



USU

*LANDSCAPE
RESILIENCY +
DROUGHT PLAN*

USU CREDIT UNION
UNIVERSITY WELCOME CENTER

UTAH STATE UNIVERSITY
Facilities Planning,
Design and Construction
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Utah State University

Facilities

Jordy Guth, Associate Director of
Planning, Design, & Construction
Jim Huppi, Planning, Design, & Construction
Ben Berrett, Associate Vice President for Facilities
Ken Carrillo, Director of Planning, Design, & Construction
Alexi Lamm, Sustainability Program Manager
Jeffrey Turley, Planning, Design, & Construction

Landscape, Operations, & Maintenance (LOAM)

Shane Richards, Manager
Andrew Beutler
Nate Christiansen

Planning & Design Team

Design Workshop

Stephanie Grigsby, Principal
Madison Pong, Project Landscape Architect
Dani Bain, Project Designer
Julia Meinhardt, Project Planner
Ethan Bergeron, Project Designer
Tarana Hafiz, Project Planner

Hines Irrigation Design

Brent Jeffery, Certified Irrigation Designer

UtahStateUniversity

DESIGNWORKSHOP

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INTRODUCTION

Utah State University's Landscape Resiliency and Drought Plan is a multi-purpose tool and reference for all green space enhancements across the campus. The University has an impressive collection of signature plants and landscapes which combine to provide an attractive and welcoming campus. Most landscapes require supplemental watering or irrigation. As drought conditions and water restrictions become increasingly common, the importance of converting some landscapes to drought-tolerant and resilient species increases. Chapter One of the document provides an introduction to the plan as well as a summary of previous planning efforts that inform the baseline metrics.

VISION STATEMENT

“Provide an aesthetically pleasing, efficiently maintainable, diverse landscape over the long term to provide a healthy environment for students, faculty, and staff.”



PLANNING PRINCIPLES



Resiliency + Sustainability

Landscapes perform many functions, and can be designed for ecological, environmental and human benefit. As existing landscapes are retrofitted and new outdoor spaces are designed, resiliency and sustainability considerations include:

- Global climate regulation
- Local climate regulation (temperature moderation and windbreak)
- Air and water cleansing
- Water supply retention
- Erosion and sediment control
- Hazard mitigation
- Pollination
- Habitat function
- Waste decomposition and treatment
- Human health and well-being
- Cultural benefits



Attractive + Inviting

The majority of prospective students make the decision to attend or not attend a university within the first 15 minutes of their campus tour. This metric amplifies the importance of the landscape's visual character and concepts like the Green Necklace where landscape connects and unifies campus. Attractive and comfortable outdoor gathering spaces, mature trees, plantings, and lawns filled with students studying, recreating or socializing form a picturesque campus image for students and alumni. At USU, these spaces must be designed with seasonal use in mind due to the harsh winters. Today's students also place importance on a landscape's environmental benefits and resiliency, including their authenticity and connection to the surrounding context and ecosystem types.



Maintenance Requirements

Maintenance and upkeep tasks for the campus have various costs that should be considered as part of new designs and existing landscape transitions. Labor intensity, time, and equipment requirements vary for different landscapes and compositions. Maintaining healthy soils and integrated pest management strategies are fundamental steps toward reducing water requirements while maintaining healthy plants. Grouping plants by water use, selecting and spacing plants based on their growth habits and mature size, and continuing to utilize best management practices allows the campus to manage water resources as efficiently as possible.



Events + Uses

Campus spaces have multiple uses. Design strategies should strive for simplicity and consistency while accommodating a range of uses. To be efficient, landscapes must be designed to accommodate more than one function, such as:

- Event hosting
- Socialization
- Recreation (informal and formal)
- Individual and group study
- Support of well-being
- Education and demonstration
 - Fire resistant
 - Native
 - Rain garden
 - Bird friendly
 - Urban agriculture
 - Permaculture
 - Traditional landscapes with waterwise plants

GOALS

The below goals guide the Resiliency and Drought Plan recommendations.

A *Functionality + Aesthetics*

Provide an aesthetically pleasing, efficiently maintainable, diverse landscape over the long term to provide a healthy environment for students, faculty, and staff.

B *Implementing Best Practices*

Develop a strategy for implementing best practices in water conservation and landscape management, drawing on the expertise of the campus community.

- Improve soil water retention.
 - Elevate low-water and native species.
 - Encourage biodiversity and transition to organic practices where possible.
 - Minimize the production of emissions from landscape equipment.
-

C *Management Approach*

Establish a uniform approach for areas of campus managed by different groups.

D *Education and Learning*

Amplify educational opportunities in landscape zones across campus to accommodate programs such as wildlife habitat, productive landscapes, water management, etc.

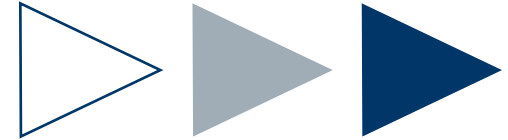
KEY TAKEAWAYS

Key takeaways from other relevant management strategies, local benchmarks, State legislation, and University plans are summarized on the following pages.

Best Practices [1. USU Water Management]

The use of WeatherTRAK irrigation controllers use has allowed the University to efficiently manage their water resources on campus.

- The majority of controllers have dedicated programs exclusively for turfgrass and perennials, and where irrigation design allows it, there's also a dedicated program for trees. This allows USU to manage watering priorities based on watering restrictions and plant resilience.
- Watering only when necessary by providing site-specific weather data and multi-factor hourly evapotranspiration calculations that takes into account sprinkler type, precipitation rate, sprinkler efficiency, soil type, plant type, root depth, microclimate, and slope on a station-by-station basis. This allows for automatic adjustment of watering periods based on weather reporting. Mobile alerts enable fast response to leaking pipes and sprinkler heads.
- Centralized irrigation alerts that allow USU to prioritize and tend to watering issues for all 130 controllers across campus.
- Specific programming to more than 1900 hydro-zones that include sprinkler type, soil type, plant type, root depth, microclimate, and slope to optimize water usage and plant health.
- Maximized water infiltration to the root zone without causing water run-off, areas in hills and those with a heavy clay soil texture have a cycle and soak watering scheduling.
- Irrigation is implemented using a water window schedule allowing for a convenient watering schedule and modifying it when watering restrictions are more severe.
- Substantial mapping of all hydro-zones on the main campus has been implemented to include assets such as valve locations, isolation valves, main and secondary drains, and junction boxes improving USU irrigation tech response and general operation time.
- Extensive programming has been implemented to create hydraulic trees with mainline pipe sizes and materials to optimize the usage of available water.



Best Practices [2. USU Drought Plan]

- **Phase 1: Abnormally Dry** [Minimal Water Savings | Focus on Good Practices and No Water Waste]:
 1. Maintain mowing height at 3"
 2. Maintain and Utilize Smart Irrigation system.
 3. Aerate at least twice a year.
- **Phase 2: Moderate Drought** [Water Savings 15-25% | Goal to Maintain Consistent Green Turf]
 1. Apply Wetting Agent to "Hot Spots" on campus. The wetting agent helps the soil hold water and distribute it more evenly through the soil.



KEY TAKEAWAYS

Best Practices [2. USU Drought Plan continued]

2. Raise mowing heights to 3.5 or 4 inches. The turf will look slightly shaggy in appearance but it will keep roots longer and reduce the amount of irrigation needed.
 3. Aerate 4 to 5 times per year.
- **Phase 3: Severe Drought** [Water Savings 25-50%]
 1. Apply Wetting Agent to all of campus.
 2. Mow twice per week, if manpower and equipment is available. This reduces stress and water usage of the turf with executive leaders to consider mandating additional water restrictions.
 3. Avoid foot traffic on turf. Ask that events and activities be held on hard surfaces if possible.
 4. Some outlier areas of campus will develop localized dry spots (about 20-25 percent of campus).
 5. Protect the trees.
 - **Phase 4: Extreme Drought** [Water Savings 50-75%]
 1. Allow small Local Dry Spots to appear across all of campus or allow larger localized dry spots to appear across 50-70 percent of campus and maintain a few key areas to higher standards.
 2. Allow grass to grow long. Very little to no mowing will occur.
 3. Protect the trees. Mature trees take priority over turf, flowers, and shrubs.
 - **Phase 5: Exceptional Drought** [Water Savings 75-100% | State to generally decide actions]
 1. Localized dry spots will cover all of campus.
 2. Outlying turf areas will be allowed to go dormant.
 3. Protect mature trees.
 4. Make decisions on what vegetation to keep alive and what vegetation will be allowed to die.
-

Best Practices [3. City of Logan Drought Operation Plan]

- **Level 1: Normal Conservation Efforts** [Year-round]:
- **Level 2: Active Conservation Efforts** (for residents) [Irrigation Season]:
 1. Decrease irrigation to 2-3 times per week
 2. Encourage watering between the times of 6pm-10am
 3. Passively promote “waterwise” and “slow the flow”



KEY TAKEAWAYS

Best Practices [3. City of Logan Drought Operation Plan continued]

- **Level 3: Mild Water Restrictions** [Consumption is 80-89% of Total Capacity*]
 1. Meet with executive leaders to consider mandating conservation efforts
 2. Consider mandating irrigation during 6pm-10am + Passively promote “waterwise” and “slow the flow”
- **Level 4: Severe Water Restrictions** [Consumption is 95% of Total Capacity*]
 1. Meet with canal companies to discuss how existing water right exchanges can be better utilized to provide water to Logan City to meet indoor demands (remove 10cfs restriction at Dewitt Springs if it has been implemented).
 2. Meet with executive leaders to consider mandating additional water restrictions
 3. Consider restricting all outdoor water use (excluding pet, livestock, and hand watering of vegetable gardens)
 4. Consider creating a hotline to report restriction violations
 5. Actively promote indoor conservation efforts from “waterwise” and “slow the flow”
- **Additional Tools:**
 1. Tiered water rate structure to promote responsible outdoor water use during summer months
 2. Community Development fines for violations for levels 4-5 if mandatory restrictions are implemented
 3. Class B misdemeanor for grievous violations for level 5 if mandatory restrictions are implemented (with shutoff option)

*Consumption measured over a 3-day average

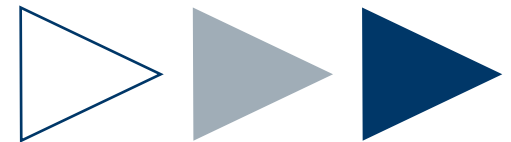
Legislation [4. State of Utah H.B. 121]

Imposes requirements related to water conservation at state government facilities and by state agencies;

- A state agency that owns or occupies a state government facility that is reconstructed after May 4, 2022, may not have more than **20%** of the grounds of the state government facility be lawn or turf.
- “State agency” includes an institution of higher education.
- A state agency shall reduce outdoor water use as compared to use for fiscal year 2020:
 - By 5% by the end of fiscal year 2023
 - By 25% by the end of fiscal year 2026
- Establishes irrigation requirements.

State incentives to use drought resistant landscaping:

- “Lawn or turf” does not include a golf course, park, athletic field, or sod farm.
- Subject to a \$5,000,000 aggregate annual cap, the division may provide an incentive to an owner to remove lawn or turf from land owned by the owner and replace the lawn or turf with drought resistant landscaping.



ALIGNMENT WITH OTHER PLANS

	TOPICS ADDRESSED/GOALS ACHIEVED			
	A Function/ Aesthetics	B Conservation Best Practices	C Uniform Management	D Education & Learning
Plans and Studies				
State Legislation				
• HB121				
Best Practices				
• USU Water Management Strategies				
• USU Drought Plan				
• City of Logan Drought Operations Plan				
Previous Studies				
• USU Sustainability Plan				
• USU Recreation and Open Space Plan				
• USU Kaysville Botanical Center Master Plan				
• Innovation Campus District Plan				
• USU Master Plan 2000				
• USU North Core Master Plan				
• USU Quad District Plan				
• USU Campus Energy Conservation Plan				
• USU Utility Master Plan				
• USU South Campus Master Plan				
• USU Quad Perimeter Landscape Plan				

2.

EXISTING CONDITIONS

Understanding the current conditions of campus open spaces informs recommendations that uphold the important civic, visual, recreational, and connective roles of these spaces. This chapter includes an analysis of existing physical conditions that shape open space on campus. This analysis is used to inform the resiliency approaches and recommendations made in Chapters 3 and 4. This chapter also shows the importance of open space in relation to other campus programming and functions, like circulation and building uses. These relationships form a basis for classifying campus open space and then making further recommendations on potential alternative designs and strategies that will help make USU's campus more resilient to drought and a continued leader in sustainable landscape strategies.

OVERVIEW



Taking the Lead

From stunning views beyond the campus horizons to the rich historical uses of open spaces that make up its network of quads and plazas, landscape is a vital part of placemaking at on campus. USU seeks to maintain the beauty and functionality of these open spaces while leading by example to reduce water usage and improve landscape resiliency.

IRRIGATION PRACTICES OVERVIEW

A Model of Water Conservation

The Utah State University Campus serves as a model of institutional water conservation practice implementation. As the home of the Center for Water Efficient Landscaping (CWEL), a research and outreach center designed to improve the efficient use of water for landscape irrigation. The campus management staff feel a responsibility to model the best practices. Many of the strategies typically recommended to large water consumers have been implemented throughout the campus.

Additionally, the University has conducted various studies to identify potential improvements and identify system weaknesses. Resulting documents include the Irrigation section of the 2019 Infrastructure Study Update, and the Main Campus Irrigation Model Study conducted in 2017. These studies and related reports have provided valuable recommendations for system improvements which have served as a guideline for ongoing maintenance and system upgrades.

FALL 2022 BASELINE IRRIGATION USE CALCULATIONS

Culinary Irrigation Usage Estimate	63,215,110 gallons	72.16 Irrigated Acres
Secondary Irrigation Usage Estimate	259,742,595 gallons	278.18 Irrigated Acres



IRRIGATION PRACTICES OVERVIEW

System Overview

The campus irrigation systems are currently supplied two water sources. The primary source that serves the main campus is secondary water from the Cache Highline Water Association canal located to the east of campus. The water supply line routes from the canal to three pump stations. Where the water is pressurized and filtered and delivered to the campus irrigation systems.

All campus irrigation systems are currently controlled from a smart highly capable central control system that enables management based on current weather conditions and can be managed and operated remotely by those who manage the system as well as by maintenance staff as they work throughout campus.

Based on recommendations provided in previous studies, and needs identified by staff, many system upgrades have been implemented, key improvements and strategies currently used are as follows:

- Replacement of irrigation controllers with Smart, WeatherTRAK controllers accessible via cell phone for easy remote operation by staff. Updates completed in 2020.
- Use of Variable Frequency Drive (VFD) units at all booster pump installations to enable efficient water delivery over a wide flow range which is typical for irrigation systems. Implementation completed in 2010.



Pump station with filtration

- Use of high-quality auto-flushing filtrations systems at each booster pump location and additional secondary auto-flush filters on all new systems with drip irrigation.
- Implementation of design and installation standards for all new projects which include the specification and installation of a range of water saving equipment such as:
 - Pressure regulated sprinkler heads
 - Master Valves installed at water supply connections
 - Smart controller upgrades

IRRIGATION PRACTICES OVERVIEW

- Implementation of standards which require water conserving landscape and correct irrigation system design principals.
 - Drip irrigation installed in planting beds at all new building projects.
 - Targeted turf grass removal to transition to lower water use landscapes in narrow planting areas, shaded areas where planting under trees is difficult, and various passive lawn areas.
 - Sprinkler head spacing to minimize dry spot problems
 - Installing secondary filters to allow for drip irrigation
- Exploration of alternative water source development through rainwater harvesting or building water source harvesting.
- Ongoing initiative to improve the campus irrigation mainline network to allow improved flow management, balance water pressure within each zone and eliminate water leakage.
- The campus maintenance department models an admirable commitment to on-going irrigation system maintenance to the extent possible focusing on key water saving practices such as:
 - Monthly irrigation system wet checks
 - Proactive maintenance & water conservation
 - Planning and implementation of phased site renovations to enhance water conservation

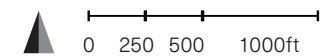
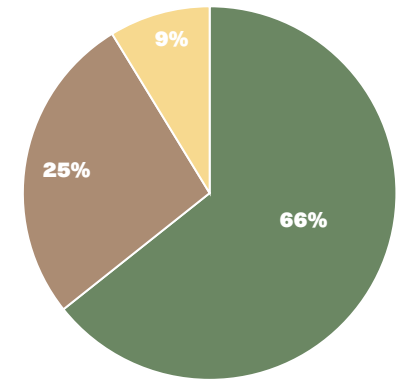
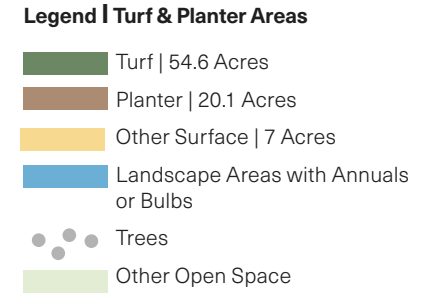
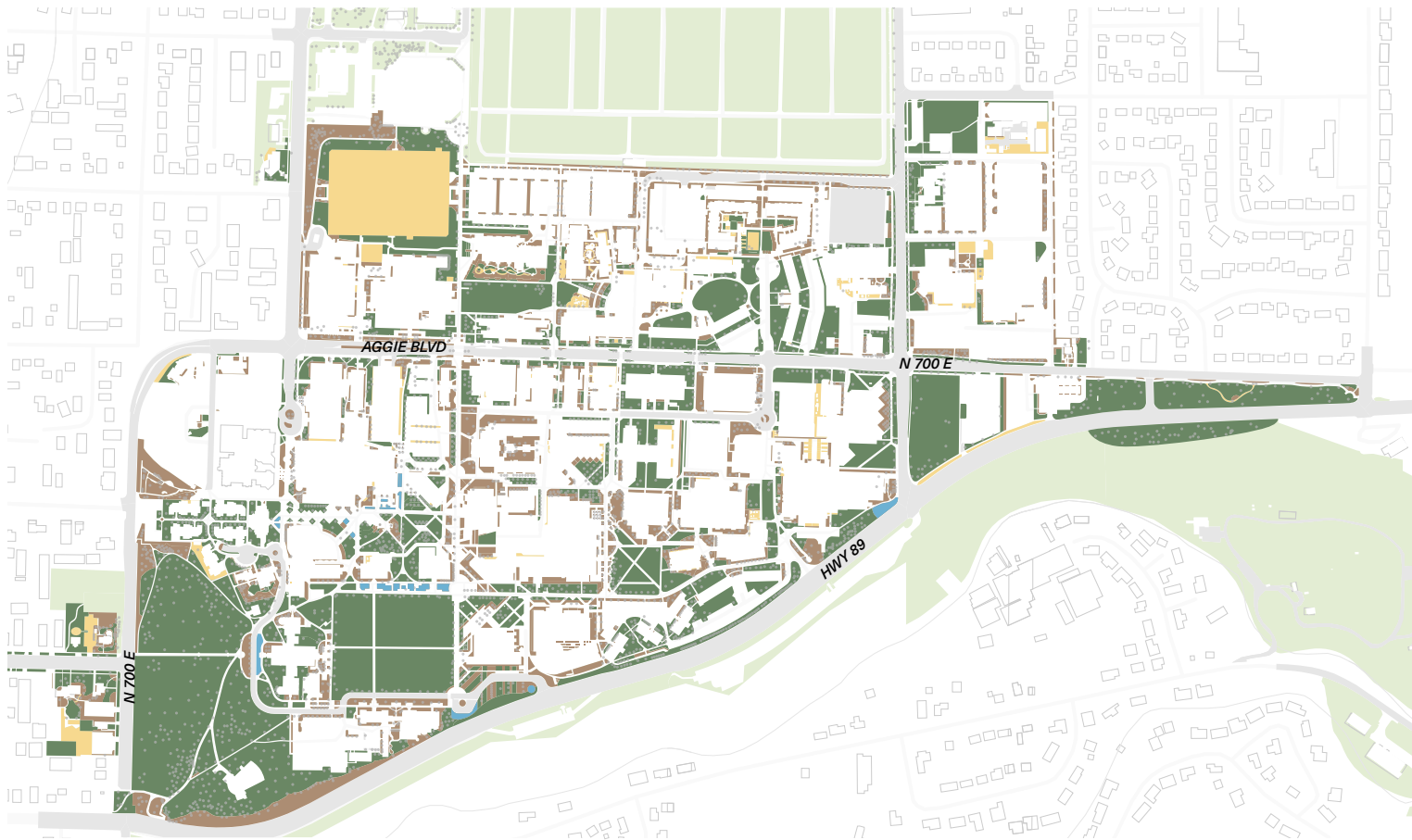


Self-flushing filtration system



Secondary filter for drip areas

EXISTING CAMPUS LANDSCAPE TYPES



Campus Open Spaces

USU’s Landscape Operations and Maintenance (LOAM) staff have mapped and organized campus landscape areas as either turf or planter, with synthetic or other non-organic surfaces making up the remaining landscape. Additional information related to planters that include annuals and bulbs were incorporated into the above map based on a campus site visit in the spring of 2022. These categories are the starting point for analysis of existing conditions. It is noted that there is great variety within these open space types. Together, they create a mosaic of spaces and experiences across Main Campus.



Turf

Over 60% of Main Campus open space is turf. Grass and lawns serve a variety of functions on campus: they create parks for sports, games, and individual recreation and also give definition to important civic spaces like the Quad, where university events like True Aggie Night and Homecoming take place annually.



Planter

Like turf, there is a wide array of planter types and conditions across campus. Planters do not contain mowed grass, but may contain shrubs, trees, annuals, perennials, native grasses, succulents, or rock gardens and swales. Planter spaces require different types of maintenance than campus turf. While they aren't mowed, planter areas may still require weeding, trimming, and upkeep.



Flower Beds

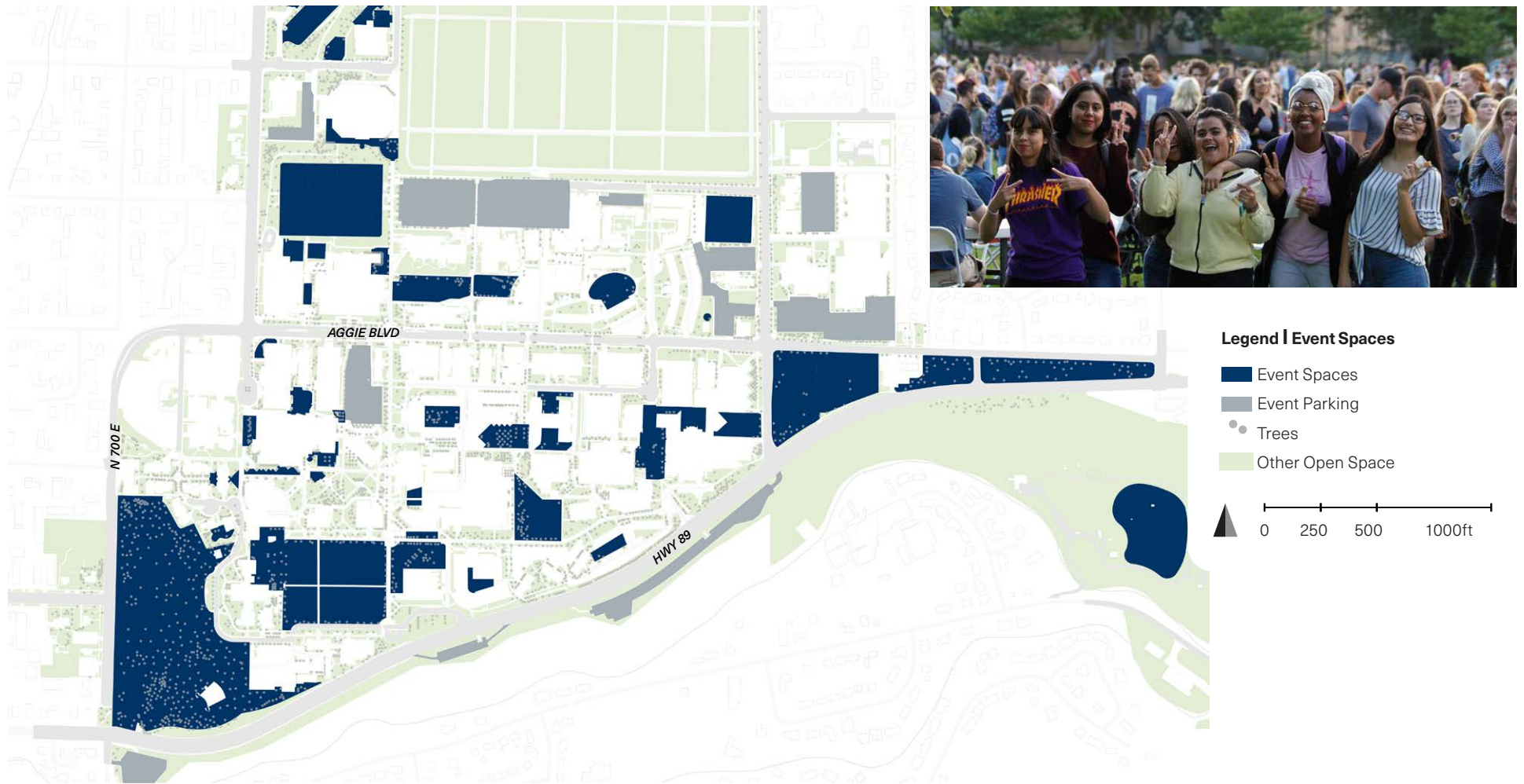
Several specialty planters filled with bulbs or annuals can be found along the edge of campus and Highway 89, as well as the Taggart Student Center Plaza.



Non-Organic Surfaces

Not all open space is grass or vegetation. The Aggie Legacy field is a synthetic open space made up of artificial turf. Other non-organic open space is made up of surfaces like gravel or sand.

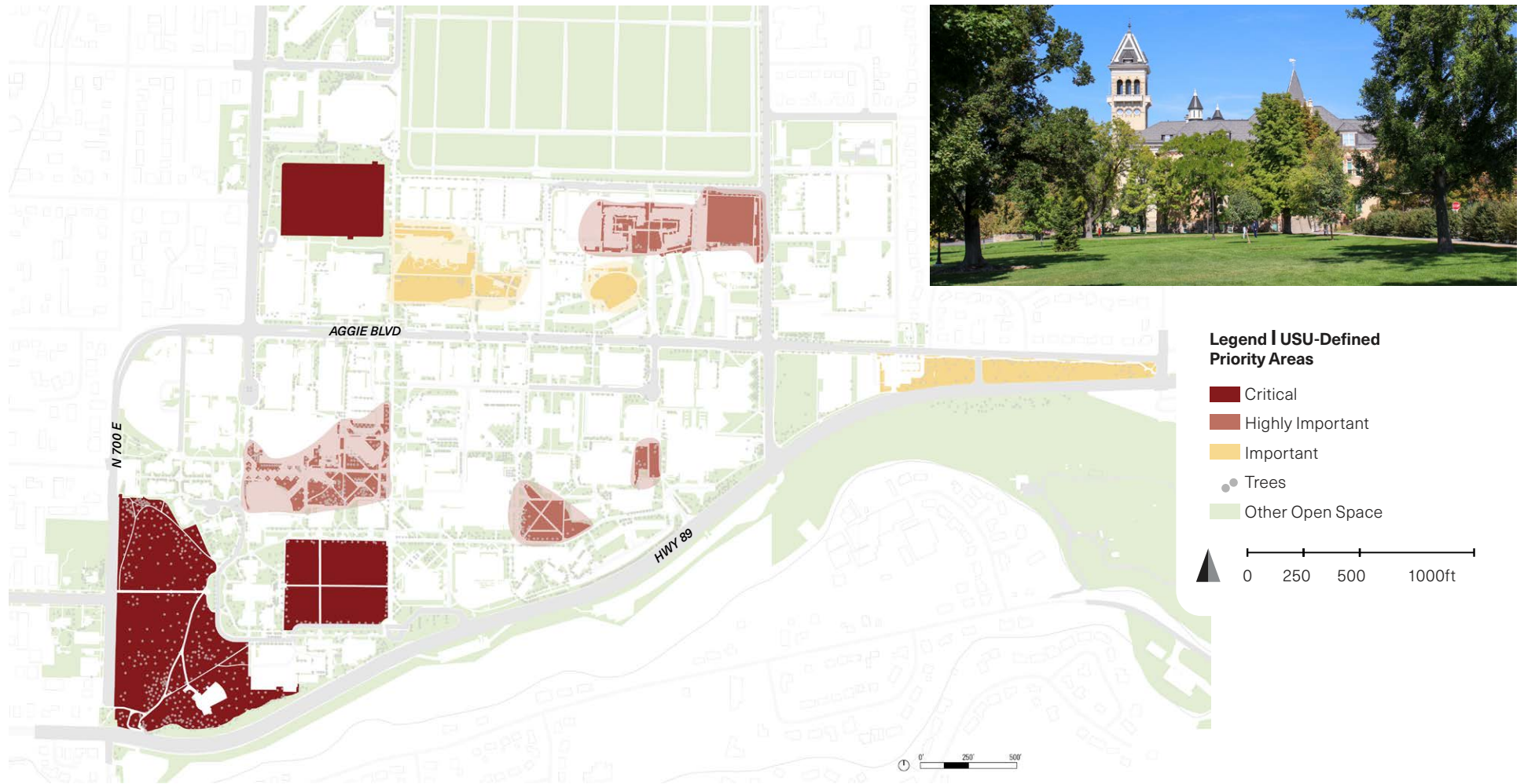
EXISTING CONDITIONS



Events

Open spaces help facilitate USU's most important and iconic celebrations and activities, from commencement to sporting events. Events take place primarily on turf and sports fields, with parking lots hosting some events like tailgates as well.

EXISTING CONDITIONS



Priority Open Space

The 2014 USU Recreation & Open Space Master Plan identifies priority spaces across campus based on their historic, cultural, and recreational values as well as future importance as the university grows. Many civic spaces, like Old Main Hill, were categorized as high priority open spaces

EXISTING CONDITIONS



Champ Trees

There are 40 trees in Main Campus that have been noted in Utah's Community Forest Council's Big Tree Directory as champion trees due to their notable size and characteristics. The majority of these trees are on Old Main Hill and can be enjoyed by students and the public as part of USU's rich network of park and open spaces.

EXISTING CONDITIONS



Quads & Allees

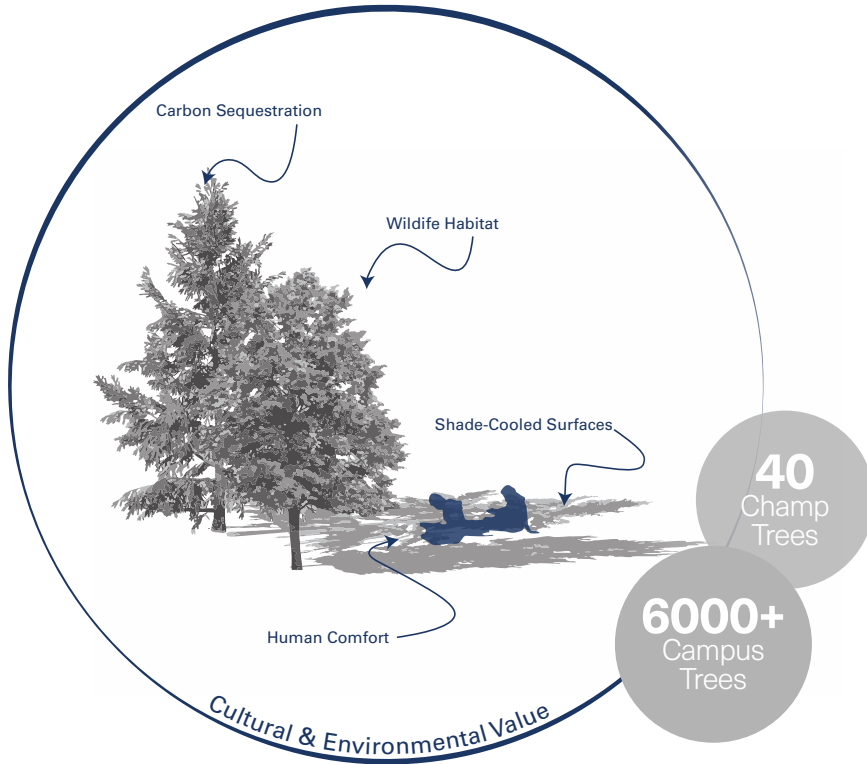
USU's well-established tree canopy also helps define its most historic and famous quads. Allees of trees around the Quad and lining the commencement procession walkway delineate a network of open spaces that is especially prominent in the south west portion of the campus. The evergreen allee is especially unique in that it is the only one on any campus in the nation.

EXISTING TREE CONDITIONS



Monitoring Tree Health

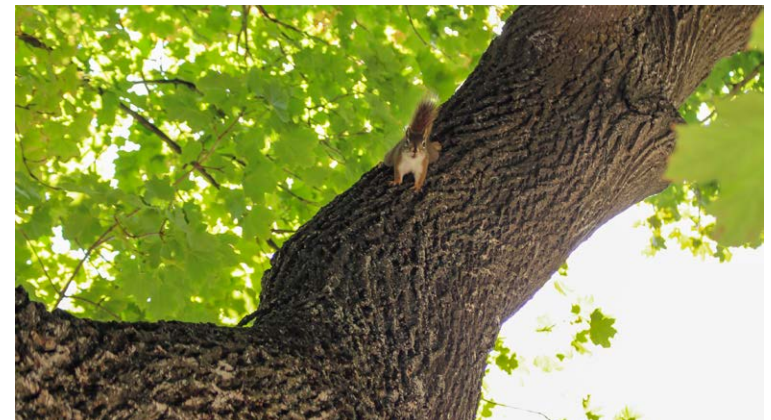
Monitoring the health of campus trees, especially as the canopy starts to reach the end of its lifespan in older parts of campus, is important to help anticipate future changes to the look and feel of campus. Most trees that have been surveyed are considered to be in “good” condition, but several areas, especially around the Quad, require special attention and planning. The 2010 Quad Tree Replacement Plan and 2015 Quad Tree Study address the aging canopy and consider how the Quad’s character might be maintained and reshaped in the future.



The Quad



Old Main Hill



Old Main Trees

Taking Care of Tree Canopy

Trees are an asset to campus health, culture, and character. USU has demonstrated a commitment to the health and prosperity of campus tree canopy and has been recognized by the Arbor Day Foundation as a Tree Campus Higher Education university for 12 consecutive years. During drought, it becomes necessary to restrict water usage to priority areas and plants. Separating irrigation systems so trees can continue to receive water while irrigation for other plant materials is reduced is critical to continue receiving the benefits of a campus tree canopy. Caring for USU's trees in low-water years an essential consideration in planning for landscape resiliency.

LANDSCAPE ADJACENCIES | BUILDING USES



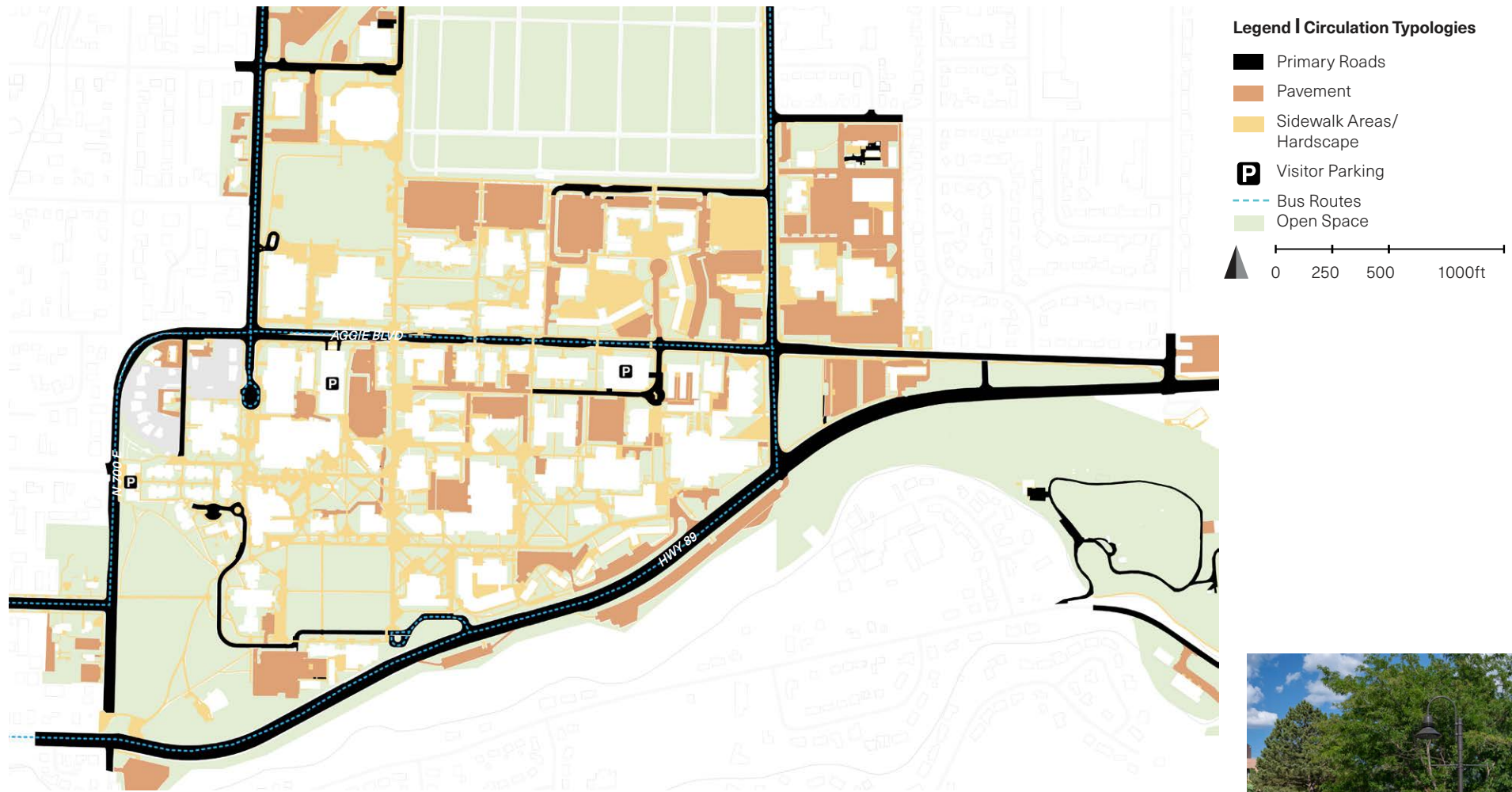
Adjacent Building Uses

USU's lawns, plazas, parks, gardens, courtyards, allees and planter beds are part of the web of buildings, facilities, housing, parking, roads, and sidewalks that work together to create the campus environment. Open space can serve as parks, sporting fields, or streetscape, or more intimate

plazas and courtyards. It is important to understand how open space is working with adjacent buildings, roads, edges, and entryways to create the function and aesthetic of the space.



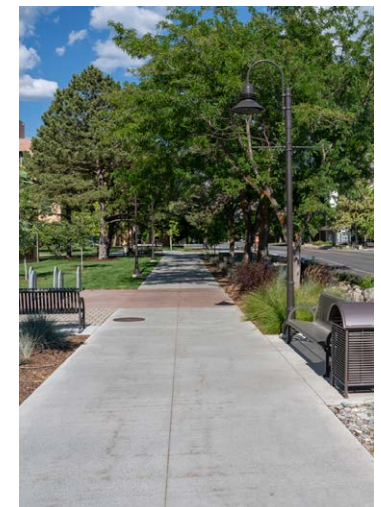
LANDSCAPE ADJACENCIES | CIRCULATION



Circulation

The multi-modal campus provides a multitude of transportation options such as vehicular, transit, bike, and pedestrian. The 2016 Transportation Study provides a vision for the future transportation system with an intent to balance needs while promoting a safer, more sustainable

system. Landscape strategies can provide rhythm and reinforce wayfinding as part of a campus circulation framework. Planting palettes utilized around parking areas can be more utilitarian and do not require the use of high water use materials.



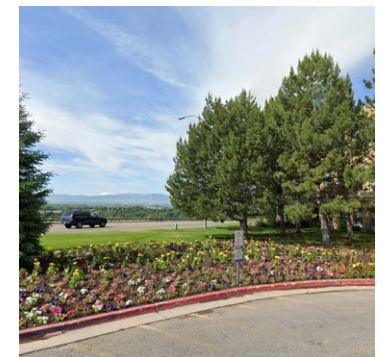
LANDSCAPE ADJACENCIES EDGES AND VIEWSHEDS



Edges & Viewsheds

Open space along the campus edge can shape the perception of the university from beyond its boundaries. When prospective students visit campus, they make the decision to attend the university within the first five minutes. First impressions are critical. These spaces shape the initial experience of the university for visitors

and students arriving by car, foot, bike, and bus. Open spaces along edges and viewsheds can communicate the universities values around open space. Places like Old Main do this by forming an effectively public space that welcomes the public and university affiliates in all seasons.



LANDSCAPE ADJACENCIES | ENTRIES

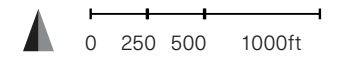
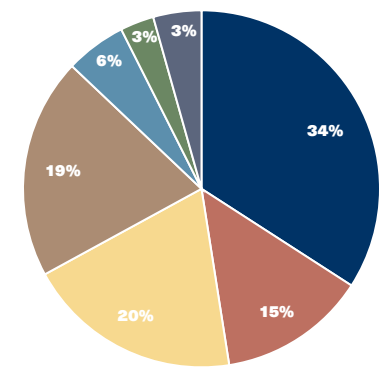
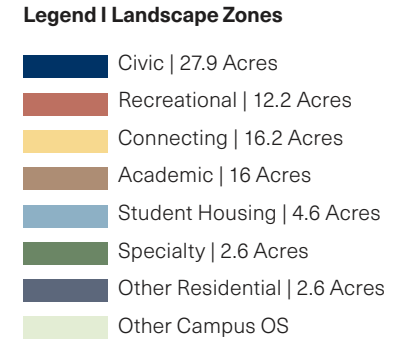
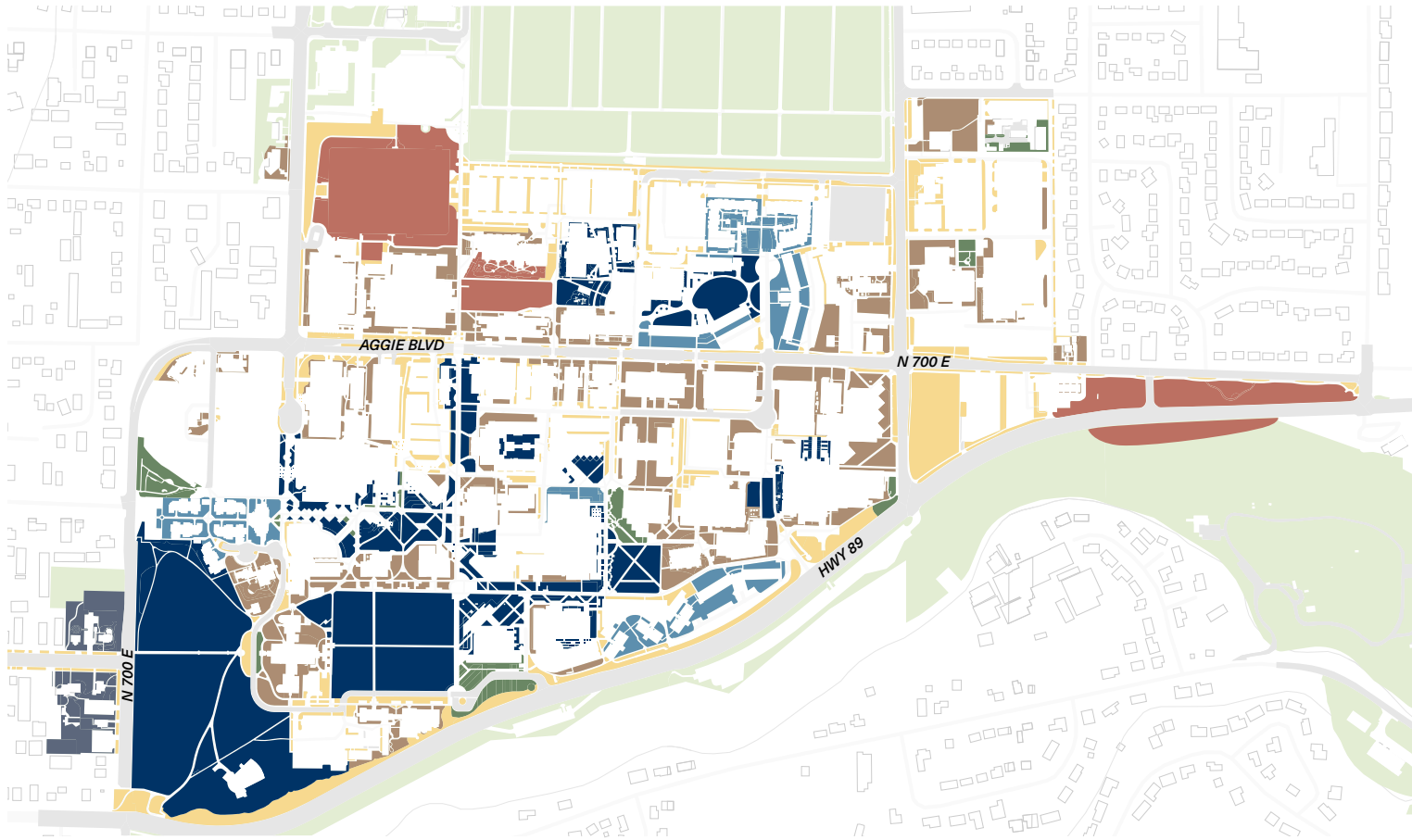


Campus Entries

Students, faculty, alumni, and guests enter the central campus through a series of primary entries. Signage marks the arrival experience for a few of the locations. Enhanced landscape plantings frame views and reinforce the sense of arrival.



LANDSCAPE ZONES



Categorizing Open Space Areas

Classifying landscapes by their cultural significance, use, and adjacent building relationships provides a starting point to understand the campus conditions. The seven categories shown in the above map help describe how the open spaces are currently being used and what alternative landscape strategies may be appropriate. The 2014 USU Recreational & Open Space Master Plan identifies three major open space types across campus: civic, recreational, and connecting. This report further defines outdoor spaces as they related to academic, housing, and specialty areas.

Civic Open Space

As defined in the 2014 Recreation & Open Space Master Plan, civic space includes plazas, courtyards, patios, quads, amphitheaters, and areas of cultural significance. Civic space plays an instrumental role in creating campus character and areas for gathering, celebrating, and building a sense of community.

Recreational Open Space

Recreational open spaces include athletic fields and large park spaces that are used for sports or individual recreation.

Connecting Open Space

Connecting spaces include park strips and parking areas, green corridors and landscape areas that exist between other major landscape types.

Academic Open Space

Open space that fronts, frames, or works in conjunction with campus academic buildings are categorized as academic open spaces. These areas have often been designed in conjunction with a building and may or may not be utilized by students for socializing or for learning. They make up nearly 20 percent of campus open spaces and vary greatly in size and composition.

Student Housing Open Space

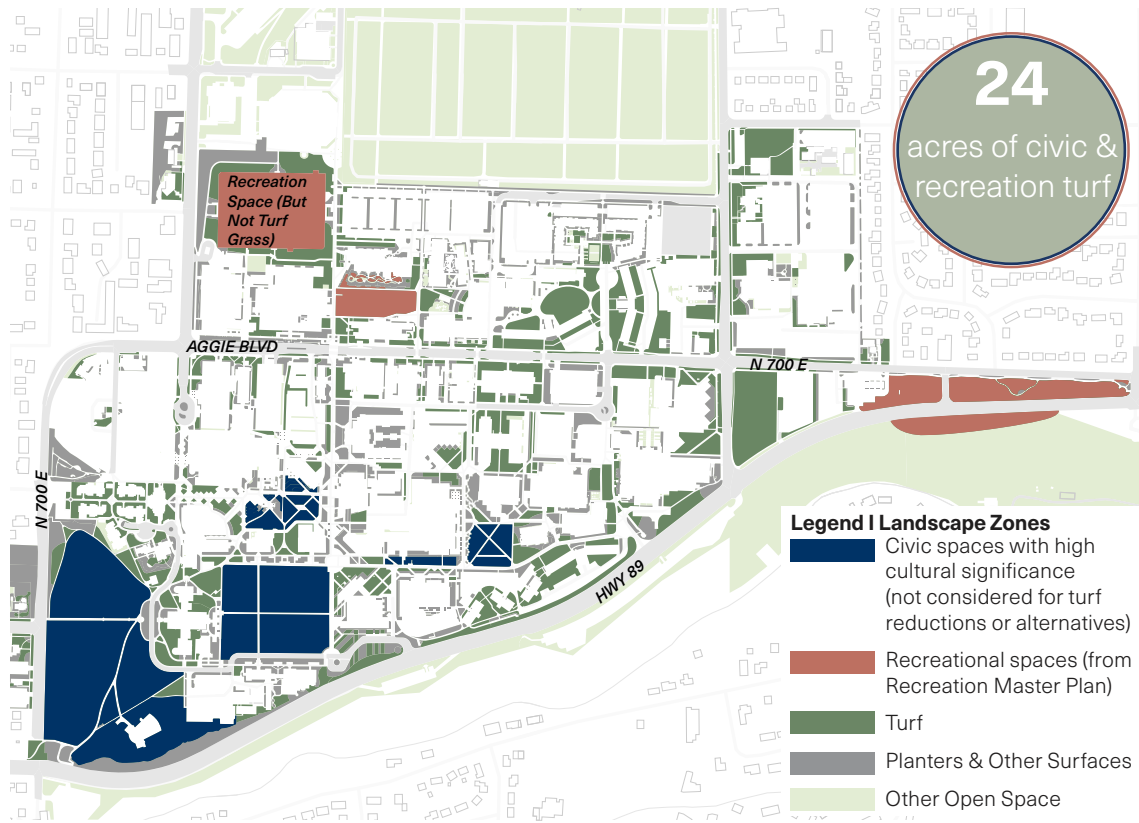
Around student residential buildings, open spaces are composed primarily of turf, with some exceptions. These areas serve as a “back yard” of sorts for students living in campus housing. Security and high visibility is also a consideration. There is also residential open space around faculty residences on the western edge of campus, which is categorized separately from student housing open space.

Specialty & Other Open Space

Specialty open spaces have unique and intentional planting compositions or functions. For example, the demonstration garden on west entrance to the campus serves a specific function to showcase water-wise landscaping techniques.

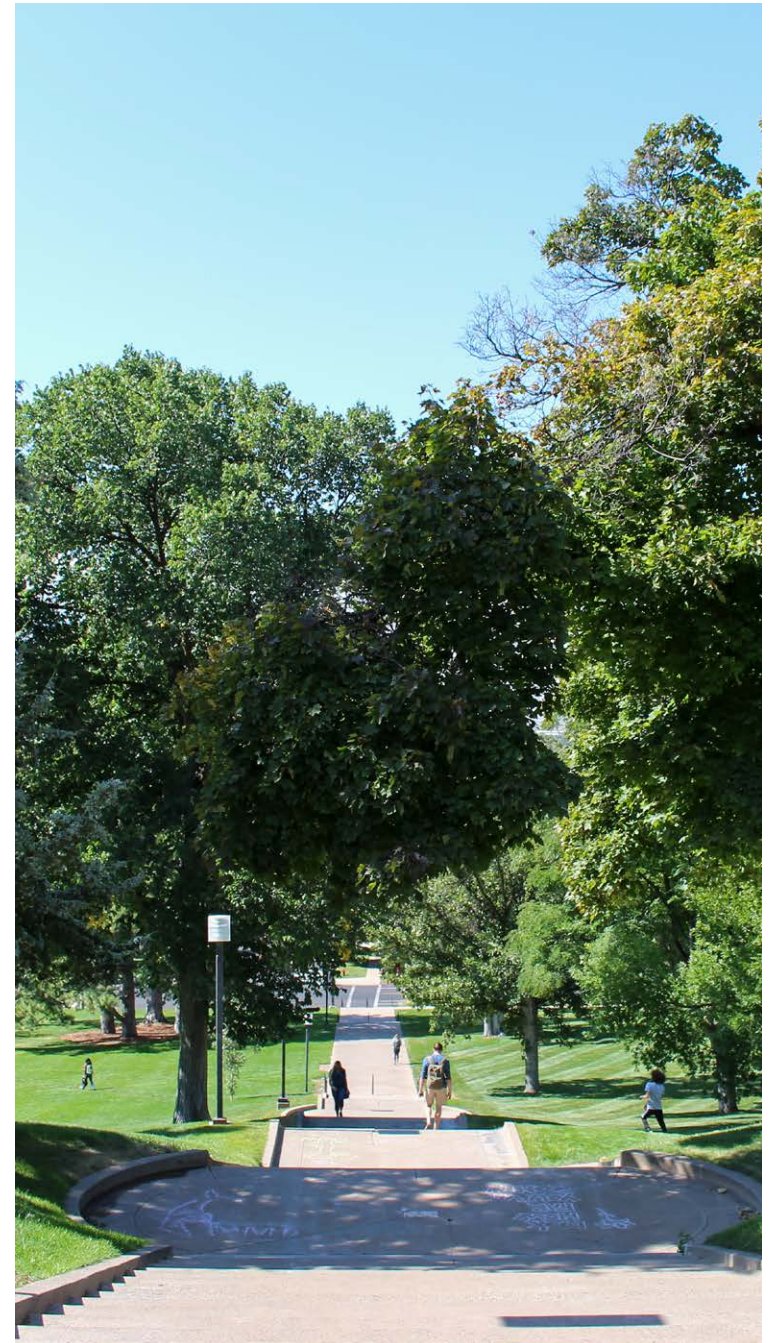
	Turf	Planter	Other
Civic	24.1 acres	3.4 acres	0.4 acres
Recreational	6.9 acres	0.5 acres	4.8 acres
Connecting	8.2 acres	7.6 acres	0.4 acres
Academic	10.1 acres	5.5 acres	0.4 acres
Student Housing	3.8 acres	0.6 acres	0.2 acres
Specialty	0.4 acres	1.9 acres	0.3 acres
Other Residential	1.1 acres	1.0 acres	0.5 acres

AREAS OF CULTURAL IMPORTANCE AND RECREATION

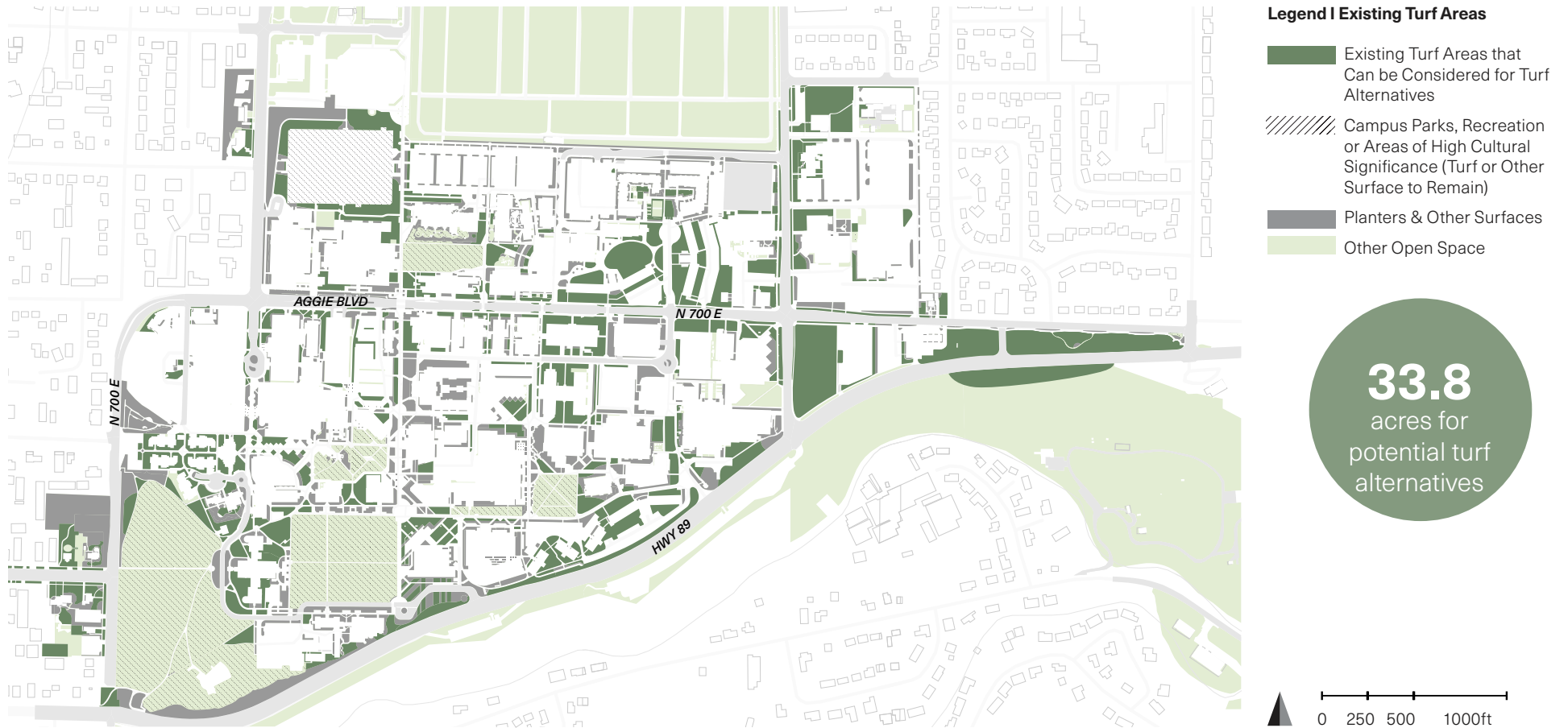


Campus Parks, Recreation, or of High Cultural Significance

Several key open spaces are categorized as recreational or civic open spaces (per the 2014 Recreation & Open Space Master Plan). Locations such as Old Main Hill and campus Quads (shown in blue in the above map) effectively function as parks and are of high cultural significance. Therefore, these sites (shown in blue) are not considered as sites to consider for turf reductions or alternatives. This aligns with HB 121 which does not apply to parks and athletic fields. The parks and recreation areas in reddish brown are either already synthetic turf or could be considered for turf alternatives or reductions.



EXISTING TURF AREAS THAT CAN BE CONSIDERED FOR TURF ALTERNATIVES



Considering Turf Alternatives

The majority of USU's Main Campus landscape areas are categorized as turf in LOAM's GIS database. Resiliency strategies that consider turf alternatives can reduce water consumption across campus and move the University toward a goal of having no more than 20 percent of open spaces, that do not serve as parks, include lawn or turf. This aligns with Utah's H.B. 121 Water Conservations Modifications bill that requires new construction to have no more than 20 percent of open space as turf and moves the University toward the water reductions required by the bill.

The landscape areas shown in green in the map above are turf areas that are opportunities to consider alternative planting strategies. These alternative strategies can reduce water use while maintaining the University's mandate for an aesthetic and attractive campus.

3.

RESILIENCY APPROACH

Chapter three outlines a toolkit of resiliency approaches that can be deployed across USU open spaces to help meet the University’s resiliency and water conservation goals. These tools include maintaining healthy soils, implementing turf alternatives, continuing to refine irrigation practices, integrating ecological planting strategies, and deploying drought-related water conservation tactics based on annual water availability.

FIRST LAYER OF TURF ALTERNATIVE OPPORTUNITY AREAS | "CONNECTING" LANDSCAPES



Connecting Landscapes: Primarily includes park strips and parking areas. These locations are not usable for recreation activities and are difficult to irrigate without overspray. These sites represent the first landscapes to be converted from turf to a low water use plant material.



SECOND LAYER OF TURF ALTERNATIVE OPPORTUNITIES AREAS | SMALL, DISCONNECTED SPACES



Small, Disconnected Spaces: Primarily small, ornamental spaces less than 2,000SF that are not used for gathering, circulation, or campus activities. These sites represent the second layer of landscapes to be converted from turf to a low water use plant material.



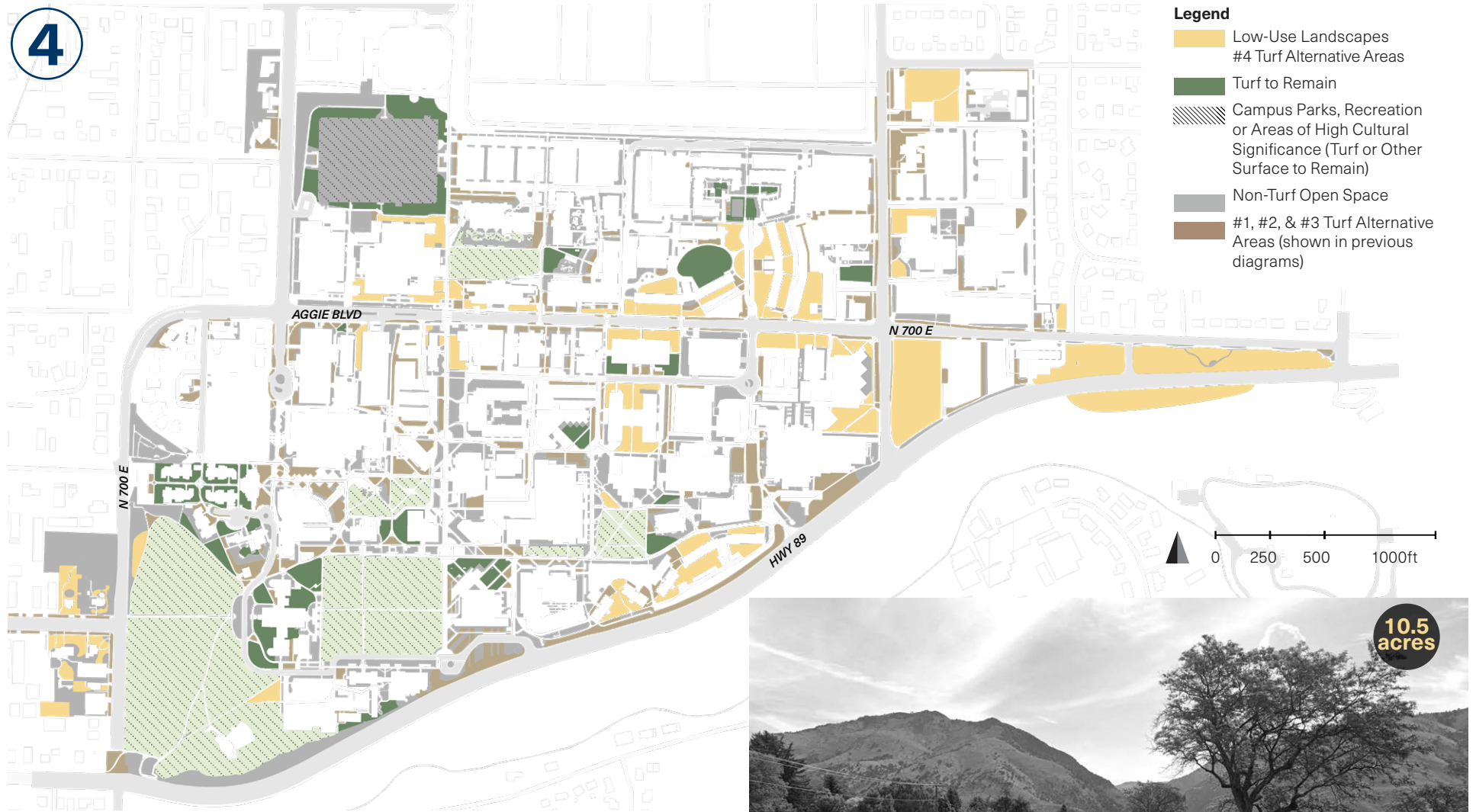
THIRD LAYER OF TURF ALTERNATIVE OPPORTUNITY AREAS | SHADE-IMPACTED LANDSCAPES



Shade-Impacted Areas: Includes sites on the north and east side of buildings and under large tree canopies where the turf is difficult to grow. Narrow turf areas along 700 N are an example. These sites represent the third layer of landscapes to be converted from turf to a low water use plant material.



FOURTH LAYER OF TURF ALTERNATIVE OPPORTUNITY AREAS | LOW-USE LANDSCAPES



Low-Use Landscapes: Sites identified for a reduction of turf are anticipated to be redesigned so that 80 percent of the turf is replaced with a lower water use landscape material. These areas could maintain their current value and use with a mix of turf and other softscape materials. Generally, these sites represent the final layer of landscapes to be converted from turf to a low water use plant material. However, the redesign of a few, highly visible sites could be prioritized in order to communicate the value the University places on reducing water use.



OVERALL COMPOSITE OF OPPORTUNITIES AREAS FOR TURF ALTERNATIVES



	Connecting Areas (e.g., park strips, parking lots, walkways)	Small, Disconnected Areas (>2,000SF or low use)	Shade-Impacted Areas	Low-Use Areas (Redesign to reduce turf by at least 80%)	Total Acres for Turf Alternative Landscapes
Civic	-	1.7 acres	0.2 acres	0.8 acres	2.7 acres
Recreational	-	-	-	2.0 acres	2.0 acres
Connecting	6.2 acres	-	-	2.0 acres	8.2 acres
Academic	-	2.9 acres	2.1 acres	2.9 acres	7.7 acres
Housing (Student)	-	0.5 acres	0.5 acres	1.7 acres	2.7 acres
Housing (Other)	-	-	-	1.1 acres	1.1 acres
Specialty	-	0.3 acres	0.04 acres	-	0.34 acres
Total Turf Areas Converted to an Alternative	6.2 acres	5.4 acres	2.8 acres	8.4 acres (80% of 10.5 acres)	22.6 acres of turf converted to an alternative landscape type

OPPORTUNITIES AREAS FOR TURF ALTERNATIVES: COMPOSITE

EXISTING TURF TO PLANTER AREA RATIO FOR MAIN CAMPUS PLANTER AREAS



Existing Ratio of Turf to Planters

Excluding areas designated as high cultural importance and recreation areas that were not identified as opportunity sites for turf reduction. In 2022, 60 percent of the University's Main Campus open space was comprised of turf.

POTENTIAL TURF TO PLANTER AREA RATIO FOR MAIN CAMUS PLANTER AREAS



Potential Ratio of Turf to Planters

By utilizing turf alternatives in the opportunity areas described in this chapter, the University would reduce campus turf areas by 67 percent. This calculation excludes areas designated as campus parks or recreation. The reduction can be achieved by considering landscape alternatives for park strips, parking lots, along walkways, and highly shaded sites and reducing turf in areas like the Golden Toaster and Mountain Aire Park by at least 80 percent.

TURF ALTERNATIVE STRATEGIES

Underlying Management Strategies

To create a resilient landscape, two essential strategies are applied to all of the landscape areas.

- Healthy soils
- Water-conscious irrigation practices



Categories of Alternative Strategies

The turf alternative strategies are organized into three categories.

- Low Water Turfs Alternatives
- Softscape Alternatives
- Hardscape Alternatives

Strategy: Low Water Turf Alternatives

Two types of low water turf alternatives are described:

- Low Water Traditional Sod-forming Grasses
- Sedges and Bunch Grasses

Strategy: Softscape Alternatives

Softscape alternatives range from large, consistent applications of groundcovers and mulches to specialty plantings and a combination of shrubs, groundcovers, and mulches. The planting strategies listed below provide options for different landscape zones on campus.

- Ground Treatment Mulches and Plantings (including groundcovers that can take occasional foot traffic)
- Utah Meadow Plantings
- Climate Adapted Shrub and Groundcover Plantings
- Specialty Plantings

Strategy: Hardscape Alternatives

In some areas it may be more practical to remove the planting materials and utilize hardscape elements such as pavers and concrete to provide usable campus spaces. This alternative is especially applicable for small sites that can be used as campus plazas or walkways.

STRATEGY: LOW WATER TURF ALTERNATIVES

Drought Hardy Traditional Sod-forming Grasses

New varieties of traditional turf grasses such as Kentucky bluegrass and tall fescues are continuing to be researched and developed. The University has experimented with these alternatives in the past and continues to do so today. These lower water turf grasses are appropriate for areas that receive high levels of recreation or pedestrian use. These new varieties provide a path to retrofit existing turf areas without extensive redesign.



Mowed and unmowed fine fescues



Mowable low water grasses and drought-tolerant groundcover (i.e.: thyme) mixed with low density planting



Fine fescue grassland with retaining walls

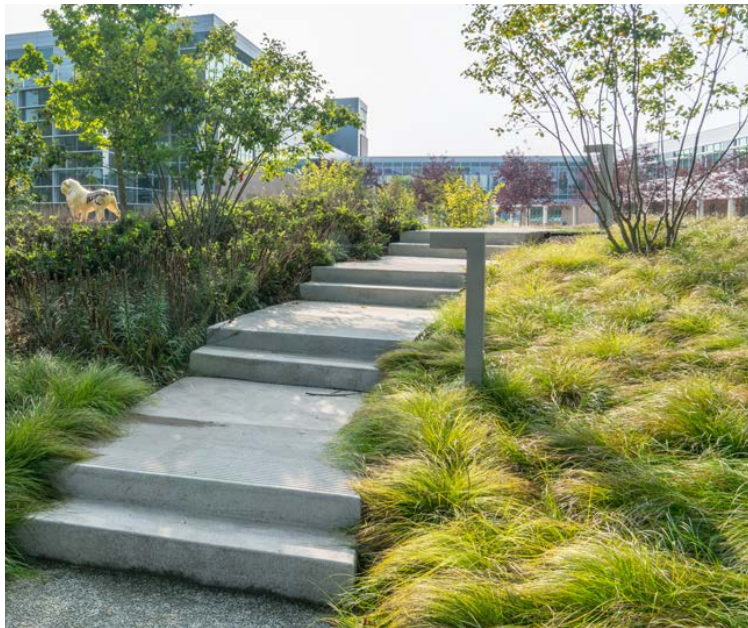
STRATEGY: LOW WATER TURF ALTERNATIVES

Bunch Grasses

Bunch grasses, such as Sheep fescue, Mondo grass, and Grama grass provide uniform, consistent planting strategies similar to traditional lawns. These grasses can create a bumpy surface that is not recommended for active uses.



No-mow grasses have lower water and maintenance needs



Bunch grasses provide slope stabilization



Mixed bunch grasses

STRATEGY: SOFTSCAPE ALTERNATIVES

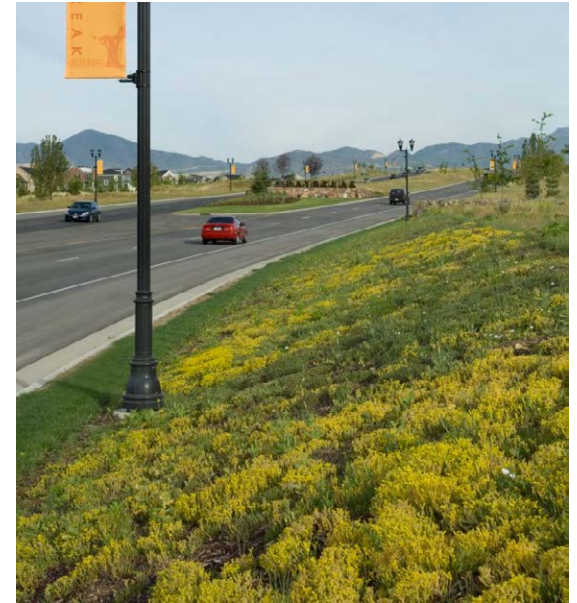
Ground Treatment Mulches and Plantings

Ground treatments can include different types of mulch and ground covers depending on where the treatment is applied. Two types of ground treatments are included as alternatives.

- Non-Living
 - Organic Mulch
 - Non-Organic Mulch: decomposed granite and rock mulches
- Spreading groundcovers that can take occasional foot traffic



Low maintenance shrub ground cover



Low water perennial ground cover



Thyme is a drought tolerant, low water use groundcover that can also be walked on.



Mini bark mulch used in park strip.

STRATEGY: SOFTSCAPE ALTERNATIVES

Utah Meadow Plantings

Revegetation of large open spaces with a mix of grasses, wildflowers, and native or adapted native shrubs.



Mixed grass meadow in Daybreak, Utah



Colorful perennial meadow



Mixed grass and perennial meadow



Early summer mixed prairie planting in Erie, Colorado

STRATEGY: SOFTSCAPE ALTERNATIVES

Climate Adapted Planting Shrub and Groundcover Plantings | Low Density

A mix of evergreen and deciduous shrubs, groundcovers and perennials where 50 percent or more of the planting area utilizes organic and inorganic mulches as the groundplane material. Use of rock mulch should be limited.

All plants should be spaced for according to their mature growth, or the size they will achieve with irrigation and maintenance.



Native shrubs in rock mulch



Colorful penstemons



Shrubs in boulder and rock mulch garden



Simple low water planting in park strip

STRATEGY: SOFTSCAPE ALTERNATIVES

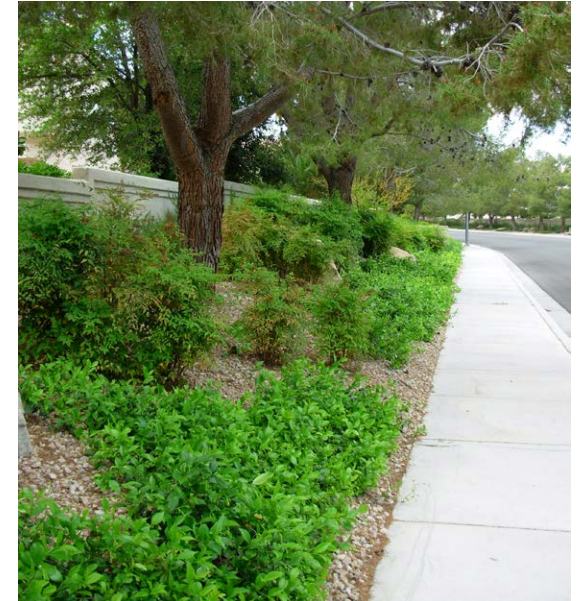
Climate Adapted Planting Shrub and Groundcover Plantings | Medium Density

A mix of evergreen and deciduous shrubs, groundcovers and perennials that are separated by areas of organic or non-organic mulches. Plantings may be organized in naturalized patterns or in a linear arrangement with spacing between individual plants or groups of plants.

All plants should be spaced for according to their mature growth, or the size they will achieve with irrigation and maintenance.



Xeric-style planting with grasses and shrubs



Shrub ground cover with mature pine trees



Low-water perennials



A mix of ornamental grasses and groundcovers

STRATEGY: SOFTSCAPE ALTERNATIVES

Climate Adapted Planting Shrub and Groundcover Plantings | High Density

A mix of evergreen and deciduous shrubs, groundcovers and perennials that when fully grown, little to no areas of mulch are visible. The landscapes include a diversity of plant species that are selected for color, texture, seasonal interest, and form.

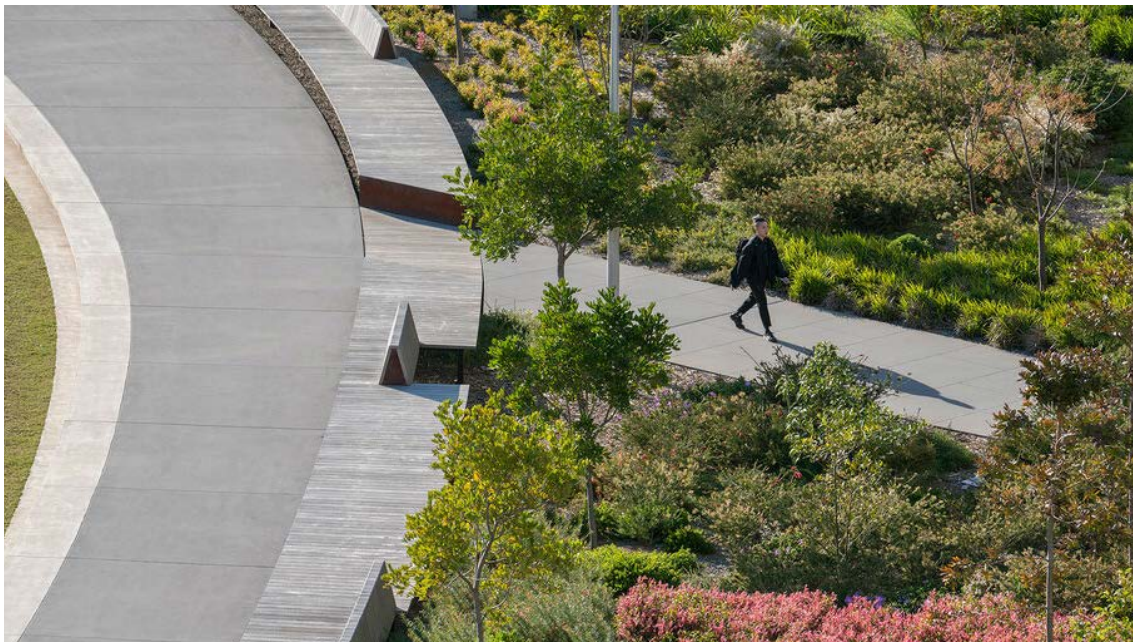
All plants should be spaced for according to their mature growth, or the size they will achieve with irrigation and maintenance.



Shrubs and grasses accent seating areas



Large drifts of shrubs and grasses



A mix of shrubs, groundcovers, and trees



Ornamental grasses

STRATEGY: SOFTSCAPE ALTERNATIVES

Specialty Plantings

A variety of planting types that showcase a specific ecological purpose, garden style or function. Examples on campus include the sagebrush garden at the Welcome Center and the stormwater treatment in front of the HPER building. Categories of Specialty Plantings shown here include:

- Stormwater treatment
- Demonstration gardens



Stormwater treatment within a landscape approach



Stormwater treatment within a streetscape design



Waterwise native plantings



Native demonstration gardens

STRATEGY: SOFTSCAPE ALTERNATIVES

Specialty Plantings

Two additional categories of Specialty Plantings include:

- Pollinator gardens
- Edible gardens
- Fragrant gardens



Pollinator gardens



Pollinator gardens



Edible gardens mixed within planting strategies

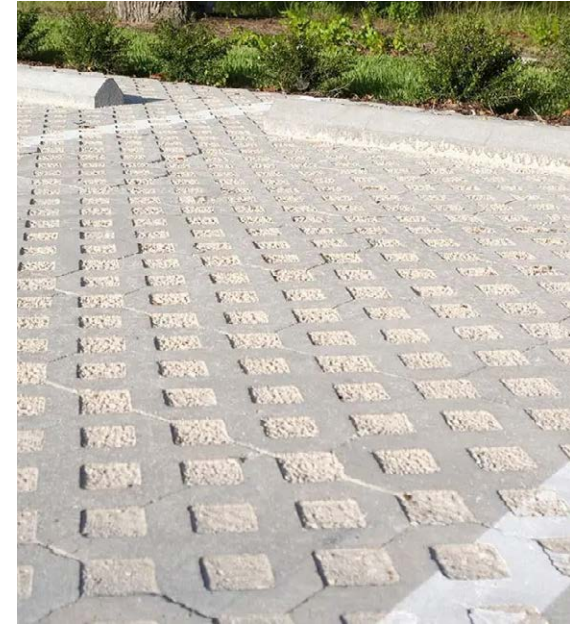
ALTERNATIVE STRATEGY: HARDSCAPE

Plazas, Courtyards, and Walkways

Turf removed and replaced with a paved surface that provides gathering space or enhances pedestrian connectivity.



Portions of a streetscape are paved for walkability



Pervious pavers allow water to infiltrate in parking areas



Seating and gathering spaces make up a significant part of campus life



Hardscape can be mixed with plantings as part of a design strategy

SHARING THE BENEFITS

Fun and Engaging Signage to Communicate Strategies and Benefits

Topics may include:

- Water savings
- Why irrigation is on during rain events
- Projects underway
- Importance of trees
- Water loss from winds
- Where USU's water comes from
- Sustainable maintenance strategies (everything that is "green" on campus, stays on campus; it is recycled, mulched, composted, etc.)
- Composting operations



Water savings sandblasted into a concrete curb



Sustainability metrics can be bold and engaging



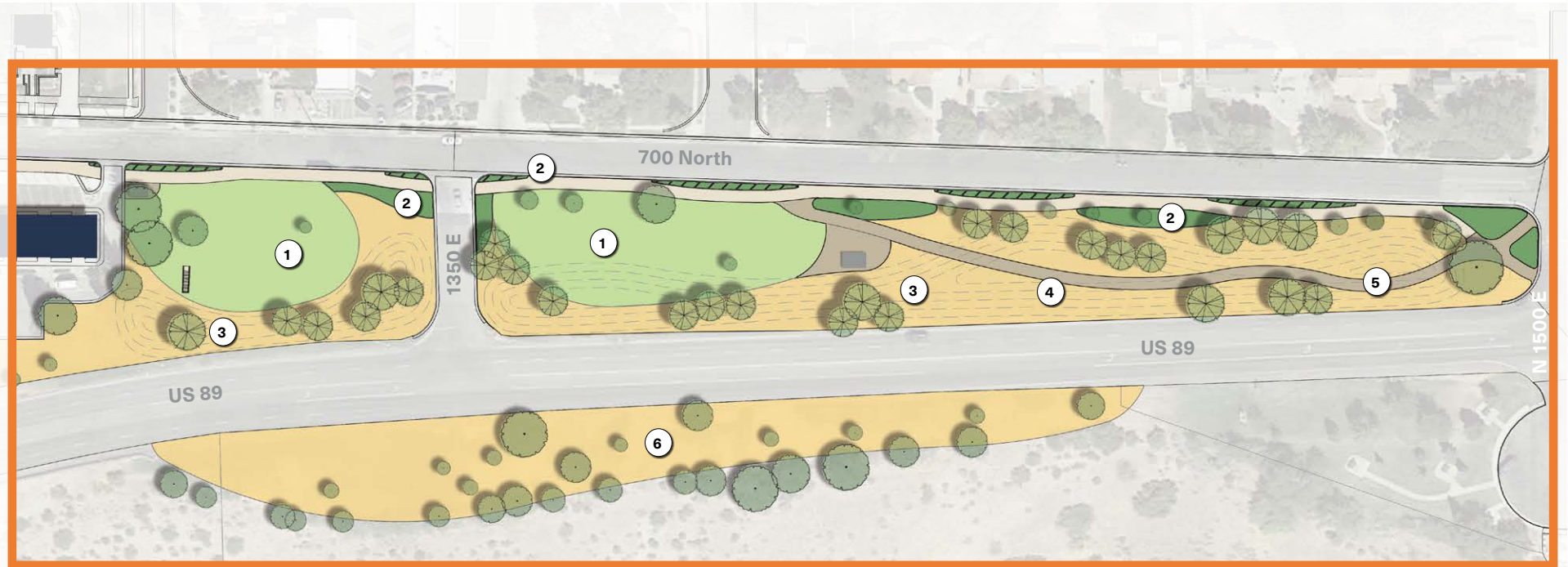
Temporary signage can utilize University branding to provide catchy metrics to show water use reductions

4.

APPLYING THE RECOMMENDATIONS

Chapter four provides case study illustrations for how to apply the water wise landscape strategies in a variety of campus settings. Plan diagrams demonstrate how lawn areas can be re-imagined. Design objectives summarize the “why” and the purpose for design changes. The page following each diagram describes the changes made along with accompanying images to convey what the improvements might look like. A summary of the importance of healthy soils, a healthy tree canopy, and irrigation recommendations and considerations for the Utah State University campus conclude the document.

PARK AREA CONCEPT PLAN: MOUNTAIN AIRE PARK

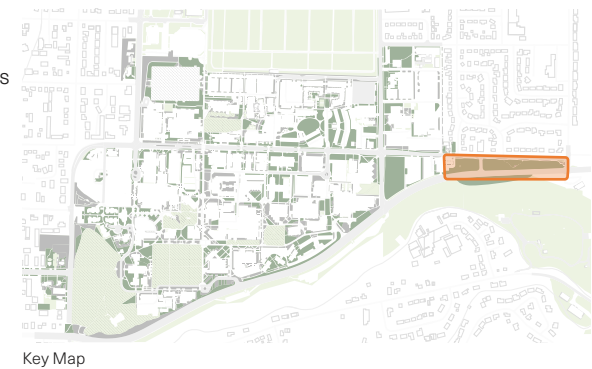


Design Objectives

- Maintain and enhance usable and inviting park spaces
- Buffer use areas from highway noise and canyon winds
- Reduce traditional lawn by using a mix of drought hardy grasses and native plants
- Bring the aesthetics of a canyon landscape into the campus with meadow and shrub plantings along US 89

Legend

- Utah Meadow Grasses & Wildflowers
- Drought Hardy Traditional Sod-Forming Grasses
- Climate Adapted Shrub & Groundcover Mix
- Existing Hardscape
- Expanded Hardscape
- Existing Planting to Remain
- Existing Trees to Remain
- Proposed Trees



Legend

1. Change turf areas to drought hardy sod-forming varieties; focus turf areas to sites close to existing commercial residential sites; size appropriately and buffer from the highway and wind to increase use
2. Replicate existing park strip turf plantings with climate adapted shrubs and groundcovers
3. Utilize sculpted landforms/grading and a mix of native grasses and wildflowers to buffer wind and noise
4. Create a gathering space with views into Logan Canyon and Cache Valley
5. Pathway integrated into landforms
6. Replace lawn with meadow grasses; maintain existing trees



Irrigation Approach

- Separate hydrozones to meet the specific water needs of the differing plant types and site conditions
- Irrigate smaller remaining sod grass areas with smaller radius, high efficiency spray heads with a 12 inch pop-up height to facilitate efficient coverage at higher grass maintenance heights
- Utilize higher pop-up heights for larger meadow and wildflower areas (consider stream rotor for rotator type heads)
- Use flood or stream bubblers for smaller shrub and groundcover areas to reduce wind drift and direct water to the plants more directly and efficiently
- Consider daytime watering when winds are at their lowest to improve efficiency in the high wind corridor and reduce night time wind drift

39%
estimated water
use reduction




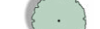
CONNECTION AREA CONCEPT PLAN: BULLEN HALL

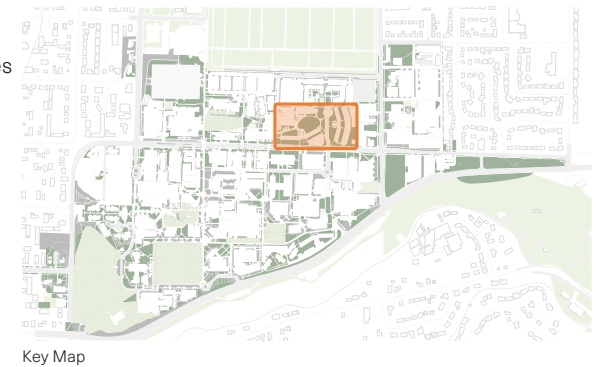


Design Objectives

- Maintain visibility into first floor dorms; new planting should be low to the ground
- Create a variety of spaces for small group gatherings
- Provide additional outdoor seating by reducing the size of main lawn behind Richards Hall
- Extend/continue stormwater treatment streetscape and planting strategies from western portion of Aggie Blvd.

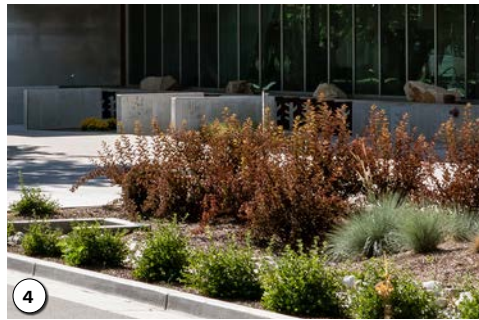
Legend

-  Ground Treatment Planting
-  Drought Hardy Traditional Sod-Forming Grasses
-  Climate Adapted Shrub & Groundcover Mix
-  Existing Turf
-  Specialty Planting (Stormwater)
-  Sedges and Bunch Grasses
-  Existing Hardscape
-  Expanded Hardscape
-  Existing Planting to Remain
-  Existing Trees to Remain
-  Proposed Trees



Legend

1. Integrate aesthetic stormwater treatment into streetscape along Aggie Blvd.
2. Add outdoor gathering spaces around the common rooms
3. Create shaded outdoor seating/dining areas near the Junction
4. Replace lawn with consistent Aggie Blvd planting style from 800 E
5. Utilize groundcovers and bunch grasses around the first floors of Bullen and Richards Hall for visibility and “lawn-like” look
6. Add recreational hangout spaces for active spaces similar to Central Suites
7. Reduce size of central lawn



51%
estimated water
use reduction

Irrigation Approach

- Separate hydrozones to meet the specific water needs of the differing plant types and the unique micro-climates created by the surrounding structures
- Irrigate smaller sod grass areas with smaller radius, high efficiency spray heads with a 12 inch pop-up height to facilitate efficient coverage at higher grass maintenance heights

- Use flood or stream bubblers for smaller shrub and groundcover areas to reduce wind drift and direct water to the plants more directly and efficiently

CONNECTION AREA CONCEPT PLAN: E CAMPUS PORTAL

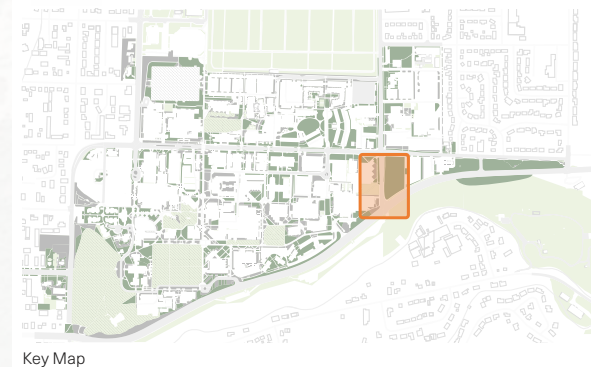


Design Objectives

- Utilize drought hardy turf at campus portals for interpretive and educational opportunity
- Replace park strip turf with low water use plantings
- Add specialty plantings to highlight campus entry from US 89
- Maintain flexible and usable space that does not impeded future site development
- Provide seating and socializing space near building entries

Legend

- Utah Meadow Grasses & Wildflowers
- Ground Treatment Planting
- Drought Hardy Traditional Sod-Forming Grasses
- Climate Adapted Shrub & Groundcover Planting Mix
- Mulch
- Existing Hardscape
- Expanded Hardscape
- Existing Planting to Remain
- Existing Trees to Remain
- Proposed Trees



Legend

1. Replace turf area with drought hardy sod-forming varieties; highlight water savings with signage
2. Accent campus entry with native meadow grass, shrub, tree mix
3. Create seating and socializing spaces added at Fine Arts Visual Building for students and outdoor class opportunities
4. Reduce areas of shaded lawn and replace with low water use shrubs and groundcovers
5. Add trees and shrubs to buffer gathering spaces from winds
6. Replace park strip lawn with groundcovers and thyme
7. Replace park strip lawn with a mix of rock mulch and low groundcovers, similar to other sections of 700 N

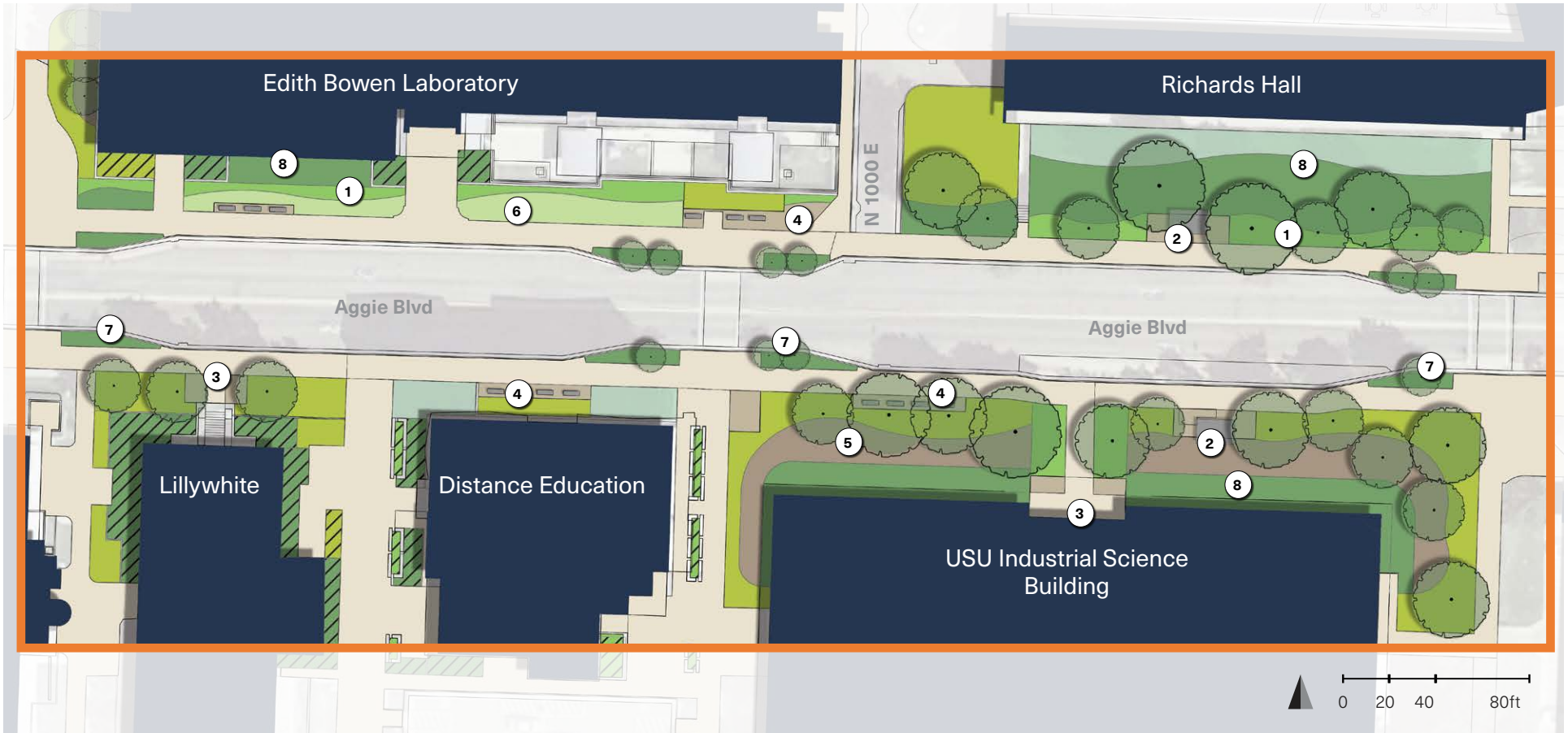


37%
estimated water
use reduction

Irrigation Approach

- Separate hydrozones to meet the specific water needs of the differing plant types and the unique micro-climates created by the surrounding structures, roadways, and open spaces
- Irrigate smaller sod grass areas with smaller radius, high efficiency spray heads with a 12 inch pop-up height to facilitate efficient coverage at higher grass maintenance heights
- Utilize higher pop-up heights or stream rotors for rotator type heads for larger meadow and wildflower areas
- Use flood or stream bubblers for smaller shrub and groundcover areas to reduce wind drift and direct water to the plants more directly and efficiently
- Consider daytime watering when winds are at their lowest to improve efficiency in the high wind corridor and reduce night time wind drift

CONNECTING AREA CONCEPT PLAN: AGGIE BLVD. NORTH FACING LANDSCAPE



Design Objectives

- Create a continuous streetscape experience with a pattern of regular street trees, lighting, seating opportunities and enhanced building entries
- Expand hardscape at building entries for increased spill out space
- Remove turf from north facing planting areas
- Extend mulch areas under mature trees
- Encourage buildings to have transparency at ground floor levels and to provide welcoming entries

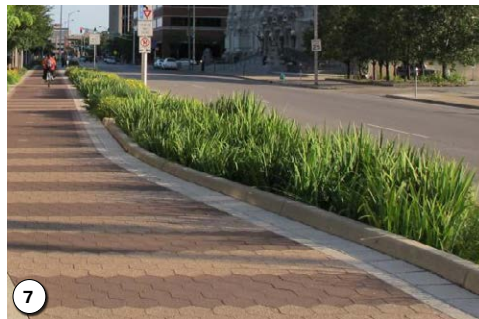
Legend

- Ground Treatment Planting
- Drought Hardy Traditional Sod-Forming Grasses
- Climate Adapted Shrub & Groundcover Mix
- Sedges and Bunch Grasses
- Specialty Plantings (Stormwater)
- Mulch
- Existing Hardscape
- Expanded Hardscape
- Existing Planting to Remain
- Existing Trees to Remain
- Proposed Trees



Legend

1. Integrate aesthetic stormwater treatment into streetscape along Aggie Blvd.
2. Enhance bus stops per 700 N Concept Plan
3. Expand hardscape for seating and provide accent plantings at entries
4. Incorporate seating areas along Aggie Blvd streetscape
5. Provide continuous mulch areas under mature trees
6. Maintain small turf areas for school pick up and drop off and outdoor classroom uses
7. Utilize low ornamental grasses and groundcovers at crosswalks for pedestrian visibility
8. Incorporate mixed shrub plantings areas along building facades



Irrigation Approach

- Separate hydrozones to meet the specific water needs of the differing plant types and the unique micro-climates created by the surrounding structures and roadway

- Irrigate smaller sod grass areas with smaller radius, high efficiency spray heads with 6 or 12-inch pop-up heights to facilitate efficient coverage at higher grass heights
- Use flood or stream bubblers for smaller shrub and groundcover

56%
estimated water
use reduction

- areas to reduce wind drift and direct water to the plants more directly and efficiently
- Consider daytime watering when winds are at their lowest to improve efficiency and reduce night time wind drift

ACADEMIC AREA CONCEPT PLAN: ENGINEERING BUILDINGS

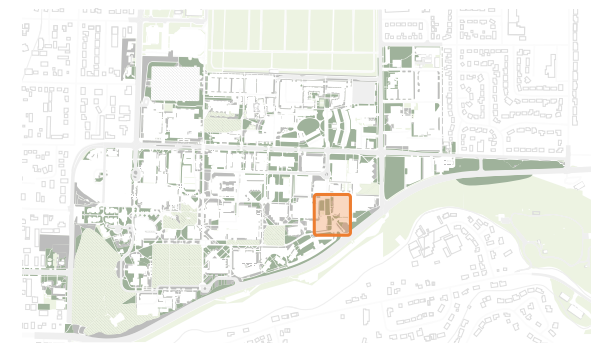


Design Objectives

- Reduce lawn where possible and replace lawn with drought hardy variety where it receives light use
- Enhance circulation and provide areas for seating and gathering
- Define lawn areas with shrubs and trees to encourage use
- Utilize low growing plants in front of bike racks for visibility
- Create continuity along campus frontage and highlight entries

Legend

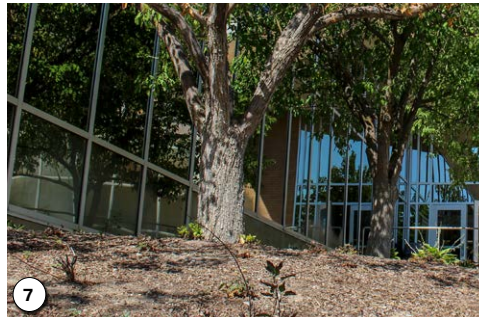
- Utah Meadow Grasses & Wildflowers
- Ground Treatment Planting
- Drought Hardy Traditional Sod-Forming Grasses
- Climate Adapted Shrub & Groundcover Planting Mix
- Specialty Plantings
- Mulch
- Existing Hardscape
- Expanded Hardscape
- Existing Planting to Remain
- Existing Trees to Remain



Key Map

Legend

1. Expand hardscape expanded pedestrian junction between arts and engineering buildings
2. Reduce lawn area and define space with mix of shrubs and groundcovers
3. Widen entry path at Engineering Building
4. Continue planting strategy of rock mulch and grasses from Caine Performance Hall
5. Accent campus entry with native meadow grass, shrub, tree mix
6. Replace turf area with drought hardy sod-forming varieties; highlight water savings with signage
7. Utilize mulch planting under trees with heavy shade

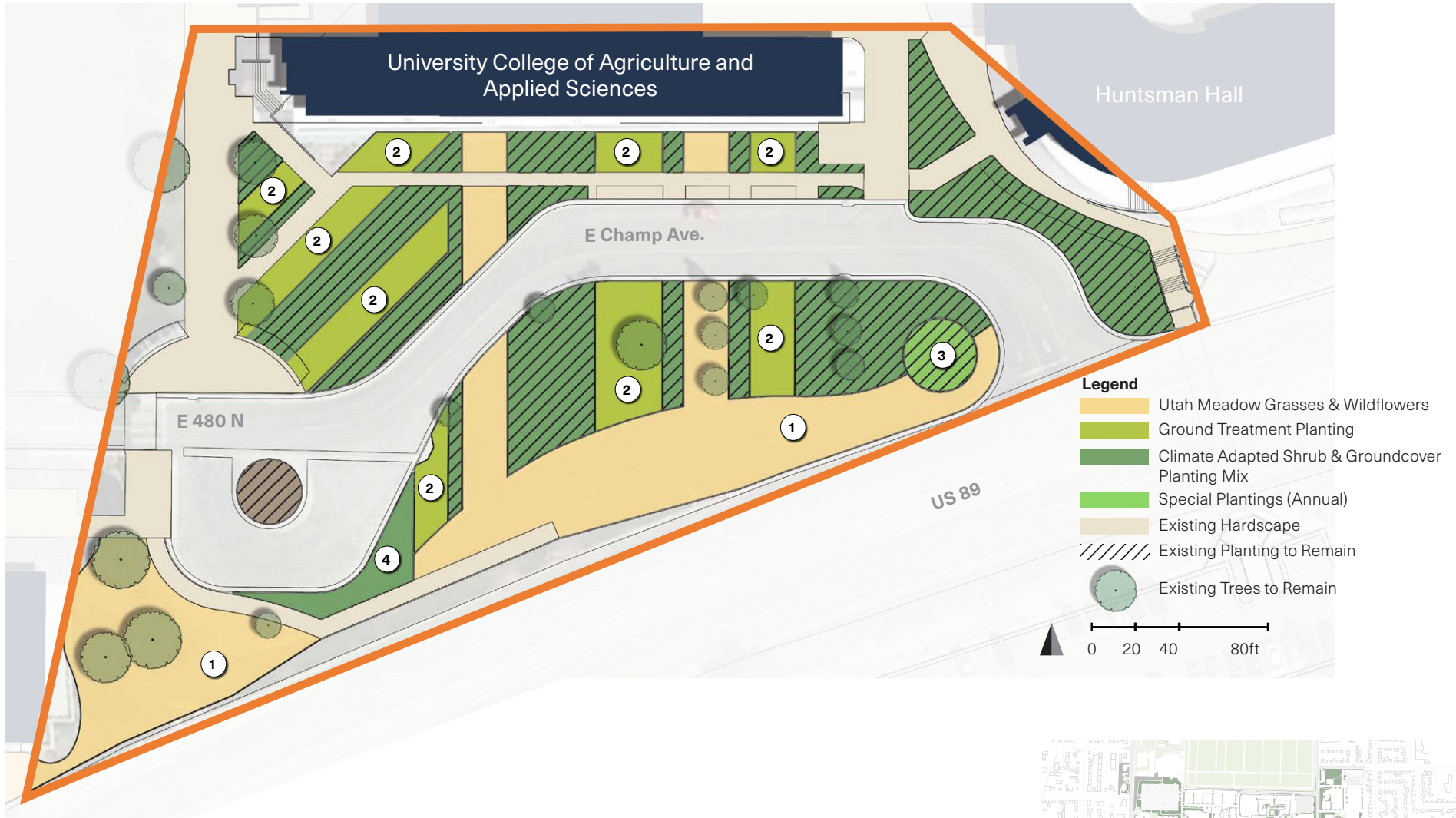


Irrigation Approach

- Separate hydrozones to meet the specific water needs of the differing plant types and the unique micro-climates created by the surrounding structures and parking areas
- Irrigate smaller sod grass areas with smaller radius, high efficiency spray heads with 6 or 12-inch pop-up heights to facilitate efficient coverage at higher grass heights
- Use flood or stream bubblers for smaller shrub and groundcover areas to reduce wind drift and direct water to the plants more directly and efficiently

50%
estimated water
use reduction

ACADEMIC / SPECIALTY AREA CONCEPT PLAN: AG BUILDING DROP OFF



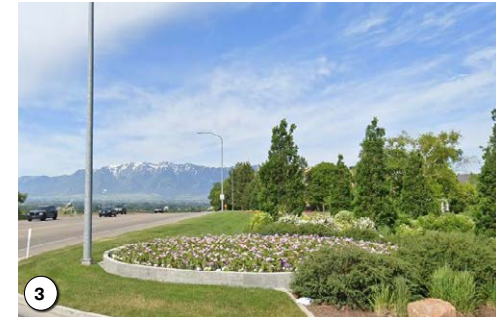
Design Objectives

- Create continuity along campus frontage and highlight entries
- Replace non-usable turf along US 89
- Maintain design of Champ Drive drop off by replacing turf with drought hardy species
- Reduce annual beds while maintaining annuals at campus entry



Legend

1. Accent campus entry with native meadow grass and wildflower mix
2. Replace lawn strips with groundcover, such as thyme
3. Maintain annual bed at entry as an accent and as a transition into the more traditional landscape around the Quad
4. Incorporate new flowering shrub and perennial bed to match existing planting beds around drop off



Irrigation Approach

- Separate hydrozones to meet the specific water needs of the differing plant types and the unique micro-climates created by the surrounding structures and roadways
- Irrigate smaller sod grass areas with smaller radius, high efficiency spray heads with 12-inch pop-up heights to facilitate efficient coverage at higher grass heights
- Utilize higher pop-up heights or stream rotors for rotator type heads for larger meadow and wildflower areas
- Use flood or stream bubblers for smaller shrub and groundcover areas to reduce wind drift and direct water to the plants more directly and efficiently
- Consider daytime watering when winds are at their lowest to improve efficiency and reduce night time wind drift

38%
estimated water
use reduction

Healthy Soils

Soils are the foundation of all gardens. Nurturing the living organisms that comprise the soil food web will foster healthy plant growth. To be effective, tailor fertilization and mulch programs to each distinct plant composition on campus rather than a one-size-fits-all approach.

For new projects and areas under renovation, it is advisable to submit soil samples to a reputable lab prior to installing new plants. This will identify and address any problems at the outset, such as extreme pH levels, nutrient deficiencies or toxicities, insufficient organic content, compaction issues, etc. Conduct a biological soil test as well to assess the status of the soil food web. If amendments are indicated, use organic products. During construction and renovation of landscapes, it is required to preserve and protect topsoil.

Inorganic mulch or a thin layer of organic mulch is suitable for plantings where the plant materials have adapted to sites of little to no organic matter in the surface. In contrast, plants that occur in woodland and forest communities where leaf litter accumulates and slowly decomposes, benefit from a more generous layer of organic mulch. Plants that require regular irrigation and high fertility levels also benefit from a layer of organic mulch.

Mulch is used to suppress weeds, retain soil moisture and thereby reduce water demand, cover drip irrigation lines, curb erosion, reduce dust levels, and moderate temperature extremes in the soil. Targeted increases in the soil aid in water retention, soil biome development and diversity, and nutrient enhancement. For every 1% organic material added to the soil, the University can potentially retain 30,000 gallons of water per acre.

As it breaks down, organic mulches add nutrients and help improve soil structure. The frequency of application will depend upon the type of mulch used and the irrigation schedule. As plants grow, they shed their older leaves and may eventually cover the ground, creating a self-sustaining layer of mulch. As a result, supplemental mulch may no longer be necessary.

Whether organic or inorganic, all mulch should be clean and free from disease pathogens, pests, and weeds. It should be evenly spread and generally two to three inches deep, taking care to avoid mulch buildup around the crowns of woody plants or smothering sensitive species when applied. In areas where wildflowers are desirable, avoid mulch in order to maximize seed germination. Bare soil is also desirable when trying to provide habitat for ground-nesting bees, wasps, and other insects.

If signs of nutrient deficiency appear, determine the type of deficiency before applying any fertilizer. In general, a top dressing of high-quality compost or slow-release organic fertilizer may be appropriate, but only on an as-needed basis.

BEST PRACTICES | HEALTHY CAMPUS TREE CANOPY

Healthy Campus Tree Canopy

Trees represent a significant investment and contribute in myriad ways to the overall character and ecology of the campus landscape. A variety of mature, healthy trees make up USU's campus and provide a suite of environmental, social, and economic benefits. Their shade reduces heat island effect and canopies filter pollutants, improving air quality. Studies show that in addition to creating a sense of place and offering opportunities for recreation and relaxation, trees reduce stress and improve mental health. The presence of mature trees has also been shown to attract customers to commercial areas and would similarly be a component that makes a campus desirable for prospective students. It can take many years for a tree canopy to be established. Maintaining tree health is a priority at all times, and especially during a drought.

When compared to smaller shrubs and other plants, mature trees may use more water overall due to their size and age, they are often able to conserve water through their deep root systems and leaf characteristics.

The shade provided by the campus tree canopy can help reduce the amount of water needed to keep trees alive by reducing evaporation and transpiration rates. Trees create a cooler microclimate by shading the surrounding area, which reduces the amount of water lost to evaporation from the soil and transpiration from the leaves. The shade can also reduce the need for cooling in nearby buildings, which can save energy and water.

Watering should be done in a way that is efficient and effective. Deep watering encourages deeper root growth. Using drip irrigation during the early morning or late evening can also minimize water loss due to evaporation.

Overall, even during a drought, it is important to water mature trees to keep them healthy. Trees that do not receive enough water can suffer from wilting leaves, premature leaf drop, stunted growth, and even death. Watering trees during a drought can also help prevent immediate damage, and trees may recover more quickly once the drought has ended.



Maintenance Recommendations

- Convert non-functioning, narrow lawn panels into dynamic, diverse, climate-appropriate vegetation.
- Create interpretive sign program for water use reductions and sustainable landscape strategies on campus.
- Create interpretive sign program for the trees on campus.
- Create a long-range urban forest canopy plan to ensure structural and botanical diversity.
- Identify areas on campus where layers of historic landscape history are largely intact and renovate as needed while simultaneously implementing sustainable landscape practices. Gradually replace problematic [e.g., invasive, pest or disease-prone] species with more climate-appropriate taxa.
- Develop guidelines for sustainable landscape maintenance practices that encompass planting, weeding, watering, pruning, soil health, pest management, green waste management, etc.
- The area on the tree where the roots meet the trunk is known as the root crown. The situation that needs to be avoided is a “buried root crown”, the raising of the grade or the piling up of soil and debris in the root crown area. This can lead to decay in the trunk and prevent water and oxygen from reaching the roots.
- Utilize informal, naturalistic hedges or mixed borders where possible. This will reduce labor costs as well as green waste.

- Leave the leaves on the ground, where appropriate. Leaves form a natural mulch that helps suppress weeds and fertilizes the soil as it breaks down naturally. Excessive landscaping grooming is not good for wildlife, soil and carbon footprint.
- Establish policy to salvage wood when trees are removed or heavily pruned (barring insect or disease concerns), either to be chipped and recycled as mulch or repurposed for benches, sculpture, indoor furniture, etc.
- As turf conversion occurs ensure that trees are preserved by converting the irrigation from spray to drip irrigation. Drip irrigation should be located at least 4 feet from tree trunk and ideally at the edges of the tree dripline.

Water Management

One of the most challenging aspects in tending living landscapes is watering. There is no one-size-fits-all method of irrigation. Companies continue to release new products that aim to improve overall efficiency; the maintenance staff will benefit by staying abreast of innovative tools and techniques.

Weather-based smart controllers are the preferred technology for managing irrigation systems. To maximize efficiency, each zone must be accurately programmed to reflect plant type, soil type, sun exposure, slope, maturity of plants (newly installed or established), and precipitation rate for heads or emitters in that zone. Staff should use soil probes periodically to check moisture levels in the root zone rather than rely solely on automated systems.

BEST PRACTICES | WATER MANAGEMENT

Although some conventional turf areas and other plantings require consistent irrigation year-round, future plantings on campus should heavily lean toward plants that thrive with minimal water during the dry summer months once established. Even plants adapted to dry summers, however, will likely need supplemental irrigation during the establishment phase (a plant is generally considered to be established once it has tripled in size after installation). Planting date, seasonal rainfall, and initial plant size influence the length of this establishment period.

The importance of regularly monitoring irrigation systems for any landscape cannot be overstated. These systems must be routinely inspected to identify broken, misdirected, or clogged spray heads or drip lines. Heads may become blocked over time as plants grow, requiring either judicious pruning, entire plant removal, or adjustments to the heads.

Once new plants are established, watering schedules will need to be adjusted accordingly to avoid overwatering. In addition, it is wise to expect and plan for the fact that some plants will need to be replaced due to natural senescence, physical damage, or unforeseen pest or disease problems. When new plants are added to a mature planting, they will likely require hand watering during establishment so that older plants are not overwatered. Periodic monitoring of plant health and soil moisture levels is necessary over the life of any landscape.

Utilizing Hydrozones

Using hydrozones can reduce water usage and costs while also improving plant health. Hydrozones refers to the grouping of plants with similar water needs to efficiently manage water use. When designing the landscape, do not plant low water shrubs and ground covers next to high water trees. Ensure that trees and surrounding shrubs are in the same hydrozone. While the goal of this plan is to create a resilient, low water use campus, during periods of drought and water restriction, the priority should be on ensuring the preservation of trees regardless of their water needs.

IRRIGATION RECOMMENDATIONS

Recommendations to Improve Irrigation Efficiency

A number of strategies have been identified to improve overall system efficiency and help meet the university's resiliency goals and water conservation requirements. Recommended improvements include the following.

Mainline Improvements

Much of the current mainline network is aging and leaks are a common occurrence. Efforts are ongoing to make improvements as budgets allow and as projects are implemented throughout campus where there are opportunities for mainline upgrades. The mainline networks downstream from each pump station have interconnections some of which need to be located and turned off to allow improved flow management and system leak detection.

System Audits

It is well known that the distribution uniformity (DU) of much of the overhead spray & rotor systems on campus is not to the level required for optimal system efficiency. Improved uniformity is achieved through correct head spacing, and proper nozzle selection based on available pressure, spacing, and as required to achieve matched precipitation rates throughout a given zone. Optimal uniformity is ultimately attained through proper system design, correct installation with a requirement to meet the desired DU percentage. It is recommended that system audits be required following installation to confirm system uniformity prior to acceptance by the university. Long term uniformity can be facilitated by regular system audits to ensure that systems are properly adjusted and maintained.

High Efficiency Non-Drip Solutions

Water quality that is not conducive to the use of drip irrigation is a condition that will be an ongoing challenge. As turf conversion is implemented, there will be a need for an efficient means of non-spray irrigation that will meet the needs of the plant material. There are various types of bubblers that could provide a solution if properly be utilized. Bubblers differ from drip in that they have larger orifices and consequently higher output rates which allow the suspended solids in the water to pass through. Flood bubbler and stream bubblers can be placed in a manner that deliver water to specific planting areas in a more targeted manner and without overspray. Additionally, this type of system would lend itself to future conversion to drip equipment as water quality is improved.

Centralized Pump Station

Campus staff has identified that there would be benefits to the future implementation of a single pump station that would replace the four pump stations that currently serve the main campus areas. The consolidation of the pumping systems into a single station would improve the overall ability to manage the campus irrigation water supply from a single point. Benefits of the approach include:

- Implementation of the most current technologies to reduce power consumption.
- Improved pressure management throughout the system.
- Enhanced water filtration capabilities.
- Improved ability to track overall campus water usage.
- Improved reliability, system redundancy and ability to efficiently meet a wide range of flow and pressure demands through a multiple pump design.

IRRIGATION RECOMMENDATIONS

The centralized pump station approach would require significant mainline upgrades to convert low pressure lines, that now feed the pump station, to high pressure piping. This conversion has been anticipated by staff as piping has been replaced and as improvements are planned for the future.

Improved Filtration

High efficiency irrigation methods such as drip irrigation and precision spray devices have smaller orifices and require significant reduction of the suspended solids in the water. The inherent quality of the secondary surface water source with its high level of fine suspended solids makes it especially challenging to implement high efficiency irrigation equipment. Current drip systems on campus are limited to new sites which utilize a second point of filtration. These systems are costly and difficult to implement throughout the existing system. The consolidated pumping system approach would allow for improved initial filtration, and it has been suggested that the existing pumping station vaults could be re-purposed as secondary filtration stations to provide two stages of filtration. This approach would enable the use of high efficiency irrigation throughout campus.

Design for the Future

Campus staff has long recognized the need to plan systems with a small percentage of additional capacity to anticipate future zone expansion or adjustments which may increase flow rates as plantings are changed or supplemented from year to year. In order to improve efficiency in the long term it will be important to require correct and appropriate system design and installation

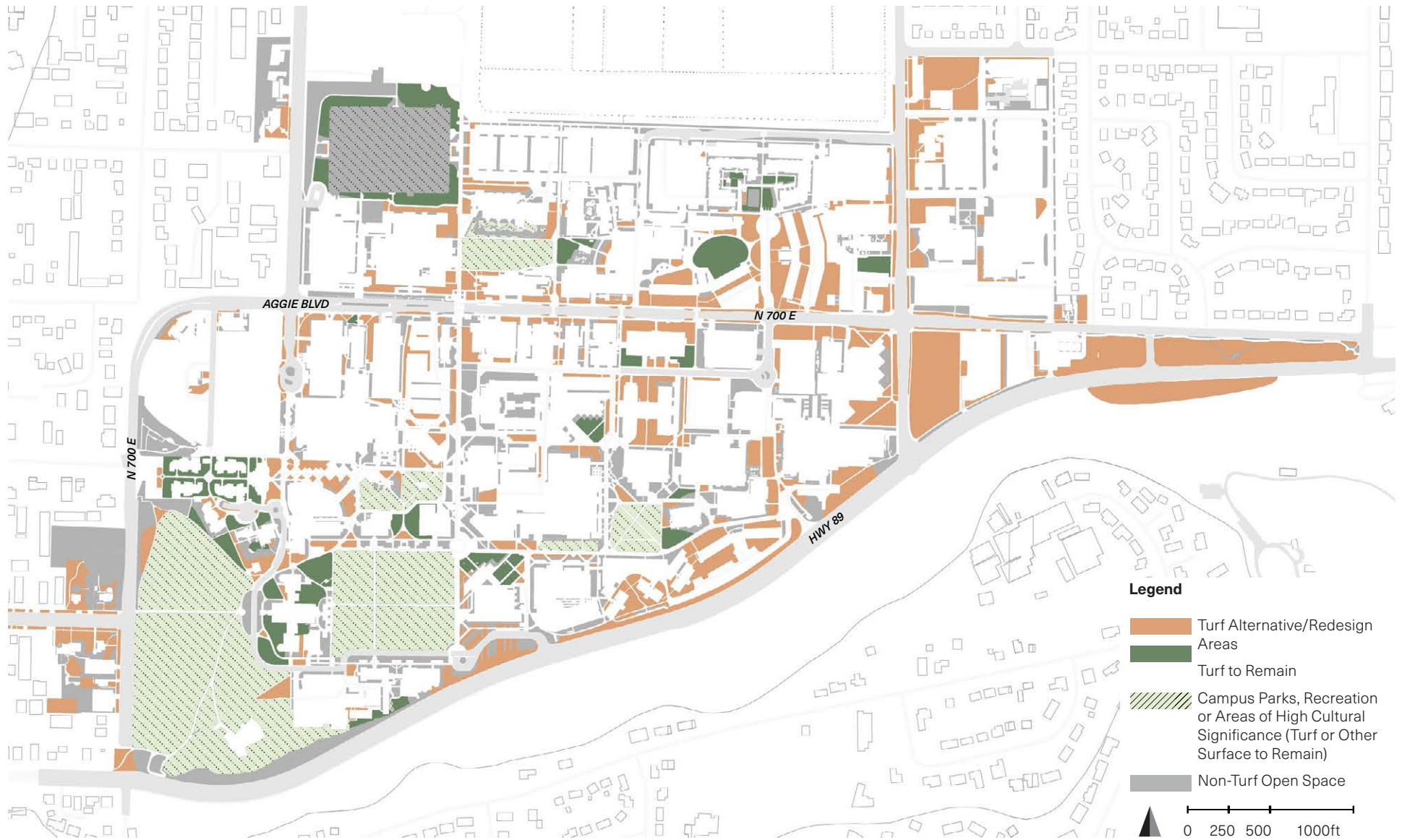
followed by proper maintenance and regular system audits to measure efficiency and ensure system integrity.

Water conservation to the level that will be required to meet the state mandates and anticipate reduced water availability in the future will require the reduction of high-water use landscape types and the introduction of landscapes with lower water requirements and reduced plant density. These types of landscapes will require the transition of the irrigation system and related technologies to achieve the level of reduction that will be required.

General Irrigation Approach for Low-Water Landscapes

- Separate hydrozones to meet the specific water needs of the differing plant types and the unique micro-climates created by the surrounding structures, roadways, and open spaces
- Irrigate smaller sod grass areas with smaller radius, high efficiency spray heads with a 12 inch pop-up height to facilitate efficient coverage at higher grass maintenance heights
- Utilize higher pop-up heights or stream rotors for rotator type heads for larger meadow and wildflower areas
- Use flood or stream bubblers for smaller shrub and groundcover areas to reduce wind drift and direct water to the plants more directly and efficiently
- Consider daytime watering when winds are at their lowest to improve efficiency in the high wind corridor and reduce night time wind drift

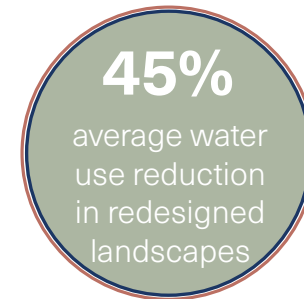
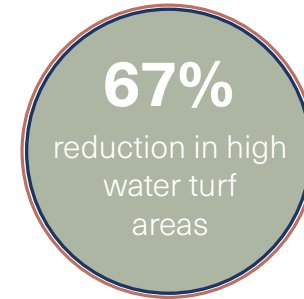
OVERALL APPLICATION OF TURF ALTERNATIVES & REDESIGN AREAS



Moving Forward

This plan allows the University to move forward with implementing landscape strategies that are resilient to more common drought conditions and water restrictions. Overall, the plan sets for the opportunity to reduce campus turf areas by 67 percent while maintaining turf areas in high use, recreation sites, and culturally significant locations such as the Quad. The opportunity areas for redesign and to switch to an alternative/low-water use turf are shown in the image to the left in salmon/orange.

Applying the principles depicted in the previous concept plan examples to the opportunity areas (light brown and salmon/orange areas on page 70), presents an opportunity for significant water savings. Redesign areas may on average see approximately 45 percent reduction in water demands while also providing a welcoming, attractive, and ecologically beneficial landscape.



A.

APPENDIX A – TURF & SOFTSCAPE LOW- WATER PLANT LISTS

Appendix A includes a list of recommended plants associated with each of the turf and softscape alternative strategies. Plant lists include the following:

Strategy: Low Water Turf Alternatives

Two types of low water turf alternatives are described:

- Low Water Traditional Sod-forming Grasses
- Sedges and Bunch Grasses

Strategy: Softscape Alternatives

Softscape alternatives range from large, consistent applications of groundcovers and mulches to specialty plantings and a combination of shrubs, groundcovers, and mulches. The planting strategies listed below provide options for different landscape zones on campus.

- Ground Treatment Mulches and Plantings (including groundcovers that can take occasional foot traffic)
- Utah Meadow Plantings
- Climate Adapted Shrub and Groundcover Plantings
- Specialty Plantings

Low Water Turf Alternative | Low Water Traditional Sod Forming Grasses

<i>Botanical Name</i>	<i>Common Name</i>	<i>Grass Season</i>	<i>Water Requirement</i>	<i>Notes</i>
Poa pratensis 'Bombay'	Bombay Kentucky Bluegrass	Cool Season	Moderate high	Currently testing on campus
Poa pratensis 'Cloud'	Cloud Kentucky Bluegrass	Cool Season	Moderate high	Currently testing on campus
Poa pratensis 'Pivot'	Pivot Kentucky Bluegrass	Cool Season	Moderate high	Currently testing on campus
Poa pratensis 'Skye'	Skye Kentucky Bluegrass	Cool Season	Moderate high	Currently testing on campus
Poa pratensis 'Starr'	Starr Kentucky Bluegrass	Cool Season	Moderate high	Currently testing on campus
Festuca arundinacea 'Blade Runner'	Blade Runner Tall Fescue	Cool Season	Moderate	Will be testing in the future
Festuca arundinacea 'Heartland'	Heartland Tall Fescue	Cool Season	Moderate	Will be testing in the future
Festuca arundinacea 'Inferno'	Inferno Tall Fescue	Cool Season	Moderate	Will be testing in the future
Festuca arundinacea 'Matador'	Matador Tall Fescue	Cool Season	Moderate	Will be testing in the future

Low Water Turf Alternative | Sedges and Bunch Grasses

<i>Botanical Name</i>	<i>Common Name</i>	<i>Water Requirement</i>	<i>Exposure</i>	<i>Notes</i>
Aristida purpurea	Purple Three Awn	Very low	Full sun	Pinkish seed heads form when now mown down
Bouteloua gracilis	Blue Grama	Low	Full sun	Grey green foliage, can be slow to fill in
Carex praegracilis	Clustered Field Sedge	Low moderate	Full sun	Bright green with thick blades
Danthonia californica	California Oatgrass	Low	Full sun	Yellow green foliage with plump looking seeds
Festuca ovina 'Covar'	Sheep Fescue, Fine fescue	Low	Full sun	Soft flowing foliage
Festuca rubra 'Shadow II SR 5100' and 'Aruba'	Creeping Red Fescue, Fine fescue	Low	Part sun	Soft flowing foliage
Festuca trachyphylla 'Durar'	Hard Fescue, Fine fescue	Low moderate	Full sun	Long lived and competitive against weeds
Koeleria macrantha	Prairie Junegrass	Low moderate	Full sun	Light green slightly pubescent blades

Softscape Alternatives | Ground Treatment Plantings

<i>Botanical Name</i>	<i>Common Name</i>	<i>Type</i>	<i>Size</i>	<i>Water Reqmnt</i>	<i>Exposure</i>	<i>Notes</i>
<i>Delosperma cooperi</i>	Ice Plant	Succulent	2-3" H x 18" W	Very low	Full sun	Succulent with magenta colored flowers, needs good drainage and full sun
<i>Sedum sieboldii</i>	Creeping Stonecrop	Succulent	4" H x 12" W	Very low	Full sun	Many cultivars with varying foliage and flower colors, good for exposed rocky sites
<i>Alyssum montanum</i>	Mountain Gold Alyssum	Perennial	4" H x 15" W		Full to part sun	Bright yellow flowers on cool green foliage
<i>Anacyclus depressus</i>	Mountain Atlas Daisy	Perennial	2" H x 18" W		Full sun	Bright white flowers in spring
<i>Antennaria</i> spp.	Pussy Toes	Perennial	2-6" H x 3' W	Low	Full sun	Very drought tolerant, pink flowers in early summer
<i>Callirhoe involucrata</i>	Prairie Wine Cups	Perennial	6-12" H x 24-36" W	Low	Full sun	Green foliage with purple to maroon flowers
<i>Cerastium tomentosum</i>	Snow in Summer	Perennial	8" H x 24" W	Low	Full sun	Mat forming silver foliage with white flowers, can die out in the center if over watered
<i>Fragaria virginiana</i>	Creeping Strawberry	Perennial	3-6" H x 12" W	Moderate	Full to part sun	Native strawberry with white flowers in spring, foliage turns red and maroon in the fall
<i>Iberis sempervirens</i>	Candytruff	Perennial	6-12" H x 6-12" W	Moderate	Full to part sun	Evergreen foliage with white flowers in spring, dense foliage
<i>Oenothera macrocarpa</i>	Evening Primrose	Perennial	12" H x 24-36" W	Low	Full sun	Prolific yellow flowers in the summer, very drought tolerant, can become rangy over time
<i>Saponaria ocymoides</i>	Soapwort	Perennial	4-8" H x 15-24" W	Low	Part to full sun	Vigorous and low growing, trailing habit
<i>Stacys byzantian</i> 'Silky Fleece'	Lambs Ear	Perennial	6-12" H x 6-12" W	Low	Part sun	Reduced sun and water help to keep growth rate manageable
<i>Tanacetum densum</i>	Partridge Feather	Perennial	4-8" H x 12-15" W	Low	Full to part sun	Silver grey foliage with yellow flowers in summer, tough plant that is drought and heat resistant

Softscape Alternatives | Ground Treatment Plantings

<i>Botanical Name</i>	<i>Common Name</i>	<i>Type</i>	<i>Size</i>	<i>Water Reqmnt</i>	<i>Exposure</i>	<i>Notes</i>
Teucrium aroanium	Gray Creeping Germander	Perennial	3" H x 18" W	Low	Full to part sun	Silver gray leaves with fragrant lavender colored flowers
Thymus serphyllum	Woolly Thyme	Perennial	2-4" H x 12-16" W	Low	Full to part sun	Textured low growing fragrant groundcover with pale pink flowers
Veronica liwanensis	Turkish Veronica	Perennial	1-3" H x 12-24" W	Low	Full to part sun	Dark green densely matted foliage with lavender flowers in spring
Arctostaphylos uva-ursi	Kinnikinnick	Creeping shrub	3-6" H x 24-36" W	Low	Part shade	Evergreen foliage with pink urn shaped flowers
Arctostaphylos x coloradoensis	Colorado Manzanita	Creeping shrub	12-18" H x 4-6' W	Low	Full sun	Slow growing
Cotoneaster dammeri 'Coral Beauty'	Coral Beauty Cotoneaster	Creeping shrub	1-2' H x 5-6' W	Low	Full sun	Evergreen, flowers in the springs and berries in the fall
Helleous orientalis	Lenton Rose	Creeping shrub	12-18" H x 12-18" W	Moderate	Part sun	Winter/early spring blooms, long lasting blooms, shiny green foliage, protect from winter wind
Hypericum calycinum	St. John's Wort	Creeping shrub	12-36" H x 12-36" W	Moderate	Full sun	Dense rounded form with large yellow flowers in early summer
Juniperus horizontalis 'Blue Chip'	Blue Chip Juniper	Creeping shrub	12" H x 6-8' W	Low	Full to part sun	Ground hugging habit with silvery blue foliage
Mahonia repens	Creeping Oregon Grape	Creeping shrub	1-2' H x 3-4' W	Low	Part sun	Evergreen, flowers fruits and leaf color change in fall
Paxistima myrsinities	Mountain Lover	Creeping shrub	24-36" H x 4-5' W	Low	Adaptable full sun to full shade	Evergreen shrub similar to boxwood, but hardier in the intermountain west climate
Prunus bessyi 'Pawnee Buttes'	Pawnee Buttes Sand Cherry	Creeping shrub	15-18" H x 4-6' W	Low	Full sun	Low growing shrub, white flowers are followed by purple berries and bright orange/red fall color
Rhus aromatica 'Autumn Amber'	Autumn Amber Fragrant Sumac	Creeping shrub	10-14" H x 6-8' W	Low	Full sun	Great for large landscapes, fall color varies from yellow to dark red
Rhus aromatica 'Gro Low'	Grow Low Fragrant Sumac	Creeping shrub	2-3' H x 6-8' W	Low	Full sun	Tolerant of poor soils and part shade, bright red/orange fall color
Symphoricarpos x chenaultii	Chenault Coralberry	Creeping shrub	3-4' H x 4-6' W	Low	Full to part sun	Pink flowers followed by persistent purple berries

**Softscape Alternatives |
Utah Meadow**

<i>Botanical Name</i>	<i>Common Name</i>	<i>Water Requirement</i>	<i>Notes</i>
<i>Wildflowers</i>			
<i>Achillea millefolium occidentale</i>	Western Yarrow	Very low	
<i>Asclepias speciosa</i>	Showy Milkweed	Low	
<i>Asclepias tuberosa</i>	Butterfly Weed	Low	
<i>Balsamorhiza sagittata</i>	Arrowleaf Balsamroot	Very low	
<i>Cleome serulata</i>	Rocky Mountain Beeplant	Very low	
<i>Eriogonum heracleoides</i>	Wyeth Buckwheat	Very low	
<i>Eriogonum umbellatum</i>	Sulfur Buckwheat	Very low	
<i>Gaillardia aristata</i>	Blanketflower	Low	
<i>Helianthus annulus</i>	Annual Sunflower	Low	
<i>Heliomeris multiflora</i>	Showy Goldeneye	Very low	
<i>Linum perenne lewisii</i>	Blue Flax	Very low	
<i>Lomatium triternatum</i>	Nineleaf Biscuitroot	Very low	
<i>Lotus corniculatus</i>	Birdsfoot Trefoil	Low	
<i>Lupinus argenteus</i> ssp. <i>rubricaulis</i>	Mountain Lupine	Low	
<i>Melilotus officinalis</i>	Yellow Sweetclover	Low	
<i>Onobrychis viciifolia</i>	Sainfoin	Low	
<i>Penstemon wilcoxii</i>	Wilcox Penstemon	Very low	
<i>Penstemon cyananthus</i>	Wasatch Penstemon	Very low	
<i>Penstemon eatonii</i>	Firecracker Penstemon	Very low	
<i>Penstemon palmeri</i>	Palmer's Penstemon	Very low	
<i>Penstemon speciosus</i>	Sage Penstemon	Very low	
<i>Penstemon strictus</i>	Rocky Mountain Penstemon	Very low	
<i>Solidago canadensis</i>	Canada Goldenrod	Low	
<i>Sphaeralcea munroana</i>	Munro Globemallow	Very low	
<i>Trifolium repens</i>	White Clover	Low	

**Softscape Alternatives |
Utah Meadow**

<i>Botanical Name</i>	<i>Common Name</i>	<i>Water Requirement</i>	<i>Notes</i>
Grasses			
<i>Achnatherum hymenoides</i>	Indian Ricegrass	Very low	
<i>Agropyron cristatum</i>	Crested Wheatgrass	Very low	
<i>Agropyron fragile</i>	Siberian Wheatgrass	Very low	
<i>Bromus marginatus</i>	Mountain Brome	Low	
<i>Elymus elymoides</i>	Bottlebrush Squirreltail	Very low	
<i>Elymus lanceolatus</i>	Thickspike Wheatgrass	Very low	
<i>Elymus lanceolatus psammophilus</i>	Streambank Wheatgrass	Low	
<i>Elymus trachycaulus</i>	Slender Wheatgrass	Very low	
<i>Festuca idahoensis</i>	Idaho Fescue	Very low	
<i>Koelleria macrantha</i>	Junegrass	Very low	
<i>Lolium perenne</i>	Perennial Ryegrass	Low	
<i>Pascopyrum smithii</i>	Western Wheatgrass	Very low	
<i>Poa fendleriana</i>	Muttongrass	Very low	
<i>Poa secunda</i>	Sandberg's Bluegrass	Very low	
<i>Pseudoroegneria spicata</i>	Bluebunch Wheatgrass	Very low	
<i>Thinopyrum intermedium</i>	Intermediate Wheatgrass	Very low	
<i>Thinopyrum intermedium</i>	Pubescent Wheatgrass	Very low	
<i>Triticale (sterile hybrid)</i>	Quickguard (Sterile Hybrid)	Low	

Softscape Alternatives | Climate Adapted Shrub and Groundcovers

<i>Botanical Name</i>	<i>Common Name</i>	<i>Type</i>	<i>Size</i>	<i>Water Reqmnt</i>	<i>Exposure</i>	<i>Notes</i>
<i>Prunus bessyi</i> 'Pawnee Buttes'	Pawnee Buttes Sand Cherry	Creeping shrub	15-18" H x 4-6' W	Low	Full sun	Low growing shrub, white flowers are followed by purple berries and bright orange/red fall color
<i>Rhus aromatica</i> 'Gro Low'	Grow Low Fragrant Sumac	Creeping shrub	2-3' H x 6-8' W	Low	Full sun	Tolerant of poor soils and part shade, bright red/orange fall color
<i>Amelanchier alnifolia</i>	Saskatoon Serviceberry	Shrub	4-15' H x 6-8' W	Low moderate	Full to part sun	Green leaves have a matte appearance, white flowers in spring followed by dark purple fruits, yellow to red fall color
<i>Aronia arbutifolia</i> 'Brilliantissima'	Red Chokeberry	Shrub	6-8' H x 3-4' W	Moderate	Full to part sun	Adaptable plant know for its fall color, white flowers in spring followed by red fruits
<i>Artemisia</i> spp.	Sage	Shrub	varies	Very low	Full sun	Many varieties ranging in size, low maintenance
<i>Berberis thunbergii</i>	Japanese Barberry	Shrub	4-6' H x 4-6' W	Moderate	Full to part sun	Many varieties ranging from reddish purple to yellow, sharp thorns
<i>Caryopteris x clandonensis</i>	Bluebeard	Shrub	3-4' H x 3-4' W	Low moderate	Full sun	Striking indigo blue flowers on green to chartreuse colored foliage, generally upright form with dense branching
<i>Chamaebatiaria millefolium</i>	Fernbush	Shrub	4-8' H x 4-8' W	Very low	Full sun	
<i>Cornus sericea</i>	Redtwig Dogwood	Shrub	3-8' H x 3-12' W	Moderate	Full to part sun	Native shrub with stems, great winter interest
<i>Cytis purgans</i> 'Spanish Gold'	Spanish Gold Broom	Shrub	3-4' H x 5-6' W	Low	Full to part sun	Semi evergreen with pale yellow vanilla scented flowers through spring and early summer
<i>Ericameria nauseosa</i>	Rabbitbrush	Shrub	3-5' H x 3-5' W	Very low	Full sun	Silver grey foliage with yellow flowers in late summer
<i>Euonymus alatus</i> 'Compactus'	Burning Bush	Shrub	6-8' H x 6-8' W	Low moderate	Full sun	Great hedge and background plant, green foliage with insignificant flowers, most notable for its bright red fall color
<i>Holodiscus dumosus</i>	Rockspray Spirea	Shrub	3' H x 4' W	Low	Full to part sun	Drought tolerant white flowers in summer
<i>Ligustrum vulgare</i> 'Lodense'	Lodense Privet	Shrub	4' H x 4' W	Moderate	Full sun	Great filler shrub green foliage with white flowers in summer when no pruned
<i>Perovskia atriplicifolia</i>	Russian Sage	Shrub	3-4' H x 3-4' W	Low	Full sun	Lavender blue flowers on white stems fine gray green foliage
<i>Philadelphus lewisii</i>	Western Mockorange	Shrub	4-9' H x 5-10' W	Very low	Shade to full sun	Adaptable shrub with fragrant white blooms in the summer
<i>Physocarpus opulifolius</i>	Ninebark	Shrub	3-12' H x 3-10' W	Moderate	Full to part sun	Whitish pink flowers with varying colors or purple to copper foliage, many cultivars
<i>Pinus mugo</i> 'pumilo'	Dwarf Mugo Pine	Shrub	3-5' H x 6-10' W	Low	Full sun	Low maintenance evergreen shrub

**Softscape Alternatives |
Climate Adapted Shrub and Groundcovers**

<i>Botanical Name</i>	<i>Common Name</i>	<i>Type</i>	<i>Size</i>	<i>Water Reqmnt</i>	<i>Exposure</i>	<i>Notes</i>
Potentilla fruticosa	Potentilla	Shrub	3' H x 3' W	Low	Full sun	Summer blooming shrub with many cultivars and bloom colors
Prunus x cistena	Sand Cherry	Shrub	6-10' H x 5-8' W	Moderate	Full sun	Purple leafed flowering cherry shrub
Ribes alpinum	Alpine Currant	Shrub	3-6' H x 3-6' W	Low moderate	Full sun	Compact green shrub grown as foliage plant, flowers are insignificant and berries are not seen on cultivated specimens
Ribes cereum	Squaw Currant	Shrub	3' H x 5' W	Low	Full to part sun	Compact form with pink flowers and red berries
Spirea spp.	Spirea	Shrub	3-5' H x 4-6' W	Moderate	Full to part sun	Many cultivars, green to orange foliage, flowers in shades of pink; blooms for extended period starting in early summer
Symphoricarpos albus	Snowberry	Shrub	3-6' H x 3-6' W	Moderate	Full sun to shade	Dull green leaves with white persistent berries in winter, will have a more dense habit and more berry production when grown in full sun
Syringa meyeri 'Palibin'	Dwarf Korean Lilac	Shrub	3-5' H x 5-7 W	Moderate	Full sun	
Viburnum opulus 'Nanum'	Dwarf Cranberry Bush	Shrub	1.5-2' H x 2-3' W	Moderate	Full to part sun	Compact green shrub grown as foliage plant, requires little maintenance to keep its dense rounded form, has red fall color
Viburnum rhytidophyllum	Leatherleaf Viburnum	Shrub	6-15' H x 6-12' W	Moderate	Shade to part sun	Great for screening with leathery evergreen leaves
Weigela florida	Weigela	Shrub	3-5' H x 3-5' W	Moderate	Full sun	Many cultivars, generally has a compact rounded form with pink or red flowers in early summer, foliage can be green or red, insignificant fall color

Softscape Alternatives | Specialty Plantings

<i>Botanical Name</i>	<i>Common Name</i>	<i>Type</i>	<i>Size</i>	<i>Water Reqmnt</i>	<i>Exposure</i>	<i>Notes</i>
All specialty gardens to be coordinated with LOAM and specific interest groups						
<i>Medicinal</i>						
Arnica montana	Arnica	Perennial	.5-2' H x .5-1.5' W	Moderate	Full sun	Used as a pain reliever
Artemisia absinthium	Wormwood	Perennial	2-3' H x 1.5-3' W	Moderate	Full sun	Used in digestive tinctures
Calendula officinalis	Calendula	Perennial	.5-1' H x .5-1' W	Moderate	Full sun	Used in skin care as an anti inflammatory
Hypericum perforatum	St. John's Wort	Perennial	1-3' H x 1-2' W	Moderate	Full sun	Used as a pain reliever
Lavendula angustifolia	Lavender	Perennial	2-3' H x 2-3' W	Low	Full sun	Used for calming
Matricaria chamomilla	Chamomile	Perennial	1-2' H x .5-1' W	Moderate	Full sun	Used in teas for sleep and calming
Mentha × piperita	Peppermint	Perennial	.5-1' H x 1-2' W	Moderate	Full sun	Used in teas for nausea and headaches
Ruta graveolens	Rue	Perennial	2-3' H x 2-3' W	Moderate	Full sun	Used for skin ailments and as an insect repellent
Tanacetum parthenium	Feverfew	Perennial	1-3' H by 1-3' W	Moderate	Full sun	Used for fevers, headaches and insect bites
Valeriana officinalis	Valerian	Perennial	3-5' H x 2-4' W	Moderate	Full sun	Used in teas for sleep
Verbascum thapsus	Mullien	Perennial	2-7' H x 1.5-2.5' W	Low	Full sun	Used for coughs and colds and anti inflammatory
Hamamelis virginiana	Witch Hazel	Shrub or small tree	15-20' H x 15-20' W	Moderate	Full sun	Used as skin ailments

Indigenous Cultural Uses

Allium cernuum	Nodding Onion	Perennial	1-2' H x 1' W	Moderate	Full sun	Roots used as a food source
Balsamorhiza sagittata	Arrowleaf Balsamroot	Perennial	1-1.5' H x 1-1.5' W	Low	Full sun	Roots used as a food source
Calochortus nuttallii	Sego Lilies	Perennial	1-1.5' H x 1-1.5' W	Low	Full sun	Roots used as a food source
Delphinium nuttallianum	Two-lobed Larkspur	Perennial	1-3' H x 1-3' W	Moderate	Full sun	Flowers were used for dye
Erigonum umbellatum 'majus'	Sulfur buckwheat	Perennial	1-2' H x 1-2' W	Low	Full sun	Used as medicine
Lewisia rediviva var. rediviva	Bitterroot	Perennial	.5' H x .5' H	Moderate	Full sun	Roots used as a food source
Hierochloe hirta	Sweetgrass	Grass	3-4' H x 3-4' W	Very low	Full sun	Important for ceremonies and medicine
Artemisia tridentata	Big Sagebrush	Shrub	3-5' H x 3-5' W	Very low	Full sun	Used for medicine and crafts
Atriplex confertifolia	Salt Brush	Shrub	1-3' H x 1-3' W	Very low	Full sun	Roots used as a food source
Juniperus scopulorum	Rocky Mountain Juniper	Shrub	8-15' H x 8-15' W	Very low	Full sun	All parts of the plant were used for medicine, food, ceremonies and crafts

[Eastern Shoshone and Northern Arapaho Traditional Ecological Knowledge \(TEK\) and Ethnobotany for Wind River Reservation Rangelands | Ethnobiology Letters](#)

Softscape Alternatives | Specialty Plantings

<i>Botanical Name</i>	<i>Common Name</i>	<i>Type</i>	<i>Size</i>	<i>Water Reqmnt</i>	<i>Exposure</i>	<i>Notes</i>
Shepherdia argentea	Buffalo Berries	Shrub	6-10' H x 6-10' W	Low moderate	Full sun	Berries used a food source
Vaccinium cespitosum	Dwarf Bilberry	Shrub	1-3' H x 1-3' W	Moderate	Full sun	Berries used as food source
Pinus monophylla	Pinyon Pine	Tree	20-40' H x 20-30' W	Very low	Full sun	Important food source and for ceremonies
Pollinators						Pollinator Garden (Plant List) USU
Agastache cana	Sonoran Sunset Hyssop	Perennial	1.5-3' H x 1-2' W	Low	Full sun	Pink flowers in summer and fall with a licorice scent
Agastache rugose 'Little Adder'	Little Adder Anise Hyssop	Perennial	1-1.5' H x 1.5-2' W	Low	Full sun	Compact form purple flowers bloom through summer and fall
Allium strictum	Flowering Onion	Perennial	1-1.5' H x 1.-1.5' W	Low	Full sun	Flowering onion with pale pink dome shaped bloom clusters
Aquilegia chrysantha	Golden Spur Columbine	Perennial	3-3.5' H x 1.5' W	Moderate	Part shade	Yellow flowers on long stalks in the spring
Aquilegia eximia	Serpentine Columbine	Perennial	3-3.5' H x 1.5' W	Moderate	Part shade	Red flowering species with greenish blue foliage
Asclepias tuberosa	Butterfly Weed	Perennial	1-2.5' H x 1-1.5' W	Low	Full sun	Orange blooms in the summer
Aster novi-belgii	Hardy Aster 'Puff White'	Perennial	3-4' H x 3' W	Low	Full sun	Purple daisy like bloom in late summer and fall
Coreopsis grandiflora	Sunray Tickseed	Perennial	1.5-2.5' H x 1-1.5' W	Low	Full sun	Bright yellow blooms, blooms for an extended period
Digitalis purpurea	Fox glove	Perennial	2-5' H x 1.5-2' W	Moderate	Part shade	Pink bell shaped flowers on tall upright stems
Echinacea purpurea	Coneflower	Perennial	2-5' H x 1.5-2' W	Low	Full sun	Pink flowers with persistent copper brown seedheads, many cultivars available
Erysimum capitatum	Wallflower	Perennial	1-2' H x .5-1' W	Low	Full sun	Four petaled yellow flowers in summer
Fire Chalice	Epilobium canum	Perennial	.5-1.5' H x 2-3' W	Very low	Full sun	Bright red flowers are prolific in late summer and fall
Gallardia spp	Blanket Flower	Perennial	1-1.5' H x 1' W	Very low	Full sun	Large yellow to red blooms on grey green foliage

Softscape Alternatives | Specialty Plantings

<i>Botanical Name</i>	<i>Common Name</i>	<i>Type</i>	<i>Size</i>	<i>Water Reqmnt</i>	<i>Exposure</i>	<i>Notes</i>
Guara lindheimeri	Whirling Butterflies	Perennial	3-5' H x 1-2' W	Moderate	Full sun	Small pink or white flowers on long flexible stems
Lavendula angustifolia	Lavender	Perennial	2-3' H x 2-3' W	Low	Full sun	Light purple flowers throughout summer, persistent seed heads in the fall
Monarda didyma	Bee Balm	Perennial	2-3' H x 2-3' W	Moderate	Full sun	Red tube shaped flowers attract hummingbirds
Nepta spp.	Catmint	Perennial	1-1.5' H x 1.5-2' W	Low	Full sun	Lavender colored blooms in early summer with serrated grey green leaves
Oenothera	Evening Primrose	Perennial	1-2' H x 2-3' W	Low	Full sun	Creeping form with large yellow flowers
Penstemon strictus	Rocky Mountain Penstemon	Perennial	2-3' H x 2-3' W	Low	Full sun	Bright purple flowers on upright stems
Buddleja davidii	Butterfly Bush	Shrub	6-8' H x 6-8' W	Moderate	Full sun	Fragrant cones of purple flowers in summer
Caryopteris x clandonensis	Bluebeard	Shrub	2-3' H x 2-3' W	Moderate	Full sun	Bright blue flowers on light green foliage
Regent Serviceberry	Amelanchier alnifolia 'Regent'	Shrub	4-6' H x 4-6' W	Low	Full sun	White flowers in spring followed by purple fruit and red fall color

Utah Native Shrubs

Eriogonum corymbosum	Crispy-leaf Buckwheat	Perennial	1-3' H x 1-3' W	Very low	Full sun	Shrubby member of the buckwheat family, copper colored blooms in the fall
Sphaeralcea ambigua	Desert Globemallow	Perennial	1-3' H x 1-3' W	Very low	Full sun	Orange flowers in late spring on grey green foliage
Yucca harrimaniae	Harriman's Yucca	Perennial	2-5' H x 1-3' W	Very low	Full sun	Blue green spike shaped foliage with white flowers
Sporobolus airoides	Alkali Sacaton Grass	Grass	3-4' H x 2-3' W	Very low	Full sun	Light airy texture, adaptable to very poor soils
Arctostaphylos uva-ursi	Kinnikinnick	Creeping shrub	3-6" H x 24-36" W	Low	Part shade	Evergreen foliage with pink urn shaped flowers
Artemisia filifolia	Sand Sage	Shrub	3-4' H x 4-5' W	Very low	Full sun	Semi evergreen with fine feather like foliage
Atriplex canescens	Fourwing Saltbush	Shrub	3' H x 3' H	Very low	Full sun	Semi evergreen fuzzy yellow green foliage

Softscape Alternatives | Specialty Plantings

<i>Botanical Name</i>	<i>Common Name</i>	<i>Type</i>	<i>Size</i>	<i>Water Reqmnt</i>	<i>Exposure</i>	<i>Notes</i>
Cercocarpus ledifolius var. intricatus	Littleleaf Mountain Mahogany	Shrub	4-6' H x 4-6' W	Low	Full sun	Small fine leaves are evergreen, adds texture to the landscape
Ephedra nevadensis	Mormon Tea	Shrub	3-4' H x 3-4' W	Very low	Full sun	Bright green desert shrub evergreen
Ericameria nauseosa	Rabbitbrush	Shrub	3-5' H x 3-5' W	Very low	Full sun	Grey green foliage with yellow flowers in the fall
Fallugia paradoxa	Apache Plume	Shrub	4-6' H x 4-6' W	Very low	Full sun	Fluffy pink seedheads in the fall
Mahonia fremontii	Utah Holly	Shrub	5-10' H x 5-10'	Very low	Full sun	Evergreen new leaves are red turning blue and then purple in the winter
Purshia tridenata	Bitterbrush	Shrub	4-10' H x 2-8' W	Very low	Full sun	Very small dark green leaves with pale yellow flowers in spring
Schizachyrium scoparium	Little Bluestem	Grass	2-3' H x 1.5-2' W	Low	Full sun	Rusty pink fall color with silvery seedheads
Shepherdia argenta	Silver Buffaloberry	Shrub	6-10' H x 6-10' W	Very low	Full sun	Long gray green leaves with red berries
Forestiera neomexicana	Desert Olive	Shrub/ small tree	12-18' H x 12' W	Very low	Full sun	Yellow flowers on bare branches pale green leaves in summer
Rhus glabra	Smooth Sumac	Shrub/ small tree	6-15' H x 8-15' W	Very low	Full sun	Leathery green foliage turns red in the fall with fuzzy reddish seedheads
Pinus aristata	Bristlecone Pine	Tree	20-40' H x 20-40' W	Low	Full sun	Evergreen tree with dense habit, dark green needles

Edible

Sources and examples for edible plants on a campus are below:

- [Edible Campus - Growfood - Gardens \(ucdavis.edu\)](#)
- [Edible Campus UNC - North Carolina Botanical Garden](#)
- [Edible Campus Program | UCSB Sustainability](#)
- [Edible Campus | Grounds and Landscaping | Seattle University](#)
- [American University's Edible Garden | Community of Gardens](#)