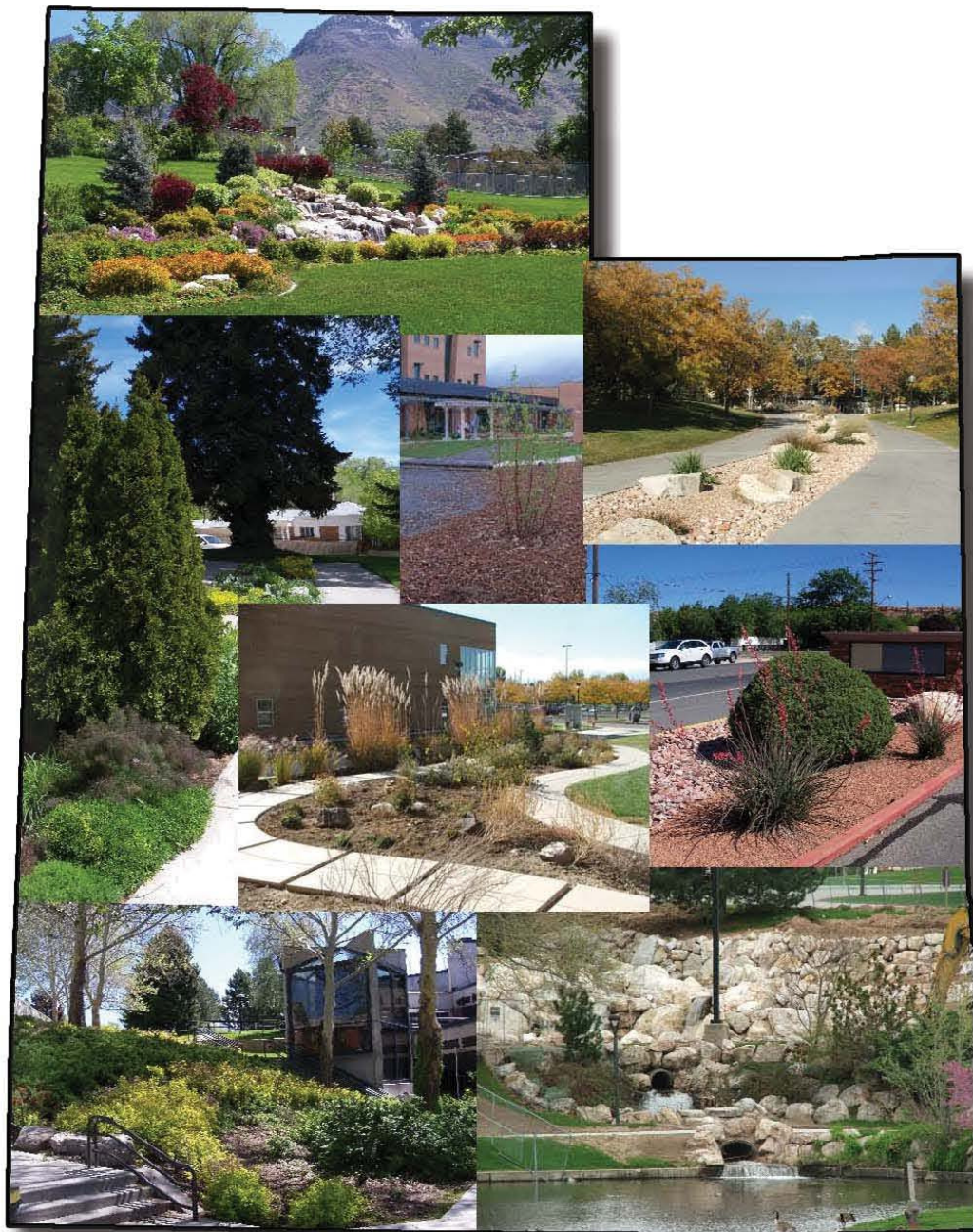


# Outdoor Water Use Efficiency of Utah's Universities and Colleges





***Outdoor Water Use Efficiency of  
Utah's Universities and Colleges***

Prepared by

Utah Division of Water Resources  
1594 West North Temple, Suite 310  
P. O. Box 146201  
Salt Lake City, Utah 84114-6201

August 28, 2012

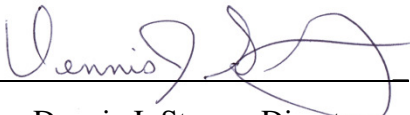


## ACKNOWLEDGEMENTS

This report was prepared under the direction of Todd Adams, Assistant Director of the Division of Water Resources (DWRe), by:

Eric Klotz ; Chief, Water Conservation and Education  
Eric Jones ; Water Resource Engineer (Primary Author)

The Division of Water Resources also wishes to express gratitude to members of the Governor's Water Conservation Team, and other advocates throughout the state; whose work to promote a long-term water conservation ethic in Utah have given the water conservation efforts of the DWRe valuable momentum.



---

Dennis J. Strong, Director



## **Table of Contents**

ACKNOWLEDGEMENTS .....	iii
INTRODUCTION .....	1
UNIVERSITIES AND COLLEGES WATER USE OVERVIEW .....	5
Brigham Young University .....	5
Dixie State College of Utah .....	11
Salt Lake Community College (Taylorsville-Redwood Campus) .....	14
Southern Utah University .....	19
University of Utah.....	25
Utah State University .....	29
Utah Valley University .....	35
Weber State University .....	39
CONCLUSION.....	45
REFERENCES .....	47

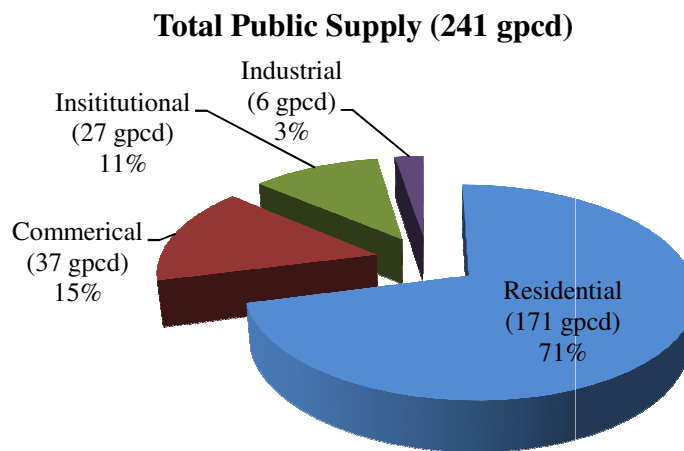




## INTRODUCTION

The Utah Division of Water Resources (DWRe) has a mission to plan, conserve, develop and protect Utah's water resources. While accomplishing its mission the DWRe receives feedback and input from the residents of Utah, especially when it comes to water conservation issues. One of the questions that the DWRe is asked is about water usage by large institutional water users. The Municipal and Industrial (M&I) water use is divided into 4 categories; residential, commercial, industrial and institutional. Residential water use is water used by an individual home owner (single family dwelling) or a group of home owners (apartment complex, condominiums/town homes) for domestic uses such as cooking, drinking water, washing clothes, cleaning, personal grooming and sanitation, irrigation of landscapes and washing automobiles and other outside facilities. Commercial water use is water use associated with business activities that include drinking water, food preparation, personal sanitation, cleaning, maintenance, private golf courses and irrigation of landscapes. Industrial water uses are water uses associated with the manufacturing or production of a product such as manufacturing plants, oil and gas producers, mining companies, dairies and greenhouses. Institutional water also includes water used by cities,

counties, state or federal government facilities; including parks, municipal golf courses, schools, hospitals, cemeteries, military facilities as well as churches. The chart indicates that institutional water uses make up 11 percent of the total public community system supply.



***The 2010 statewide M&I summary shows that institutional water use accounts for 11 percent of the total public water usage***

This is the third largest category. Often times, Utah residents will pass by an institutional

water user and wonder why they are watering at the wrong time of day, or why a sprinkler system does not seem to be working properly. In a response to the public's issues with institutional users, the DWRe decided to explore this issue of large institutional water users to better understand what it is they are doing to be water-wise.

The research included information from individuals associated with the maintenance of the campuses statewide. The universities and colleges that were included are all major public and private universities and colleges in the state which include Brigham Young University, Dixie State College of Utah, Salt Lake Community College, Southern Utah University, University of Utah, Utah State University, Utah Valley University and Weber State University.



The water-wise practices that are addressed in the research follow the 7

Principles of Water-Wise Landscaping: 1) Planning

and Design 2) Soil Improvement 3) Practical Turf Area 4) Efficient Irrigation 5) Mulch 6) Low Water-Use Plants and 7) Appropriate Maintenance. Planning includes proper irrigation design and placing the appropriate plants in the appropriate zones. Most of the institutions researched were built long before the idea of proper planning for Utah's climate was taken into account. Soil Improvement means that good soil has organic material that retains water provides the vegetation with the proper nutrients and a soil matrix that allows water to percolate to the root zone. Turf is important for most institutional landscapes, it provides students and patrons an area to relax and enjoy their surroundings. However, non-practical turf is an unnecessary water consumer. An

*An example of water-wise landscaping at Weber State University shows how a water-wise landscape can still be attractive*

irrigation system that provides the plants with the required water as efficiently as possible is an important component of water wise landscaping. Efficient irrigation means that every time the irrigation system is turned on it only waters what needs water (pavement



***A newly remodeled section of the landscape at Utah State University shows how to create a water-wise landscape that will be able to grow to maturity with little pedestrian disruption***

and sidewalks do not need water) and that it provides the correct amount of water to the plants and at rate that is consistent with the infiltration rate of the soil. Mulch can provide the soil with needed protection from the sun. Also a thick layer (two to four inches) of mulch will help retain the water that has been applied to the vegetated areas. In

response to wise water use goals some institutions are removing water guzzling plants and replacing them with drought tolerant plants. Proper maintenance of landscaped areas is crucial to plant health. What the institutions are doing in each of these seven principles is discussed in their respective section of the report.

Several of the researched institutional facilities utilize some form of a central irrigation controller that is based on local weather data. The two most common irrigation systems used are the Rain Bird Maxicom and the Rain Master Irritrol systems. These systems consist of two main components, hardware and software. The hardware is the equipment needed to run the irrigation system. This includes the weather station; the control unit that interfaces with the central control and irrigation controllers onsite. Once all of the hardware is in place, the software controls the amount of irrigations that occur in a given time period. At the end of each irrigation cycle data is recorded and stored. These irrigation systems irrigate based on the evapotranspiration (Et) rate that is calculated by

the local weather station. Et is defined as the amount of water a plant and its environment loses from evaporation and transpiration. Simply put, transpiration is water the plant uses to grow and survive, and evaporation is water lost from the surrounding soil. The factors that affect Et are temperature, wind, precipitation, humidity and solar radiation. Et is usually expressed in inches of water over a certain time period; commonly, a day, week, month or year. These central irrigation control systems are beneficial to the facility maintenance crew. In addition to the benefit of irrigating based on weather, the central irrigation systems help the grounds crew locate leaks in the their system. Leaks are detected by the system

when flow is detected via the flow sensors but the system is not turned on. The leak information is then returned back to the control station. With this information the grounds crew able to find and fix leaks before too much water is lost. Thus the institutional facility can become more efficient in



*On the Southern Utah University campus the Maxicom weather station provides the irrigation system with data to turn the sprinklers on or off*

water use and have become the “industry standard” for large landscapes wishing to conserve water. The centralized systems work properly with both potable and secondary water. Potable water is classified as treated water for drinking. Secondary water is any untreated water typically diverted from canals, ditches or pressurized irrigations systems.

The majority of the universities are owned by the State of Utah. Therefore all new construction must meet the standards of Department of Facility Construction and Management (DFCM) standards. These standards require that all new buildings meet LEED® certification.

# UNIVERSITIES AND COLLEGES WATER USE OVERVIEW

## Brigham Young University



### *Overview*

Originally founded as the Brigham Young Academy on October 16, 1875, Brigham Young University (BYU) (name changed in 1903) is now a large private institution located in Provo, Utah. Over 30,000 students attend this university on an annual basis. In order to support the large student body, the BYU grounds crew takes care of 667 acres. Of these 667 acres 226 acres are irrigated turf, shrubs or trees. The campus has a vast array of colorful landscaped areas ensuring that the atmosphere is befitting of the guidelines set by the university. The campus is made up of common grass areas for students to use at their leisure beautiful flower gardens, a football stadium, baseball, softball and soccer fields as well as some artificial turf fields that also require irrigation. Artificial turf fields need to be irrigated for cleaning and cooling purposes.



*The BYU campus is located in the heart of Provo and provides a good example of a lush green landscape*

From the description above, one would guess that the BYU campus uses a lot of water to maintain their landscaped areas and they do.

However, they are using many water-wise practices that are quite remarkable, cost effective and follow water wise guidelines.

However, BYU was not always water-wise in their irrigation practices. But after a 5-year renovation program that began in 2001 of the irrigation system, the BYU campus has

become one of the leaders in water-wise landscaping while still maintaining a lush green look. Their hard efforts were rewarded by the U.S. Bureau of Reclamation when Roy Peterman, BYU grounds crew director, was awarded the Commissioner's Water Conservation Award in 2006. This award is given to entities that plan, demonstrate, and implement the use of water-wise measures.

### ***Irrigation System***

The BYU campus uses both potable and untreated (secondary) water to irrigate their campus. Prior to the installation of the new irrigation system, the BYU campus utilized a

system constructed of galvanized metal pipes that irrigated all campus grounds the same amount. During that time, the BYU grounds crew realized how inefficient they were at using water. They then replaced their old system with a new PVC pipe system and between 2001 and 2006 installed a Rain



***An example of the type of landscaping that is occurring on the BYU campus, lush green and still maintains a water-wise staple***

Bird Maxicom irrigation system The Rain Bird Maxicom system allows the BYU grounds crew to control each irrigation zone and water different plant types to their individual water needs. BYU's turf areas require different amounts of water than many landscape plants surrounding the campus. The Rain Bird Maxicom system allows the BYU grounds crew to irrigate all plants, including their turf areas at 70 percent of each plant type's respective Et. The system also alerts ground crews if there are problems that need to be addressed. These could include broken pipes, sprinkler head malfunctions or water flow blockage. The Maxicom system receives the necessary data from a local weather station located on campus and waters accordingly. This system has allowed the BYU campus to become one of the most water efficient institutional facilities in the state.

### ***Water-Wise Practices***

On a weekly basis, a complete sprinkler system check is performed by the BYU grounds crew. This check is crucial to catching issues with sprinkler heads that may no longer be working as efficiently as possible. The Rain Bird Maxicom system will inform the grounds crew if there is a major problem with the irrigation system while these weekly sprinkler checks find non-major problems. For example, if someone has tampered with a sprinkler head and it now sprays the road instead of the designated landscaped area, the grounds crew will be able to correct the problem during their weekly checks.

Another water-wise practice utilized by the BYU grounds crew is aeration. On the BYU campus, many of the turf areas, especially the athletic fields, become greatly compacted. The BYU grounds crew regularly aerates the turf areas in order to combat compaction and maintain a healthy water-wise turf.

The BYU grounds crew have raised their lawn mower height to 3 inches to promote a healthier deeper root system and thus conserving water. Also, they do not remove



***The BYU campus maintains its landscaped areas to serve many purposes***

more than one-third of the leaf blade per mowing, thus maintaining the health of the turf areas. The grass clippings are used in their composting process and later returned to different planted areas to promote healthy soil. A healthy soil promotes healthy grass.

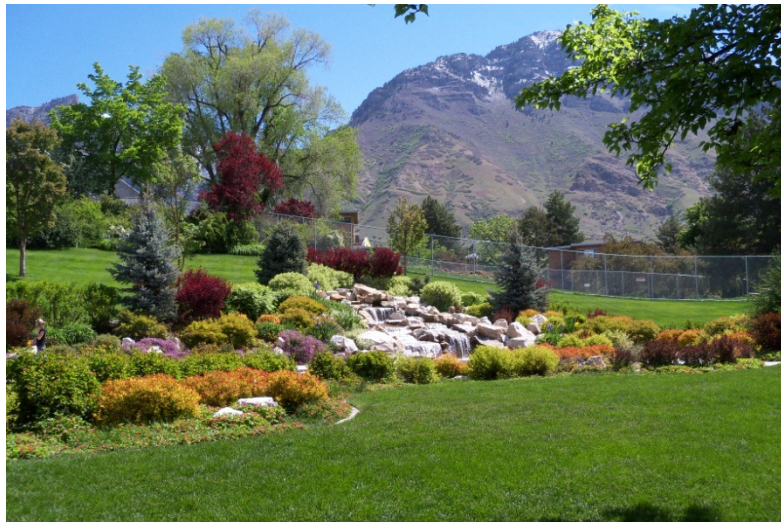
With such a large campus area, the BYU campus grounds crew is able to produce a significant amount of wood chips. The wood chips are processed on campus from the pruned trees, old desks, book shelves and other wood furniture found on campus. These

recycled wood chips are returned to the flower beds and shrub areas to help maintain soil moisture, thus reducing water use. All of the landscaped areas are mulched on a regular basis and 100 percent of the mulch is produced on campus. This again, makes BYU a leader in this water-wise practice.

In addition, the BYU grounds crew, with its horticultural experience, has focused on overall plant health. Not only do they provide the correct amount of water, they also provide the correct amount of care. BYU grounds crew have successfully realized that non-native plants can be water-wise if they are properly cared for. In order for these traditional Utah landscape plants to be water-wise, it is crucial that they receive proper nutrition through the soil in addition to the correct amount of water. The BYU grounds crew has an extensive soil rehabilitation program, where they enrich their own soils for new construction areas as well as older existing landscaped areas. Their soils maximize water absorption and limit runoff allowing more water to be absorbed by the plants root system.

### ***Miscellaneous***

The BYU grounds crew composts almost everything (e.g. desks, shelves, old trees, paper and other miscellaneous waste from the campus) on campus that is



compostable. This onsite site composting is both energy efficient and water-wise. They have cut down on the need to purchase outside source compost. This helps create a more sustainable, “green” campus.

***The BYU campus demonstrates how a water-wise landscape does not have to be a barren waste land***



All of the BYU grounds crew personnel are required to attend yearly training on how to properly maintain the campus grounds. Having a crew that knows how to operate and maintain a complex irrigation system ensures that the system is operating as efficiently as possible. In addition to the training the grounds crew makes the “rounds.” They drive around the campus looking for areas that may not be getting watered properly or that appear unhealthy. Maintaining the health of the plants will ensure that they stay water-wise.

### ***Conclusion***

Upon implementing these water-wise techniques BYU has been able to more efficiently use their water. With their high tech irrigation system and leak detection they are able to irrigate to 70 percent of Et. However since the majority of their campus is grass they still use 2.5 acre-feet/acre (ac-ft/ac).

### ***Something to Work On***

Although the BYU campus is very water-wise, watering to 70 percent of Et. The BYU grounds crew could look around campus and find areas of turf that are not functioning properly and replace it with more native vegetation. Removing grass and replacing it with native vegetation will not only save BYU water; but they can demonstrate to their large student and community how beautiful water-wise landscaping can be.

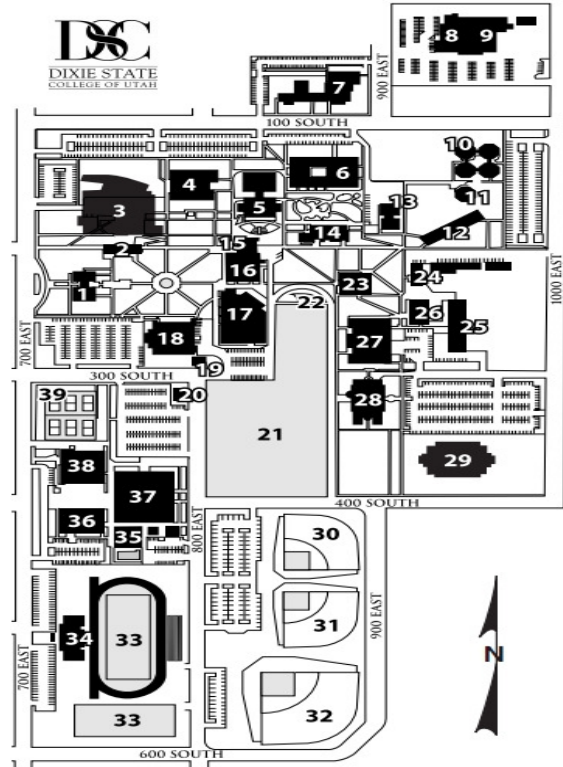


## Dixie State College of Utah



### Overview

Originally founded by the LDS Church the St. George Stake Academy, nicknamed the Dixie Academy, was opened in 1911. In 1916 the name of the school officially changed to Dixie Normal College only to be changed again 7 years later, 1923, to Dixie Junior College. In the midst of the Great Depression, the LDS Church, in favor of a state-supported education system, discontinued its support of the Dixie Junior College. Once the college started receiving state funding, around 1933, the college began to thrive and grow. In 1970, the name of the college changed again to Dixie College and in 2000 the name changed to what it is currently known as Dixie State College of Utah (DSC). Annually the college enrolls approximately 9,000 students. The main DSC campus is on approximately 100 acres with 80 acres



*The DSC campus is located in the heart of St. George and provides the student body with beautiful landscapes*

of that being irrigated landscape. Much like the early years of the college the current grounds crew faces many challenges that hinder their efforts in water-wise practices.

### Irrigation System

The DSC main campus in St. George does not have a sophisticated irrigation system that is controlled by a local weather station like BYU. The DSC grounds crew has been able to hook most of the campus up to automatic clocks that are adjusted as required by perceived weather. A small amount of the DSC campus is on a manual system that is hand operated. The campus receives secondary water from St. George City that irrigates roughly 95 percent of its grounds. The culinary water that is used on campus for

irrigation is also provided by St. George City. The irrigation system has been installed for several decades and many of the main lines are buried so deep in the ground. That it is difficult for the DSC grounds crew to repair leaks. Because of this, there has been some major water loss from the old deteriorating irrigation system. In addition to the aging irrigation system, DSC campus has issues with small clams entering the irrigation system. These clams clog pipes and valves making the irrigation system inefficient. In the summer months due to low water levels in the Virgin River the water quality is diminished again. As the salinity of the water rises later in the summer, more water is required to be used on plants to ensure that the plant is getting all of the needed water and nutrients.



### ***Water-Wise Practices***

With the current state of the irrigation system, the DSC grounds crew does perform weekly checks of each of the irrigation zones. However, with the

***The DSC campus has been working on implementing more drought tolerant landscapes on their campus***

systems condition, as well as the quality of the water, it is a constant battle for the DSC grounds crew and overall, they do very well with the resources they are provided.

The DSC grounds crew does aerate on a regular basis and fertilization of the turf areas occurs as needed. The non-athletic fields are mowed to 2.5 inches; however in the areas where Bermuda grass is used it is mowed to  $\frac{3}{4}$  to 1 inch length. This is the appropriate length for Bermuda grass to maintain the health of the turf. The DSC grounds crew also performs top dressing to ensure that organics are being placed on the turf areas. All shrub and flower beds incorporate mulch to help retain water.

As their budget allows, the DSC grounds crew is removing non-functional turf areas, mostly small strips of turf areas, and replacing it with more drought tolerant plants.



### ***Miscellaneous***

The DSC grounds crew attends training regularly. The DSC grounds crew is also visited regularly by irrigation representatives to train them on the latest products that are available to become more water-wise.

***The DSC campus uses dry landscapes surrounded by fountains to create a relaxing atmosphere for students and visitors***

### ***Conclusion***

The DSC campus is currently working on being more water-wise. However with the current conditions of their water sources and irrigation system the water-wise road ahead is steep. The campus uses roughly 3 ac-ft/ac of water; this number could be reduced with a more efficient irrigation system.

### ***Something to Work on***

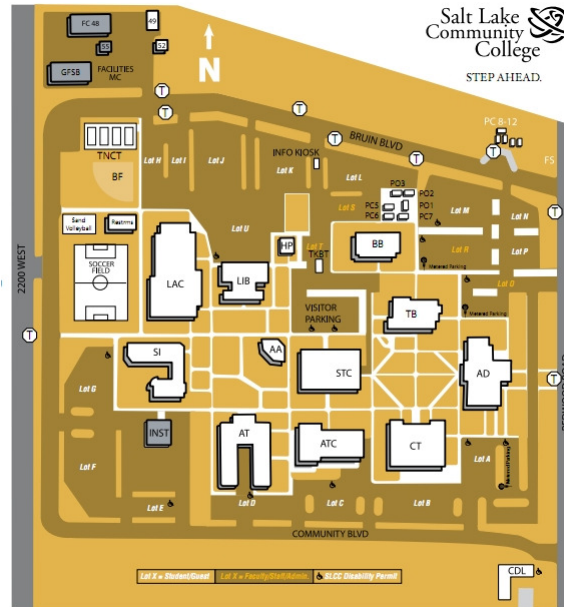
The number one concern for this campus is the irrigation system. The DSC campus needs to improve the efficiency of the irrigation system. An efficient irrigation system, from source to sprinkler, will greatly reduce the amount of water that is being applied to the campus landscape.

## Salt Lake Community College (Taylorsville-Redwood Campus)

### Overview



The Salt Lake Community College (SLCC) is the largest higher education institution with the most diverse student body in Utah. Established in 1948, SLCC annually has roughly 60,000 students that attend one of the nine campuses located throughout the Salt Lake and Tooele counties. Due to the nature of some of the campuses only the largest of the locations, the Taylorsville-Redwood Campus, will be discussed in this report. The Redwood Campus also has the largest irrigated acreage (40 acres) of all the SLCC campuses.



### Irrigation System

*The SLCC Taylorsville-Redwood campus is located in Salt Lake County and has large turf areas that are irrigated with secondary water*

Since 2005, non-potable (secondary) water from the North Jordan Canal company has been utilized to irrigate 95 percent of the Taylorsville-Redwood SLCC Campus. The other 5 percent is currently on culinary water provided by the Taylorsville-Bennion Water Improvement District. The secondary water is easily assessable, since the North Jordan canal runs along the north side of the campus. The water is pumped from the canal into a storage tank that then provides water to all necessary irrigation zones. In the summer of 2010, the SLCC grounds crew finished installing a Rain Bird Maxicom central control and weather station system that allows them to irrigate to a certain percentage of Et. This system allows the SLCC grounds crew to isolate and locate all major leaks and broken pipes. With the SLCC canal water diversion, filtering is necessary. As they first began using their new secondary system, a lot of sediment build up was reducing the efficiency of their irrigation system. Recently,

SLCC grounds crew have installed a new intake filter that is self cleaning. Thus, increasing the efficiency of the irrigation system.

### ***Water-Wise Practices***

The SLCC grounds crew performs regular checks on all of the irrigation zones and has a flagging system to indicate where problem sprinkler heads are located. The major issues that arise with their sprinkler heads are tilting, improper rotation, broken heads, and incorrect nozzles in the sprinkler head. All of the grounds crew members are trained on how to fix these issues.



The SLCC grounds crew is very proactive in aeration of their large turf areas. They utilize deeper aeration techniques than the traditional 1 to 2 inch soil cores of a traditional aeration. The deeper aeration allows for better root development and healthier plants.

***The SLCC Taylorsville-Redwood campus is converting non-functional landscaped areas into functional water-wise landscaped areas***

Because converting turf areas to more water-wise plantings can sometimes be cost prohibitive. SLCC has many turf landscaped areas that could be converted, but they do not have the financial means to change the landscape to a more water-wise design. However, they do implement water-wise landscaping in areas where new projects are built and in areas where the landscape is not truly functional. For the SLCC grounds crew, a non-functional landscape would be any landscape that requires an inordinate amount of effort to keep the landscape healthy. For example, on the SLCC campus, near the heating and cooling building, the traditional turf landscape was not healthy and

required a lot of water to keep the turf alive, therefore the SLCC grounds crew removed the turf. In its place is now a rock garden that in the near future will have fountain grasses and other native drought tolerant plants. The SLCC grounds crew believes that these landscapes, if done properly, can be more aesthetically pleasing than a traditional turf landscape.



### ***Miscellaneous***

The SLCC grounds crew receives hands on training on how to properly adjust and design an irrigation

***The SLCC Taylorsville-Redwood grounds crew replaced a grassy area that required a lot of water with a landscape that required minimal amounts of water***

system. In addition to this training, grounds crew members are sent to training seminars to learn the latest technology in irrigation.

### ***Conclusion***

The SLCC grounds crew is maintaining a water-wise mentality as they improve their landscaped areas. Since the transition from potable to non-potable secondary irrigation, SLCC has been able to conserve extraordinary amounts of potable water. From the early 2000's to present day, SLCC has been able to reduce their outdoor water consumption by roughly 35 percent. Over the past years, since the installation of the non-potable irrigation system, SLCC campus applies on average 2.9 ac-ft/ac. Once the Rain Bird Maxicom system has been installed for the entire campus more water savings will be realized through more efficient watering practices.



### *Something to Work on*

The future plans for the campus include removing non-functional grass and replacing them with water-wise landscaping. In addition to these modifications, the SLCC grounds crew plans on continually updating the irrigation system to improve the efficiency.

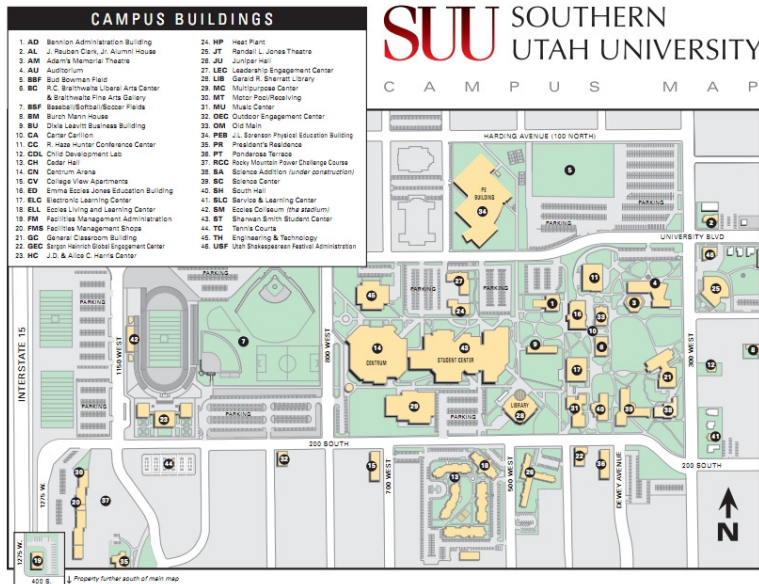




## Southern Utah University

### Overview

In 1897, after approval from the Utah Legislature, a branch of the state’s teacher training school was set to be constructed in Southern Utah. Cedar City was rumored to have been selected as the site of the new school because it was the only town large enough that did not have a saloon or pool hall. With some tribulation in the early years of the school, the then Branch Normal School (1897-1913) changed to the Branch Agricultural College (1913-1953), then to the College of Southern Utah (1953-1969). Before its current name, the school was called Southern Utah State College (1969-1990). Currently, Southern Utah University (SUU 1990-current) enrolls roughly 10,000 students. The main SUU campus in Cedar City is roughly 131 acres with 70 of those acres being



*The SUU campus is located in Cedar City and is home to the Utah Summer Games and the Shakespearean Festival*

irrigated landscapes. The campus also has several thousand acres of surrounding mountain areas that are used for the students benefit. The SUU campus also happens to be home to state’s largest tree, a Siberian Elm (80 feet high, 192 inches circumference with a spread of 24 feet).

### Irrigation System

Since the late 90’s the SUU grounds crew has had a Rain Bird Maxicom system in place managing the majority of their irrigation system. Currently, the Rain Bird Maxicom system controls about 90 percent of the irrigation on campus. The irrigation system uses water from a local irrigation pond. Cedar City provides the non-potable water to the SUU campus, once the unused water reaches the end of the secondary system it is pumped up

to the irrigation pond. The pond is controlled by Cedar City. Approximately 80 percent of the campus is watered with this secondary water source. The other 20 percent is watered with potable water delivered by Cedar City.

### ***Water-Wise Practices***

With the SUU campus being a key part of the community, patrons find a lot of the irrigation inefficiencies. However, the SUU grounds crew performs daily checks on the irrigation system. All problem areas are quickly checked and fixed. Irrigation efficiency checks are performed regularly by the SUU grounds crew to ensure that all landscaped areas are receiving the required water. Distribution uniformity and only watering landscaped areas are a primary concern for the SUU grounds crew.

Aeration occurs at a minimum of two times during the year, once in the spring time and again in the fall months. In addition to these aerations, the SUU grounds crew performs additional aerations in high traffic areas and on athletic fields to combat compaction as needed.



***The main SUU campus shows how a combination of grass and more regional landscaping can be beautiful and water-wise***

The lawns are cut to a height of 3 inches for all non-athletic fields. During the off-season of the athletic fields, the mowers are raised and even those large turf areas will be at 3 inches.

The soils on the SUU main campus are not ideal for growing plants therefore the SUU grounds crew supplements the soil with organics. The SUU grounds crew does this by top dressing the soil with organic mulches. This operation is done to help bring the pH of the soil back into an area that is more conducive to growing landscape plants.



*The SUU Native Plant Center is a perfect demonstration of how beautiful natively landscaped areas can be*

The SUU grounds crew is very proactive in their attempt to show the surrounding community and visitors to the campus and how beautiful landscapes can be when you integrate a water-wise flower beds with traditional landscapes. The SUU grounds crew have installed native plant gardens that demonstrates what will grow in the area with little water and maintenance. In addition to this garden, they have several water-wise flower beds sporadically placed throughout the campus that either receives little or no water supplemental water.



### ***Miscellaneous***

The managers of the SUU grounds crew combine for over a hundred years of experience in their specific fields and

*Once turf the SUU grounds crew has converted this area to a very water-wise beautiful flower garden*

their experience is demonstrated on the SUU campus landscaped areas. This knowledge is passed from them to their seasonal employees. One interesting aspect of the SUU grounds crew is that it is almost entirely made up of students. Annually, hundreds of students apply to be a member of the grounds crew. The managers all indicate that this employment base is essential to maintaining a beautiful campus within their allotted budget. The reasoning behind this is, those that use the campus are the same that maintain it; therefore they take pride in what they do and the campus is a reflection on that pride.

### ***Conclusion***

The SUU grounds crew has been able to increase the efficiency of their irrigation system and decrease their overall water consumption. The main SUU campus is a great example to the surrounding community, as well as other large institutional facilities around the state, that you can be

water-wise and still maintain a beautiful campus. In 2010, the SUU main campus used approximately 18 inches of water on their landscaped areas (15 inches of secondary water and 3 inches of culinary water). This is a remarkable amount of water to be used on their 70 acres of landscaped



***One of the many flower beds on the SUU campus that requires little or no supplemental water***

area; this is 1.5 ac-ft/ac. The average home owner in Utah will use somewhere in the range of 30 to 40 inches of water on their landscaped areas. If the SUU campus used what the average home owner does then they would have consumed 2.5 ac-ft/ac or roughly 175 ac-ft of water. With their efficiency they only used 105 ac-ft of water conserving 70 ac-ft to be used elsewhere in the drainage.

***Something to Work on***

The secondary irrigation system does not currently provide water to the entire campus. The SUU grounds crew is currently working on remedying this problem. Attempt to get a horticultural program started at SUU that can educate students on how to properly use water for landscape needs. This program could be incorporated into the class schedule or separate classes instructed by the SUU grounds crew to a more general audience.





## University of Utah

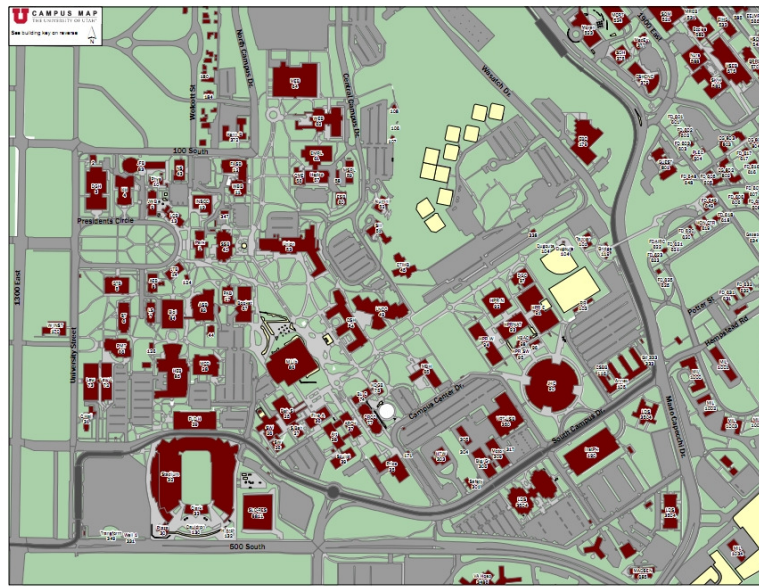


### *Overview*

On a large parcel of land on the north east benches of Salt Lake City, sits the oldest higher education institution in Utah. The University of Utah (UofU) occupying roughly 1,700 acres of land with

629 acres being irrigated the UofU campus currently supports over 30,000 students.

Originally established in 1850 as the University of Deseret, the UofU has seen many changes to its landscaped areas since its inception. As the university grows, the UofU grounds crew is adapting right along with it ensuring that the students



*Located on the benches of Salt Lake City the University of Utah sits on over 1,700 acres with 629 of those acres being irrigated*

are experiencing a rich colorful landscape to coincide with their education. The UofU campus' landscaped areas include large common turf areas for students to relax on as well as baseball, softball, and soccer fields. The Rice-Eccles Football Stadium has an artificial surface that does not require irrigation; however artificial turf does require water for cleaning and cooling.

### *Irrigation System*

The UofU campus receives the majority of its culinary water from Salt Lake City. However, the UofU grounds crew is in the process of utilizing onsite non-potable water to irrigate their landscapes. Currently the lower (South West region) section of campus has access to the non-potable irrigation water, roughly 1/5 of the campus. In 2008, a Rain Bird Maxicom system was installed on the campus and controls all of the irrigation

zones. The UofU has an on campus weather station that regulates the irrigation system. However, since the campus is so large, there are 8 additional rain gauges on the campus that control different sections of the irrigation system. This setup provides for a more efficient watering of each irrigation zone.

### ***Water-Wise Practices***

The UofU grounds crew performs regular irrigation system checks to ensure that sprinklers are distributing the water normally and uniformly. The UofU's Rain Bird Maxicom system will indicate if there is a major problem with the irrigation system. However, visual checking of the system has to occur on a regular basis to ensure that the irrigation is functioning properly. This routine checking of irrigation system is vital to any irrigation system since most watering occurs when no one is watching.

The UofU grounds crew follows standards on how the turf areas should be aerated, fertilized and cut to promote a healthy root system. In heavily compacted areas of the campus, the UofU grounds crew will aerate



***The U of U has been installing native plant beds where turf is not functional***

regularly. In addition to aeration, the UofU grounds crew applies moderate amounts of fertilizer to ensure that the lawn is receiving the proper nutrients. Finally mowing their lawn to the proper length in the spring and summer months helps maintain a healthy root system and plant. In the spring the UofU grounds crew cut the lawn to a shorter 1 to 2 inches length. During the summer months, the lawn mowers are adjusted to 2.5 to 3 inches in height. The UofU grounds crew believes the spring length is used to entice the

plant to put more energy into the root system. Then during summer months, the length helps shade the soil keeping the roots moist in between watering.

The UofU campus sits atop a wide variety of soil types. Different soils require different amounts of water. In an attempt to combat this issue, the UofU grounds crew has set standards for the soils that are placed in all landscaped areas. In conjunction with the soil standards, when new construction occurs on the UofU campus, the new landscaped areas are planted with water-wise plants.

The UofU grounds crew has been engaged over the past several years in removing the non-functional turf areas such as small park strips and small areas between sidewalks to provide a more water-wise natural landscape on the campus. Many of these new water-wise landscapes are being watered sparingly with drip systems.



### ***Miscellaneous***

All employees of the UofU grounds crew receive annual training on the latest irrigation systems components.

With this training, the UofU grounds crew can ensure that they are

***The U of U has great examples of how beautiful more native landscapes can be***

implementing the latest water-wise practices into their irrigated landscapes.

In an effort to eliminate inefficiencies in irrigation, the UofU grounds crew is using bioswales intermittently throughout the campus. A bioswale is a landscape design that captures runoff waters and moderately treats the water returning the water back to the

ground. Since a portion of the irrigation water comes from groundwater some of the irrigation runoff will be captured in the bioswales. In the future, the UofU grounds crew plans on channeling the bioswales water to an underground storage tank. Once the water is in localized storage it will be pumped back onto landscaped areas. All of these features are being utilized by the UofU grounds crew as part of the sustainable initiative at the UofU campus.

### ***Conclusion***

Since the UofU campus receives its water from several sources an exact amount of water reduction over the years is difficult to obtain. However, using estimates it can be determined that UofU has been able to reduce water usage by 15 percent through their water-wise practices. They use roughly 2 ac-ft/ac of water for their outdoor irrigation.



### ***Something to Work on***

Continue working on using secondary water on the entire campus. Look at

***The U of U campus mixes vegetation types to create relaxing areas for patrons to enjoy***

ways to incorporate bioswales throughout the entire campus. With the help of student body programs, continue to remove grass areas that are not used and replace them with water-wise landscaping as budget allows. In addition to these ideas, in order to become more water efficient it is crucial to know how much water is being applied via irrigation. Therefore, becoming better at metering their used water is key to becoming more efficient.

# Utah State University



## Overview

Originally founded as the Agricultural College of Utah (UAC) in 1888, Utah State University (USU) has progressed from a small state college into a research institution with 25,000 students annually attending one of the USU campuses. In the early 1900's, UAC began to spread its footprint establishing extension campuses in rural parts of Utah

to take research-based knowledge to the people, especially farmers. In 1957, the UAC became USU; soon thereafter USU established two of the most respected research institutions in the West, the Space Dynamics



*USU strives to be one of the nation's premier universities by putting academics first, by cultivating diversity of thought and culture, and by serving the public through learning, discovery and engagement*

Laboratory and the Utah Water Research Laboratory. Since then USU has continued to grow, with regional campuses in Brigham City, Tooele, the Uintah Basin and recently added Price's College of Eastern Utah as part of USU. In addition to the regional campuses USU also provides Education Centers scattered throughout the state (Beaver, Blanding, Delta, Ephraim, Heber, Kaysville, Loa, Milford, Moab, Nephi, Orem/Provo, Piute, Price, Richfield and Salt Lake).

This report will only focus on the main USU Logan campus and what they are doing to be water-wise. The USU Logan campus sits on approximately 500 acres with 201 of those acres being irrigated (160 acres of turf, 40 acres of shrubs and 1 acre of flower beds). Like other campuses, they maintain the grounds so that they aid in the education of the students, providing relaxing landscapes and places for students. The campus is located at the mouth of Logan Canyon on the east bench of the Cache Valley surrounding

some of the old agricultural buildings and horticultural departments of the university. The campus extends into North Logan with the recently constructed research park.

### ***Irrigation System***

Currently the Logan USU campus has a Rain Bird Maxicom system that has been installed for roughly 10 years. The Rain Bird Maxicom system provides management of the irrigation water to approximately 75 percent of the campus. The campus gets its secondary water from the Logan Hyde Park Smithfield Canal Company which is used on roughly 80 percent of the outdoor



***USU has converted areas into more native landscapes that still provide relaxing areas as shown at the North Logan research park***

irrigation. The culinary water that is used on the remaining landscape, mostly in the areas surrounding the student housing, is provided by Logan City. The irrigation system is monitored in several places, at the main line intake, and at each of the three main pump houses. Due to elevation changes and distance from the canal, pumps are required to ensure that the sprinklers operate properly. There are also areas of the campus' irrigation system that are gravity fed. Since the majority of the landscape watering is utilizing non potable secondary water, the irrigation systems is filtered at several locations (intake and pump houses). For nearly 20 years, the USU grounds crew have been refining and updating the irrigation system on campus. They have been able to increase the efficiency of the system and decrease water usage. In addition to the long term effort of updating the irrigation system, the USU grounds crew performs weekly checks of the irrigation system to ensure that all of the heads are distributing the water effectively and efficiently.

### ***Water-Wise Practices***

As mentioned above, the most effective water-wise practice that USU is doing is removing inefficiencies in their irrigation system. The USU grounds crew is also looking at removing any grass areas that are too small to water efficiently and replacing them with native vegetation plants. One of these areas is shown in the photo. In addition to this retrofitting action, the USU grounds crew has set a standard stating that if the width of the new landscaped area is less than 8 feet then it cannot have grass. These areas are now being landscaped with water-wise plants and shrubs.



***USU has converted areas into more native landscapes that still provide an aesthetically pleasing vista***

Other water-wise practices that are being utilized on the USU campus are the mowing standards. All non-athletic turf areas are mowed at a height of 2.5 to 3 inches all year round. This technique helps shade the soil decreasing the amount of water that evaporates from the soil. The grass clippings are also left on the grass. Doing this also helps with the shading of the soil and helps keep the moisture in the grass longer allowing the grass to use less water. In addition, regular aeration occurs on all the turf areas of the campus.

The USU grounds crew utilizes mulch in all shrub and flower beds. The USU grounds crew does compost leaves, grass clippings and other green waste for reuse on the campus. However, the majority of the mulch used on campus is purchased.

Where possible, the USU grounds crew, in conjunction with other departments of the university, is installing nature gardens and other water-wise landscaping. For example, the early childhood development building has a play area for children. This area has been

modified from its original wall to wall grass area, to incorporate only limited grass areas. Also, these play areas utilize mulch under the playground equipment. This design is very efficient and functional, since turf areas usually become very compacted under these play areas. There are also several other areas near buildings that once would have been landscaped with grass and large trees, that are now being landscaped with water-wise plants.



### *Miscellaneous*

USU has a campus wide composting program. The compost that is collected from the campus is returned back to the campus' shrub and flower beds. Adding this composted material to the shrub and flower beds helps keep the soils healthy. When a plant is healthy it requires less water.

*USU grounds crew adapts to what is required by the users of a given landscaped area*

The employees of the USU grounds crew attend training courses when they are available. This training addresses the latest irrigation practices that should be implemented to increase irrigation efficiencies.



### ***Conclusion***

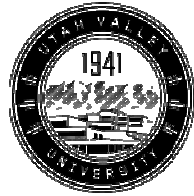
Over the past decades, USU has been able to conserve substantial amounts of water through irrigation system updates. Over the last decade the USU grounds crew has cut their outdoor water consumption in half. This translates into millions of gallons water saved annually. USU waters responsibly with the conditions they are given. A campus wide average shows that the USU landscaped areas are being irrigated with 70 percent efficiency. With this efficient use of their irrigation system the USU campus uses roughly 2.2 ac-ft/ac of water for irrigation purposes.

### ***Something to Work on***

Work with grounds crew to incorporate more water-wise landscaping on campus. Make sure that the weather station, for the irrigation system, is located in an appropriate location to give accurate data. Maintain and monitor existing meters on a regular schedule to improve data collection of water use on campus. Improve irrigation training for summer help to better understand water use and how to maintain system efficiencies.



# Utah Valley University



## Overview

Founded in 1941, the Utah Valley University (UVU) was known as the Central Utah Vocational School. The name has changed several times since its inception in 1941 to the

Utah Trade Technical Institute to Utah Technical College at Provo to the Utah Valley Community College. In 1993, the school changed its name one more time, before becoming UVU, to Utah Valley State College. However, since 2008, the school has been known as UVU and currently has an enrolment of about 30,000. The main campus in Orem encompasses 228 acres with approximately 167 acres being irrigated.



*The UVU main campus encompasses 228 acres with approximately 167 acres being irrigated*

This includes the baseball fields that are also used by the Rookie League team, the Orem Owls. The UVU main campus is landscaped with many acres of turf for the student body to relax and learn.

## Irrigation System

The UVU campus uses a Rain Bird Maxicom system to control their irrigation system. The irrigation system is very old and has many old-style inefficient sprinkler heads that the UVU grounds crew are slowly removing and replacing with more efficient sprinklers. The irrigation system's water is 90 percent non-potable secondary water from several local irrigation companies, including the West Union Irrigation Company, the

Provo Bench Irrigation Company, and Wasatch Water Users Lake Bottom Irrigation Company. All secondary water is brought to the UVU campus through a canal and put into two ponds located on the west side of campus. From there, the water is pumped to other parts of campus as needed for irrigation. The UVU grounds crew has, in the past, attempted to implement some drip irrigation. However, with constant foot traffic in those areas where the drip irrigation was installed, the sections were removed because of damage.

### ***Water-Wise Practices***

The UVU grounds crew performs daily efficiency checks on the irrigation system. They also utilize a system where patrons on campus will report problems that are seen. The Rain Bird Maxicom system provides the UVU grounds crew with major leak detection. With these two warning systems, in addition to the 3 full time employees that check irrigation heads, the UVU campus has been able to gradually increase the irrigation efficiency.



***The UVU main campus has several areas of grass that could be removed to increase water consumption efficiency***

Aeration occurs twice a year on all non-athletic fields. The athletic fields are aerated 4-5 times a year and the intramural sports fields are aerated 3 times a year. The extra aerations are used to combat compaction that occurs on the heavily used fields. In addition to regular aeration the turf areas are cut to a length of 3 to 3.5 inches. Fertilizers are used in the spring to add the necessary nutrients and help the turf recover after the cold winter.

The soils on the UVU campus are not conducive to easy growing therefore the UVU grounds crew top dresses the soil in an attempt make the soil better. With poor top soil more frequent irrigations are required because the grass will burn without additional water.

Since UVU became a state university all new construction has to meet the standards of the DFCM. Therefore site planning is important and all immediate landscaped areas will be water-wise and utilize more native plants. There are currently no plans to remove non-functional turf areas and replace them with water-wise landscaping.



### ***Miscellaneous***

The UVU grounds crew has attended several classes on how to better utilize the Rain Bird Maxicom system.

***For example near a newly constructed building the UVU grounds crew has placed a more water-wise landscape that still provides a pleasing vista for patrons***

### ***Conclusion***

Over the past several years the UVU grounds crew has been able to reduce the amount of water used on campus utilizing the above mentioned water-wise practices. The campus currently uses approximately 750,000 gallons per day (gpd) however if they were still watering with the same efficiency as before that number would more than 1 million gpd. Their current water application rate is 2.5 ac-ft/ac on the UVU campus.

***Something to Work on***

With the current amount of turf areas on campus the UVU grounds crew could begin to remove non-functional turf areas. For example the traffic circles that provide access to the campus have turf. These turf areas could be removed and replaced with a more water-



***Very difficult to maintain and unsafe to mow these grassy hills should be replaced with a more native landscape***

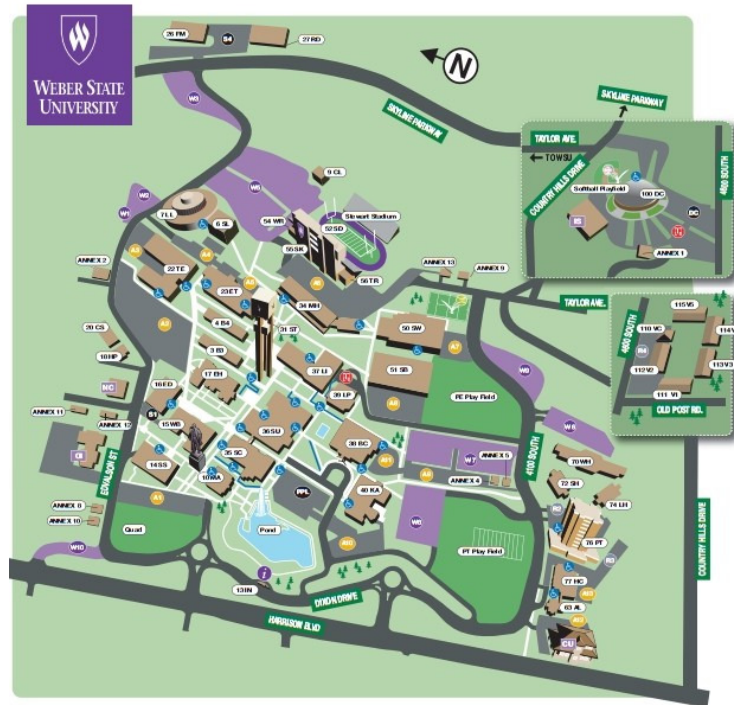
landscapes reducing water consumption inefficiencies and promoting a more safe work environment.

wise landscape. The UVU campus also has several hill areas that have a slope greater than 40 percent. They are currently covered with grass. This is both very non-water-wise and in order to maintain them (mowing) is unsafe. UVU should replace these areas with more water-wise natural

*Overview*

From 1889 to present day Weber County has been privy to a higher education facility. Originally started by the LDS Church the Weber Stake Academy, later renamed 5 times to Weber State University (WSU), is now owned and operated by the state of Utah. In

1954, the then Weber College, moved east from downtown Ogden to its current location on Harrison Boulevard. The current WSU campus is 400 acres. The WSU campus serves over 21,000 students on an annual basis. The campus has several large grassy areas for students to use as they study or relax on campus. The mission of the university is to help



*WSU Ogden Campus is approximately 400 acres with 100 acres being irrigated in order to provide an enriched learning experience for their students*

engage in research, artistic expression, public service, economic development, and community-based learning experiences in an environment that encourages freedom of expression while valuing diversity.

Similar to many other universities in Utah, WSU has several satellite campuses. Similar water-wise practices are utilized on these campuses, however this report will only address what is being done on the Ogden WSU campus.

## *Irrigation System*

The Ogden WSU campus is using a Rain Master Irritrol irrigation system. This centralized irrigation system controls 90 percent of the irrigation on campus. The WSU campus landscaped area is roughly 100 acres being irrigated by secondary water and another few acres is irrigated by culinary water. The irrigation water, both potable and non-potable, comes from 3 different sources. The non-potable secondary water comes from Weber Basin



Water Conservancy District and from Pineview Irrigation Company. The

*The pond on campus has multiple functions, one of which is storm water retention. The pond also collects the runoff water from the irrigation system. Once the water is in the pond it can be pumped back onto the majority campus to be used as irrigation water*

campus is entitled to a certain amount of this water annually. If they exceed this amount of water then they have to purchase irrigation water from another user on those systems. Approximately 10 percent of the campus is irrigated with potable water. This water is supplied by the City of Ogden. The WSU grounds crew is currently working on converting all of the irrigation system to the non-potable secondary system. The Rain Master Irritrol system has leak detection that will automatically shut-off the irrigation system if there is a broken pipe or broken sprinkler head. WSU is unique in that all the storm water that is generated on campus and several surrounding residential areas flows, by gravity, into a large retention pond on the bottom (west side) of campus. In addition to storm water, the majority of inefficiencies that occur in the irrigation system are also collected by this retention pond. Once the water is in the pond, the water is then reused on the campus landscaped areas. The pond, with its storm water and return flow water, can supply anywhere from 50 to 70 percent of the water required by the landscaped areas during the irrigation season. This is an amazing facility and places WSU among the



leaders in the state with respect to water reuse. In some instances of water reuse the salinity of the water becomes an issue. However since the water used by WSU is diluted and mixed in the pond salinity does not appear to be an issue.

### ***Water-Wise Practices***

The WSU grounds crew performs a rigorous check on the irrigation system upon start up in the spring. Once the irrigation system is up and running, the WSU grounds crew will perform weekly checks on the system to ensure that all the heads are being as efficient as possible. All issues that are reported by either the Rain Master system or by campus patrons are immediately addressed by the WSU grounds crew.

The WSU grounds crew performs annual aeration of the campus' turf areas. On turf areas that receive high foot traffic, including athletic fields, aeration is performed more often to combat compaction. In addition to proper aeration the lawn mowers cut the non-athletic field turf areas to a height of 2.5 to 3 inches.



In order to help retain the water that is applied to shrub and flower areas mulch is applied. The mulch is purchased. In addition to mulch, the WSU

***Transitioning previously turf landscaped areas into a more water-wise not only can save water but will diversify the landscape of the campus***

grounds crew has a composting program on campus that utilizes green waste from the campus. This compost is worked into the soil to encourage a rich organic soil. In the near future the composting program is scheduled to incorporate pre and post human food waste such as fruit rinds and other biodegradable solid waste from campus food services.

All new projects that are constructed on the WSU campus are to be LEED® certified. This certification includes site planning. Therefore, the site plan has to include water-wise landscaping. Also, in problems areas or where it is more feasible to use water-wise landscape, the WSU grounds crew uses this type of landscaping.

### ***Miscellaneous***

The WSU grounds crew attend regular conservation training. The majority of this training is for energy conservation. However, a portion of the training does address water conservation. With this training, the WSU grounds crew and facility management team have been implementing water conservation strategies. They have installed water-wise landscaping as budget allows and have been retrofitting old buildings with new water saving plumbing fixtures.

The WSU football field is currently being converted from turf to an artificial turf. With this modification, the university will be able to save millions of gallons of water annually.



### ***Conclusion***

Over the past several years the WSU campus has become more water self-sufficient and as they strive to become a water sustainable campus their water use efficiency will become better. The water application rate of the campus currently is an estimated 2.1 ac-ft/ac.

***Complying with the latest LEED standards areas directly around buildings incorporate more water-wise landscaping***

### *Something to Work on*

There are several areas that would be considered non-functional turf areas. The WSU grounds crew could save millions of gallons of water if these areas were to be converted to more native plant displays.



## CONCLUSION

Throughout the state there are many shining examples of what a water-wise landscape could and should look like. This report has been in response to the growing concern that large institutional water users are not doing their part to conserve water. However as shown in this report major colleges and universities across the state are trying to use water efficiently. The water use efficiencies of the college and university campuses are listed in the following table. The table shows that because of the efforts made by the SUU grounds crew with native vegetation, and efficient watering of turf, they are the most water efficient campus in Utah. The campuses that have incorporated more native vegetation areas into their campus landscapes have increased their irrigation efficiency. Campuses like BYU, SLCC and UVU that primarily have turf grass as their irrigated area may have higher application rates. Dixie College has the highest application rate due to the climate.

**Table 1**  
**Water Use Efficiencies of Utah's College and University Campuses**

College/University	Water Application Rate (acre-feet /acre)
BYU	2.5
Dixie	3
SLCC	2.9
SUU	1.5
UofU	2
USU	2.2
UVU	2.5
WSU	2.1

If there were some way to create the most water efficient campus in the state it would incorporate aspects of all the campuses. The campus would be equipped with BYU's state of the art irrigation system, Dixie College's beautiful water gardens (these gardens if designed correctly will use less water than large turf areas), SLCC's renovation of an old irrigation system, SUU's wonderful use of native and drought tolerate plants, the UofU's

use of bioswales that collect storm water and inefficient irrigation waters returning them to the irrigation system to be used again, USU's removal of non-functional turf areas, UVU's ability to maintain turf areas under less than ideal circumstances, and WSU's use of a large storm water and runoff collection pond. The incorporation of these elements into a large campus would provide an aesthetically pleasing campus that has both functionality and efficient water use.

After discussing the water efficiency challenges that face each campus the report should note that if each organization had an endless supply of money they would be more efficient and implement more water wise concepts. However since they have limited budgets, they are doing what they can with what they have. As indicated by this report what they are doing is saving millions of gallons of water annually and they will strive to save more water every year by continuing on their path to water efficient landscapes.

## REFERENCES

BYU Information

<http://www.usbr.gov/newsroom/newsrelease/detail.cfm?RecordID=10901>

Dixie State College of Utah <http://www.dixie.edu/aboutdixie/>

SLCC Information [http://www.slcc.edu/ir/docs/Fingertips\\_Facts\\_2010\\_11.pdf](http://www.slcc.edu/ir/docs/Fingertips_Facts_2010_11.pdf)

UofU Information <http://infact.utah.edu/>

USU information <http://www.usu.edu/about/traditions/>

Weber State information <http://www.weber.edu/AboutWSU/History.html>

UVU information <http://www.uvu.edu/visitors/about/index.html>

SUU information <http://www.suu.edu/general/>

Peterman, Roy. Personal interview. 30 April 2011. Brigham Young University.

Leonard, Dan. Personal interview. 5 May 2011. Salt Lake Community College.

Pope, Sue. Personal interview. 9 May 2011. University of Utah.

Huppie, Jim. Personal interview. 17 May 2011. Utah State University.

Cain, Jake. Personal interview. 23 May 2011. Weber State University.

Danklef, Troy. Personal interview. 25 May 2011. Dixie State College of Utah.

Tanner, David. Personal interview. 25 May 2011. Southern Utah University.

Clegg, Russ. Personal interview. 31 May 2011. Utah Valley University.