

## ***BEST PRACTICE 8: Rules and Regulations for Landscape Design and Installation and Certification of Landscape Professionals***

- Programmatic and control practice
- Customer side best practice - implemented by water customers with support from water utilities
- Customer participation – action by customers required for successful implementation

### **Overview**

The key concept of this best practice is creating landscapes that are “water smart from the start.” Creating rules for new landscape and irrigation system design and installation is a relatively inexpensive way to affect landscape water use. Proper installation and maintenance are needed to create and maintain water-efficient irrigation. A second powerful tool is minimum training requirements and certification for landscape irrigation professionals. These requirements can function in concert as trained and certified professionals are in the best position to design and install water efficient landscapes and irrigation systems that meet mandated standards.

### ***Why a Best Practice?***

In Colorado, urban landscape irrigation accounts for 50 percent or more of the total annual water demand for a utility.<sup>13</sup> Improving the efficiency of water use on urban landscapes is perhaps the single most important urban water conservation effort than can be made in Colorado.

Colorado’s population is expected to double over the next 40 years. If all new landscapes in Colorado are designed, installed and maintained with water efficiency as a priority there is tremendous potential to reduce future demands below what they might be otherwise.

Ensuring that landscapes are designed and installed with water efficiency in mind and that landscape professionals have the best available training represents a best practice for water providers.

### ***State Planning Requirements***

Colorado statute requires that all covered entities (water providers that deliver more than 2,000 acre-feet per year) file a water conservation plan with the Colorado Water Conservation Board (CWCB). Entities that do not have an approved plan on file are not eligible to receive grant funding from the State. Under this statute, one of the water saving measures and programs that must be considered in a conservation plan is, “Low water use landscapes, drought-resistant vegetation, removal of phreatophytes, and efficient irrigation.” [CRS 37-60-126 (4) (a) (II)].

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<sup>13</sup> AWWA (1999), Aquacraft (2007), Davis et. al. (2009), Grabow et. al. (2009), Mayer et. al. (2009), McReady (2009), County (2008), Dukes et. al. (2008), GreenCO (2008), Guz (2008), Jakubowski et. al. (2008), Haley et. al. (2007), US BOR (2007), NCWCD (2008), Baum (2005), CSU, (2005), PMSI (2005), Bamezai (2004), Barta (2004), CWRRI (2004), MWDOC (2008, and 2004), DeOreo et. al. (1998), CSU (1994).

## ***Applicability***

This best practice is applicable to all utilities, cities, counties, and states seeking to improve the efficiency of outdoor use and increase the technical capabilities of local landscaping professionals.

## **Implementation**

This best practice can be implemented through local ordinances and codes such as a model landscape code, green building programs, local building and plumbing codes, and the specification of training requirements. Proper jurisdiction must be determined for successful implementation and enactment may require approval of city or county government for some code provisions. This is an area where the State of Colorado could enact stricter plumbing codes and set landscape standards.

Mandating certification of landscape professionals is greatly simplified by the WaterSense Certification offered by the US EPA which accredits programs such as the Irrigation Association’s training courses. An entity such as a city, county, or state can specify that all landscapes must be designed and installed by a WaterSense certified professional.

Additional landscape certification programs that may be considered are listed in Table 4-13 along with the sponsoring organization and link to access addition information.

**Table 4-13: Landscape certification programs**

<b>Certification Program</b>	<b>Sponsoring Organization</b>	<b>Web Link</b>
Licensed Landscape Architect	State of Colorado	<a href="http://www.dora.state.co.us/la/LAinstructions.pdf">www.dora.state.co.us/la/LAinstructions.pdf</a>
Professional Land Care Network (PLANET)	Various programs	<a href="http://www.landcarenetwork.org/cms/certification/categories.html">www.landcarenetwork.org/cms/certification/categories.html</a>
- Landscape Industry Certified Technician (formerly CLT)	Professional Land Care Network (PLANET) and Associated Landscape Contractors of Colorado (ALCC)	<a href="http://www.landcarenetwork.org/cms/certification/clte.html">www.landcarenetwork.org/cms/certification/clte.html</a>  <a href="http://www.alcc.com/index.php?option=com_content&amp;view=article&amp;id=154&amp;Itemid=84">www.alcc.com/index.php?option=com_content&amp;view=article&amp;id=154&amp;Itemid=84</a>
- Certified Landscape Professional (CLP)	Professional Land Care Network (PLANET)	<a href="http://www.landcarenetwork.org/cms/certification/clte.html">www.landcarenetwork.org/cms/certification/clte.html</a>
- Certified Turfgrass Professional	Professional Land Care Network (PLANET)	<a href="http://www.landcarenetwork.org/cms/certification/clte.html">www.landcarenetwork.org/cms/certification/clte.html</a>
Colorado Certified Nursery Professional (CCNP)	Colorado Nursery and Greenhouse Association (CNGA)	<a href="http://www.coloradonga.org">www.coloradonga.org</a>
Certified Greenhouse Growers Program (CGG)	Colorado Nursery and Greenhouse Association (CNGA)	<a href="http://www.coloradonga.org">www.coloradonga.org</a>
Certified Arborist	International Society of Arboriculture (ISARMC)	<a href="http://www.isarmc.org/pro/index.htm">www.isarmc.org/pro/index.htm</a>
Board Certified Master Arborist	International Society of Arboriculture (ISARMC)	<a href="http://www.isarmc.org/pro/index.htm">www.isarmc.org/pro/index.htm</a>

<b>Certification Program</b>	<b>Sponsoring Organization</b>	<b>Web Link</b>
Irrigation Association	Various Programs	
- Certified Irrigation Contractor (CIC)	Irrigation Association	<a href="http://www.irrigation.org">www.irrigation.org</a>
- Certified Water Conservation Manager – Landscape (CWCM-L)	Irrigation Association	<a href="http://www.irrigation.org">www.irrigation.org</a>
- Certified Irrigation Designer (CID)	Irrigation Association	<a href="http://www.irrigation.org">www.irrigation.org</a>
- Certified Landscape Irrigation Auditor (CLIA)	Irrigation Association	<a href="http://www.irrigation.org">www.irrigation.org</a>
- Certified Golf Irrigation Auditor	Irrigation Association	<a href="http://www.irrigation.org">www.irrigation.org</a>
- Certified Agricultural Irrigation Specialist (CAIS)	Irrigation Association	<a href="http://www.irrigation.org">www.irrigation.org</a>

Customer outreach is also an important component to implementing this best practice. A utility should communicate with customers about the value of quality landscape service. Customers should know who they are hiring and what their certifications and accreditations mean.

## **Water Savings and Other Benefits**

### ***Range of Likely Water Savings: Moderate to Significant***

A 2002 study of three landscape tracts located in northeastern Colorado Springs compared water use between a traditional landscape and two landscapes developed using the principles of xeriscape. The study found water savings ranging from 22% to 63% over that of a traditional turfgrass landscape after implementing the rules and regulations set forth in the 1998 Colorado Springs Landscape Code and Design Manual. The tract developed prior to implementation of the 1998 manual applied 170% of ET to the landscape. The landscape manual was developed by following the main principles of good xeriscape design, installation, maintenance and “regulations set forth by the city, requiring additional [soil] amendments, inspections, and the submittal of landscape professional’s credentials” (Schneider 2008).

There are many factors that contribute to water use and savings when considering urban landscapes. Many of the factors are behavioral (irrigation scheduling, maintenance, etc.) and education should be a component of a landscape efficiency program.

### ***How to Determine Savings***

Determining savings from new development is difficult since new demand patterns are being established and pre- versus post-analysis is not possible. Savings can be determined by comparing annual water demands on a new property against an older property or properties with comparable area, plantings, and irrigation methods.

There are no established methods for measuring the effectiveness of training and certification for landscape professionals.

### ***Savings Assumptions and Caveats***

Mandatory landscape water efficiency standards are more likely to achieve measurable savings for a community compared with voluntary programs. If programs consist of voluntary certifications (such as LEED), the number of new accounts with conservation measures in place will be significantly lower than if standards are mandated and enforced. Many voluntary green

building programs encompass much more than water conservation, and as such, buildings may qualify as green without having significantly reduced water use.

### ***Goals and Benchmarks***

Water providers seeking to ensure long range irrigation efficiency should establish a goal of having all new landscape and/or irrigation system installations and retrofits meet strict efficiency standards. Water providers should also seek mandate that local landscape professionals be trained and certified. Because of jurisdictional issues, water providers may need to work with local and/or state to enact certain code and training requirement provisions.

### ***Other Benefits***

In addition to water efficiency, well-designed and maintained landscapes also improve storm water management, provide recreation opportunities, offer habitat to local wildlife, and provide aesthetic benefits (GreenCO 2008). Additionally, proper landscape installation can reduce life-time maintenance costs.

## **Costs**

### ***Utility Costs***

Costs for new rules fall less on utilities than on customers. However, passing ordinances costs legal fees, staff time for research and political capital. There are no exact numbers for costs of adopting ordinances, codes and rules.

Enforcement of any new rules can add to costs. However, in the case of rules involving new construction, water utilities are not solely responsible for enforcement. If water conservation standards are incorporated into the local government's building code, enforcement can be part of the building department's permitting process.

Costs associated with requiring certification of landscape professionals are similar to rules for landscape installation. Creating requirements will take staff time, some financial outlay and political will. These costs are small compared to enforcing such rules. Enforcement costs can be significant, however. One way to manage enforcement costs is to have requirements built into the building permit process. For example, the permitting process could require that only certified professionals are allowed to design landscapes. While this approach will capture new building projects, new installation of landscape on existing buildings may not be controllable through the building permitting process. This approach will not be able to control who performs maintenance of landscapes and irrigations systems.

### ***Customer Costs***

Utilities contemplating landscape installation regulations must realize that there are many stakeholders who will see both costs and benefits. There are two distinct types of customers affected by rules for new construction. Builders and residents each face different costs and savings potentials from rules for new construction. The commercial sector sees an additional disconnect in costs for green building in that building owners may bear the costs associated with green building but tenants may reap the rewards in the form of lowered utility bills.

Builders face increased costs from constructing green buildings. A study on the costs associated with LEED certification found that green building practices added 1.5% to 3% to the so-called soft costs (such as design and certification) of building a commercial building. Complete costs, from design through implementation were estimated to be 4% to 11% (Northbridge Environmental Management Consultants, 2003). The EPA calculates additional costs associated with WaterSense New Home Specifications to range from \$700 to \$3,000, with \$300 of that allocated for turf and mulching.

Occupants of green buildings, on the other hand, will likely see savings in the form of reduced utility bills. The EPA estimates that WaterSense homes save \$100 per year in utility costs over standard new homes and \$200 in utility costs over a typical home.

Most of the costs for professional certification requirements will be borne by customers and contractors and not by the utility. Professionals and companies employing irrigation professionals will be faced with costs of certification. Irrigation Association certification costs range from \$250 to \$500 for examination fees; annual renewal fees cost between \$50 and \$150. Certified professionals will likely charge a higher rate for their services, meaning these costs may be passed on to customers. Requiring certification will tend to level the playing field for irrigation professionals who currently have to compete with businesses with fewer qualifications and less training.

## **Resources and Examples**

### ***Resources***

Additional information on WaterSense – including information for utilities – can be found online at the EPA website: [www.epa.gov/watersense/partners/promotional.html](http://www.epa.gov/watersense/partners/promotional.html)

Information on LEED can be found at the US Green Building Council's website: [www.usgbc.org/](http://www.usgbc.org/)

Utilities must identify and make available a local source of ET data. There are several sources for ET data for Colorado. Colorado ET provides links to different three ET networks around the state. [www.coloradoet.org/etnetworks.html](http://www.coloradoet.org/etnetworks.html). Denver Water maintains nine weather stations in the metro area.

Northern Colorado Water Conservancy District (NCWCD) has 24 weather stations located in the northeastern part of the state, six of which are located east of Greeley. Some stations are located on turfgrass and others are in agricultural settings. The website provides daily weather summaries at each station dating as far back as 1996 for some stations. More information can be found at [www.ncwcd.org/weather/weather.asp](http://www.ncwcd.org/weather/weather.asp).

Colorado Agricultural Meteorological Network (CoAgMet) is a network of over seventy-two weather stations located around the state primarily in rural agricultural settings. Originally developed by plant pathology specialists at Colorado State University and the USDA's Agricultural Research Service Water Management Unit, as a means of collecting local weather data in irrigated agricultural areas, the site now provides ET data for many areas of Colorado.

Climate data is now being collected by the Colorado Climate Center at CSU and can be found at [www.coagmet.com/](http://www.coagmet.com/)

## **Examples**

### **Model Codes – DOLA Steamboat Springs and Routt County**

Colorado’s Department of Local Affairs has various model building codes, including a green building program that includes rules for new landscapes. The City of Steamboat Springs, Routt County and DOLA collaborated to develop a green building program. DOLA offers the program as a working model for other communities. The program was developed to provide guidance for green building and to raise the bar on green standards. The program applies to single family, duplex and row town home construction. A green building checklist is required when applying for a building permit. The building plans will then be reviewed against the checklist. If the minimum point threshold is met, the building permit will proceed through the usual sign off process.

The checklist is organized to follow the construction process. It comprises 17 categories and a total of 321 possible points. The categories include energy, recycling and reuse, electrical, landscaping and plumbing. The landscape requirements section has a score of 27 possible points. The mandatory measures affecting water use include:

- Turfgrass must have water use requirement less than Buffalo Grass, Tall Fescue or Blue Grama.
- Installed irrigation systems must use low-flow drip or bubblers and low-flow sprinklers.

Table 4-14 shows a list of water conservation rules for landscape in the DOLA plan.

**Table 4-14: Water conservation rules for landscape found in DOLA Model Green Building Program**

<b>Measure</b>	<b>Means of Conservation</b>
Construct water efficient landscapes	Native species account for 75% of plants, and these must be drought-tolerant species.
Group plants by water needs (hydrozoning)	Hydrozoning matches water needs of plants located together.
Turf type	Water requirement will be less than or equal to Tall Fescue, Buffalo Grass, or Blue Grama.
No turf on hard to irrigate areas	Turf shall not be installed on areas with slope greater than 10% or on turf strips less than eight feet wide because these types of areas are hard to irrigate efficiently.
Limited turf area	Turf must be less than 33% of landscape area (for 2 points) or less than 10% of landscape area (for 3 points).
Irrigation system uses low-flow technology	System uses only low-flow drip, bubblers, or low-flow sprinklers.
Irrigation system includes rain sensor	The system includes a rain shut-off device.
Irrigation system includes a weather-based irrigation controller	The irrigation system is controlled by a weather-based irrigation controller with the idea that such controllers reduce over-watering.

The Colorado Department of Local Affairs (DOLA) has links to other green building programs in the state. Links and details on the Steamboat Springs and Routt County program can be found at: [www.dola.colorado.gov/osg/modelcodes.htm#GreenBuildingProgram](http://www.dola.colorado.gov/osg/modelcodes.htm#GreenBuildingProgram)

### ***Castle Rock – required training for landscape professionals***

The Town of Castle Rock requires anyone designing, installing or maintaining properties within the Town to attend the Town's Landscape Registration Program and GreenCO's Best Management Practices Training and Exam. The Landscape Rules and Regulations training covers their ordinance information and also affidavits to confirm understanding of the regulations. If professionals do not attend, they cannot perform work in the Town of Castle Rock.

### ***Sterling Ranch – conservation from the developer's point of view***

Conservation is not the sole purview of water utilities – nor should it be. Developers have a major role to play in water conservation. One example of a proposed development design with strong water planning goals is Sterling Ranch. Sterling Ranch intends to be a 3,100 acre, multi-use development located in Douglas County. Building in the development is slated for 2011, but already the conservation plan is in place. The developer, Sterling Ranch LLC, states that they are, “ a firm believer that new development must be planned to meet human needs while protecting natural resources so that these needs can be met into the indefinite future,” (Headwaters Corp. 2009). Water planning includes several aspects, such as a water supply plan (recycled water is a major part of the water supply plan), water treatment, water demand planning and conservation.

A major conservation component enacted by Sterling Ranch is a proposal to limit landscapes to an average of 1,500 square-feet per single family detached home. This will be done through landscape water budgets. Sterling Ranch plans to have builders submit front and back yard landscape designs for approval. Sterling Ranch plans to follow up with 100% inspection of all sites. Efficient sprinklers or sub-surface drip will be standard. Narrow swaths of landscaping will be watered with subsurface or drip, in an effort to limit overspray (Headwaters Corp. 2009).

### ***City of Westminster Landscape Regulations***

Westminster City Council adopted landscape regulations with provisions for design, installation and maintenance criteria which took effect in September 2004. The landscape regulations are intended to enhance property values and the living environment while improving air and water quality and reducing heat, dust, and noise. The efficient use of water resources is an important component of the landscape regulations as well and addresses water conservation through water wise landscaping, xeriscape and irrigation design. The regulations pertain to all landscaped areas and include:

- New development
- Redevelopment (with exceptions)
- Existing development requesting modification from previously approved plans
- Non-single family detached dwellings with no Official Development Plan or waiver
- Existing single family detached dwellings with no Official Development Plan or waiver

New landscape designs or modification of existing landscapes are subject to approval and must incorporate certain irrigation and landscape design elements. They include:

- The seven principles of xeriscape
- Identification of low, moderate, and high hydrozones on landscape and irrigation plans<sup>14</sup>
- Water budget not to exceed 24 inches (15 gallons) per square foot/year
- Transitioning of hydrozones
- Installation of automatic irrigation systems
- Soil preparation to include rototilling and incorporation of soil amendment. Soil analysis recommended
- Mulching in all non-turf areas; organic mulch required in moderate and high hydrozones
- Plant selection and location must be appropriate for the hydrozone

Section XII of the Westminster Landscape Regulations 2004 provides considerable detail of the design and construction of the irrigation plan and installation requirements. Although not part of the Official Development Plan, the irrigation plan must be submitted for review and approval at the same time. This section reiterates many of the basic irrigation design, installation, and operating recommendations and requirements necessary for efficient operation of an irrigation system as set forth by the Irrigation Association (IA 2002).

### ***An Evaluation of Landscape Regulations in a Planned Community in Colorado Springs***

The impact of rules and regulations, designed to conserve water in the landscape, was examined in a planned community in Colorado Springs in 2002. Evaluation of water use was performed on three separate tracts of land located within a master planned community consisting of large areas of open space, including two housing communities and a business campus. Development of the community took place over a period of twenty-five years and as a result the community has created a mix of landscapes “that are representative of different regulation and design eras” (Schneider, 2008) in the three tracts of land.

Because of the similarity of characteristics of the three sites (proximity, climate, part of the same master plan), the study sites provided a much better than normal opportunity to examine the impact of various codes, regulations, and the enforcement of each on water consumption. Each tract was developed using one of three sets of codes:

1. City landscape codes, policies, and guidelines developed and enforced prior to 1998
2. City landscape codes, policies, and guidelines developed and enforced after 1998
3. Regulations required by the master plan combined with city landscape and policy guidelines developed after 1998 but without enforcement

A scoring system of water savings measures<sup>15</sup> was developed for the study as a way to determine the effectiveness of various conservation measures. The site that was developed prior to 1998

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<sup>14</sup> Low hydrozones require no more than 3 gallons/SF/yr; moderate hydrozones require 10 gallons/SF/yr; high hydrozones require 18 gallons/SF/yr.

had implemented only six water savings measures at the time of the study whereas the second and third sites implemented thirty and thirty-six measures respectively during the same period. Water use varied considerably at each of the three sites; the site that was developed prior to the 1998 rules and regulations had water use that was 70% greater than that of ET for the same time period. The second site and third sites were developed using the same principles of a water efficient landscape design but showed significant variability in savings. The second site showed a savings of 63% over that of a traditional turfgrass landscape. Irrigation management decisions resulted in water use that exceeded ET by 11%; the result of manually irrigating areas that were not designed to be irrigated. Manual irrigation was applied to plants that were perceived not to be thriving as a result of improper soil preparation. When the data were normalized to control for the manual irrigation, the site showed water savings of 22% over that of a traditional landscape (Schneider, 2008).

### ***WaterSense Certification for Landscape Professionals***

In addition to the new home specifications, WaterSense also includes certification for landscape professionals. This program is analogous to the WaterSense label for products in that it provides a standard for evaluating certification programs. As part of the New Home specification, landscapes must be evaluated by a WaterSense irrigation partner. While this requirement can be waived if there are too few WaterSense irrigation partners, it presents a model of possible certification requirement. The labeling program targets three categories of landscape professionals:

- Irrigation system designers,
- Irrigation system contractor<sup>16</sup>
- Irrigation auditors.

Each of these professional types has similar requirements for labeling.

- Programs must have an independent oversight committee.
- Certification must require experience. In the case of auditors, the certification program must require at least one irrigation audit be performed before being certified. For irrigation system designers, certification must require at least three years of experience in the field of landscape design.
- Installation and maintenance professionals must have at least one year of experience before they can be certified.
- In order to be awarded a WaterSense label, a certification program also must have an examination component.
- Exams must be independently administered and graded.
- In order to be awarded the WaterSense label, the certification must require certification renewal including continuing education. (EPA WaterSense Program 2006, Specification for WaterSense Labeling of Certification Programs for Irrigation System Installation and Maintenance Professionals, Specification for WaterSense Labeling of Certification

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<sup>15</sup> The scoring system gives points for implementing the principles of xeriscape, good design, efficient irrigation, and regular maintenance of the landscape and irrigation.

<sup>16</sup> Irrigation contractors are responsible for the installation, maintenance, and repair of the irrigation system.

Programs for Irrigation System Designers and Specification for WaterSense Labeling of Certification Programs for Irrigation System Auditors).

Specific exam topics are shown in Table 4-15.

### ***Irrigation Association***

The Irrigation Association (IA) provides several training and certification programs for landscape professionals. Association members include landscape equipment manufacturers, landscape installation and maintenance professionals, retailers and distributors. The organization's mission is to promote efficient irrigation. The certification process, including training and the composition of exams, is overseen by IA's Certification Board. Several of the IA certifications have been approved to the EPA WaterSense label. Six areas of certification are offered by the IA. These are shown in Table 4-15. Details can be found at <http://irrigation.org/certification/default.aspx?pg=programs.htm&id=93>.

**Table 4-15: WaterSense experience and exam requirements for certification programs (EPA WaterSense 2006)**

	<b>Irrigation Installation and Maintenance Professionals</b>	<b>Irrigation System Designers</b>	<b>Irrigation Auditor</b>
Experience required	A minimum of one year of experience installing and maintaining irrigation systems	At least three years of design experience	At least one audit performed prior to certification
Exam Topics Required	<ul style="list-style-type: none"> <li>• Knowledge of system components, system design layout and equipment specifications particularly as they pertain to distribution uniformity and system efficiency</li> <li>• System maintenance</li> <li>• Soil/water/plant relationships</li> <li>• Precipitation rates and irrigation scheduling</li> <li>• Impact of site conditions on equipment choice</li> <li>• System hydraulics</li> <li>• System pumps</li> <li>• System pressure</li> <li>• Equipment commissioning</li> <li>• Blueprint reading and interpretation</li> <li>• Awareness of other aspects of good practice, such as OSHA</li> <li>• Electrical and plumbing codes</li> <li>• Knowledge of when local and state regulations supersede federal regulations.</li> <li>• Recent innovations and technology developments</li> </ul>	<ul style="list-style-type: none"> <li>• Design, operation, and scheduling for water efficiency</li> <li>• Preparation of site design reflecting site requirements</li> <li>• Soil/water/plant relationships</li> <li>• Slope and runoff</li> <li>• Equipment selection and specification</li> <li>• System hydraulics</li> <li>• System pumps</li> <li>• System pressure</li> <li>• Maintenance</li> <li>• Evaluation of available water sources</li> <li>• Water management (budgeting and consumption)</li> <li>• Awareness of other aspects of good practice, such as OSHA</li> <li>• Electrical and plumbing codes</li> <li>• Knowledge of when local and state regulations supersede federal regulations.</li> <li>• Recent innovations and technology developments</li> </ul>	<ul style="list-style-type: none"> <li>• Distribution uniformity</li> <li>• Precipitation rates and irrigation scheduling</li> <li>• Water pressure and impact on sprinkler performance</li> <li>• Auditing process</li> <li>• Soil/water/plant relationships</li> <li>• Recognition of system problems and maintenance requirements</li> <li>• Awareness of other aspects of good practice, such as OSHA and</li> <li>• Electrical and plumbing codes</li> <li>• Knowledge of when local and state regulations supersede federal regulations</li> <li>• Recent innovations and technology developments</li> </ul>

**Table 4-16: Certification types offered by the Irrigation Association (Irrigation Association 2010)**

Certification Type	Overview	Requirements
CIC, Certified Irrigation Contractor	<ul style="list-style-type: none"> <li>• Execute irrigation projects to meet all specifications and requirements.</li> <li>• Prepare installation sites, including layout, staking, excavation, boring, trenching, grading and back-filling.</li> <li>• Cut and join pipe, know the limitations of different piping systems and understand basic hydraulics.</li> <li>• Layout and install piping and water delivery components; backflow prevention components; mechanical, hydraulic and electrical irrigation controls; and other irrigation system components.</li> <li>• Troubleshoot and repair irrigation components and systems.</li> <li>• Understand good business practices; construction contracts and their legal rights and obligations; and licensing laws and codes in their state.</li> </ul>	<ul style="list-style-type: none"> <li>• Demonstrate a minimum of three years of irrigation-related experience and education.</li> <li>• Pass a written exam on general irrigation and specialty topics.</li> <li>• Agree to follow the Code of Ethics established by the IA Certification Board.</li> <li>• Remain in good standing by submitting 10 continuing education units and a nominal renewal fee each year.</li> </ul>
CID, Certified Irrigation Designer	<ul style="list-style-type: none"> <li>• Evaluate site conditions and determine water availability and use requirements.</li> <li>• Select the most effective irrigation equipment, methods and materials for the application.</li> <li>• Develop efficient and cost-effective irrigation designs that meet the plant or crop’s watering requirements.</li> <li>• Prepare comprehensive plans and specifications that include construction details, equipment or materials, as well as appropriate irrigation schedules.</li> <li>• Ensure the installation matches the design intent.</li> <li>• Provide direction to the end user on system use, scheduling and maintenance.</li> </ul>	<ul style="list-style-type: none"> <li>• Evaluate site conditions and determine water availability and use requirements.</li> <li>• Select the most effective irrigation equipment, methods and materials for the application.</li> <li>• Develop efficient and cost-effective irrigation designs that meet the plant or crop’s watering requirements.</li> <li>• Prepare comprehensive plans and specifications that include construction details, equipment or materials, as well as appropriate irrigation schedules.</li> <li>• Ensure the installation matches the design intent.</li> <li>• Provide direction to the end user on system use, scheduling and maintenance.</li> </ul>

Certification Type	Overview	Requirements
CLWM, Certified Landscape Water Manager	<ul style="list-style-type: none"> <li>• Evaluate site conditions and determine water availability and use requirements.</li> <li>• Have working knowledge of general irrigation theory, including hydraulics, soil-plant-water relationships, water requirements and electricity principles.</li> <li>• Understand irrigation equipment selection, use, restrictions and installation methods.</li> <li>• Identify and implement system upgrades and modifications, and manage the control system to provide the most efficient irrigation possible.</li> <li>• Provide direction to the end user on system use, scheduling, maintenance and water conservation.</li> </ul>	<ul style="list-style-type: none"> <li>• Demonstrate a minimum of three years of irrigation-related experience.</li> <li>• Be an IA certified landscape or golf irrigation auditor in good standing.</li> <li>• Pass a written exam on irrigation water management topics, including scheduling, efficiency, and uniformity and soil-plant-water relationships.</li> <li>• Agree to follow the Code of Ethics established by the IA Certification Board.</li> <li>• Remain in good standing by submitting 10 continuing education units and a nominal renewal fee each year.</li> </ul>
CGIA, Certified Golf Irrigation Auditor	<ul style="list-style-type: none"> <li>• Develop system testing strategies.</li> <li>• Identify plant materials by general groups and determine irrigation water requirements.</li> <li>• Take soil samples and determine soil types and root zone depths.</li> <li>• Observe system operations, locate irrigation zones, prepare site audit maps and visually identify broken or misaligned equipment.</li> <li>• Check pressure and flow rates, conduct water application distribution tests and collect data to determine irrigation uniformity and efficiency.</li> <li>• Estimate potential dollar and water savings.</li> </ul>	<ul style="list-style-type: none"> <li>• Demonstrate a minimum of one year of irrigation-related work experience.</li> <li>• Pass a written exam on the principles and practices of auditing.</li> <li>• Submit an independently completed audit on a green and fairway for evaluation.</li> <li>• Agree to follow the Code of Ethics established by the IA Certification Board.</li> <li>• Remain in good standing by submitting 10 continuing education units and a nominal renewal fee each year.</li> </ul>

Certification Type	Overview	Requirements
CLIA, Certified Landscape Irrigation Auditor	<ul style="list-style-type: none"> <li>• Develop system testing strategies.</li> <li>• Identify plant materials by general groups and determine irrigation water requirements.</li> <li>• Take soil samples and determine soil types and root zone depths.</li> <li>• Observe system operations, locate irrigation zones, prepare site audit maps and visually identify broken or misaligned equipment.</li> <li>• Check pressure and flow rates, conduct water application distribution tests and collect data to determine irrigation uniformity and efficiency.</li> <li>• Estimate potential dollar and water savings.</li> </ul>	<ul style="list-style-type: none"> <li>• Demonstrate a minimum of one year of irrigation-related work experience.</li> <li>• Pass a written exam on the principles and practices of auditing.</li> <li>• Submit an independently completed audit on one rotor and one spray area for evaluation.</li> <li>• Agree to follow the Code of Ethics established by the IA Certification Board.</li> <li>• Remain in good standing by submitting 10 continuing education units and a nominal renewal fee each year.</li> </ul>
CAIS, Certified Agricultural Irrigation Specialist	<ul style="list-style-type: none"> <li>• Understand surface irrigation methods and pressurized systems, including micro-irrigation and sprinklers.</li> <li>• Evaluate crops and determine water availability and use requirements.</li> <li>• Understand soil-plant-water relationships and how salinity affects irrigation.</li> <li>• Select the most effective irrigation methods and equipment for the application.</li> <li>• Develop efficient and cost-effective irrigation schedules that meet the crop's water requirement.</li> </ul>	<ul style="list-style-type: none"> <li>• Pass a written exam on the principles and practices of on-farm irrigation management.</li> <li>• Agree to follow the Code of Ethics established by the IA Certification Board.</li> <li>• Remain in good standing by submitting 10 continuing education units and a nominal renewal fee each year.</li> </ul>

### ***Colorado House Bill 10-1358***

Colorado House Bill 10-1358, passed in May 2010 and taking effect in 2011, presents buyers of new homes with the chance to select water efficient appliances and fixtures up front. By integrating high-efficiency toilets, water efficient clothes washers, low flow faucets and showerheads, and water-smart landscapes into new homes at the outset, we can avoid sending precious water and money down the drain. This bill allows new home buyers to choose from several options, including:

- Low use water fixtures like toilets, faucets, and showerheads
- High efficiency washing machines that save both energy and water.
- Financed water wise landscape upgrades implemented by the builder and designed utilizing GreenCO's best management practices (GreenCO 2008) including proper landscape design, installation, irrigation technology, water budgeting and all 7-principles of Xeriscape.

More information about this new Colorado program can be found here:

[www.leg.state.co.us/clics/clics2010a/csl.nsf/fsbillcont/7F972C539E9610D6872576BE0079EE23?Open&file=1358\\_rer.pdf](http://www.leg.state.co.us/clics/clics2010a/csl.nsf/fsbillcont/7F972C539E9610D6872576BE0079EE23?Open&file=1358_rer.pdf)

### ***California Model Water Efficient Landscape Ordinance***

California's Model Water Efficient Landscape Ordinance presents a sophisticated approach to defining new landscape requirements. California law requires municipalities to adopt ordinances governing landscape conservation and this model ordinance is the approved template. There are supporting documents online, including a table of text that will need to be changed for adoption of the ordinance by other agencies. This table can be found at the California Department of Water Resources website: [www.water.ca.gov/wateruseefficiency/landscapeordinance/](http://www.water.ca.gov/wateruseefficiency/landscapeordinance/).

Two methods of calculating a water budget for the landscape were compared for the California Model. One landscape budget was calculated using the maximum applied water allowance and was based on the amount of area landscaped, local climate (using ET) and an ET adjustment.<sup>17</sup> This budget functions as the design standard. The second method of calculating the landscape water budget – the estimated total water use – is calculated based on the water needs of the plants chosen as part of the landscape design and the total area irrigated. The estimated water use may not exceed the maximum water allowance. Because the California ordinance bases water need on local ET, it can be readily translated to Colorado's various local climates.

### ***EPA WaterSense***

WaterSense is a label and certification program developed by the United States Environmental Protection Agency. This label has been applied to a number of products, but WaterSense has also released a standard of efficiency for new homes. The development process included stakeholders with different perspectives. Water utilities, product manufacturers, retailers and consumers were all involved in creating the WaterSense standards. Products are independently tested to earn the WaterSense label.

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<sup>17</sup>The ET adjustment in California is 0.7 in the case of new landscape.

The EPA WaterSense specification for new homes extends beyond labeling fixtures and extends to household-wide uses of water. This standard requires WaterSense fixtures and Energy Star appliances, which are covered in Best Practice 8 but also includes landscape design and installation specifications. These specifications recommend conservation-oriented landscape design, slope management, mulching, and pool covers. Irrigation systems are not required. However, if they are installed, the systems are subject to efficiency standards.

There are two approaches for landscape design in the WaterSense requirements. The simplest approach is to limit turfgrass to 40% of the landscaped area. Alternatively, landscapes may be designed using a water budget (see Best Practice 10). The budget tool is a Microsoft Excel-based calculator that can be found at: [www.epa.gov/watersense/nhspeccs/water\\_budget\\_tool.html](http://www.epa.gov/watersense/nhspeccs/water_budget_tool.html). For each hydrozone, the landscape designer enters square footage and then selects plant type and irrigation type. Zip code-based ET and rainfall data are needed and are available from the EPA website (with a hyperlink in the relevant place on the tool spreadsheet). These data comes from the International Water Management Institute and based on historic data gathered from 1961 to 1990. The calculator then determines how much water the given design will use. If it is more than the allowance calculated from the ET and rainfall, the calculator indicates that the design should change. However there is no guarantee that limiting turf will absolutely result in a certain percentage of water reduction, since people can and do over water turf, no matter how much they have in their yards.

WaterSense goes beyond landscape design and has additional standards for outdoor water use:

- Pools must be covered when not in use; water features must use re-circulated water.
- Once installed, the landscape must be evaluated by a WaterSense irrigation partner (unless there are an insufficient availability of irrigation partners).
- The system shall not have leaks, runoff or overspray.
- The lower quarter distribution uniformity shall be 65% or higher. The lower quarter distribution uniformity is, “the average water applied in the 25% of the area receiving the least amount of water divided by the average water applied,” to the total area (The Irrigation Association 2007). It measures the potential for dry patches and over-watered areas. See Best Practice 10 - landscape evaluations.
- The system shall be equipped with a rain sensor.
- Sprinklers shall not be used to water landscape other than turfgrass.
- Micro-irrigation systems shall be equipped with pressure regulators, filters and flush end assemblies.
- Schedules developed in the audit phase shall be posted at the controller.

In addition, there are several measures targeting storm water management: slopes must be vegetated and exposed soil must be covered with mulch.

In order to meet the standard, homes must be inspected by an independent contractor. It is estimated that WaterSense homes will be 20% more efficient than typical new homes. Over the course of a year, these homes are expected to save 10,000 gallons of water. (EPA WaterSense Program 2009 WaterSense Single-Family New Home Specification Supporting Statement).

Utilities looking for water savings in the residential sector can use EPA WaterSense to specify community standards for landscapes. Sixteen utilities in Colorado are WaterSense Promoting Partners. Partners are given a tool kit specific to their needs. For utilities, the kit includes materials promoting conservation.

Additional information on WaterSense – including information for utilities – can be found online at the EPA website: [www.epa.gov/watersense/partners/promotional.html](http://www.epa.gov/watersense/partners/promotional.html)

### ***LEED***

LEED (Leadership in Energy and Environmental Design) is a scoring program for green building. LEED was created by the US Green Building Council, made up of public and private entities focused on promoting environmental building practices. LEED standards cover a broad range of building types and a few specific CII types such as schools and hospitals. LEED is applicable to both new and existing buildings. LEED certification is voluntary.

The LEED program is based on scoring different conservation measures across a broad range of environmental issues, of which water is only one part. Water efficiency accounts for 11 out of 110 possible points in the scoring system. Certification for LEED is based on four possible scoring levels: certified (40 to 49 points), silver (50 to 59 points), gold (60 to 79 points), and platinum (80 points or higher).

The areas of focus for LEED are:

- Energy and atmosphere
- Sustainable sites
- Materials and resources
- Indoor environmental quality
- Location and linkages (e.g. located near transit options)
- Education and awareness
- Water efficiency
- Innovation and design
- Regional priority

LEED’s philosophy on water conservation is, “While saving water may be one boon of the survey, secondary benefits may not be as apparent.... Finding and stopping leaks may also prevent structural or landscape damage.”

Water conservation measures for LEED 2009 (version 3) are:

- 20% reduction in water use<sup>18</sup>
- Innovative waste water technologies
- Water efficient landscaping

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<sup>18</sup> This is the only required water conservation measure. Additional conservation break points are at 30%, 35%, and 40%.

- Water use reduction beyond 20%.

The Alliance for Water Efficiency has recommendations for water utility personnel who are trying to ensure that their green programs include water conservation:

- Be familiar with green building programs in your service area. This includes voluntary and mandated programs.
- Seek out other programs and governments working on sustainability issues. Guide and advise them about water conservation.
- Know about national standards that may be adopted or in place in your area. Make friends in the local government offices charged with building codes and land use.
- Be alert to “green washing,” the tendency to adopt and promote practices that appear to be sustainable but have little or negative impacts on conservation. Be aware that many green building programs focus on energy conservation far more than water conservation.

(Alliance for Water Efficiency 2010)

### ***Built Green Colorado***

Built Green Colorado is one of oldest and largest green home building programs in the nation. It was started by the Home Builders Association of Metro Denver for the purpose of encouraging home builders to use technologies, products, and practices that result in homes that are better built and better for the environment.

Similar to LEED certified homes, Built Green homes must achieve a minimum amount of points awarded for incorporating certain technologies across topic areas. A detailed checklist provides the home builder with the required specifications and associated point values. The Built Green standards have also been adopted to certify homes by Build Green Utah. A selection of the Built Green Water Conservation requirements is provided below.

- Efficient hot water delivery system is designed so that water heater is within 20 pipe feet of all hot water fixtures.
- Clothes washer has ENERGY STAR label.
- Toilets are dual-flush gravity, or pressure/vacuum assist averaging 1.1 gallon per flush
- Landscape is designed based on a water budget with a maximum of 15 gallons per square foot per year.
- Efficient irrigation system incorporates hydrozones where shrubs and trees are irrigated with drip or subsurface irrigation.
- A list of drought-tolerant plants is provided to home buyers.

(Source: WRA 2009)