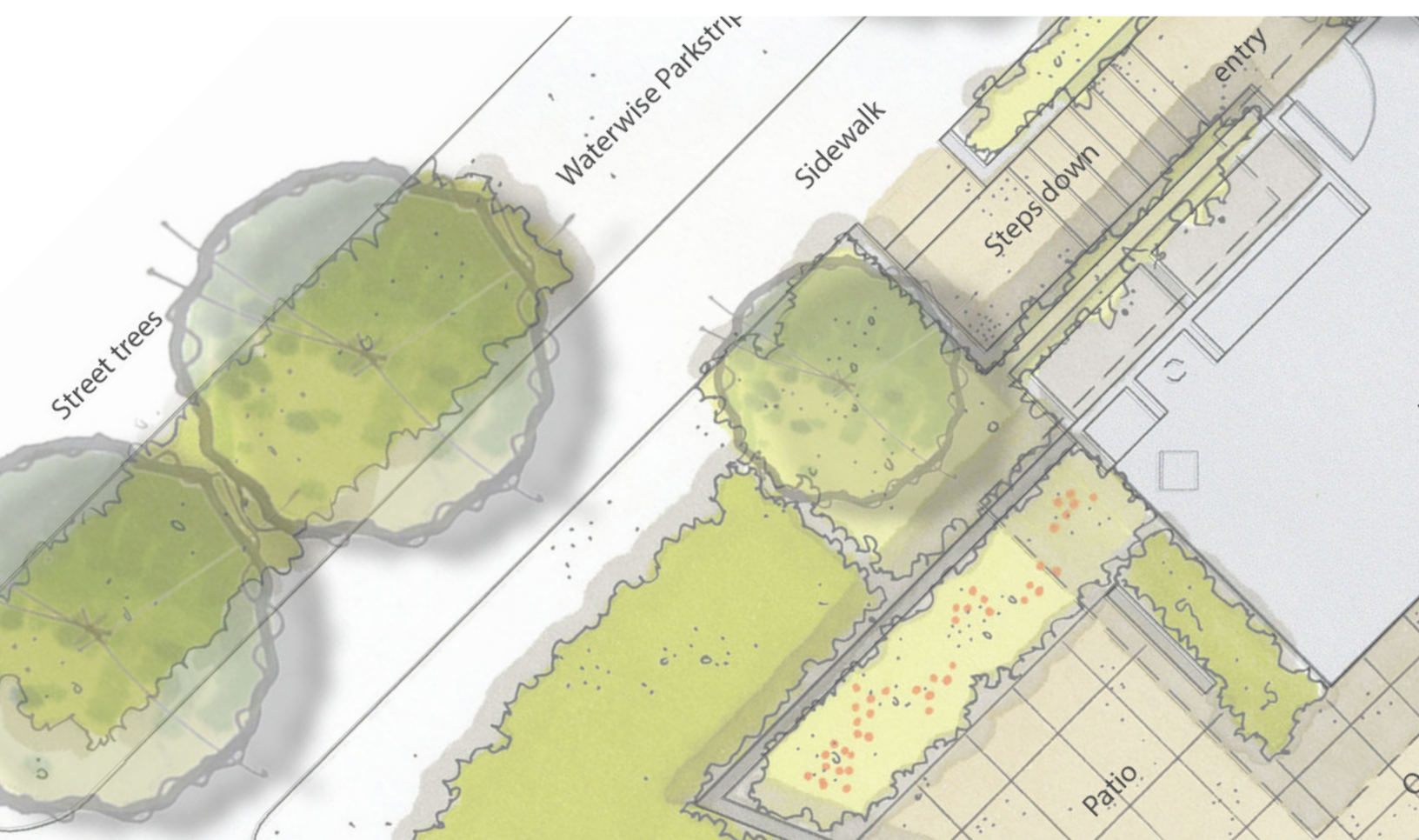


South Salt Lake
Landscape Handbook

City of South Salt Lake, Utah



South Salt Lake
Landscape Handbook

Revised 22 January 2015

South Salt Lake City Community Development

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1 Introduction

Purpose

This manual is a supplemental tool meant to assist in the implementation of South Salt Lake City's landscape requirements and provide an educational guide for landscape and irrigation design. Proper application of these principles will promote positive and enriching development by assuring that landscapes provide an investment in the overall community quality of South Salt Lake City.

Mission

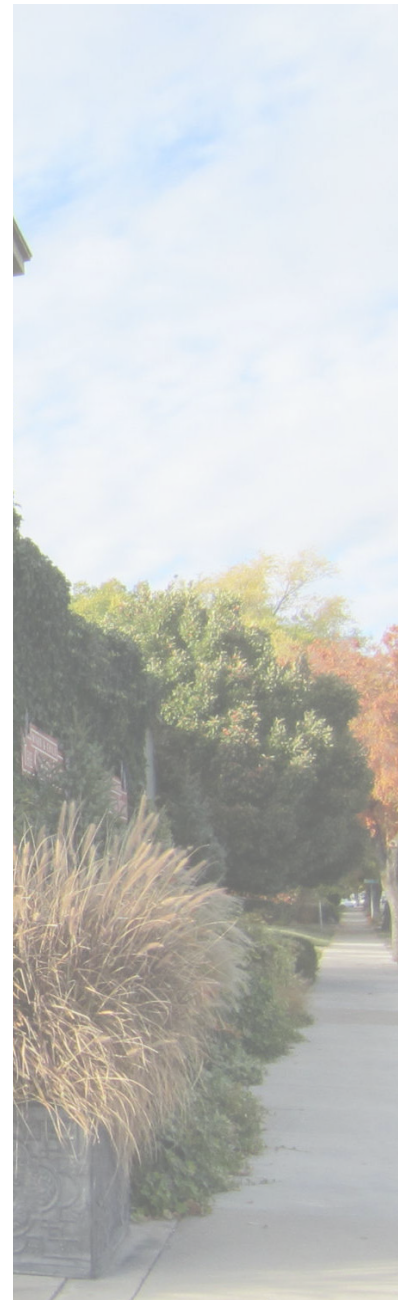
South Salt Lake City encourages landscaping that is beautiful, clean, and well maintained. The City's landscape ordinance sets minimum standards and incentives to achieve high-quality landscapes for the long-term, to improve the community's quality of life.

The intention of this Landscape Handbook is to clearly state city goals, give examples of successful landscapes, encourage innovation in design, and help applicants understand and comply with city ordinances related to landscape design.

Goals

As outlined in South Salt Lake City's landscape ordinance, new landscaping should:

1. Improve the City's image and identity, particularly by incorporating more landscape into commercial projects;
2. Mitigate impacts caused by business near single family neighborhoods by the addition of landscape buffers;
3. Enhance the visual appearance of streetscapes;
4. Encourage innovation and design;
5. Establish opportunities for sustainable storm water management;
6. Encourage water conservation;
7. Support a diversity of plants suited to local conditions; and
8. Sustain and improve the City's urban forest.



2 Landscape Design Principles

The following design principles help explain the best design techniques for South Salt Lake City's unique microclimate, soils, urban design and design challenges. These principles clarify the city's intent in applying its landscape ordinance to help landscape designers meet this intent.

1. Scale And Nature Of Plants:

The scale and nature of plants shall be appropriate to the size of the structures. Large scaled buildings, for example, should generally be complemented by larger scaled plants.

2. Selection Of Plants:

Plants shall be selected for form, texture, color, pattern of growth and adaptability to local conditions. All plants shall be of good quality and capable of withstanding the extremes of individual site microclimates.

3. Plant Coverage:

Proper plant selection can lead to the most efficient use of water in the landscape. At least 50% of landscaped planter areas should be covered by plants at maturity(not including tree canopies), not merely covered with rock or gravel. A landscape made up of native and adaptive species can look just as lush as a "traditional" landscape.

3. Evergreens:

Evergreens should be incorporated into the landscape design, particularly in those areas where wind protection, screening and buffering is required.

4. Softening Of Walls And Fences:

Plants shall be placed intermittently against long expanses of building walls, fences, and other barriers to create a softening effect.

5. Detention/Retention Basins And Ponds:

Site drainage and detention facilities shall be integrated into the overall landscape design as open space. Detention/retention basins and ponds shall be landscaped.

6. Onsite stormwater retention:

Methods to retain and percolate stormwater runoff on site are encouraged.



Waterwise landscape with good plant variety and plant coverage.



Waterwise landscape with 100% plant coverage.



Landscape with unacceptable plant coverage.

6. Energy Conservation:

Plant placement shall be designed to reduce the energy consumption needs of the development.

- a. Deciduous trees should be placed on the south and west sides of buildings to provide shade from the summer sun.
- b. Evergreens and other plant materials should be concentrated on the north side of buildings to dissipate the effect of winter winds.

9. Above Ground Utilities:

The landscape design shall identify the location of above ground public utilities (i.e., overhead power lines, transformers, meter boxes, backflow preventers, etc.), and offer design solutions to mitigate the visual impact of such elements on the site while not obstructing access to such facilities for maintenance and service.

10. Sign Visibility:

Although landscaping may not initially appear to obscure a sign, it may significantly reduce or eliminate the sign's effectiveness unless taken into account in the planning stage. Selection and placement of plants in the vicinity of signs should be determined by the mature height and spread of the plants to ensure that signs are not obscured from view when the landscape has reached full maturity. Plant foliage shall not obscure in any way complete visibility of public safety and traffic regulatory signs.



Waterwise landscape in a park strip.

11. Water Features:

Water features can provide relief from summer temperatures, but should be used sparingly with every attempt made to limit the amount of water used. This should be accomplished through proper design of the catch basin of the water feature and, where there is a significant risk of overspray, wind shutoff valves should be incorporated into the system.

12. Site Lines at Corners

Corner lots should keep landscaping low in order to preserve open site lines for traffic safety. All landscaping within 30' of the corner must be shorter than 36" at maturity.



Landscape on corners must be kept low for optimal traffic safety and visibility.

13. Crime prevention through environmental design (CPTED)

Crime can flourish in spaces that are perceived as vacant, unwatched, or hidden from view. CPTED is an approach to environmental design that ensures that public spaces are designed in such a way to remove the opportunity for crime to happen. CPTED principles should be followed in all public landscape areas in the city, including encouraging natural surveillance, natural access control, and natural territorial reinforcement.

Irrigation Considerations:

The below information provides detailed design guidelines for irrigation systems. Generally, these standards have been adapted from the Utah Irrigation Association's "Minimum Standards for Efficient Landscape Irrigation System Design and Installation." The Utah Irrigation Association and the National Irrigation Association can provide industry standards which can be incorporated into irrigation designs in addition to those found below.

1. Irrigation Systems:

While irrigation systems are necessary for certain landscape areas, and may be desirable for other applications, all irrigation systems should be designed for the most efficient use of water.

2. Parkstrip Landscaping:

Parking strips and other landscaped areas less than eight feet (8') wide should not be irrigated with pop up fixed or rotor sprinklers. These areas should generally be landscaped with water conserving plants or approved street trees irrigated with micro spray, bubblers or drip irrigation. Turf grass should only be used in these areas if irrigated with surface bubblers or subsurface systems.

3. Irrigation Times:

Spray head sprinklers shall be scheduled to operate between six o'clock (6:00) P.M. and ten o'clock (10:00) A.M. to reduce water loss from wind and evaporation.

a. Exceptions: Bubblers, drip and subsurface irrigation and during the 60-day plant establishment period.

4. Reduction of runoff:

Valves shall be programmed for multiple repeat cycles where necessary to reduce runoff, particularly on slopes and soils with slow infiltration rates.

5. Winterization:

All pressurized irrigation systems shall be winterized each year.

6. Weather:

All irrigation systems should be equipped with controllers for temporary shutoff due to inclement weather thru internal/external options such as rain, wind, and freeze devices.

7. Installation:

Irrigation systems should be installed by an irrigation contractor, as defined by South Salt Lake Municipal Code.



Open landscapes with a feeling of casual surveillance from buildings are some of the basic concepts of CPTED.

9. Slope:

On slopes exceeding thirty three percent (33%), the irrigation system should consist of drip emitters, bubblers or sprinklers with a maximum average precipitation rate of 0.85 inch per hour, and the controller clock should be set with appropriate cycles and run times to eliminate runoff.

9. Valve Separation:

Each valve should irrigate a landscape with similar site, slope and soil conditions and plant materials with similar watering needs. Turf and non-turf areas shall be irrigated on separate valves. Each type of irrigation device (drip, bubblers, fixed, rotors, etc.) shall be placed on separate valves.

10. Tree Irrigation:

Drip emitters or a bubbler should be provided for each tree. Bubblers should not exceed one and one-half (1 1/2) gallons per minute per device. Bubblers for trees should be placed on a separate valve unless found unfeasible due to the limited number of trees on the project site.

11. Drip Irrigation:

Drip irrigation lines should be installed underneath mulch, except for emitters and where approved as a temporary installation. Filters and end flush valves should be provided as necessary.

Irrigation Schedules:

Two irrigation schedules should be created based on the precipitation rate measurements found in the final audit report. For zones not audited, estimated precipitation rates should be based on flow calculations. The first schedule should cover the initial sixty (60) day plant establishment period. The second schedule should cover the post-establishment period. The table should suggest sprinkler run times, in minutes, and irrigation frequency to apply ½ inch of water based on each zone’s designed pressure and precipitation rate. Copies of these schedules should be provided to the city, property owner and business owner. Both the establishment and post-establishment irrigation schedules should be posted visibly near the irrigation controller and include the following information for each valve:

- a. Station (valve) number;
- b. Plant type;
- c. Sprinkler type;
- d. Precipitation rate (inches per hour);
- e. Minutes required for appropriate watering depth;
- f. Cycles and run times (minutes per cycle) to avoid runoff;
- g. Irrigation intervals (days between watering) based on plant material, soil type, and the seasonal fluctuations in water demand. The seasonal intervals found on the next page may be used as a general guide, but may be adapted as needed:

Month	Apply One-Half Inch Of Water
January	No irrigation
February	No irrigation
March	No irrigation
April	Every 6 days (if needed)
May	Every 4 days
June	Every 3 days
July	Every 3 days
August	Every 3 days
September	Every 6 days
October	Every 10 days (if needed)
November	No irrigation
December	No irrigation

3 Plant and Tree Recommendations

Regulation of street trees is of direct interest to South Salt Lake City. Many studies have found that quality, appropriate street trees have a direct impact on many factors in the public realm. In shopping areas, it has been found that visitors tend to stay longer, and spend more in areas that have mature street trees. Home values are greater on streets with mature street trees. Motorists have been found to reduce speed and drive more cautiously in areas with street trees. An overall feeling of community quality and value are significantly impacted by the presence of mature street trees along public streets.

These lists are designed to provide a variety of trees to choose from, depending on individual site factors. These tree species may also be incorporated into general landscape areas. If other varieties of trees are preferred, a request for an assessment can be made with South Salt Lake City.

In an effort to create shade and increase pedestrian comfort, parkstrips shall be planted with consistently spaced medium or large street trees wherever possible and appropriate. At maturity street trees shall form a continuous canopy and street edge. Interruptions in tree spacing for driveways and building entryways detract from the overall street identity and should be avoided through techniques such as the consolidation and sharing of driveway approaches. Tree spacing will vary depending on the size of tree canopy. Typical spacing between small trees is 20 feet on center. Typical spacing between medium and large trees is 25-30 feet on center.

The minimum size of a street tree when planted must measure 1.5 inches in diameter.

Approved Street trees

Small Street Trees: For use under power lines:

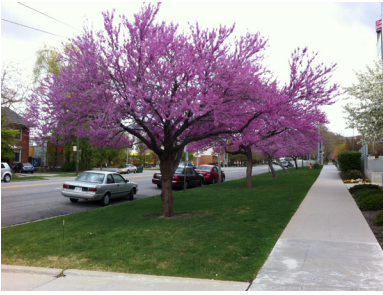
Crabapples (fruitless only)	Zelkova
Goldenrain Tree	Red Bud, Eastern
Japanese Tree Lilac	Hedge Maple
Amur Maple	Rocky Mountain Maple
Tatarian Maple	Crape Myrtle
Dwarf Littleleaf Linden	



Street trees add value to neighborhoods.



Commercial streets without street trees can discourage pedestrian usage of the street.



Small/medium sized street trees below power lines.



Small Street Trees: For use in parkstrips 3-feet in width or more:

Any of the trees in the above list, also:

Amur Chokecherry	Japanese Tree Lilac
Amur Maple	Netleaf Hackberry
White Mulberry	Paperbark Maple
Goldenrain Tree	Red Horsechestnut
Hardy Rubber Tree	Tatarian Maple
Thornless Hawthorn	Turkish Filbert
Flowering Pear	Kwanzan Cherry
Bigtooth Maple	Lavalle Hawthorn

Medium Street Trees: For use in parkstrips 5-feet in width or more:

Hedge Maple	Sensation Boxelder
Little Leaf Linden	Yellowwood
Lacebark Elm	Fairview Maple
Pyramidal Hornbeam	Chinese Fringe Tree
Thornless Honey Locust	Frontier Elm
Briotii Horsechestnut	Golden Raintree
California Redbud	Mayday Tree
Purple Robe Locust	
Yellowwood	

Large Street Trees: For use in parkstrips 8-feet wide or more:

American Linden	Honeylocust
Common Hackberry	Red Oak
English Oak	Silver Linden
European Beech	Sycamore Maple
Ginkgo	Accolade Elm
Japanese Zelkova	Texas Red Oak
London Planetree	
Japanese Pagodatree	
Kentucky Coffeetree	
Sterling Silver Linden	

Other tree species may be considered by the city upon written request from a property owner and/or developer of land in South Salt Lake.

List of Unacceptable Street Trees

Aspen	Fruit-bearing or nut trees
Balm-of Gilead	Gambel Oak
Birch (all species)	May Day Tree
Black Locust	Mulberry (all species)
Common Box Elder	Russian Olive
Catalpa	Saskatoon Serviceberry
Chinese Date	Siberian Elm
Cottonwood (all species)	Silk Tree
Flowering Plum	Conifers (all species not on list)
Willow (all species)	Ash (all species)



Recommended Ground Cover

Recommended Ground Covers for Park Strips

SHADE	SUN
Creeping Mahonia	Lamb's Ear
Robbiae Wood Spurge	Horizontal Juniper
Bishop's Weed	Grow Low Sumac
Grow Low Sumac	Wooly Thyme
Pachysandra	

Recommended Water Efficient Turf Grass List

Sheep Fescue	Creeping Red Fescue
Buffalo Grass	Perennial Ryegrass
Chewings Fescue	Hard Fescue

EMERALD ASH BORER AWARENESS

The Emerald Ash Borer (EAB), is an exotic insect that has killed millions of ash trees in the Midwest, and was first reported in North America in June of 2002 and as of July 2014, EAB has been found in 23 states and two Canadian provinces, and as close as Colorado. Since the spread of this insect has risen to such a damaging level, South Salt Lake prohibits all species of ash trees from being planted in city rights-of-way and encourages private land owners to stop the planting of ash trees on private property.

The Emerald Ash Borer is a very small, shiny green beetle (1/2 inch long x 1/8 inch wide). If you believe you have EAB in your trees please contact South Salt Lake City at (801)483-6011, Lori Spears (USU CAPS coordinator; lori.spears@usu.edu) or Clint Burfitt (State Entomologist; cburfitt@utah.gov) as soon as you suspect an infestation.

Further information on the Emerald Ash Borer can be found at:

<http://www.emeraldashborer.info/>

<http://utahpests.usu.edu/caps/htm/invaders/emeraldashborer>



Emerald Ash Borer

Weeds should be controlled to prevent their spread and maintain a neat appearance. Weeds listed on the Noxious weeds list, below, shall be removed and shall not be included in any new landscape planting. This list was compiled from the State of Utah Noxious Weeds List, as administered by the Utah Department of Agriculture, the list of additional noxious weeds declared by Salt Lake County in August of 2009, and the Utah Weed Control Association Noxious Weeds List. The plants below are listed in alphabetical order by their common name. The botanical name has been included for reference purposes.

South Salt Lake Noxious Weeds List

Bermudagrass	Perennial pepperweed
Black henbane	Perennial sorghum
Blue Lettuce	Poison hemlock
Buffalobur	Puncturevine
Bull Thistle	Purple loosestrife
Camelthorn	Quackgrass
Canada thistle	Russian knapweed
Common Burdock	Russian Olive
Dalmatian toadflax	Saltcedar
Diffuse knapweed	Scotch thistle
Dyerswoad	Silverleaf Nightshade
Field bindweed	Spotted knapweed
Garlic mustard	Squarrose knapweed
Goatsrue	St. John's wort
Hoary cress	Sulfur cinquefoil
Houndstongue	Velvetleaf
Johnsongrass	Western Whorled Milkweed
Jointed Goatgrass	Yellow Nutsedge
Leafy spurge	Yellow starthistle
Medusahead	Yellow toadflax
Musk thistle	
Myrtle spurge	
Ox-Eye daisy	

Recommended Water Efficient Plant List

PERENNIALS	
Penstemon	Yarrow
Coneflower	Flax
Sedum	Hens & Chicks
Bugleweed	Rock Cress
Aster	Daisy
Bellflower	Blanket Flower
Cranesbill	Red Hot Poker
Poppy	Phlox
Black Eyed Susan	Lavendar
Coral Bells	Hosta
SHRUBS	
Juniper	Sumac
Woods Rose	Dogwood
Cotoneaster	Forsythia
Honeysuckle	Sand Cherry
Lilac	Burning Bush
Euonymous	Privet
Oregon Grape	Spirea
Yew	Viburnum
Mugo Pine	Barberry
Potentilla	Currant
Hydrangea	Ninebark
TREES	
Sycamore Maple	Chitalpa
White Oak	Gingko
Shademaster Honeylocust	Norway Spruce
Colorado Spruce	Common Hackberry
Black Locust	Austrian Pine
Scotch Pine	Japanese Pagoda Tree
Japanese Zelkova	Bigtooth Maple
Hedge Maple	Almond Tree
Chokecherry	Amur Maple
Smoke Tree	Hawthorn
Golden Raintree	Crabapple



Additional plants can be found at:

Utah State University Forestry Extension: <http://treebrowser.org/>

Waterwise Plants for Utah Landscapes: <http://waterwiseplants.utah.gov/>

Jordan Valley Conservation Garden Park: <http://conservationgardenpark.org/>

4 Landscape Plan Submittal Process

Do I need to submit landscape plans to South Salt Lake City?

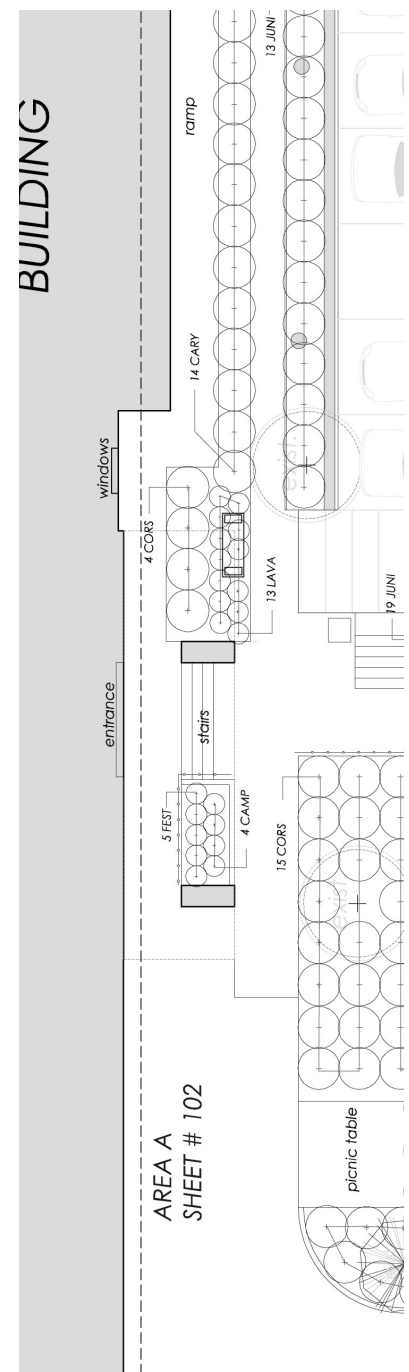
Landscape drawings are required for submittal to South Salt Lake City Community Development if you answer **YES** to **ANY** of these questions:

1. Are you proposing a new development of any kind?
2. Are you applying for a conditional use permit to change use of your land?
3. Are you applying for a building permit for any addition, expansion, or intensification of any property other than a single family home that increases the size of the building or parking area by 50% or more?
4. Are you increasing the size of your single family residence by 75% or more?
5. Are you expanding your parking lot by 15% or more or by a minimum of 7 stalls?
6. Are you relandscaping an existing (non-residential) property?

REQUIRED DRAWINGS/SUBMITTALS

The following elements are required on ALL landscape plan submittals to South Salt Lake City:

- i. The location and dimensions of all existing and proposed structures, property lines, easements, planting areas, buffers, parking lots, driveways, roadways and rights of way, sidewalks, bicycle paths, freestanding signs, waste enclosures, bicycle parking areas, fences, walls, ground level utility equipment, recreational facilities, and any other freestanding structure.
- ii. The location, spacing, quantity, size, and common and botanical names of all proposed plants.
- iii. The location, size, and common and botanical names of all existing trees and other plants on the property and in the park strip, either to be





retained or removed.

- iv. Existing and proposed grading of the site at one foot (1') contour intervals including any proposed landscaped berms.
- v. Elevations for fences and retaining walls proposed for location on the site.
- vi. Elevations, cross sections, and other details as determined necessary by the Land Use Authority.
- vii. The irrigation plan, drawn on a separate sheet.
- viii. Summary data indicating the area of the site in the following classifications:
 - 1. Total area and percentage of the site in landscaped area.
 - 2. Total area and percentage of the site in turf grasses.
 - 3. Total area and percentage of the site in water-efficient plant species at mature growth.

3 Appendix

Additional Information:

Waterwise Plants for Utah Landscapes: <http://waterwiseplants.utah.gov/>

Jordan Valley Conservation Garden Park: <http://conservationgardenpark.org/>

State of Utah Water Division: <http://www.conservewater.utah.gov/outdooruse/Lawn/>

State of Utah Water Division: <http://www.conservewater.utah.gov/OutdoorUse/SprinklerSystem/>

USU Center for Water Conservation: <http://www.hort.usu.edu/html/CWEL/CWELOverview.htm>

Crime Prevention Through Environmental Design: <http://www.cpted.net>

Minimum Standards for Efficient Landscape Irrigation

System Design and Installation

VERSION 2002

Prepared by the Irrigation Standards Committee of the Utah Irrigation Association

Introduction:

This Standards document has been provided to assist in promoting efficient irrigation design and installation. Underscored throughout the → subject to revision. Please forwards comments and suggestions to the Utah Irrigation Association.

1. GENERAL SCOPE:

1. Irrigation systems shall be subject to construction and completion inspections as specified by system designer prior to turnover to owner.
2. Irrigation drawings shall include but not limited to zone size, operating pressure and scheduled flow rates.
3. Owner shall be provided a complete scaled as-built drawing upon project completion. Refer to Section 2 "As-Built Drawings."

1.1 SYSTEM CHARACTERISTICS:

1. Design and construction of irrigation system must meet all applicable codes. Components of irrigation system shall be designed and installed in accordance with guidelines set forth by manufacturers.
2. Spray or overhead type systems shall be designed to match/provide efficient watering cycles utilizing E.T has baseline.
3. Systems shall be designed to provide a minimum of 60% Distribution Uniformity (DU) for spray type heads and 70% DU for rotor type heads.
4. Pressure regulation devices will be installed to allow entire system including all remote control valves and all sprinkler heads to operate at optimum pressure designated by product manufacturer. Pressure regulation devices may include one or all of the following: 1—pressure regulation valve at main line POC, 2—pressure regulation device on/at remote control valve, 3—pressure regulation device on individual sprinkler heads. 4- regulation of low volume drip/micro systems.

5. Booster pumps shall be installed on systems where supply pressure does not meet minimum recommended pressures of sprinkler manufacturers.
6. Systems shall be able to complete watering in 10 hours or less per night. (Applies to post established landscapes.)
7. Provide separate zones for turf, shrubs, and drip.
8. Provide separate zones for different exposures. (i.e. north side of building vs. south side)
9. Match appropriate zones for plant material to irrigation.
10. Provide separate zones for sloped areas. When irrigating slopes, take runoff at slope bottom into consideration. Run lateral lines parallel to slope.
11. Systems shall contain check valves to prevent low point drainage where applicable.
12. Provide separate zones for variations in site soil types.
13. Design and/or install with reduced head spacing or low angle nozzles for windy conditions.
14. Each zone shall have its own station on the controller.
15. No single zone shall be designed or installed with sprinklers of differing pressure requirements or precipitation rates. (Rotors, spray heads, drip emitters may not be mixed within a zone.)
16. All sprinkler heads shall be spaced at a maximum of 50% of design performance diameter of the sprinkler. Spacing shall be reduced below 50% of design performance diameter when conditions demand.
17. Irrigation systems with 1" POC or 2500 square feet and larger of landscaped area shall have a master valve installed.
18. The UIA endorses the use of non potable color indicators (equipment) for heads, valves, valve boxes, quick couplers, piping, etc., when irrigation systems are supplied by secondary or other non potable water sources.

1.2 POINT OF CONNECTION:

1. Systems with irrigated area of 1 acre and larger shall have a normally closed master valve. Where necessary, the master valve shall be capable of manual operation to allow manual use of the irrigation system. A normally open master valve is acceptable if the controller is capable to shut the valve off in event of unscheduled flow.
2. Recommended Point of Connection component installation order: 1- connection to source, 2-stop & waste valve/ or shut off, 3-wye strainer, 4- pressure regulator, 5-backflow preventer, 6-quick coupler blowout, 7-master valve, 8-flow meter - (if required).
3. In situations of secondary water supply, provide filtration system

necessary to clean water supply and protect irrigation system components. Provide accessible pressure gauges immediately upstream and downstream of the filtration device. (non self cleaning units).

4. The UIA recommends with 1 1/2" POC systems, an additional/separate water meter be installed for use with the landscape.

1.3 CONTROLLER / WIRE:

1. Controller shall be able to provide separate programs for turf zones, shrub zones, and drip zones.
2. Controllers shall be capable of temporarily shutting down system by utilizing internal/external options (such as rain, wind, freeze devices).
3. Controller shall be programmable for multiple start times for repeat and rest periods, and shall be capable of water budget adjustment.
4. Power wire and control wire shall not be contained in the same conduit.
5. Controller wiring at outside exposure shall be contained in steel rigid conduit. EMT conduit for inside installations.
6. Remote control valve wiring shall be a minimum of 14 gauge, UF UL or PE UL rated.
7. All wire connections shall be made with watertight connectors and contained in valve box.
8. Provide slack/extra control wire at all change in directions.
9. Provide 36" of slack wire at each remote control valve in valve box.
10. Remote control valve wiring shall be installed with the main line pipe where possible, taped to the underside of the mainline pipe at regular intervals.
11. Remote control valve wiring shall have separate colors for common, control, and spare.
12. Provide minimum of one spare wire for every five remote control valves in system. Spare wire shall be available at all valve manifolds or clusters. All spare wires shall be "home run" to the respective controller. End run common.
13. Outdoor controllers shall be lockable and weather resistant.
14. All wiring under hardscaping shall be contained in sleeving.

1.4 PIPING / FITTINGS:

1. All PVC pipe shall be rated ASTM D 1784 or 1785.
2. Minimum recommended standards for PVC pipe: Schedule 40 for sizes 3/4" through 3", Class 200 for sizes 4" and up. 1/2" PVC pipe not allowed.
3. Maximum flow velocity in any pipe shall not exceed five feet per second. Pressure Polyethylene pipe shall be ASTM D2239 rated, lateral and drip

tubing excepted.

4. All piping under hardscape shall be contained in sleeving separate from wire sleeving.
5. All piping will be capable of winterization by air blowout.
6. Manual drains may be used in main line pipe applications.
7. Minimum pipe depths: lateral pipe 12" cover, main line 18" cover, sleeving 18" cover.
8. All piping will be backfilled with clean material, settled and compacted to proper finish grade.
9. All solvent weld joints to be installed according to manufacturer specifications.
10. All insert fittings shall be installed according to manufacturer specifications.
11. PVC Main lines shall use a minimum of Schedule 40 fittings for $\frac{3}{4}$ " through 1 1/2". Sch 80 or better 2"-3".
12. Push on ductile or Mechanical cast iron fittings shall be used on PVC main line fittings 4" and larger.
13. Proper thrust blocking shall be installed on all fittings 3" and larger.

1.5 VALVES:

1. Remote control valves shall be sized according to the of the zone demand requirement, lateral piping downstream and manufacturer's specifications.
2. All remote control valves shall have flow control adjustment.
3. Non potable (secondary) systems shall use compatible (dirty water) remote control valves.
4. Control valves will be installed in a Standard or larger, manufactured, valve/meter box, capable of being bolted closed after installation.
5. Remote control valve in valve box shall have ample space for service and to remove valve cover

1.6 SPRINKLER HEADS

1. All sprinkler heads shall be attached to lateral line pipe with a flexible/ adjustable swing assembly.
2. Spray heads shall pop up a minimum of 4" in turf areas.
3. Sprinkler heads adjacent to hardscape paving shall be spaced 1 to 3" away from paving. Sprinklers adjacent to walls, buildings, fences or other structures shall be spaced a min. 6" away from structures.
4. All sprinklers within a zone shall have matched precipitation rates.

5. Shrub heads located adjacent to pedestrian areas shall be pop up variety.
6. Sprinklers in turf areas shall be fully spring retractable and pop up a minimum of 4".

2. IRRIGATION AS-BUILT DRAWINGS AND OPERATIONS AND MAINTENANCE MANUALS

- 2.1 The following shall be included on Irrigation As-Built Drawings. In addition, provide a reduced color-coded drawing(s) showing all zones and assigned valves.
- 2.2 Note all points of connection (P.O.C.) include tap size, line size and static water pressure (P.S.I.) of service.
- 2.3 Provide name and phone number of the servicing water purveyor. Include the date the installation was completed and the date the as-built drawing was approved.
- 2.4 Accurately locate all of the following major components and their size, installed on the project.
 - a. Water Meters
 - b. Backflow Preventors
 - c. Pressure Reducing Valves (note pressure settings)
 - d. Filters
 - e. Stop and Waste
 - f. Master Control Valves
 - g. Isolation and Gate Valves
 - h. Flow Sensors
 - i. Remote Control Valves (note station assignment, size, flow rate, pressure setting, D.U. and actual flow rates if available from water audit)
 - j. Drip System Pressure Regulators and Filters
 - k. Quick Couplers and Hose Bibs
 - l. Pressure Main Lines and Sizes
 - m. Main Line Sleeves and Sizes
 - n. Capped Main Lines and Future P.O.C.'s
 - o. Manual Drain Valves and Sumps
 - p. Remote Control Wire
 - q. Controller Location (s) (note manufacturer, model, size and number of stations used)
 - r. Rain Sensors
 - s. Moisture Sensors

- t. Note and identify location(s) of existing utility systems as encountered during installation i.e. gas, phone, sewer etc.

2.5 Locate the following additional components installed on the project:

- a. All Sprinkler Heads
- b. Lateral Lines and sizes
- c. Lateral Line Sleeves and sizes
- d. Manual or Automatic Flush Valves
- e. Air Release Valves

2.6 Operations and Maintenance Manual

- 1. A signed and dated written description of the contractor's warrantee and warrantee period. Include name, address, phone number and license number.
- 2. A description of system start up and winterization process.
- 3. All product literature and customer service information for products used/installed on project.