



MODEL EFFICIENT IRRIGATION AND LANDSCAPE DESIGN STANDARDS – GUIDELINES FOR PREPARING AND ADOPTING YOUR ORDINANCE OR STANDARDS

INTRODUCTION

Landscape irrigation is the single largest use of potable water in the U.S. During summer months, outdoor water use creates peak demand on existing water supplies and system capacity. Water purveyors and utilities must increase supply to meet irrigation needs, sometimes as much as three to four times the amount used for domestic needs during the winter. Nationwide, landscape irrigation is estimated to account for nearly one-third of all residential water use, totaling nearly 9 billion gallons per day. As much as 50 percent of water used for irrigation is wasted due to evaporation, wind, or runoff caused by inefficient irrigation methods and systems.¹

Locally, forecasts show water use increasing substantially by 2040 in the Spokane Valley-Rathdrum Prairie (SVRP) aquifer. Water demand in Spokane County is forecasted to increase 31% by 2040. The increase is approximately 156 CFS, which is significant given that the most recent USGS study indicates a close relationship between increases in withdrawal and decreases in Spokane River's flow. The public supply sector and self-supplied

¹ EPA Water Sense, Water-Smart Landscapes, 2013

residential sectors are projected to increase by 41% and 47% respectively. During the same time frame population is projected to increase by 55% (based on the Washington State Office of Financial Management medium population projection for Spokane County).

In Idaho, approximately two thirds of the total non-agricultural water withdrawn from the SVRP is devoted to landscape irrigation use. The population of Kootenai County living within the SVRP is projected to increase by 81% by 2045. As it exists presently, water purveyors must petition the Idaho Department of Water Resources for additional water rights to serve their growing populations.

Given the recent drought in 2015, the imminent reality of water shortages in the SVRP aquifer has arrived, and measures to conserve water should be implemented now. During the drought, water sources that typically feed the aquifer ran low. In some cases rivers ran dry and areas lakes had water levels lower than had been seen in decades.² In contrast, the hot dry summer weather caused homeowners and landscape maintenance staff to dramatically increase watering times in an effort to keep landscapes looking lush. Private well owners in the City of Coeur d'Alene went to the Consolidated Irrigation District (CID), the City, and other purveyors to purchase water. The City of Airway Heights ran out of water and enacted odd and even day watering. The City also resorted to purchasing more water as private wells dried up.

Climate scientists indicate weather models predict more years of drought like 2015 in the future.³ Warmer winter weather is leading to winter precipitation falling in the mountains as rain instead of snow. With a lower snowpack, this "snow drought" causes rivers and streams feeding the aquifer run dry earlier in the year. More frequent water shortages combined with increased demand and population growth demand more efficient use of water withdrawn from the SVRP aquifer.

One way to combat water shortages is to enact water efficient irrigation and landscape requirements for new and rehabilitated landscape projects. Water conservation has not historically been specifically addressed in irrigation and landscape design practices in the region. Due to ever-increasing demands on our limited water resources and inefficient uses of water there is a need for regional irrigation efficiency and design standards. For that purpose, IWAC developed this regional Model Efficient Irrigation and Landscape Design Standards. This guide will aid municipalities and water purveyors to promote water use efficiency of our sole source aquifer, the Spokane Valley-Rathdrum Prairie Aquifer.

USING THIS GUIDE

The purpose of this guide is to provide local jurisdictions, agencies, and water purveyors with an understanding of the importance of designing, installing, and maintaining landscapes with water efficiency in mind. Most jurisdictions do not have strong provisions for water efficiency within their landscape codes. Even absent efficient landscape and irrigation standards, a local jurisdiction may have landscape requirements or public works standards that could conflict with a new ordinance. This guide provides the recommended elements that an ordinance or design standard should include, to ensure landscapes are designed with water efficiency in mind.

Some of the recommended elements contained within this guide may be considered best practice in water efficient design. Others may include recommendations with "ranges" of standards a local jurisdiction can choose

² Spokesman-Review, November, 2016, "Lingering drought seen in regions low lakes, waterways", Becky Kramer.

³ Spokesman-Review, November 4, 2016, "Pacific Northwest's 2015 weather likely to be repeated, climate scientists say", Becky Kramer.

from depending on their individual goals. There is not a one size fits all standard and local jurisdictions may choose to alter or apply these standards as they see fit.

If the regulating entity is a water provider but has no land use authority, the regulations could be implemented through another mechanism (adopted design standards) or through an agreement entered into during the application for water service (e.g. tied to applications for water availability). In this case, references within these guidelines should be updated to reflect the specific permitting procedures of the provider.

MODEL EFFICIENT IRRIGATION AND LANDSCAPE DESIGN STANDARDS

The following includes a summary of the recommended elements that may be included within design standards for water efficient landscaping and irrigation systems. A local jurisdiction may choose to alter or amend these standards to comply with their own local goals or vision.

1. PURPOSE

Local codes or design standards are crafted to achieve a purpose. Landscape standards may be adopted for many reasons. The original purpose may have been for beautification, or to protect property values. They may serve to minimize erosion on sensitive slopes, or to retain specific locally important plant species. This section of the guidelines provides purpose and goal statements that may be incorporated into a water efficient irrigation and landscape ordinance to respond to the specific goals that would be achieved through the implementation of newly adopted standards for water efficiency in landscape and irrigation design.

Below are several examples of goal statements with a focus on water efficiency. These statements should be crafted with the local jurisdiction in mind.

EXAMPLE LANGUAGE

From the Colorado Model Water-Efficient Landscape Ordinance for Commercial Businesses:

The City Council has found that it is in the public interest conserve the public's water resources and to promote water-efficient landscaping. The purpose of this ordinance is to protect and enhance the community's environmental, economic, recreational, and aesthetic resources by promoting efficient use of water in the community's landscapes, reduce water waste and establish a structure for the designing, installing and maintaining of water-efficient landscapes throughout the City.

The Water-Smart Landscapes publication by the Environmental Protection Agency includes statements that may be a source of inspiration for purpose statements for a water efficient irrigation and landscape ordinance:

- *Reducing outdoor irrigation which can account for up to 60 percent of a household's water use.*
- *Replacing eye-catching landscapes, which require extensive watering, fertilization, and pesticide application, with drought-tolerant and water-smart landscaping. These landscapes can be designed to be aesthetically pleasing, save water, and protect the environment.*

From the California Model Water Efficient Landscape Ordinance (MWELo):

- *Creating the conditions to support life in the soil by reducing compaction, incorporating organic matter that increases water retention, and promoting productive plant growth that leads to more carbon storage, oxygen production, shade, habitat, and esthetic benefits.*
- *Minimizing energy use by reducing irrigation water requirements, reducing reliance on petroleum based fertilizers and pesticides, and planting climate appropriate shade trees in urban areas.*
- *Conserving water by capturing and reusing rainwater and graywater wherever possible and selecting climate appropriate plants that need minimal supplemental water after establishment.*
- *Protecting air and water quality by reducing power equipment use and landfill disposal trips, selecting recycled and locally sourced materials, and using compost, mulch and efficient irrigation equipment to prevent erosion.*
- *Protecting existing habitat and creating new habitat by choosing local native plants, climate adapted non-natives and avoiding invasive plants. Utilizing integrated pest management with least toxic methods as the first course of action.*

The City of Hayward, CA, has similar goal statements to the California MWEL0:

- *Encouraging the use of a watershed approach and reducing compaction, incorporating organic matter that increases water retention, and promoting productive plant growth that leads to more carbon storage, oxygen production, shade, habitat and esthetic benefits.*
- *Establishing provisions for water management practices and water waste prevention for existing landscapes.*
- *Setting a Maximum Applied Water Allowance as an upper limit for water use and reducing water use to the lowest practical amount.*

2. APPLICABILITY

2.1 APPLICABILITY

Depending on the jurisdiction, landscape applicability standards may already exist, that will need to be reviewed in implementing water efficient landscape standards. The applicability section will describe which and what kinds of development actions must comply with the water efficient standards. Consider the following types of projects that include landscapes for water efficient irrigation and landscape requirements:

- New construction and rehabilitated landscapes of:
 - Public agency projects;
 - Commercial/industrial development;
 - Single-family and multi-family projects by a developer; and
 - Single-family on lots of record.
- Existing landscapes (with criteria for remodels or renovated landscape greater than a minimum area).

When adding any of the included sections of this guide to a local ordinance, the implementation procedures should be aligned with the local jurisdiction's existing procedures and regulations. For example, the implementation of a water efficient irrigation and landscape ordinance could occur through the building permit process and there may be a minimum threshold project size for which it applies.

The adopting jurisdiction or agency should evaluate appropriate thresholds for when these standards are triggered. Several local jurisdictions in the SVRP aquifer already specify a minimum size of the landscape area for when the the landscape ordinance applies. As a practical matter, this size threshold would only apply generally when development permits or review is required. This means that activities that would not require a development permit are not reviewed under the landscape provisions in many instances.

RANGE OF STANDARDS CURRENTLY EMPLOYED WITHIN THE SPOKANE VALLEY:

Municipality	Code Reference	Summary of Standards
Airway Heights, WA	AHMC 17.22	Landscaping is not required in the residential zones. Requires water efficient design and irrigation plans on sites over 10,000 sf of irrigated area.
Spokane, WA	SMC 17C.200.110	Landscape plans are not required for a house, an attached houses or a duplex on a lot. For all other types of development on sites, including planned unit developments, of more than seven thousand square feet of lot area must include a landscape plans. No irrigation plans required.
Spokane Valley, WA	SVMC 22.70.90	Applies to multifamily and nonresidential projects. No irrigation plans required.
Liberty Lake, WA	Article 10-3C	Applies to all new development except single-family. No irrigation plans required. Must comply with City Water Conservation Ordinances.
Spokane County	SCC 14.806	Applies to all new development except single-family requirements. No irrigation plans required.
Post Falls, ID	PFMC 18.24.080	Applies to all new development except single-family. Irrigation required, but plans for water efficiency are not.
Hayden, ID	Chapter 11-11-11	Applies to all new development except single-family. Irrigation plans are not required for any type of development.
Coeur d’Alene, ID	Chapter 17.06	Does not have any single-family landscape requirements. Irrigation is required for non-residential use only requirement for documentation is to specify the type of irrigation and submit a water spray pattern plan.
Kootenai County, ID	KCC 8.4.6	Does not have any residential landscape requirements, nor does it require irrigation plans for any type of development.

There is no one-size-fits-all approach to applying water efficient landscape standards and the communities adopting them should think about their existing landscaping standards and their applicability. Enacting water efficient requirements for residential development will likely be met with resistance. However, since residential irrigation use accounts for the highest amount of annual water demand, it is critical to address water efficiency in residential zones.

2.2 EXCEPTIONS

An adopting jurisdiction may choose to exempt some development activities from all or some of the provisions of the efficient irrigation and landscape design standards. An example of some activities that communities may choose to exempt include:

- Existing landscapes.
- Cemeteries.
- Registered local, state or federal historic sites.
- Ecological restoration sites.
- Plant collections or botanical gardens.

3. LANDSCAPE AND IRRIGATION DOCUMENTATION

3.1 REQUIRED DOCUMENTATION PACKAGE

In order to determine conformance with the landscape and irrigation design standards, applicants will need to prepare various documentation, including, but not limited to the following;

- Landscape design plan
- Irrigation design plan
- Irrigation water demand calculations and a watering schedule
- Maintenance schedule
- Grading design plan
- Soil analysis
- Reclaimed water use

The adopting jurisdiction may also consider requiring certain elements of this package at different stages of project review. For instance, an irrigation plan may be able to be deferred until final plat during subdivision review.

3.2 WHAT IS REQUIRED TO BE SHOWN ON A LANDSCAPE PLAN

The adopted water efficient irrigation and landscape ordinance/standards should identify the required items that will be shown on a submitted landscape plan to determine conformance with the water efficient landscape design standards.

The adopting jurisdiction should examine its existing landscape plan requirements to ensure that the plans depict water efficient landscape features such that they can be reviewed for conformance with water efficient landscape standards.

For example, the City of Post Falls, ID requires the following to be shown on a submitted landscape plan. This language is typical of most jurisdictions in the region:

- *Boundaries and dimensions of the site.*
- *Location of existing and proposed streets, curbs, utility lines, sidewalks.*
- *Location of buildings and structures, parking lots, driveways, loading areas, outdoor mechanical equipment, signs, refuse enclosures, overhead utilities, water meter location, grassy swales, parking lot lighting, and any plants or trees that are to remain on site.*

- *The location and design of landscape areas to be landscaped, and plant list to include the location, number, size and type of plant material by botanical and common name.*
- *North arrow and scale.*
- *Proposed irrigation system. All landscaped areas, including adjacent rights of way shall be provided with an underground irrigation system.*
- *Planting details (using Post Falls detail for trees).*
- *Name, address and phone number of the person preparing the plan.*
- *Landscaping calculations in compliance with subsections C5 and D of this section.*

A landscape plan prepared with water efficient landscaping in mind should group plantings by hydrozone to minimize irrigation needs. Landscape design plans should prioritize the use of native plant species, and minimize site disturbance where appropriate.

It should be noted that most local jurisdictions require irrigation as shown in Post Fall's ordinance. However, irrigation plans and calculations are almost never required to ensure water conservation measures are employed.

EXAMPLE LANGUAGE:

The follow language could be added to landscape plan requirements in order to enforce water efficient landscape design, installation and maintenance practices.

- 1) *Landscape Design Plans must be designed by a licensed landscape architect or contractor, Certified Irrigation Designer, or other licensed or certified professional. Provide the name, address and phone number of preparer, license number and expiration date, if applicable.*
- 2) *Indicate existing and proposed topographic lines and elevations, 100 year floodplain line and riparian or shoreline habitats.*
- 3) *The total square footage must be provided on the plan legend for each of the following: the site, impervious areas, gross parking area, undisturbed landscape areas, landscaping required, and landscaping provided.*
- 4) *Indicate the square footage for each landscaped area separated by service meter and the total number of acres or square footage of landscaped area for the site on the plan legend. For example: if there are multiple landscape meters, the area served by each meter must be measured (in square feet) and the % of total site determined for each area.*
- 5) *Designation of planting hydrozones and irrigation requirements. Specifically describe the method(s) and system(s) used.*
 - a. *A calculation of the total landscaped area.*
 - b. *A calculation of the estimated applied irrigation water to establish the landscape.*
 - c. *A calculation of the estimated applied irrigation water for the landscape at maturity.*
- 6) *Graphically show the extent of disturbed/graded areas and all materials and elements provided for the revegetation and/or slope stabilization of these areas.*
- 7) *When grading plans or a combination paving/grading plan is required, the landscaping plans must be submitted concurrently with the first submittal of the grading plans.*
- 8) *A plant list and legend, indicating the scientific (botanical) and common name and total quantity of each plant, planting size, location and symbol, hydrozone/water need.*
- 9) *Specifications and/or details for plant installation, soil preparation, and mulch.*

- 10) *A design concept statement, plan notes or sketches that contain:*
- a. *Plant selection. Plant materials with intrusive root systems cannot be placed within drainage basins with engineered bottoms.*
 - b. *Irrigation. Groundwater and stormwater runoff detention and use; temporary or permanent systems.*
 - c. *Site grading and how it benefits landscaping. Where applicable, specifications for stockpiling and reapplying site topsoil or imported topsoil.*
 - d. *Use of groundcover or mulch (both organic and inorganic).*
 - e. *Use or disposal of existing, on-site vegetation*
 - f. *Address maintenance requirements. Specifically describe the maintenance and include a statement assuring the continued maintenance program of the required landscaping and assigning the responsibility of the maintenance to the property owner or agent, a homeowners' association or other liable entity.*

3.3 WHAT IS REQUIRED TO BE SHOWN ON AN IRRIGATION PLAN

An irrigation plan, if not already required, should be included in the list of materials submitted required as part of the landscape documentation package. The irrigation plan should demonstrate conformance with the nationally recognized irrigation design standards identified in the most recent version of the Irrigation Association's "Landscape Irrigation Best Management Practices".

EXAMPLE LANGUAGE:

The Irrigation Design Plan must meet the irrigation design standards identified in the most recent version of the Irrigation Association's "Landscape Irrigation Best Management Practices" and accurately and clearly identify:

- 1) *Location and size of separate water meter(s) for the landscape.*
- 2) *The static water pressure in pounds per square inch (p.s.i.), at the point of connection to the public water supply (or to a water well where applicable).*
- 3) *Total landscape water demand, effective rainfall, watering window, assumed irrigation system efficiency, and system operation constraints.*
- 4) *Layout of the irrigation system, (i.e. backflow prevention device, pump, pressure regulator, automatic controller, main and lateral lines, valves, sprinklers, bubblers, drip emitters, quick couplers, and filters, where applicable)*
- 5) *A legend containing a general description of all components of the irrigation system, including: manufacturer's name and model number, operating pressure, manufacturer's irrigation nozzle rating in gallons per minute (g.p.m.) or gallons per hour (g.p.h.), as necessary, spray radius, and calculated precipitation rate per nozzle, based on the Irrigation Design Plan.*
- 6) *A critical zone pressure calculation indicating the highest pressure demand to assure adequate operating pressure.*
- 7) *A valve chart indicating flow rate (in gallons per minute) and design operating pressure, (p.s.i.) for each valve, and precipitation rates in inches per hour.*
- 8) *All irrigation systems must have, at a minimum, a rain sensor installed.*
- 9) *Installation specifications and details for workmanship and installation of irrigation components and requirements for owner/operator training.*

3.4 WHO IS QUALIFIED TO PREPARE LANDSCAPE AND IRRIGATION DOCUMENTATION

The local jurisdiction should determine who is qualified to prepare landscape and irrigation plans. Landscape plans may be prepared by a licensed landscape architect, licensed/certified landscape contractor, or any other person authorized to design a landscape. The signature of a qualified irrigation professional such as licensed landscape architect, certified irrigation designer, licensed/certified landscape contractor, or any other person authorized to design an irrigation system within the jurisdiction.

4. LANDSCAPE DESIGN CRITERIA

This section includes a range of landscape design criteria an adopting jurisdiction may consider as a way of achieving a goal for landscape design. Examples include lists of approved plant species, spacing, quantity, minimum landscape areas, etc. The adopting jurisdiction may already have adopted landscape design criteria. As a part of adopting water efficient landscape standards, the adopting jurisdiction should review their existing codes to identify where existing provisions may conflict with water efficient landscape requirements (such as requiring high water use plants).

EXAMPLE LANGUAGE:

A Landscape Design Plan meeting the following requirements must be submitted as part of the Irrigation and Landscape Documentation Package.

- 1) Planting design must be consistent with all requirements of current landscape codes (existing facilities of pre-existing landscaped areas are not subject to landscape code requirements unless the landscape was installed after the effective date of the (jurisdiction/department) landscape ordinance(s), except in areas where there has been a major renovation or expansion to the landscape areas).*
- 2) Plant Selection - Plants must be selected from the approved Drought Tolerant/Low Water Use Plant list.*
- 3) Plants that are not on the approved Drought Tolerant/Low Water Use Plant list, or that require spray irrigation cannot be used in street medians or public rights of way.*
- 4) Plants having similar water use must be grouped together in distinct hydrozones. Consideration must also be given to variations in: exposure (e.g. microclimates); slope; and soil infiltration rates when determining hydrozones.*
- 5) Plants must be selected appropriately based upon their adaptability to the climatic, geologic, and topographical conditions of the site.*
- 6) Landscaping associated with storm drainage facilities shall be integrated into the overall design of the project.*
- 7) For projects located at the interface between urban areas and natural open space (non-irrigated), Drought Tolerant/Low Water Use plants shall be selected that will blend with the native vegetation and are fire resistant or fire retardant. Plants with low fuel volume or high moisture content shall be emphasized. Plants that tend to accumulate excessive amount of dead wood or debris shall be avoided.*
- 8) A mulch (organic or inorganic) of at least three inches must be applied to all planting areas except turf. Placing non-porous material under the mulch is not allowed.*

5. IRRIGATION DESIGN CRITERIA

This section includes irrigation design criteria for reducing irrigation water use. The standards should be reviewed to ensure compatibility with the City's existing water system (i.e. requiring a separate meter and back flow prevention device). Similar to the above provisions for landscape design, this section should be reviewed where a local jurisdiction has existing irrigation standards to identify where they may conflict with water efficient irrigation requirements.

5.1 IRRIGATION SCHEDULES

To provide for efficient use of water, a water budget and irrigation schedule should be developed and managed to utilize the minimum amount of water required to maintain plant health. The water efficient irrigation and landscape ordinance should include requirements for irrigation to be regulated by automatic irrigation controllers and, at a minimum, rain sensor overrides should be provided to ensure irrigation is delayed during and immediately following rain events.

A water budget is a tool that allows regulators to verify water efficient measures are being employed during design. Several calculation methods exist for creating irrigation water budgets although they primarily show the same results. Calculations compare a baseline design, typically the entire site in turf with inefficient irrigation, and an efficient design. The water budget is established as an allowable percentage of the baseline design, or a required amount of water savings in the design case. The two most widely accepted calculations have been provided in the language below.

The water efficient irrigation and landscape ordinance may establish allowable hours for irrigation, with irrigation scheduled for the evening hours when evaporation and evapotranspiration are minimized. The local jurisdiction should limit scheduled irrigation during the day, and may consider appropriate time limitations (in the range of 7:00pm – 10:00am). Exceptions may be permitted for performing audits of irrigation systems.

Irrigation schedules should provide parameters for the irrigation controller to be applied during the following:

- the plant establishment period;
- the established landscape; and
- temporarily irrigated areas.

The local jurisdiction should also require the following information to be submitted within an irrigation schedule:

- irrigation interval (days between irrigation);
- irrigation run times (hours or minutes per irrigation event to avoid runoff);
- number of cycle starts required for each irrigation event to avoid runoff;
- amount of applied water scheduled to be adjusted on a monthly basis;
- application rate setting;
- root depth setting;
- plant type setting;
- soil type;

- slope factor setting;
- shade factor setting; and
- irrigation uniformity or efficiency setting.

EXAMPLE LANGUAGE

Irrigation Water Budgets and Schedules satisfying the following conditions must be submitted as part of the Irrigation and Landscape Documentation Package:

- 1) *A water budget analysis based on one of the following calculation methods:*
 - a. *Appendix B - Landscape Water Budget. Landscape Irrigation Best Management Practices. The Irrigation Association and American Society of Irrigation Consultants, May 2014.*
 - b. *WaterSense Water Budget Tool. United States Environmental Protection Agency.*
 - c. *The [agency] shall periodically undertake an evaluation of the water budget analysis calculation formula outlined in subsection (1) of this section. The evaluation shall include a recommendation to retain or modify the adjustment factor or components thereof, and shall be made in consultation with groups including landscape professionals and water purveyors.*
 - d. *The water budget will be calculated upon the total area of the site in landscape areas and in landscape water features (such as decorative ponds, pools or fountains) that are fed by irrigation water. For the purpose of calculating the water budget, "landscape area" shall mean the entire parcel, less:*
 - i. *Sensitive areas and their buffers;*
 - ii. *The building footprint;*
 - iii. *Driveways;*
 - iv. *Paved portions of parking lots; and*
 - v. *Hardscapes (e.g., decks, patios, sidewalks, and other nonporous areas).*
 - e. *Areas such as playgrounds, sport fields, golf courses, school yards, or other recreational spaces where the turf provides a playing surface or serves other recreational purposes may be allowed additional water beyond the calculated water budget. In order to receive additional water for such turf areas, the applicant shall submit a statement designating such turf areas for recreational purposes and specifying additional water needs above the water budget. This additional water need will be based upon the ETO information for the turf grass species or species mix used in such turf areas.*
 - f. *Landscape water features shall not use potable water unless the water feature recirculates water used in its operation.*
 - g. *The irrigation water use may be monitored by the water purveyor after the date of release of the performance bond.*
 - h. *Alternative water sources such as recycled wastewater or rainwater are encouraged as permitted by the Department of Ecology. Such water sources shall not be subject to the limits of the water budget.*
- 2) *An annual irrigation program with monthly irrigation schedules, are required for:*

- a. *The plant establishment period,*
 - b. *The established landscape, and*
 - c. *Any temporarily irrigated areas.*
 - d. *A schedule for weaning water requirement plants (see approved plant list) from irrigation, if applicable.*
- 3) *The irrigation schedule must:*
- a. *Be included on the Irrigation Design Plan as well as in the Irrigation and Landscape Documentation Package;*
 - b. *Include run time (in minutes per cycle), number of cycles per day, frequency of irrigation for each station (weekly/monthly) and maximum operating hours per day for peak demand; and*
 - c. *Program valves for multiple repeat cycles shall be required where necessary to reduce runoff, particularly on slopes and soils with slow infiltration rates.*
 - d. *Provide the amount of applied water (in hundred cubic feet, gallons, or in whatever billing units the local water supplier uses) recommended on a monthly and annual basis.*
- 4) *Whenever possible, irrigation scheduling will incorporate the use of evapotranspiration data such as those from the AgriMet weather stations to apply the appropriate levels of water for different climates.*
- 5) *Sprinkler irrigation will be scheduled for the early morning, late evening or at night to avoid irrigating during times of high wind or high temperature. This will reduce losses due to evaporation.*

5.2 MAINTENANCE SCHEDULES

A maintenance schedule should be submitted as part of the required landscape documentation package. Regular maintenance of installed landscapes should include reviewing irrigation systems for water efficiency.

EXAMPLE LANGUAGE

A regular maintenance schedule satisfying the following conditions must be submitted as part of the Irrigation and Landscape Documentation Package:

- 1) *Maintenance must consist of regular watering, pruning, fertilizing, clearing of debris and weeds, the removal and replacement of dead plants, aerating and de-thatching turf areas; replenishing mulch in all landscaped areas and the repair of architectural features.*
- 2) *Pruning and thinning of foliage should not be done during hot months since it can increase plant water requirements (i.e. shading of the ground creates microclimates and reduces Eto rates.)*
- 3) *Landscapes must be maintained to ensure water efficiency, which must include but is not limited to regularly checking, adjusting, repairing and replacing of irrigation equipment. This is particularly important because irrigation scheduling occurs at a time that the system operation is not routinely observed. Schedules should include cleaning of filters and strainers, flushing of drip irrigation lines, adjusting sprinkler patterns to maintain uniformity, and calibrating all sensing and recording equipment. Repair or replacement of irrigation equipment should be done with the originally specified materials or their equivalents in order to meet the original specifications in the approved Irrigation Design Plan.*

- 4) *Monthly irrigation meter reading to check the landscape water use and necessary adjustment of the automatic controller. In addition, the battery and fuse in the controller should be checked and replaced when necessary.*
- 5) *Annual backflow assembly testing (test reports are required by the water purveyor).*
- 6) *Maintenance Assurances: The final approval of any subdivision plat or development plan that includes an approved final Landscaping Design Plan will require covenants or assurances that:*
 - a. *Ensure the continued maintenance of required landscaping, buffering and associated irrigation systems; and*
 - b. *Assign the responsibility of maintenance to the property owner or agent, homeowners' association or other liable entity.*

5.3 GRADING DESIGN PLAN

A grading design plan may be required to review site grading and drainage patterns for opportunities to reduce runoff and ensure consistency with the irrigation and landscape design standards.

EXAMPLE LANGUAGE

A Grading Design Plan, if required, satisfying the following conditions must be submitted as part of the Irrigation and Landscape Documentation Package:

- 1) *A Grading Design Plan must be drawn on project base sheets. It must be separate from, but use the same format as, the Landscape Design Plan and Irrigation Design Plan.*
- 2) *The plan must indicate finished configurations (pre-existing and new contour elevations) of the landscaped area(s), including the height of graded slopes, drainage patterns, pad elevations, and finish grade.*
- 3) *Erosion and sediment control measures and features.*
 - a. *All temporary stormwater barriers and siltation fences shall be maintained in a satisfactory condition by the owner of the property, or his/her agents or contractors, until such time that grading and/or construction is completed.*

5.4 SOIL ANALYSIS

A soil analysis may be required to assist in identifying appropriate plant species that minimize the need for artificial irrigation.

EXAMPLE LANGUAGE

The Irrigation and Landscape Documentation Package must include the following soil analysis data:

- 1) *Determination of soil texture, indicating the percentage of organic matter.*
- 2) *An approximate soil infiltration rate (either measured or derived from soil texture/infiltration rate tables). A range of infiltration rates will be noted where appropriate.*

5.5 RECLAIMED WATER USE

The adopting jurisdiction should consider requiring the use of reclaimed or recycled water for plantings within the public right-of-way (such as medians and planting strips). Other landscapes

such as parks, golf courses, and other facilities, may also be required to use reclaimed wastewater or other non-groundwater water supplies for irrigation. Consider including statements encouraging the use of reclaimed water for private landscapes.