interrelated by function at different scales, so that those at the larger scale require certain smaller scale patterns to provide associated solutions where their associated use impacts one another, and patterns at the smallest scale of the network, lend greater detail to solutions at that level.

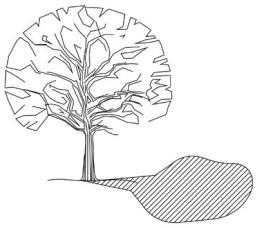
Pattern implementation is therefore complex, layered, and evolves continually over time, based on environmental changes. As a result, this master list of 253 patterns can be mixed, matched, and connected in infinite ways for architects and planners to provide custom designs to each space and situation. Furthermore, the structure of the language is able to evolve by updating current or adding new patterns observed over time to continually seek and provide solutions for integration of our urban and natural environments. A more recent architectural theory established by Nikos Salingaros suggests that this pattern language, accepted and utilized since presented, can be used together with traditional architectural form language, as an adaptive design method to address fitting the built environment to human needs rather than fitting human needs to abstract ideas or forms. Thereby enhancing the solutions available to integrate the human and the built environment. Hence, it stands then, that a pattern language could also be created for another profession or an individual project based on the methodology used for identification and application of the patterns shared in A Pattern Language. This concept is supported by Alexander's philosophy of the language's evolution and execution that "each part of the environment is given its character by the collection of patterns which we choose to build into it."

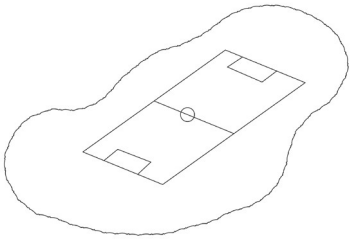
Patterns identified in homeowner association (HOA) common areas are replicated throughout communities to lend functional value and aesthetics to their neighborhoods, while creating a sense of place specific to the region. By combining these useful patterns with appropriate plant palettes for the arid desert environment, HOAs can create custom curated solutions for their residents. The patterns identified and described in this chapter can be mixed and matched to transform a variety of common areas for homeowner associations throughout the Tucson metropolitan region.

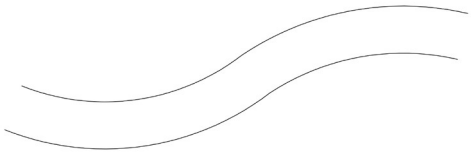


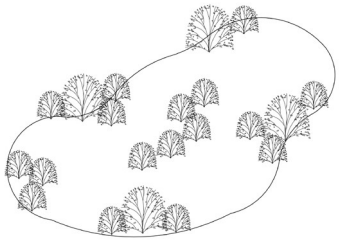


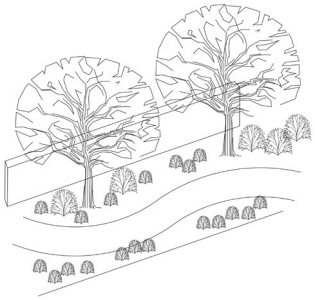










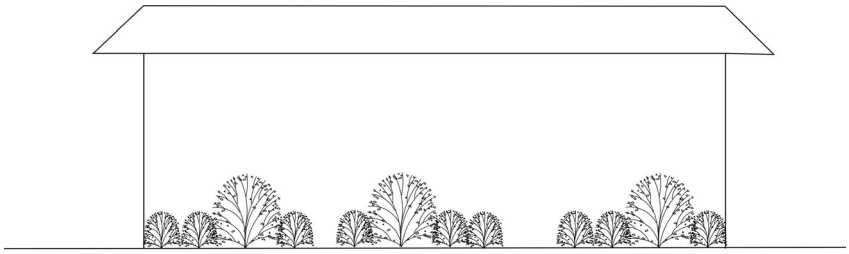


Patterns Identified in Homeowner Association Common Areas

To provide a common language which HOAs may use with designers and other landscape professionals to transform their common areas into water wise spaces, a small pattern language has been developed using observations of two local homeowner associations included in the Smartscape Homeowner Association (HOA) Landscape Transformation Pilot Program. Seven patterns have been identified among the two HOA common areas which represent problems or needs for land use, with one additional pattern identified in HOAs throughout the Tucson Water Service Area. Each pattern has been labeled with a short representative name, explanation to the problem/need it represents, alongside methods of the pattern's implementation for providing the necessary or desired solutions when used in that space. Although some of the patterns described here might also be seen or could be applied to individual lots, note the patterns identified and example applications are directed only to common areas of the HOA landscape/development and do not include individual or collective residential homes/condos within the development. The reason is the Smartscape HOA Landscape Transformation Program relates specifically to water use by the HOA itself and not the collective residential neighborhoods within. Likewise, landscape patterns described and used here are meant for conversion of HOA common spaces, and not necessarily newly constructed developments, whose context may produce different patterns.

To transform common area plantings of exotic species, nonnative, or high-water use plant material to lower water use material, keep plant choices to native and/or low-water use plant species suited for Southern Arizona's arid Sonoran Desert environment. Plants should always be placed so that the type and size of plant at its maturity is not crowded by the structure, inhibit passage at entries, or watering quantity and schedule challenges the health and growth of nearby plants.

HOA PATTERN: Foundation Planting



A foundation planting is planting of vegetation near the foundation of a structure designed to transition the view between the horizontal plane of the landscape and the vertical architecture of the building. It typically surrounds the entire structure in either the same or a variety of planting designs to create curb appeal for the property.

Homeowner association buildings are typically community centers, recreation facilities, conference/ meeting facilities, childcare facilities, storage units, gazebos, outdoor stages, or association offices. Although buildings in a common area function differently than for individual homes, they seem to require the same if not more need to mitigate the scale of the building to the human scale of visitors viewing, approaching, or using them. Hence, planting vegetation at this transition point, the foundation, between the human and built scales occurs in these areas. The foundations of many buildings also look rather barren, void of any architectural style, so the desire to hide them and provide greater aesthetic view in the space often occurs using foundation plantings. Furthermore, foundation planting may also serve to reduce utility costs, such as cooling and heating, by insulating the space around a foundation.

Classic style of foundation garden beds were arranged linear with lines in parallel to the building, with placement of beds near entry, corner, and to bridge gaps between. Foundation plantings, once installed in traditional classic style, over time may become overgrown, unattractive, or simply no longer functional. This pattern can be updated by redesign of one or more key areas (entry, corner, gap between) of the foundation garden to achieve a different aesthetic or resolution to scale and energy efficiency.

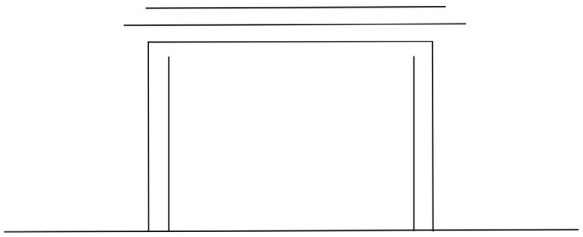
Consider curves rather than the traditional linear garden for creating greater space for planting and added visual interest by curving beds out away from the foundation.

Corner plantings should be placed far enough away from the building to not obscure it at maturity. Keep vegetation low and open near entries to prevent people or wildlife from hiding nearby, so people feel secure approaching doors. Consider plant choice which are different than the rest of the foundation garden, to draw awareness to the entry to transition people from the outdoor to the indoor environment.

For gap spaces between entry and corners which typically contain windows, keep plant choices in front of windows below sill height to allow best views of the property from inside, and views outside in, which provide queues that the building is active. To provide privacy to the building inhabitants, plants with height greater than the window sil can be considered. It is assumed that when following the planting guidance in this manual and working with professional landscape designers/architects that plant choices would be of appropriate size in these spaces to prevent damage to windows. Additional consideration should be given to plant texture though, in relation to the window to prevent screen damage and repair costs during growth.

Layer the vegetation with taller species in the back of the garden beds, medium size shrubs in the middle, and low lying accent or groundcover species in the front of the garden bed. Consider placing shorter vegetation in front of windows unless privacy is needed. Flank entries with specimens, plant varieties with unique characteristics, emphasizing their location, and providing a desired style, or an inviting aesthetic.

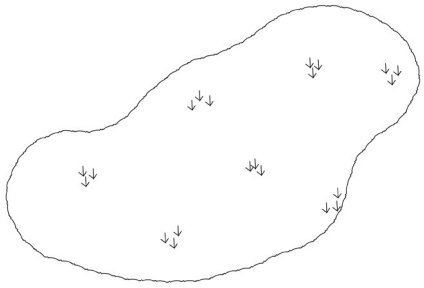
HOA PATTERN: Entry



To create welcoming spaces for building or common area outdoor entries, place in ground garden beds, or raised planters near thresholds or pass through. Place plants so that at their mature size they are 1-2 feet away from edge of planter so they don't disrupt circulation, don't inhibit plant growth, and prevent over pruning to maintain. Avoid plants such as cacti with thorns near the outer edge of the beds to prevent injury to those who pass by. Place specimens, plants with unique characteristics or prominent features, chosen for their ideal size or aesthetic value in these areas to create focal points drawing attention to primary access points. Place plants so that at their mature size they are 1-2 feet away from edge of any signage for optimal view. To minimize water runoff and increase water conservation mulch can be used to allow water infiltration and retain soil moisture. Up lighting in signage planters or at base of signs to illuminate them at night is recommended.

Keep vegetation low and open near entries to prevent people or wildlife from hiding nearby, so people feel secure approaching doors or entry thresholds. Consider plant choices which are different than the rest of the garden space, to draw awareness to the entry and transition people from the outer to the inner environment. Flank entries with specimens, plant varieties with unique characteristics, emphasizing their location, and providing a desired style, or an inviting aesthetic.

HOA Open Space

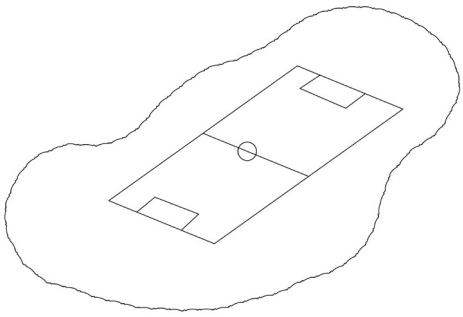


Open Space in homeowner association (HOA) common areas are defined here as land residing away from structures with plenty of room for natural or human activity. For purposes of this study, they are separated into patterns of Active and Passive Open Space categories.

Place nearby structures, recreation elements, and plants outside the open space to prevent obstruction of activity, prevent injury to participants/users, and enable optimal maintenance of the landscape.

In arid environments recreational activities which require open space should be only as large as functionally necessary. If a portion or all of an Open Space will be used for lawn, its boundary should be curvilinear to match irrigation spray patterns preventing over spray for best water application and enable easier mowing. Note, for water conservation only functional turfgrass (turfgrass utilized for recreation or other use, not intended for mere aesthetics) is recommended to remain in place only in sizes feasible for the intended function. Hardscape in open space areas should also be limited to functional use only or removed, to prevent increased temperatures in the arid environment increasing urban heat island effect. Alternative stabilized decomposed granite, permeable paving spaced for water infiltration, or other alternative permeable materials increase water infiltration to capture stormwater for replenishing aquifers and cooling ground temperatures.

HOA PATTERN: Active Open Space



Active Open Space is land set aside for formal outdoor recreation containing special facilities for organized sports training or competition. These facilities typically include permanent sports equipment, pools, playing fields or courts, and sometimes includes a small number of changing rooms or some spectator seating. The space is utilized by formal community sports teams for both recreational and competitive exercise.

Sports fields requiring turf should be planted with low-water use species turfgrass or synthetic turf, and maintained at a height required for use. Irrigation should be installed to prevent tripping hazards and regulate watering to only that required for the species grown. Vegetation for aesthetic purposes should be planted outside the open space to allow appropriate maintenance of the turf due to different water and growth requirements.

If the sport/activity requires equipment or use which trees are an obstruction, ensure trees or other outdoor shade structures are provided at seating locations outside the space for human comfort.

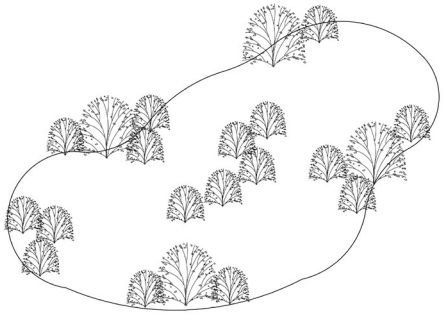
Provide access to the Active Open Space and place pathways away from the recreation facilities consisting of limited to no hardscape material to prevent tripping hazard and injury to players retrieving balls or sports equipment that goes outside the field/court during play.

Shade trees or structures should only be applied along boundaries of active spaces where the function does not include sport equipment which is flown through the air, such as balls which are hit or kicked higher than ground level, over or into nets, or into goals. This is to prevent obstruction during play and prevent injury to players and spectators from balls rebounding or ricocheting off natural or built shade elements, such as nearby trees or pergolas. This best practice also prevents injury to players from colliding into shade elements near the sport field/court, where the elements would reside to provide the best comfort to spectators or players on the sidelines.

Likewise, though resting areas are desired or required for some spectators, permanent seating structures should be kept to a minimum, small scale, intentionally oriented to be out of the line of play. As an alternative to large or permanent shade and seating elements, provide ample space surrounding or adjacent to the sport field/court for small scale permanent seating or for spectators to use temporary seating such as folding chairs, umbrellas, and blankets during games.

In pool areas, natural shade elements, trees or large shrubs, should be plant species which drop limited debri (leaves, pollen, blossoms) to reduce excessive pool maintenance and impact to water quality. The vegetation should also be species whose litter does not stain pool hardscape (decking or plaster) for best aesthetic quality. Stay away from plant species attractive to stinging pollinators, such as bees and wasps, due to their close vicinity to people using the pool space.

HOA PATTERN: Passive Open Space



Passive Open Space consists of either undeveloped land covered by vegetation set aside for conservation or land designed for community access for activity other than organized sports. These spaces do not contain prepared facilities for organized sports, though can be used for informal small scale ad hoc sport activity or exercise. These spaces include greenbelts, mini parks and playgrounds, spaces for rest and relaxation, and areas for entertainment or social gathering and community events.

Vegetation planted for undeveloped land use will need irrigation for establishment, and supplemental irrigation as needed during droughts, letting natural rainfall nourish them. Native plants or those adapted to the arid desert environment placed effectively in these locations will use less water and require little to no maintenance (such as pruning.) Trees will offer cooling microclimates for plants and wildlife, and reduced temperatures in these spaces. Layer shrubs, accents, and groundcovers around taller trees for natural aesthetic. Other more formal designs can be achieved using the same methodology.

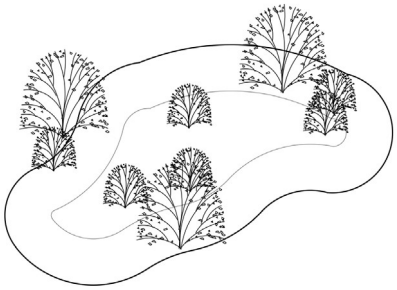
Provide plenty of shade preferably using natural trees vs structures.

To activate the space for wildlife or people, remove unnecessary boundary structures such as walls or fences. If visual or structural boundaries are necessary, keep them short and open for pass through. For example, stagger low walls with spaces between sections for wildlife to navigate through the open spaces. Provide intentional pathways for people with permeable material such as natural earth, decomposed granite, permeable pavers, or staggered pavers to allow water infiltration.

Desired aesthetic can be achieved by plant species and placement.

Entertainment, community events, or social function in Passive Open Space should provide ample space for gathering without overcrowding. Plant soft textured, flowering plants with aesthetic appeal around edge of space to decorate the space, without injuring visitors. Create a staging area at a prominent focal point of the space flexible enough for multiple uses. Place shade trees outside the edge of the area for ease of open space maintenance while protecting visitors from heat and sun. Ensure vegetation planted nearby isn't too dense for attracting unwanted wildlife.

HOA PATTERN: Passive Rainwater Harvest

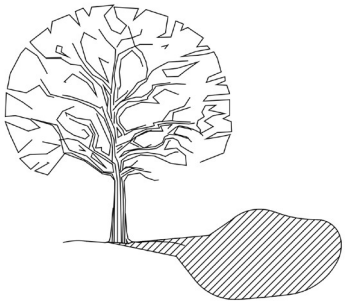


Rainwater harvesting can be accomplished by either active or passive methods. In the urban residential environment, active methods include man-made structural elements such as gutters and downspouts, cisterns/tanks, pumps, or pipes to capture, direct, and manage stormwater. Passive methods include swales, channels, berms, rain gardens, detention/retention basins. Passive Rainwater Harvest is landscape formed to naturally capture stormwater for irrigating vegetation and enabling stormwater infiltration to increase groundwater capacity without human intervention once established.

Rain gardens and detention basins should be placed in open spaces or between functional landscape to prevent obstruction of activity and obstruction of stormwater capture, management, and infiltration.

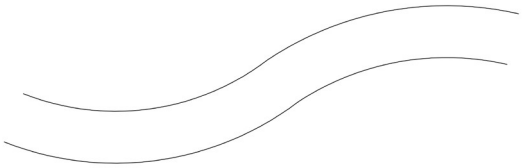
Vegetate basins and swales to prevent soil erosion, clean pollutants from water runoff, and promote infiltration. Similar to passive open space, vegetation planted for rainwater harvesting will need irrigation for establishment, and supplemental irrigation as needed during droughts, letting natural rainfall nourish them. Native plants or those adapted to the arid desert environment placed effectively in these locations will use less water and require little to no maintenance (such as pruning.) Trees will offer cooling microclimates for plants and wildlife, and reduced temperatures in these spaces. Layer shrubs, accents, and groundcovers around taller trees for natural aesthetic. Other more formal designs can be achieved using the same methodology. Desired aesthetic can be achieved by plant species and placement.

HOA PATTERN: Shade



For the arid desert environment, shade is necessary to provide human and wildlife comfort from the sun and cooler temperatures from the heat. Shade is recommended to be trees as natural shade provides greater cooling benefits from evapotranspiration, better air and water quality, and wildlife habitat. If trees are infeasible for a space due to type of function or space constraints of the existing location, then structural shade is recommended in a design consistent with the rest of the HOA structures for a cohesive sense of place. If shade in the form of trees or built structure is not feasible in the space, then size and spacing of seating should accommodate people wearing shade hats or temporarily utilizing handheld umbrellas.

HOA PATTERN: Path



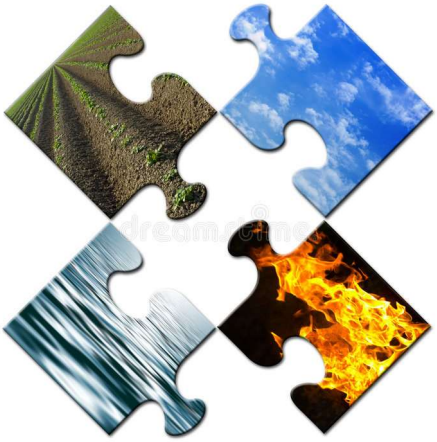
A path is best suited for linear spaces which allow connections between common areas. They should be at minimum 4 foot wide for accessibility purposes for pedestrians, and wide enough to accommodate multi-modal navigation as needed or desired (such as pedestrians and bicycles, minimum 6-8 feet wide.) Individual or multi-modal pathways should remain unplanted at grade for safe navigation. Place plants outside the Path to prevent obstructed navigation and injury to users. To promote water infiltration for groundwater conservation and nearby vegetation, paths should best consist of permeable material such as decomposed granite, permeable pavers, or pavers spaced apart for water infiltration.

HOA PATTERN: Streetscape

Landscape alongside streets/roadways present Streetscape patterns of planting. Streetscapes should contain trees for shading roads and sidewalks and vegetation to reduce ground temperatures, prevent soil erosion, and provide aesthetically pleasing meandering through neighborhoods. Unless grading requirements for nearby structures require it, soil should be a couple inches below planting space not elevated above sidewalk/roadway to prevent runoff and capture stormwater for water conservation. Trees should be planted in spaces at least 4 – 5 foot wide to allow proper space to grow and prevent tree roots from damaging hardscape paths such as sidewalks or roadways. Grasses, groundcover, or accent plants are best planted between the street and pathway to buffer pedestrians or bicyclists from automobiles.

CHAPTER 4

EXAMPLE PATTERN APPLICATIONS



"...patterns are still hypotheses...tentative, free to evolve under the impact of new experience and observation."

~ Christopher Alexander, A Pattern Language

Using the pattern language developed in the previous chapter, each pattern is applied to photographs from a photo inventory of existing challenges found in common areas of two homeowner association pilot communities. In order to provide visual understanding of their potential application, two applications are compared to explain how both an existing versus a new land use can be achieved using these landscape transformation pattern solutions for water efficiency. Following the comparison, one potential application for each pattern is shared as examples only.

Next, thematic land use categories were created grouping function and aesthetics into three main styles as a starting point for HOA transformation planning and communication with designers. The definitions of these categories for purposes of this landscape transformation study and land use are listed below, and associated plant categories are provided in the Appendix: Plant List.

Historic/Cultural Preservation Theme plantings consider vegetation with high biomass associated with deeper green foliage and providing a similar aesthetic prevalent in historic Tucson metropolitan region plantings at the time many historic neighborhoods/homeowner associations were incorporated into the regional boundaries.

Vegetation which provides attraction, food, or shelter for various wildlife or open space enrichment are considered within the Habitat Enhancement Theme.

Mostly native species of cacti, succulents, and plants identified as tolerant of the heat and arid conditions of the Sonoran Desert including finer textured shrubs are considered a Dynamic Desert Theme, since they represent an identifiable appearance of natural desert landscapes.

Then, a conceptual design topology was developed for each pattern matched with additional potential applications for each thematic land use theme, including 2-4 plants used from their associated plant palettes.

The idea is to provide a context for the application of the new landscape transformation pattern language within homeowner association common spaces to help communities better understand how the design concepts developed in this study can be utilized for moving to water efficient urban environments.

SAMPLE 1 PATTERN APPLICATION

BEFORE

The sample pattern application below presents a water wise planting solution to retain an original aesthetic for the historic planting design of the building Entry, Foundation, and Passive Open Space common areas of this 1965 established condominium homeowner association. Historically, planting design in this neighborhood included linear garden beds planted with high biomass vegetation of deep green foliage, citrus, ornamental blossoming plants, linear pruned dense hedges, and vast green lawns. Notice how this historical/cultural look can be retained by replacing high-water use vegetation with low-water use plantings which exhibit similar characteristics, while achieving water efficient landscape.

AFTER

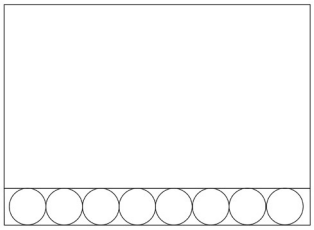
SAMPLE 2 PATTERN APPLICATION

The sample pattern application below shows a much different set of planting solutions for the same building Entry, Foundation, and Passive Open Space patterns of the previous sample. Notice how the habitat enhanced planting of the building Entry combined with a desert theme planted Foundation and Passive Open Space creates a light urban habitat for small wildlife such as birds, lizards, and butterflies while providing a warm and pleasing aesthetic to welcome visitors and residents alike. The open space could be blanketed with a denser planting of vegetation to achieve different styles or meet a variety of budgets.

BEFORE

AFTER

FOUNDATION PLANTING: HISTORICAL/CULTURAL PRESERVATION



Conceptual Design

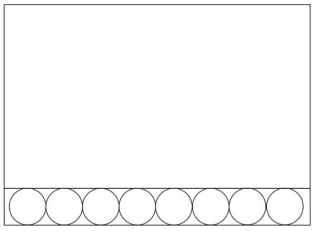
Transformation Theme Applied

Shrubby Germander
Teucrium fruticans

Associated Plant Palette

Foundation Planting: Planting of vegetation near foundation of a structure designed to transition the view between the horizontal plan of the landscape and the vertical architecture of the building.
Historical/Cultural Preservation: Vegetation with high biomass associated with deeper green foliage and providing a similar aesthetic which was prevalent in historic Tucson neighborhoods.

FOUNDATION PLANTING: HABITAT ENHANCEMENT



Conceptual Design

Transformation Theme Applied

Mexican Blue Sage
Salvia chamaedryoides

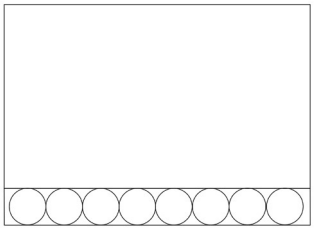
Desert Globe Mallow
Sphaeralcea ambigua

Associated Plant Palette

Brittlebush
Encelia farinosa

Foundation Planting: Planting of vegetation near foundation of a structure designed to transition the view between the horizontal plan of the landscape and the vertical architecture of the building.
Habitat Enhancement: Vegetation which provides attraction, food, or shelter for various wildlife or open space enrichment.

FOUNDATION PLANTING: DYNAMIC DESERT



Conceptual Design

Transformation Theme Applied

Totem Pole Cactus
Lophocereus schottii f. monstrosus

Purple Prickly Pear
Opunta santa-rita

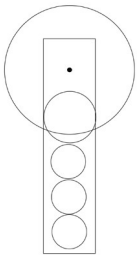
Feathery Senna
Senna artemisioides

Associated Plant Palette

Foundation Planting: Planting of vegetation near foundation of a structure designed to transition the view between the horizontal plan of the landscape and the vertical architecture of the building.

Dynamic Desert: Mostly native species of plants, cacti, and succulents identified as tolerant of the heat and arid conditions of the Sonoran Desert which represent an identifiable appearance of natural desert landscapes.

ENTRY: HISTORIC/CULTURAL PRESERVATION



Conceptual Design

Transformation Theme Applied

Little leaf Cordia
Cordia parviflora

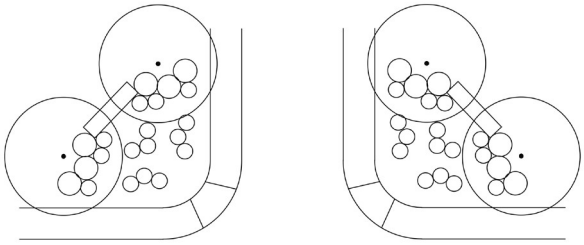
Baja Ruellia
Ruellia peninsularis

Texas Mountain Laurel
Sophora secundiflora

Associated Plant Palette

Entry: Threshold to a common building or to community itself.
Historical/Cultural Preservation: Vegetation with high biomass associated with deeper green foliage and providing a similar aesthetic which was prevalent in historic Tucson neighborhoods.

ENTRY: HABITAT ENHANCEMENT



Conceptual Design

Transformation Theme Applied

Red Bird of Paradise
Caesalpinia pulcherrima

Desert Milkweed
Asclepias subulata

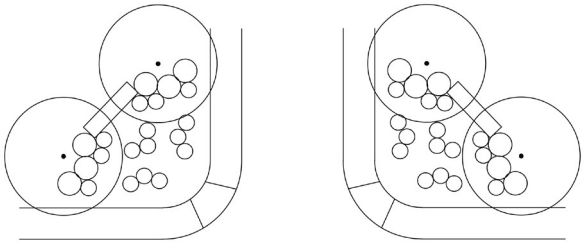
Gopher Plant
Euphorbia rigida

Texas Ebony
Ebenopsis ebano

Associated Plant Palette

Entry: Threshold to a common building or to community itself.
Habitat Enhancement: Vegetation which provides attraction, food, or shelter for various wildlife or open space enrichment.

ENTRY: DYNAMIC DESERT



Conceptual Design

Transformation Theme Applied

Totem Pole Cactus
Lophocereus schottii f. monstrosus

Purple Prickly Pear
Opunta santa-rita

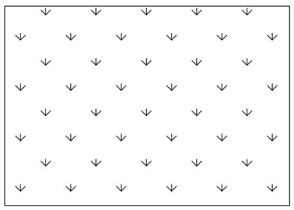
Blue Glow Agave
Agave 'Blue Glow'

Palo Brea
Parkinsonia praecox

Associated Plant Palette

Entry: Threshold to a common building or to community itself.
Dynamic Desert: Mostly native species of plants, cacti, and succulents identified as tolerant of the heat and arid conditions of the Sonoran Desert which represent an identifiable appearance of natural desert landscapes.

PASSIVE OPEN SPACE: HISTORICAL/CULTURAL PRESERVATION



Conceptual Design

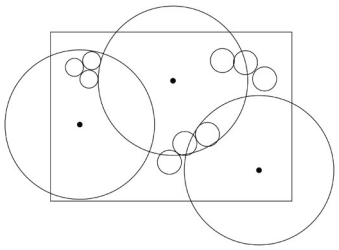
Transformation Theme Applied

Hybrid Bermuda Grass
Cynodon dactylon

Associated Plant Palette

Passive Open Space: Undeveloped land covered by vegetation set aside for conservation or land designed for community access for activity other than organized sports
Historical/Cultural Preservation: Vegetation with high biomass associated with deeper green foliage and providing a similar aesthetic which was prevalent in historic Tucson neighborhoods.

PASSIVE OPEN SPACE: HABITAT ENHANCEMENT



Conceptual Design

Transformation Theme Applied

Palo Brea
Parkinsonia praecox

Desert Milkweed
Asclepias subulata

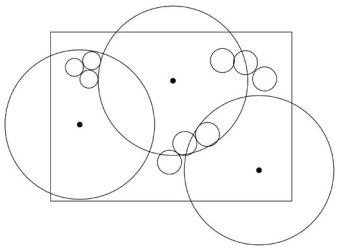
Apache Plume
Fallugia paradoxa

Chuparosa
Justicia californica

Associated Plant Palette

Passive Open Space: Undeveloped land covered by vegetation set aside for conservation or land designed for community access for activity other than organized sports
Habitat Enhancement: Vegetation which provides attraction, food, or shelter for various wildlife or open space enrichment.

PASSIVE OPEN SPACE: DYNAMIC DESERT



Conceptual Design

Transformation Theme Applied

Ocotillo
Fouquieria splendens

Golden Barrel
Echinocactus grusonii

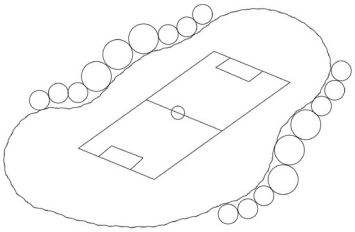
Red Yucca
Herperaloe parviflora

Moroccan Mound
Euphorbia resinifera

Associated Plant Palette

Passive Open Space: Undeveloped land covered by vegetation set aside for conservation or land designed for community access for activity other than organized sports
Dynamic Desert: Mostly native species of plants, cacti, and succulents identified as tolerant of the heat and arid conditions of the Sonoran Desert which represent an identifiable appearance of natural desert landscapes.

ACTIVE OPEN SPACE: HISTORIC/ CULTURAL PRESERVATION



Conceptual Design

Transformation Theme Applied

Red Bird of Paradise
Caesalpinia pulcherrima

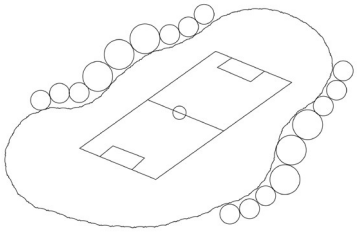
Rosemary
Rosmarinus officinalis

Synthetic Turfgrass

Associated Plant Palette

Active Open Space: Land set aside for formal outdoor recreation containing special facilities for organized sports training or competition
Historical/Cultural Preservation: Vegetation with high biomass associated with deeper green foliage and providing a similar aesthetic which was prevalent in historic Tucson neighborhoods.

ACTIVE OPEN SPACE: HABITAT ENHANCEMENT



Conceptual Design

Transformation Theme Applied

Feathery Senna
Senna artemisioides

Mexican Blue Sage
Salvia chamaedryoides

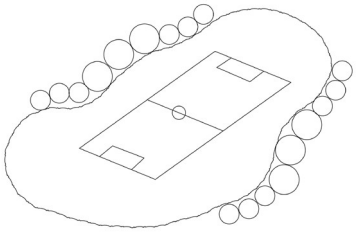
Desert Globe Mallow
Sphaeralcea ambigua

Synthetic Turfgrass

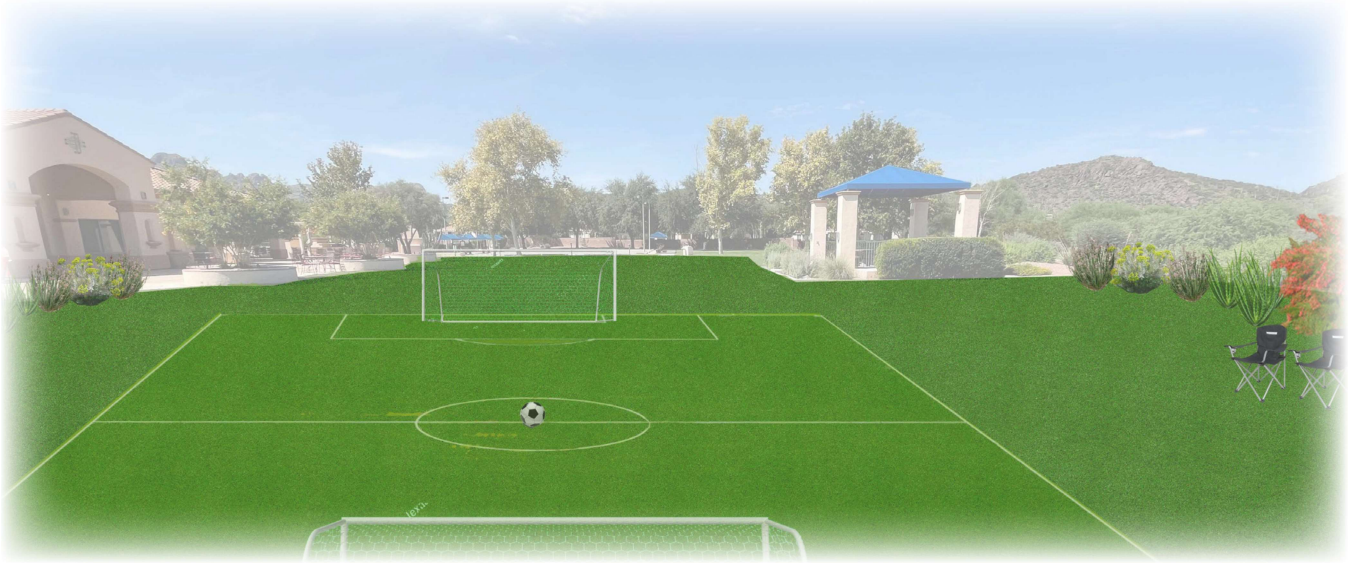
Associated Plant Palette

Active Open Space: Land set aside for formal outdoor recreation containing special facilities for organized sports training or competition
Habitat Enhancement: Vegetation which provides attraction, food, or shelter for various wildlife or open space enrichment.

ACTIVE OPEN SPACE: DYNAMIC DESERT



Conceptual Design



Transformation Theme Applied

Synthetic Turfgrass

Chuparosa
Justicia californica

Gopher Plant
Euphorbia rigida

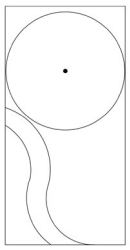
Medicinal Aloe
Aloe vera

Candelilla
Euphorbia antisyphilitica

Associated Plant Palette

Active Open Space: Land set aside for formal outdoor recreation containing special facilities for organized sports training or competition
Dynamic Desert: Mostly native species of plants, cacti, and succulents identified as tolerant of the heat and arid conditions of the Sonoran Desert which represent an identifiable appearance of natural desert landscapes.

SHADE / PATH: HISTORIC/CULTURAL PRESERVATION



Conceptual Design

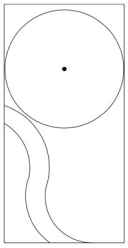
Transformation Theme Applied

Texas Mountain Laurel
Sophora secundiflora

Associated Plant Palette

Path: Connection between common areas.
Shade: Natural or structural protection from the sun.
Historical/Cultural Preservation: Vegetation with high biomass associated with deeper green foliage and providing a similar aesthetic which was prevalent in historic Tucson neighborhoods.

SHADE/PATH: HABITAT ENHANCEMENT



Conceptual Design

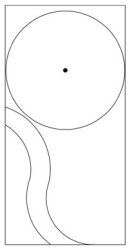
Transformation Theme Applied

Texas Ebony
Ebenopsis ebano

Associated Plant Palette

Path: Connection between common areas.
Shade: Natural or structural protection from the sun.
Habitat Enhancement: Vegetation which provides attraction, food, or shelter for various wildlife or open space enrichment.

SHADE / PATH: DYNAMIC DESERT



Conceptual Design

Transformation Theme Applied

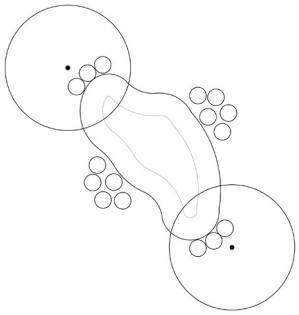
Palo Brea
Parkinsonia praecox

Associated Plant Palette

Path: Connection between common areas.
Shade: Natural or structural protection from the sun.

Dynamic Desert: Mostly native species of plants, cacti, and succulents identified as tolerant of the heat and arid conditions of the Sonoran Desert which represent an identifiable appearance of natural desert landscapes.

PASSIVE RAINWATER HARVEST: HISTORIC/CULTURAL PRESERVATION



Conceptual Design

Transformation Theme Applied

Native Fairy Duster
Calliandra eriophylla

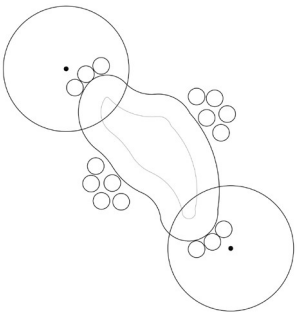
Bear Grass
Nolina macrocarpa

Chinese Pistache
Pistacia chinensis

Associated Plant Palette

Passive Rainwater Harvest: Landscape formed to naturally capture stormwater for irrigating vegetation and enable water infiltration to increase groundwater capacity without human intervention.
Historical/Cultural Preservation: Vegetation with high biomass associated with deeper green foliage and providing a similar aesthetic which was prevalent in historic Tucson neighborhoods.

PASSIVE RAINWATER HARVEST: HABITAT ENHANCEMENT



Conceptual Design

Transformation Theme Applied

Desert Globe Mallow
Sphaeralcea ambigua

Desert Milkweed
Asclepias subulata

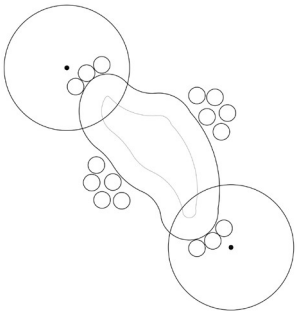
Bear Grass
Nolina macrocarpa

Texas Mountain Laurel
Sophora secundiflora

Associated Plant Palette

Passive Rainwater Harvest: Landscape formed to naturally capture stormwater for irrigating vegetation and enable water infiltration to increase groundwater capacity without human intervention.
Habitat Enhancement: Vegetation which provides attraction, food, or shelter for various wildlife or open space enrichment.

PASSIVE RAINWATER HARVEST: DYNAMIC DESERT



Conceptual Design

Transformation Theme Applied

Ocotillo
Fouquieria splendens

Golden Barrel
Echinocactus grusonii

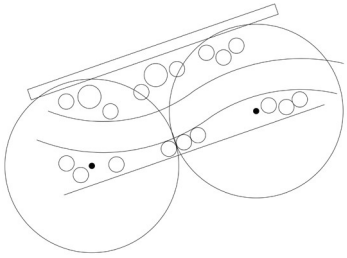
Parry's Agave
Agave parryi

Palo Brea
Parkinsonia praecox

Associated Plant Palette

Passive Rainwater Harvest: Landscape formed to naturally capture stormwater for irrigating vegetation and enable water infiltration to increase groundwater capacity without human intervention.
Dynamic Desert: Mostly native species of plants, cacti, and succulents identified as tolerant of the heat and arid conditions of the Sonoran Desert which represent an identifiable appearance of natural desert landscapes.

STREETSCAPE: HISTORIC/CULTURAL PRESERVATION



Conceptual Design

Transformation Theme Applied

Baja Ruellia
Ruellia peninsularis

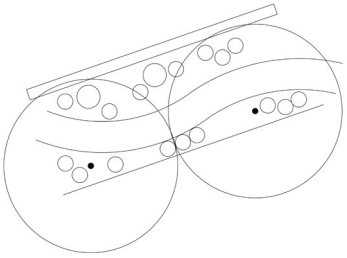
Bear Grass
Nolina macrocarpa

Fruitless Olive
Olea europaea

Associated Plant Palette

Streetscape: Landscape along streets/roadways.
Historical/Cultural Preservation: Vegetation with high biomass associated with deeper green foliage and providing a similar aesthetic which was prevalent in historic Tucson neighborhoods.

STREETSCAPE: HABITAT ENHANCEMENT



Conceptual Design

Transformation Theme Applied

Apache Plume
Fallugia paradoxa

Gopher Plant
Euphorbia rigida

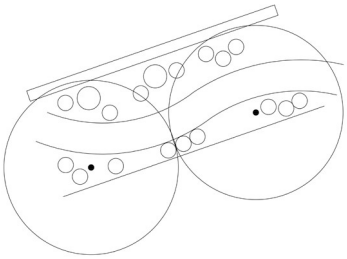
Desert Globe Mallow
Sphaeralcea ambigua

Mulga
ACacia aneura

Associated Plant Palette

Streetscape: Landscape along streets/roadways.
Habitat Enhancement: Vegetation which provides attraction, food, or shelter for various wildlife or open space enrichment.

STREETSCAPE: DYNAMIC DESERT



Conceptual Design

Transformation Theme Applied

Golden Barrel
Echinocactus grusonii

Red Bird of Paradise
Caesalpinia pulcherrima

Palo Brea
Parkinsonia praecox

Red Yucca
Herperaloe parviflora

Parry's Agave
Agave parryi

Associated Plant Palette

Streetscape: Landscape along streets/roadways.

Dynamic Desert: Mostly native species of plants, cacti, and succulents identified as tolerant of the heat and arid conditions of the Sonoran Desert which represent an identifiable appearance of natural desert landscapes.

APPENDIX

PLANT LIST

Figure A.1 Caesalpinia mexicana (Mexican Bird of Paradise)
Residential front yard in Marana, AZ

The purpose of the following plant list is to provide a foundation of native and adapted plants suited to the arid environment of the Southern Arizona and Sonoran Desert region, from which professionals assisting homeowner associations with landscape transformation projects may use as a starting point in discussion for planning planting design. The plant list is not exhaustive and only a basis for which to draw ideas, inspiration, and be able to readily begin transformation planning and design. Due to the extensive number of plants which could be included, it is recommended that any plants desired for aesthetic or function beyond what these categories offer, or questions about plants which best suit project design be addressed with landscape design and implementation professionals.

For purposes of this study, categories of plant aesthetics and function were simplified into three groups for visualizing landscape transformation pattern applications. Historic/Cultural Preservation includes plants with high biomass, many associated with deeper green leaves and provide similar aesthetic prevalent in historic Tucson Water Service Area metropolitan neighborhoods/homeowner associations established or incorporated into the city boundaries of the 1960s or prior. Plants included in the Habitat Enhancement category provide attraction, food, or shelter for various wildlife or enrich open space vegetation. Plants identified as tolerant of the heat and arid conditions of the Sonoran Desert, mostly native species including cacti and succulents, symbolic of natural desert landscapes are categorized into Dynamic Desert.

The list is grouped by these categories, then subdivided into trees, shrubs, groundcover/vines/grasses, cacti/succulents, with each section listed alphabetically by botanical name.

HISTORIC/CULTURAL PRESERVATION

**Historic/cultural preservation theme plantings for purposes of this study are plants with high biomass associated with deeper green foliage and providing a similar aesthetic which was prevalent in historic Tucson and regional neighborhoods.*

Trees

**Historic/cultural trees used for purposes of this study and transformation theme are listed here as trees with high biomass, deeper green foilage, or ornamental aesthetic.*

Botanical Name	Common Name	Mature Size (h x w)	Water Use	Bloom Season	Bloom Color
Acacia aneura	Mulga	5'x15'	Low	Spring	Yellow
Acacia craspedocarpa	Leatherleaf Acacia	10'x8'	Very Low	Sp,Su	Yellow
Bauhinia lunarioides	Anacacho Orchid Tree	8'x6'	Low	Sp,Su	White or Pink
Brahea armata	Mexican Blue Palm	15'x8'	Low	Summer	Creamy white
Chamaerops humilis	Mediterranean Fan Palm	10'x10'	Moderate	Summer	Cream
Dalbergia sissoo	Indian Rosewood	40'x40'	Moderate	Spring	Cream
Ebenopsis ebano	Texas Ebony	20'x15'	Low	Sp, Su	Cream/Yellow
Eysenhardtia orthocarpa	Kidneywood	15'x10'	Low	Summer	White
Lagerstroemia indica	Crape Myrtle	15'x12'	Low	Sp,Su	Purple, White, Pink
Lysiloma watsonii	Feather Bush	15'x15'	Low	Sp,Su	Cream
Olea europaea	Fruitless Olive	25'x25'	Low	Spring	Cream
Olneya tesota	Ironwood	25'x25'	Very Low	Spring	Dusty Lavender
Phoenix canariensis	Canary Island Date Palm	12'x20'	Low	Summer	Cream, White
Pistacia atlantica	Mt. Atlas Pistache	30'x30'	Low	Summer	Greenish White
Pistacia chinensis	Chinese Pistache	40'x40'	Moderate	Fall	Red Leaves
Pistacia lentiscus	Mastic	15'x20'	Low	Spring	Green
Punica granatum	Pomegranate	8'x'6'	Moderate	Spring	Red Orange
Quercus virginiana	Live Oak	40'x50'	Moderate	Spring	Green
Sophora secundiflora	Texas Mountain Laurel	8'x6'	Low	Spring	Purple
Tara cacalaco	Cascalote	15'x15'	Low	W,Sp	Yellow
Ungnadia speciosa	Mexican Buckeye	10'x10'	Low	Spring	Rose Pink
Vitex agnus-castus	Chaste Tree	20'x20'	Moderate	Su,F	Lavender

Historical/Cultural Preservation: Vegetation with high biomass associated with deeper green foliage and providing a similar aesthetic which was prevalent in historic Tucson neighborhoods.

HISTORIC/CULTURAL PRESERVATION

Shrubs

**Historic/cultural shrubs used for purposes of this study and transformation theme are listed here as shrubs with high biomass, deeper green leaves, or ornamental aesthetic.*

Botanical Name	Common Name	Mature Size (h x w)	Water Use	Bloom Season	Bloom Color
Aniscanthis quadrifidus	Flame Honeysuckle	3'x4'	Low	Su, F	Orange Red
Berberis trifoliolata	Barberry	5'x5'	Very Low	W, Sp	Yellow
Buddleja marrubiifolia	Woolly Butterfly Bush	5'x5'	Very Low	Sp,Su	Orange
Caesalpinia gilliesii	Yellow Bird of Paradise	6'x5'	Low	Sp,F	Yellow, Red stamen
Caesalpinia mexicana	Mexican Bird of Paradise	10'x8"	Very Low	Sp,F	Yellow
Caesalpinia pulcherrima	Red Bird of Paradise	6'x6'	Low	Sp,F	Orange, Yellow
Cordia boissieri	Texas Olive	10'x10'	Moderate	Sp, F	White
Cordia parvifolia	Little Leaf Cordia	6'x6'	Very Low	Sp,F	White
Carissa macrocarpa	Natal Plum	8'x8'	Low, Drought	Sp, Su	White
Dalea frutescens	Black Dalea	3'x4'	Low	F,W	Rose Purple
Dalea pulchra	Bush Dalea	4'x5'	Low	W,Sp	Violet
Dicliptera resupinata	Dicliptera	2'x3'	Low	Sp, Su, F	Purple
Dodonea viscosa	Hop Bush	10'x8'	Low	Spring	Green Tan
Eremophila maculata	Emu Bush	5'x5'	Low, Drought	W,Sp	Red
Guaiacum coulteri	Guayacan	5'x5'	Low	Summer	Deep Violet Blue
Hamelia patens	Firecracker Bush	4'x4'	Moderate	Summer	Red Orange
Justicia candicans	Red Justicia	3'x3'	Moderate	F,Sp	Bright Red
Leucophyllum candidum	Violet Silverleaf	3'x3'	Very Low	Su,F	Deep Violet
Leucophyllum frutescens	Texas Sage	6'x6'	Very Low	Su,F	White, pink,purple
Leucophyllum laevigatum	Chihuahuan Sage	4'x5'	Very Low	Su,F	Lavender
Leucophyllum langmaniae	Langman's Sage	5'x5'	Very Low	Su,F	Lavender
Myrtus communis	Myrtle	5'x4'	Moderate	Spring	White
Nerium oleander	Oleander	6'x4'	Low	Sp, F	White, Pink, Red
Plumbago scandens	Plumbago	2'x3'	Moderate	Su,F	White
Punica granatum	Pomegranate	8'x6'	Moderate	Spring	Orange Red
Rosa banksiae	Lady Bank's Rose	20'x15'+	Low, Drought	Spring	Yellow
Rhus ovata	Sugar Bush	6'x6'	Low	Spring	Red,Pink,White
Ruellia peninsularis	Baja Ruellia	3'x4'	Low	Sp, F	Purple
Salvia chamaedryoides	Mexican Blue Sage	2'x2'	Low	Sp,F	sky blue
Salvia leucantha	Mexican Sage	4'x4'	Low	Sp,F	Lavender
Senna artemisioides	Feathery Senna	6'x6'	Very Low	W, Sp	Yellow
Senna wislizenii	Shrubby Senna	4'x6'	Very Low	Summer	Bright Yellow
Simmondsia chinensis	Jojoba	6'x6'	Very Low	Spring	Yellow Green
Sophora secundiflora	Texas Mountain Laurel	8'x6'	Low	Spring	Purple
Tecoma capensis	Cape Honeysuckle	6'x6'	Moderate	Sp,Su,F,W	Orange Red
Teucrium fruticans	Shrubby Germander	8'x8'	Low	Sp, F	Blue, Lavender
Tecoma stans	Yellow Bells	6'x6'	Low	Sp, F	Bright Yellow
Vauquelinia californica	Arizona Rosewood	10'x8'	Low	Summer	White

**Additional aesthetic can be achieved through supplemental planting of additional seasonal annuals or perennials not listed here.*

Historical/Cultural Preservation: Vegetation with high biomass associated with deeper green foilage and providing a similar aesthetic which was prevalent in historic Tucson neighborhoods.

HISTORIC/CULTURAL PRESERVATION

Groundcover/Vines/Grasses/Succulents

**For turfgrass, either synthetic turf or Hybrid Bermuda Grass (Cynodon dactylon) is the standard grass for arid environments due to its tolerance for heat and high foot traffic. Grasses included in the plant list are native vegetation meant for open space aesthetic and not replacement for turfgrass functional areas.*

Botanical Name	Common Name	Mature Size (h x w)	Water Use	Bloom Season	Bloom Color
Acacia redolens	Freeway/Trailing Acacia	1'x10'	Low	Spring	Yellow
Antigonon leptopus	Queen's Wreath	40'x15'	Very Low, Drought	Su, F	Hot Pink
Bougainvillea spp.	Bougainvillea	15'x20'	Low	Sp,Su,F,W	Many varieties
Bouteloua spp.	Grama Grass	.5'x1'	Low	Su, F	Variety of colors
Cissus trifoliata	Grape Ivy	15'x10'	Low	Summer	Green
Concolvulus cneorum	Bush Morning Glory	2'x3'	Very Low	Spring	White
Dalea greggii	Trailing Indigo Bush	2'x6'	Low, Drought	Sp,Su	Indigo purple
Dolichondra unguis-cati	Cat Claw Vine	25'x15'	Low	Spring	Yellow
Erioneuron pulchellum	Fluffgrass	.5'x.5'	Very Low	Su, F	White
Lantana camara	Lantana	3'x5'	Moderate	Sp,Su	multiple
Lantana montevidensis	Trailing Lantana	1'x5'	Moderate	Sp,Su	lavender
Mascagnia macropterum	Yellow Orchid Vine	15'x15'	Low	Sp, Su	Yellow
Muhlenbergia capillaris	Pink Muhly	3'x3'	Low	Fall	Pink
Muhlenbergia capillaris 'Regal Mist'	Regal Mist	3'x3'	Low	Fall	Pink
Muhlenbergia emersleyi	Bullgrass	4'x4'	Low	Fall	Purple, Tan
Muhlenbergia lindheimeri	Autumn Glow	5'x5'	Low	Fall	Yellow Tan
Muhlenbergia rigens	Deer Grass	4'x4'	Low	Su, F	Tan
Myoporum parvifolium	Myoporum	1'x6'	Low	Spring	White
Nolina bigelovii	Bigelow's Beargrass	6'x4'	Very Low	Summer	Cream
Nolina macrocarpa	Sacahuista Beargrass	3'x6'	Very Low	Summer	Greenish White
Nolina texana	Texas Sacahuista	3'x3'	Very Low	Spring	White
Rosa Banksiae	Lady Bank's Rose	20'x15'	Very Low, Drought	Spring	White, Pale yellow
Rosmarinus officinalis	Trailing Rosemary	2'x4'	Low	W,Sp	Blue
Sphagneticola tribolata	Yellow Dot	2'x6'	Moderate	Sp, Su	Yellow
Teucrium chamaedrys	Postrate Germander	1'x3'	Low	Sp,Su, F	Lavender
Verbena gooddingii	Goodding Verbena	2'x4'	Very Low	Sp,Su,F	Lavender,Pink

**Additional aesthetic can be achieved through supplemental planting of additional seasonal annuals or perennials not listed here.*

Historical/Cultural Preservation: Vegetation with high biomass associated with deeper green foliage and providing a similar aesthetic which was prevalent in historic Tucson neighborhoods.

HABITAT ENHANCEMENT

**For purposes of this study and landscape transformation use, habitat enhancement theme plantings included here are those which provide attraction, food, or shelter for various wildlife or open space vegetation enrichment.*

Trees

**Habitat trees used for purposes of this study and transformation theme are listed here as trees which provide attraction, food, or shelter for various arid environment wildlife species.*

Botanical Name	Common Name	Mature Size (h x w)	Water Use	Bloom Season	Bloom Color
Acacia aneura	Mulga	15'x15'	Low	Spring	Yellow
Acacia craspedocarpa	Leatherleaf Acacia	10'x8'	Very Low	Sp,Su	Yellow
Acacia salicina	Willow Acacia	30'x15'	Low	Spring	Cream
Acacia stenophylla	Shoestring Acacia	30'x20'	Very Low	F, W	Creamy
Bauhinia lunarioides	Anacacho Orchid Tree	8'x6'	Low	Sp,Su	White or Pink
Chilopsis linearis	Desert Willow	25'x20'	Low	Sp, F	Purple, White, pink
Dalbergia sissoo	Indian Rosewood	40'x40'	Moderate	Spring	Cream
Ebenopsis ebano	Texas Ebony	20'x15'	Low	Sp, Su	Cream/Yellow
Eysenhardtia orthocarpa	Kidneywood	15'x10'	Low	Summer	White
Havardia mexicana	Mexican Ebony	30'x20'	Low	Spring	Cream
Havardia pallens	Tenaza	25'x12'	Low	Summer	Cream
Lagerstroemia indica	Crape Myrtle	15'x12'	Low	Sp,Su	Purple, White,Pink
Lysiloma watsonii	Feather Bush	15'x15'	Low	Sp,Su	Cream
Mariosousa willardiana	Palo Blanco	20'x10'	Very Low	Spring	Cream
Olea europaea	Fruitless Olive	25'x25'	Low	Spring	Cream
Olneya tesota	Ironwood	25'x25'	Very Low	Spring	Dusty Lavender
Parkinsonia florida	Blue Palo Verde	30'x30'	Very Low	Spring	Bright Yellow
Parkinsonia microphylla	Foothills Palo Verde	15'x15'	Very Low	Spring	Sulfur Yellow
Parkinsonia praecox	Palo Brea	25'x25'	Very Low	Spring	Bright Yello
Pistacia atlantica	Mt. Atlas Pistache	30'x30'	Low	Summer	Greenish White
Pistacia chinensis	Chinese Pistache	40'x40'	Moderate	Fall	Red Leaves
Pistacia lentiscus	Mastic Tree	15'x20'	Low	Spring	Green
Prosopis alba	South American Mesquite	30'x30'	Very Low	Spring	Yellowish Green
Prosopis glandulosa	Texas Honey Mesquite	30'x30'	Very Low	Spring	Pale Yellow
Prosopis pubescens	Screwbean Mesquite	20'x20'	Low	Spring	Yellow
Prosopis velutina	Velvet Mesquite	25'x25'	Very Low	Spring	Pale Yellow
Quercus virginiana	Live Oak	40'x40'	Moderate	Spring	Green
Senegalia berlandieri	Guajillo	15'x15'	Low	Spring	Cream
Sophora secundiflora	Texas Mountain Laurel	8'x6'	Low	Spring	Purple
Tara cacalaco	Cascalote	15'x15'	Low	W,Sp	Yellow
Ungnadia speciosa	Mexican Buckeye	10'x10'	Low	Spring	Rose Pink
Vachellia constricta	White Thorn Acacia	10'15'	Very Low	Sp,Su	Yellow
Vachellia farnesiana	Sweet Acacia	20'x20'	Low	W,Sp	Golden Yellow
Vitex agnus-castus	Chaste Tree	20'x20'	Low	Su,F	Lavender

Habitat Enhancement: Vegetation which provides attraction, food, or shelter for various wildlife or enrichment of open space.

HABITAT ENHANCEMENT

Shrubs

**Habitat shrubs used for purposes of this study and transformation theme are listed here as shrubs which provide attraction, food, or protection of various arid environment wildlife species.*

Botanical Name	Common Name	Mature Size (h x w)	Water Use	Bloom Season	Bloom Color
Abutilon pameri	Superstition Mallow	4'x3'	Low	Sp,F	Orange-Yellow
Aloysia gratissima	Bee Brush	6'x6'	Very Low	S,F	White, Pale Purple
Ambrosia deltoidea	Triangleleaf Bursage	1'x2'	Very Low	W,Sp	Green
Aniscanthis quadrifidus	Flame Honeysuckle	3'x4'	Low	Su, F	Orange Red
Asclepias angustifolia	Arizona Milkweed	2'x2'	Low	Summer	Whitish Pink
Asclepias asperula	Antelope Horns Milkweed	2'x2'	Low	Sp,Su	Green Yellow Maroon
Asclepias englemanniania	Englemann's Milkweed	4'x4'	Low	Summer	Pale Green
Asclepias linaria	Pineneedle Milkweed	3'x3'	Low	W,Sp,Su,F	Greenish White
Asclepias subulata	Desert Milkweed	3'x3'	Very Low	Sp,Su,F	Whitish Green
Asclepias subverticillata	Horsetail Milkweed	2'x2'	Low	Sp, Su	White
Asclepias tuberosa	Butterfly Weed	2'x2'	Low	Summer	Orange
Atriplex canescens	Fourwing Saltbush	5'x8'	Very Low	Sp,Su	Green
Bahiopsis parishii	Goldeneye	3'x3'	Very Low	Spring	Yellow
Berberis trifoliolata	Barberry	5'x5'	Very Low	W, Sp	Yellow
Buddleja marrubiifolia	Woolly Butterfly Bush	5'x5'	Very Low	Sp,Su	Orange
Caesalpinia gilliesii	Yellow Bird of Paradise	6'x5'	Low	Sp,F	Yellow, Red stamen
Caesalpinia mexicana	Mexican Bird of Paradise	10'x8"	Very Low	Sp,F	Yellow
Caesalpinia pulcherrima	Red Bird of Paradise	6'x6'	Low	Sp,F	Orange, Yellow
Calliandra erophylla	Native/Pink Fairy Duster	3'x4'	Very Low	Sp, F	Pink
Calliandra californica	Baja Fairy Duster	5'x5'	Low	Sp,F	Red
Carissa macrocarpa	Natal Plum	8'x8'	Low, Drought	Sp, Su	White
Celtis pallida	Desert Hackberry	8'x10'	Very Low	Spring	Yellow Green
Cordia boissieri	Texas Olive	10'x10'	Moderate	Sp, F	White
Cordia parvifolia	Little Leaf Cordia	6'x6'	Very Low	Sp,F	White
Dalea frutescens	Black Dalea	3'x4'	Low	F,W	Rose Purple
Dalea pulchra	Bush Dalea	4'x5'	Low	W,Sp	Violet
Encelia farinosa	Brittlebush	3'x4'	Very Low	W,Sp	Yellow
Dodonea viscosa	Hop Bush	10'x8'	Low	Spring	Green, Tan
Ephedra nevadensis	Desert Tea	3'x3'	Low	Spring	Green
Eremophila maculata	Emu Bush	5'x5'	Low, Drought	W,Sp	Red
Eriogonum fasciculatum polifolium	Flattop Buckwheat	1'x2'	Very Low	Spring	Pale Pink,White
Fallugia paradoxa	Apache Plume	6'x6'	Low, Drought	Sp, Su, F	White
Guaiacum coulteri	Guayacan	5'x5'	Low	Summer	Deep Violet Blue
Hamelia patens	Firecracker Bush/Firebush	4'x4'	Moderate	Summer	Red Orange
Hyptis emoryi	Desert Lavender	6'x4'	Very Low	Spring	Lavender
Justicia californica	Chuparosa	4'x4'	Low	W,Sp	Red Orange
Justicia candicans	Red Justicia	3'x3'	Moderate	F,Sp	Bright Red

Habitat Enhancement: Vegetation which provides attraction, food, or shelter for various wildlife or enrichment of open space.

HABITAT ENHANCEMENT

Botanical Name	Common Name	Mature Size (h x w)	Water Use	Bloom Season	Bloom Color
Larrea tridentata	Creosote	6'x6'	Very Low	Sp,F	Yellow
Leucophyllum candidum	Violet Silverleaf	3'x3'	Very Low	Su,F	Deep Violet
Leucophyllum frutescens	Texas Sage	6'x6'	Very Low	Su, F	White, pink,purple
Leucophyllum laevigatum	Chihuahuan Sage	4'x5'	Very Low	Sp,Su,F,W	Lavender
Leucophyllum langmaniae	Langman's Sage	5'x5'	Very Low	Su,F	Lavender
Lycium fremontii	Wolfberry	8'x8'	Very Low	W,Sp,F	White, Lavender
Muhlenbergia rigens	Deer Grass	4'x4'	low	Summer	Tan
Myrtus communis	Myrtle	5'x4'	Moderate	Spring	White
Nerium oleander	Oleander	6'x4'	Low	Sp, F	White, Pink, Red
Plumbago scandens	Plumbago	4'x4'	Low	Sp,Su,F	White
Rhus ovata	Sugar Bush	6'x6'	Low, Drought	Spring	Pink,White
Rosa banksiae	Lady Bank's Rose	20'x15'	Very Low, Drought	Spring	White, Pale yellow
Ruellia peninsularis	Baja Ruellia	3'x4'	Low	Sp, F	Purple
Salvia chamaedryoides	Mexican Blue Sage	2'x2'	Low	Sp,F	sky blue
Salvia leucantha	Mexican Sage	4'x4'	Low	Sp,F	Lavender
Senna artemisioides	Feathery Senna	6'x6'	Very Low	W, Sp	Yellow
Senna wislizenii	Shrubby Senna	4'x6'	Very Low	Summer	Bright Yellow
Simmondsia chinensis	Jojoba	6'x6'	Very Low	Spring	Yellow Green
Sophora secundiflora	Texas Mountain Laurel	8'x6'	Low	Spring	Purple
Sphaeralcea ambigua	Desert Globe Mallow	4'x4'	Low	Sp, Su, F, W	Orange, multi
Tecoma capensis	Cape Honeysuckle	6'x6'	Moderate	Sp,Su,F,W	Orange Red
Tecoma stans	Yellow Bells	6'x6'	Low	Sp, F	Bright Yellow
Teucrium fruticans	Shrubby Germander	8'x8'	Low	Sp, F	Blue, Lavender
Vauquelinia californica	Arizona Rosewood	10'x8'	Low	Summer	White
Ziziphus obtusifolia v. canescens	Gray Thorn	6'x8'	Very Low	Summer	Cream

**Additional aesthetic can be achieved through supplemental planting of additional seasonal annuals or perennials not listed here.*

Habitat Enhancement: Vegetation which provides attraction, food, or shelter for various wildlife or enrichment of open space.

HABITAT ENHANCEMENT

Groundcover/Vines/Grass/Succulents

**For turfgrass, either synthetic turf or Hybrid Bermuda Grass (Cynodon dactylon) is the standard grass for arid environments due to its tolerance for heat and high foot traffic. Grasses included in the plant list are native vegetation meant for open space aesthetic and not replacement for turfgrass functional areas.*

Botanical Name	Common Name	Mature Size (h x w)	Water Use	Bloom Season	Bloom Color
Acacia redolens	Freeway/Trailing Acacia	1'x10'	Low	Spring	Yellow
Antigonon leptopus	Queen's Wreath	20'x15'	Very Low, drought	Su, F	Hot Pink
Bougainvillea spp.	Bougainvillea	15'x20'	Low	Sp,Su,F,W	Many varieties
Bouteloua spp.	Grama Grass	.5'x1'	Low	Su, F	Variety of colors
Cissus trifoliata	Grape Ivy	15'x10'	Low	Summer	Green
Concolvulus cneorum	Bush Morning Glory	2'x3'	Very Low	Spring	White
Chrysactinia mexicana	Damianita	2'x2'	Very Low	Sp,F	Yellow
Dalea greggii	Trailing Indigo Bush	2'x6'	Low, Drought	Sp,Su	Indigo purple
Dasylirion acrotriche	Green Desert Spoon	4'x5'	Low	Su, F	Cream
Dasylirion leiophyllum	Smooth Leaf Sotol	4'x6'	Low	Spring	Greenish Yellow
Dasylirion quadrangulatum	Toothless Desert Spoon	4'x5'	Low	Spring	Greenish & White
Dasylirion texanum	Texas Sotol	5'x5'	Low	Sp,Su,F	Creamy White
Dasylirion wheeleri	Desert Spoon	4'x4'	Low	Sp, Su	Cream
Dolichondra unguis-cati	Cat Claw Vine	25'x15'	Low	Spring	Yellow
Erioneuron pulchellum	Fluffgrass	.5'x.5'	Very Low	Su, F	White
Euphorbia ridida	Gopher Plant	2'x3'	Very Low	W,Sp	Green
Hesperaloe funifera	Giant Herperaloe	5'x5'	Very Low	Sp, Su	Greenish White
Hesperaloe funifera	Giant Yucca	6'x6'	Low, drought	Spring	White
Hesperaloe parviflora	Red Yucca	3'x3'	Very Low	Sp, Su, F	Red Coral
Lantana camara	Lantana	3'x5'	Moderate	Sp,Su	multiple
Lantana montevedensis	Trailing Lantana	1'x5'	Moderate	Sp,Su	lavender
Muhlenbergia capillaris	Pink Muhly	3'x3'	Low	Fall	Pink
Mulenbergia lindheimeri	Autumn Glow	5'x5'	Low	Fall	Yellow Tan
Nolina bigelovii	Bigelow's Beargrass	6'x4'	Very Low	Summer	Cream
Nolina macrocarpa	Sacahuista Beargrass	3'x6'	Very Low	Summer	Greenish White
Nolina texana	Texas Sacahuista	3'x3'	Very Low	Spring	White
Mascagnia macropterum	Yellow Orchid Vine	15'x15'	Low	Sp, Su	Yellow
Muhlenbergia capillaris 'Regal Mist'	Regal Mist	3'x3'	Low	Fall	Pink
Muhlenbergia emersleyi	Bullgrass	4'x4'	Low	Fall	Purple, Tan
Muhlenbergia rigens	Deer Grass	4'x4'	Low	Su, F	Tan
Rosa Banksiae	Lady Bank's Rose	20'x15'	Very Low, Drought	Spring	White, Pale yellow
Rosmarinus officinalis	Trailing Rosemary	2'x4'	Low	W,Sp	Blue
Teucrium chamaedrys	Prostrate Germander	1'x3'	Moderate	W,Sp	Pale Pink
Verbena gooddingii	Verbena	2'x4'	Low	Sp,Su,F	lavender

Habitat Enhancement: Vegetation which provides attraction, food, or shelter for various wildlife or enrichment of open space.

DYNAMIC DESERT

** For purposes of this study and landscape transformation use, desert theme plantings included here are those identified as tolerant of heat and arid conditions of the Sonoran Desert, with finer textured shrubs, mostly native species, and cacti/ succulents symbolic of natural desert landscapes.*

Trees

**Dynamic Desert trees used for purposes of this study and landscape transformation are those species tolerant of heat and arid conditions of the Sonoran Desert, with finer texture, mostly native species, symbolic of natural desert landscapes.*

Botanical Name	Common Name	Mature Size (h x w)	Water Use	Bloom Season	Bloom Color
Acacia aneura	Mulga	15'x15'	Low	Spring	Yellow
Acacia craspedocarpa	Leatherleaf Acacia	10'x8'	Very Low	Sp,Su	Yellow
Acacia gregii	Catclaw Acacia	15'x20'	Very Low	Sp, Su	Cream Yellow
Acacia salicina	Willow Acacia	30'x15'	Low	Spring	Cream
Acacia stenophylla	Shoestring Acacia	30'x20'	Very Low	F, W	Creamy
Caesalpinia cacalaco	Cascalote	15'x15'	Low	W, Sp	Yellow
Chilopsis linearis	Desert Willow	25'x20'	Low	Sp, F	Purple, White, pink
Ebonopsis eboni	Texas Ebony	20'x20'	Low	Spring	Cream
Eysenhardtia orthocarpa	Kidneywood	15'x10'	Low	Summer	White
Havardia mexicana	Mexican Ebony	30'x20'	Low	Spring	Cream
Havardia pallens	Tenaza	25'x12'	Low	Summer	Cream
Lysiloma watsonii	Feather Bush	15'x15'	Low	Sp,Su	Cream
Mariosousa willardiana	Palo Blanco	20'x10'	Very Low	Spring	Cream
Olneya tesota	Ironwood	25'x25'	Very Low	Spring	Dusty Lavender
Parkinsonia 'Desert Museum'	Desert Museum Palo Verde	25'x25'	Very Low	Sp, Su	Yellow
Parkinsonia florida	Blue Palo Verde	30'x30'	Very Low	Spring	Bright Yellow
Parkinsonia microphylla	Foothills Palo Verde	15'x15'	Very Low	Spring	Sulfur Yellow
Parkinsonia praecox	Palo Brea	25'x25'	Very Low	Spring	Bright Yellow
Prosopis chilensis or alba	South American Mesquite	30'x30'	Very Low	Spring	Yellow Green
Prosopis glandulosa	Texas Honey Mesquite	30'x30'	Very Low	Spring	Pale Yellow
Prosopis pubescens	Screwbean Mesquite	20'x20'	Low	Spring	Yellow
Prosopis velutina	Velvet Mesquite	25'x25'	Very Low	Spring	Pale Yellow
Senegalia berlandieri	Guajillo	15'x15'	Low	Spring	Cream
Sophora secundiflora	Texas Mountain Laurel	8'x6'	Low	Spring	Purple
Vachellia constricta	White Thorn Acacia	10'15'	Very Low	Sp,Su	Yellow
Vachellia farnesiana	Sweet Acacia	20'x20'	Low	W,Sp	Golden Yellow
Vachellia rigidula	Blackbrush Acacia	12'x12'	Very Low	Spring	Light Yellow
Vitex agnus-castus	Chaste Tree	20'x20'	Moderate	Su,F	Lavender

Dynamic Desert: Vegetation identified as tolerant of heat and arid conditions of the Sonoran Desert, with finer texture, mostly native species, and cacti/succulents symbolic of natural desert landscapes.

DYNAMIC DESERT

Shrubs

**Desert shrubs used for purposes of this study and transformation theme are listed here as shrubs with finer texture (lower biomass) prevalent in native species found in the low Sonoran Desert environment.*

Botanical Name	Common Name	Mature Size (h x w)	Water Use	Bloom Season	Bloom Color
Asclepias subulata	Desert Milkweed	3'x3'	Very Low	Sp,Su,F	Whitish Green
Asclepias angustifolia	Arizona Milkweed	2'x2'	Low	Summer	Whitish Pink
Asclepias linaria	Pineneedle Milkweed	3'x3'	Low	W,Sp,Su,F	Greenish White
Asclepias subverticillata	Horsetail Milkweed	2'x2'	Low	Sp, Su	White
Asclepias englemanniania	Englemann's Milkweed	4'x4'	Low	Summer	Pale Green
Asclepias tuberosa	Butterfly Weed	2'x2'	Low	Summer	Orange
Asclepias asperula	Antelope Horns Milkweed	2'x2'	Low	Sp,Su	Green Yellow Maroon
Abutilon pameri	Superstition Mallow	4'x3'	Low	Sp,F	Orange-Yellow
Ambrosia bursage	Triangleleaf Bursage	1'x2'	Very Low	W,Sp	Green
Atriplex canescens	Fourwing Saltbush	5'x8'	?very low	Sp,Su	Green
Bahiopsis parishii	Goldeneye	3'x3'	Very Low	Spring	Yellow
Buddleja marrubiifolia	Woolly Butterfly Bush	5'x5'	Very Low	Sp,Su	Orange
Cassia nemophila	Desert Senna	6'x6	Very Low	Spring	Yellow
Caesalpinia gilliesii	Yellow Bird of Paradise	6'x5'	Low	Sp,F	Yellow, Red stamen
Caesalpinia mexicana	Mexican Bird of Paradise	10'x8''	Very Low	Sp,F	Yellow
Caesalpinia pulcherrima	Red Bird of Paradise	6'x6'	Low	Sp,F	Orange, Yellow
Calliandra californica	Baja Fairy Duster	5'x5'	Low/Mod	Sp,F	Red
Calliandra erophylla	Native/Pink Fairy Duster	3'x4'	Very Low	Sp, F	Pink
Celtis pallida	Desert Hackberry	8'x10'	Very Low	Spring	Yellow Green
Cordia parvifolia	Little Leaf Cordia	6'x6'	Very Low	Sp,F	White
Dalea frutescens	Black Dalea	3'x4'	Low	F,W	Rose Purple
Dalea pulchra	Bush Dalea	4'x5'	Low	W,Sp	Violet
Encelia farinosa	Brittlebush	3'x4'	Very Low	W,Sp	Yellow
Ephedra nevadensis	Desert Tea	3'x3'	Low	Spring	Green
Ericameria laricifolia	Turpentine Bush	2'x3'	Very Low	Su,F	Yellow
Eriogonum fasciculatum polifolium	Flattop Buckwheat	1'x2'	Very Low	Spring	Pale Pink,White
Fallugia paradoxa	Apache Plume	6'x6'	Low, Drought	Sp, Su, F	White
Hyptis emoryi	Desert Lavender	6'x4'	Very Low	Spring	Lavender
Justicia californica	Chuparosa	4'x4'	Low	W,Sp	Red Orange
Leucophyllum candidum	Violet Silverleaf	3'x3'	Very Low	Su,F	Deep Violet
Leucophyllum frutescens	Texas Sage	6'x6'	Very Low	Su,F	White, pink,purple
Leucophyllum laevigatum	Chihuahuan Sage	4'x5'	Very Low	Su,F	Lavender
Leucophyllum langmaniae	Langman's Sage	5'x5'	Very Low	Su,F	Lavender
Larrea tridentata	Creosote	6'x6'	Very Low	Sp,F	Yellow
Lycium fremontii	Wolfberry	8'x8'	Very Low	W,Sp,F	White, Lavender
Salvia chamaedryoides	Mexican Blue Sage	2'x2'	Low	Sp,F	sky blue
Salvia leucantha	Mexican Sage	4'x4'	Low	Sp,F	Lavender

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DYNAMIC DESERT

Botanical Name	Common Name	Mature Size (h x w)	Water Use	Bloom Season	Bloom Color
Senna artemisioides	Feathery Senna	6'x6'	Very Low	W, Sp	Yellow
Senna wislizenii	Shrubby Senna	4'x6'	Very Low	Summer	Bright Yellow
Simmondsia chinensis	Jojoba	6'x6'	Very Low	Spring	Yellow Green
Sophora secundiflora	Texas Mountain Laurel	8'x6'	Low	Spring	Purple
Sphaeralcea ambigua	Desert Globe Mallow	4'x4'	Low	Sp, Su, F, W	Orange, multi
Ziziphus obtusifolia v. canescens	Gray Thorn	6'x8'	Very Low	Summer	Cream

Groundcover/Vines

**Desert groundcover or vines used for purposes of this study and transformation theme are species with finer texture (lower biomass) prevalent in native species found in the low Sonoran Desert environment.*

Acacia redolens	Freeway/Trailing Acacia	1'x10'	Low	Spring	Yellow
Bouteloua spp.	Grama Grass	.5'x1'	Low	Su, F	Variety of colors
Calylophus berlandieri	Sun Drops	1'x3'	Low	Sp,F	Lemon Yellow
Chrysactinia mexicana	Damianita	2'x2'	Very Low	Sp,F	Yellow
Dalea greggii	Trailing Indigo Bush	2'x6'	Low, Drought	Sp,Su	Indigo purple
Dolichondra unguis-cati	Cat Claw Vine	25'x15'	Low	Spring	Yellow
Euphorbia rigida	Gopher Plant	2'x3'	Very Low	W,Sp	Green
Mascagnia macropterum	Yellow Orchid Vine	15'x15'	Low	Sp, Su	Yellow
Thymophylla pentachaeta	Dog weed	.5'x.5'	Low	Sp,Su	Yellow

**Additional aesthetic can be achieved through supplemental planting of additional seasonal annuals or perennials not listed here.*

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DYNAMIC DESERT

Cacti/Succulents

**Cacti and succulents included in the plant list are representative of, native to, and particular to the Southern Arizona Sonoran Desert environment.*

Botanical Name	Common Name	Mature Size (h x w)	Water Use	Bloom Season	Bloom Color
Agave bovicornuta	Lechuguilla Verde	3'x3'	Very Low	W, Sp	Yellow
Agave 'Blue Glow'	Blue Glow Agave	2'x3'	Very Low	Summer	Green, Yellow
Agave desmettiana	Smooth Agave	3'x3'	Very Low	Spring	Bright Yellow
Agave parryi	Parry's Agave	2'x2'	Low	Summer	Deep Yellow Ochre
Agave vilmoriniana	Octopus Agave	4'x5'	Very Low	Spring	Yellow
Aloe ferox	Cape Aloe	5'x3'	Very Low	W, Sp	Orange Red
Agave geminiflora	Twinflower Agave	3'x3'	Very Low	Winter	Yellow
Agave weberi	Weber's Agave	6'x6'	Very Low	Sp, Su	Yellow
Aloe variegate	Partidge Breast Aloe	1'x1'	Very Low	W, Sp	Salmon
Aloe vera	Medicinal Aloe	3'x4'	Very Low	Spring	Yellow
Asclepias subulate	Desert Milkweed	3'x'3'	Very Low	Sp, F	White
Carnegia gigantea	Saguaro	20'x10'	Very Low	Spring	White
Cereus hilmannianus	Hilmann's Cereus	15'x10'	Very Low	Sp, Su	White
Cylindropunia acanthocarpa	Buckhorn Cholla	4'x'5'	Very Low	Spring	Red, Yellow
Dasylirion wheeleri	Desert Spoon	4'x4'	Low	Sp, Su	Cream
Dasylirion quadrangulatum	Toothless Desert Spoon	4'x5'	Low	Spring	Greenish & White
Echinocactus grusonii	Golden Barrel	2'x2'	Very Low	Spring	Yellow
Echinocereus engelmannii	Englemann's Hedgehog	1'x2'	Very Low	Spring	Magenta
Echonopsis huascha	Argentine Hedgehog	2'x3'	Low	Sp, Su	Orange,Red
Euphorbia antisyphilitica	Candelilla	1'x2'	Very Low	Sp, Su	White, Pink
Euphorbia resinifera	Moroccan Mound	2'x6'	Low	W,Sp	Yellow
Euphorbia rigida	Gopher Plant	2'x4'	Very Low	Spring	Chartruese
Ferocactus cylindraceus	Compass Barrel	2'x2'	Very Low	Sp, Su	Yellow, Orange
Ferocactus wislizenii	Fishhook Barrel	4'x4'	Very Low	Su, F	Orange, red
Fouquieria splendens	Ocotillo	12'x10'	Very Low	Spring	Red, Orange
Hesperaloe funifera	Giant Herperaloe	5'x5'	Very Low	Sp, Su	Greenish White
Hesperaloe funifera	Giant Yucca	6'x6'	Low, drought	Spring	White
Hesperaloe parviflora	Red Yucca	3'x3'	Very Low	Sp, Su, F	Red Coral
Justicia californica	Chuparosa	4'x4'	Low	W,Sp	Red Orange
Lophocereus schottii	Senita	10'x10'	Very Low	Sp, Su	Pink
Lophocereus schottii f. monstrosus	Totem Pole Cactus	10'x10'	Very Low	Sp, Su	Pink
Muhlenbergia capillaris	Pink Muhly	3'x3'	Low	Fall	Pink
Muhlenbergia capillaris'Regal Mist'	Regal Mist	3'x3'	Low	Fall	Pink, Purple
Muhlenbergia emersleyi	Bullgrass	4'x4'	Low	Fall	Purple, Tan
Mulenbergia lindheimeri	Autumn Glow	5'x5'	Low	Fall	Yellow Tan
Muhlenbergia rigens	Deer Grass	4'x4'	Low	Su, F	Tan

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Botanical Name	Common Name	Mature Size (h x w)	Water Use	Bloom Season	Bloom Color
Myrtillocactus geometrizans	Blue Myrtle Cactus	15'x10'	Very Low	Spring	Green White
Nolina bigelovii	Bigelow's Beargrass	6'x4'	Very Low	Summer	Cream
Nolina macrocarpa	Sacahuista Beargrass	3'x6'	Very Low	Summer	Greenish White
Nolina texana	Texas Sacahuista	3'x3'	Very Low	Spring	White
Opuntia basilaris	Beavertail Prickly Pear	2'x2'	Very Low	Spring	Fuschia
Opuntia engelmannii	Engelmann's Prickly Pear	6'x6'	Very Low	Sp, Su	Yellow
Opuntia ficus-indica	Indian Fig	12'x18'	Very Low	Spring	Yellow, Orange
Opuntia santa-rita	Purple Prickly Pear	4'x4'	Very Low	Spring	Yellow
Pachycereus marginatus	Mexican Fencepost	10'x6'	Very Low	Spring	Pink
Pedilanthus macrocarpus	Lady Slipper	4'x4'	Low	Spring	Reddish Orange
Pedilanthus bracteata	Slipper Plant	6'x4'	Very Low	Sp, Su, F	Greenish Pink/Red
Stenocereus thurberi	Organ Pipe Cactus	10'x10'	Very Low	Sp, Su	Pink
Yucca baccata	Banana Yucca	3'x5'	Very Low	Sp, Su	White
Yucca pallida	Paleleaf Yucca	2'x4'	Very Low	Sp, Su	White

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