



CMG GardenNotes #411

## Water Wise Landscape Design: Steps

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### Seven Principles of Water-Wise Landscaping

- **Planning and designing for water conservation, beauty, and utility.** Water savings does not happen by accident or by just placing a few xeric plants around the landscape. – The take home message is that it requires planning.
- **Hydrozoning** – Selecting plants appropriate to our climate, grouping them according to water need, and then actually irrigating according to water need. – The take home message is actually watering the plants according to their need rather than watering the entire yard the same.
- **Watering efficiently with appropriate irrigation methods.** – Of all the principles, watering efficiently has a greatest water savings potential for the typical landscape. The average homeowner uses twice the amount of water the lawn and gardens actually need. Efficient irrigation includes attention to design, maintenance, and management.
- **Creating practical turf and non-turf areas.** – Water wise landscaping is not anti turf, but rather matching the turf type to the actual use of the site. This is a change from the typical landscape design where a high input lawn is the common ground covering.
- **Improving the soil.** – With improved soils, plants reach a larger supply of water.

- **Mulching to reduce evaporation.** – Mulch with drip irrigation can reduce water use by 50%.
- **Maintaining with good horticultural practices.** – Healthy plants are more tolerant of summer heat and wind.

## What Is “Landscape Design”?

Landscape design is a **process**, rather than just plunking down plants. For existing landscapes, let the process guide the evolution of the design to become more water wise.

Landscape design **creates practical and pleasing outdoor living space.**  
Landscape design develops a series of outdoor rooms.

Landscape design **brings the family's wants, needs, and values into the design.** These will vary from family to family and will evolve with time for any family.

Landscape design is about **how the space will be used.** It is about the connections and "feelings" created with the space. Is the space for relaxation and healing, or for action? For many, gardening is a vehicle for spiritual and emotional connection and renewal.

- *More than anything else, a garden is a portal, a passage into another world, one of your own thoughts and your own making; it is whatever you want it to be and you are what you want to be.* – William Longgood
- *Paradise* is from the Persian word for “walled garden”.

Landscape design is about the family’s investment in **time** and **dollars**.

Design is more of an art. Gardening is more of a craft. The two are not the same. Being a good gardener does not make the individual a good designer. Being knowledgeable about gardening does not necessarily give knowledge about design. Most knowledgeable gardeners are rather unfamiliar with landscape design concepts.

## Steps to Creating Practical and Pleasing Outdoor Living Space

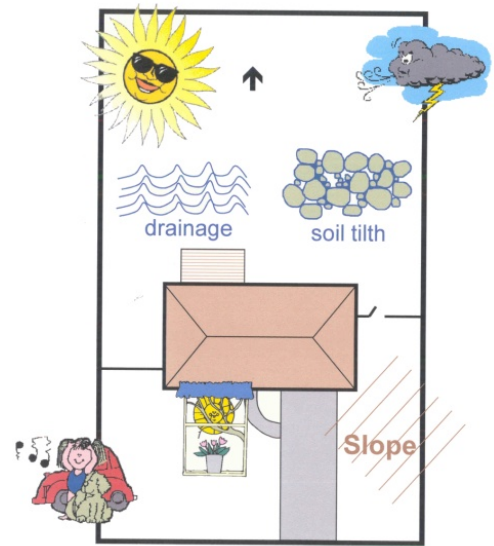
1. *Site analysis* identifies opportunities and limitations of the property.
2. *Family analysis* creates a story line, bringing unity into the landscape.
3. With *bold lines*, delineate softscape and hardscape areas, creating outdoor rooms.
  - a. Define macro-use of space with *hydrozone bubble drawings*.
    - Bubble drawings define *hydrozones* for efficient landscape irrigation.
    - Create practical turf and nonturf areas.
  - b. Refine macro space (lawn areas, flowerbeds, vegetable garden, patio, etc) with *bold lines*, in *rectilinear*, *curvilinear*, or *angular* design style.
  - c. Refine preliminary design for efficient irrigation.

- d. Delineate micro-spaces with connecting paths, plants, and hardscape features.
4. Develop plant consideration lists based on hydrozones.
5. Fit elements into the design based on the design principles of *color, texture, form, line, unity, scale, balance, simplicity, variety, emphasis* and *sequence*.

## Step 1 – Site Analysis Identifies Opportunities and Limitations of the Property.

Landscape maintenance professionals estimate that 90% of the landscape maintenance problems arise from issues that could/should have been addressed with the site analysis. For most, site analysis is an ongoing process. Keep a garden journal, recording concerns and success for future reference. [Figure 1]

Figure 1. Site analysis looks at opportunities and limitations of the property including sun/shade patterns, wind and air drainage, soil tilth, soil drainage, slopes, views, and factors outside the property line that influence use and design of the property.



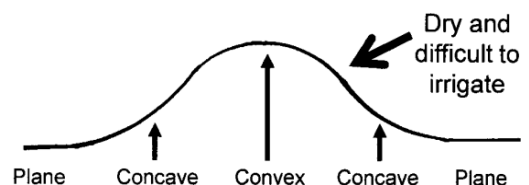
**Soil Tilth** – most landscape plant problems are soil related!

- Soil structure and compaction
- Sandy, clayey, or rocky
- Soil depth and profile
- Organic content
- pH and free lime
- Nutrients
- Salts

**Grading and Drainage**

- Slopes and land use
- Erosion potential
- Grading structures
- Drainage off the property
- Drainage onto the property
- Low spots and standing water
- Drainage down through the soil profile

Figure 2. Although berms are popular with designers, they may be high maintenance with dry slopes



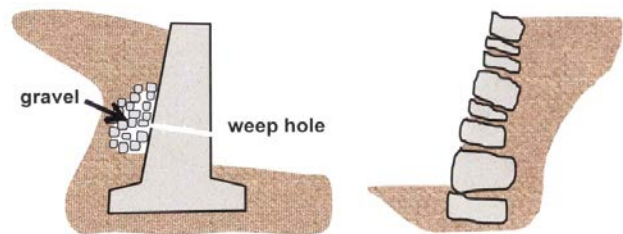
## Acceptable Slope

- Patio-terrace 1 to 2%
- Entrance walks 1 to 4%
- Ramps (with railing) up to 15%
- Steps (with railing) up to 50%
- Driveways 1 to 15%
- Drainage swales 2 to 10%
- Planted banks up to 33% - Year-round plant cover to prevent erosion.
- Slopes greater than 10% are hard to walk on and require year-round plant cover to prevent erosion.

## Grading Structures

- For stability, retaining walls and dry walls have specific design criteria. Contact the local city building department for details on local code requirements.
- For scale, the minimum depth of the level area below the wall should be at least one and one-half times the wall height.

Figure 3. Retaining structures have specific design criteria. Refer to local city building codes for details. Left: retaining wall with weep hole. Right: dry wall.



## Microclimate

- Orientation (north and south) and shade patterns
- Prevailing winds and air drainage
- Temperature extremes (heat sinks, cold pockets)

## Existing Plant Materials

- What plants are currently in the landscape?
- What is their condition?
- Which will be kept?

## Extensional Landscape

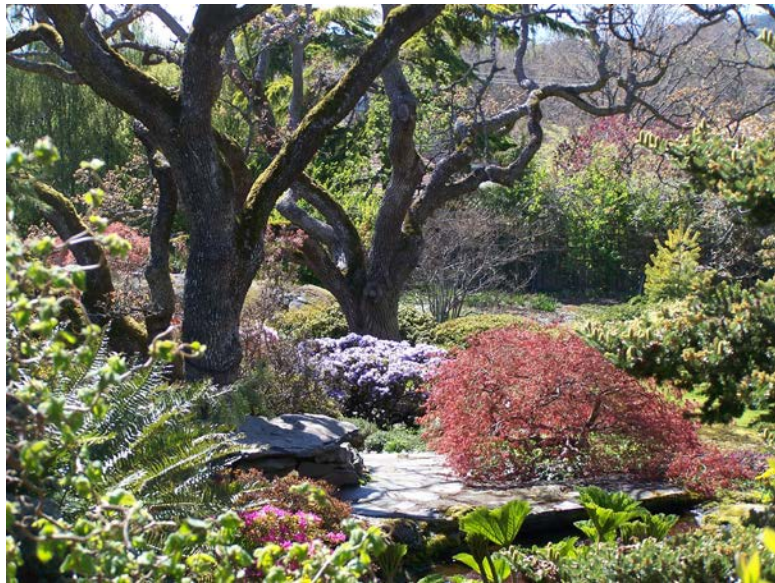
- Subdivision covenants
- Views to frame or mask
- Noise
- Neighborhood landscape style
- Privacy and security

## Natural Precipitation and Irrigation Potential

- In Colorado, natural precipitation varies greatly, from below seven inches per year to above 35 inches per year. What is the natural precipitation at your site?
- Colorado communities vary greatly in water resources. Due to the planning of forefathers, some have good water resources and others are lacking for landscape irrigation. What is the situation in your community?

## Opportunity or Restraint?

- Use the site analysis as an opportunity to create a unique landscape working with the limitations of the site. [Figures 4 to 6]





Figures 4 to 6. In site analysis, look at how the gardener can work with the limitations of the property to create a practical and pleasing landscape. Here at Abkhazi Garden in Victoria, BC, much of the property is covered in rock outcroppings. Working with the rock, Prince and Princess Abkhazi created an amazing garden of love and peace.

## Step 2. *Family Analysis* Creates a Story Line, Bringing Unity to the Landscape.

What does the family **want and need** from the landscape? How will the family relate to the landscape? Will the space be regularly used by the family or is it simply filler space around the home?

What does the family want the landscape to **communicate**? What does the family want to “feel” from the landscape? Is it a setting of peace and relaxation, or a setting for action activities? What does the family want the landscape to communicate to others?

- *The Latin word for “sacred” gives us the word “sanctuary” denoting not only a sacred space but also a place of refuge and protection. – Peg Streep*
- *Creating Sacred Space – We transform our gardens and yards into sacred space when we understand them as places of growth, not only for plants and trees but also for our inner selves. – Peg Streep*

**Irrigation:** What are the family’s interests and values towards irrigated and non-irrigated landscape areas? How does this match with reality of the natural precipitation and irrigation potential?

**Time:** What are the family’s interests and values towards gardening activities?

**Dollars:** What financial resources will be invested in the landscape?

## **Rather than filling the landscape with stuff, make some choices!**

1. Select the three most important elements in the design.
2. From these important elements, write a story line that reflects how you want to relate to the landscape. [Figures 7 and 8]

Figure 7. Family analysis is about what the family wants and needs in the landscape. How will the family connect to the space? How will the outdoor rooms be used? The family of this Steamboat Springs garden enjoys the sitting area with fire pit.



Figure 8. Outdoor rooms in this backyard include a dining room, a fountain garden room, and vegetable garden room, creating a pleasant, relaxing space.



## **Writing a Story Line**

The story line creates a more congruent message bringing unity into the design.

The story line clarifies how the family wants to relate to and use the space. It reflects the family's personal tastes. It clarifies the "feeling" or mood the family desires from the landscape. It clarifies what the family want to communicate to others.

- This is the **most important design step**. Without a story line, most landscapes are not really designs, but rather collections of plant materials.
- This is the **most difficult design step** in the design process. It takes some careful evaluation about what the family really wants and needs in the design.

### Step 3. With Bold Lines, Delineate Softscape and Hardscape Areas, Creating Outdoor Rooms.

Note: *Softscape features* of the landscape include all the plants (trees, shrubs, flowers, turf, vegetables, fruits, etc.) *Hardscape features* of the landscape include the non-living elements of the design (patio, deck, fences, water features, and lighting.)

#### Three Areas in the Landscape

**Public area** (front yard) is the portion of the yard openly viewed by others. Homeowners associations and cities often regulate what can/cannot be done in the public area. [Figures 9 to 11]

- Driveway and path to front door
- Lawn, trees, shrubs and flowers
- Community standards – Following community standards for the front yard helps create the feeling that the community is friendly and welcoming, increasing property values.
- What does the family want to communicate to the neighborhood?

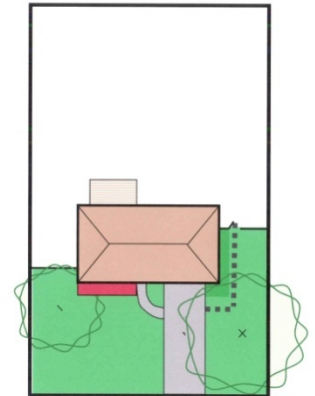


Figure 9. The *public area* is the portion of the yard in open view by others. It may have HOA or community standards that influence the design

Figures 10 and 11. When the public area reflects community landscape standards it builds a welcoming and friendly feeling for the community and enhances neighborhood property values. The public area communicates about the family.

What does your front yard communicate about your family?







**Private area** (back yard) is the portion of the yard not openly viewed by others. Being the family's private space, it is designed with rooms to support the family's activities and interests. [Figure 12]

- Cooking and eating rooms
- Sitting rooms, play room
- Fruit, vegetable, and flower garden room
- Water features
  
- How does the family want to relate to the space?
- How will the family use the space?

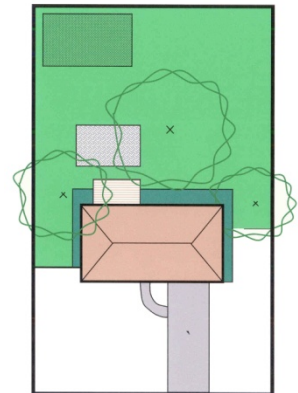


Figure 12. The *private area* is typically the family's primary outdoor living space.

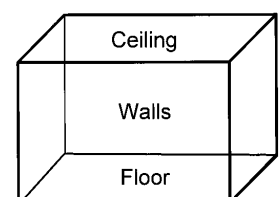
**Utility areas** serve specific nonlandscape functions such as the dog run and parking. They need to fit into the function of the landscape design.

- Garden shed, potting area, work area, compost bins
- Storage, dog runs, additional parking for cars, boats, RVs
- How does this fit into the landscape?

**Think of Design as Creating an Assortment of Outdoor Rooms.** [Figure 13]

- What makes up the floor?
- What makes up the wall?
- What makes up the ceiling?
- *Lines* connect and defines space (rooms)

Figure 13. The landscape is an assortment of outdoor rooms with various activities. In design, pay attention to the floor coverings, wall features, and what makes up the ceiling.



### Step 3a. Define Macro-Use of Space with *Hydrozone* Bubble Drawings.

#### Bubble Drawings

Bubble drawings brainstorm the macro-use of space. It the first and primary opportunity in the design process to be creative.

Bubble drawings are ovals that identify space allocation and use. For example, a circle represents the location and approximate size of the patio. Other circles identify the location and approximate size of lawn areas, the vegetable garden area, flower beds, etc. [Figure 14]

Bubble drawings do not identify actual lines, beds, path, or individual plants. These will come in future steps in the design process. [Figure 15]

The bubble drawing step also defines hydrozones, areas with various levels of irrigation. [Figure 16]

Landscape elements that will not change (like an existing deck or large tree) should be on the plan before starting this step.

Do not move on too fast. Breaking out of the box, look at a variety of options. Try lots of options before selecting the one to use as the base for the design

**To become the design base, select a bubble drawing that best serves the design needs, best communicates “feelings,” and gives the best connection with the space.**

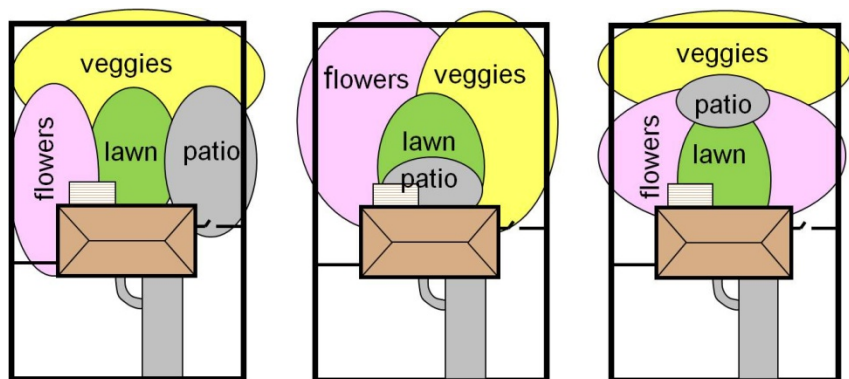
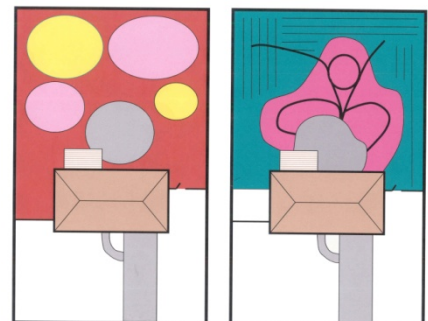


Figure 14. Examples of bubble drawings for a back yard with people space (patio and lawn rooms), vegetable room, and flower room.

Figure 15. Bubble drawings are ovals that depict various uses and irrigation levels of the space. Left: They need to fill the space, rather than leave large areas unidentified (red in the drawing). Right: Bubble drawings do not identify the actual shape and line of the area; this will come in the next step.



**Hydrozoning – Selecting plants appropriate for the climate, grouping plants according to water needs, and actually watering them according to need.**

In irrigation management, individual plants are not watered plant by plant. Rather the irrigation system waters all plants in an area (call *zone*). With sprinkler irrigation this is easy to understand.

With drip irrigation, we apply water to individual plants, but all plants in the zone receive the same run time and frequency of irrigation. As a point of clarification, some gardener mistakenly think that using half, one, and two gallon per hour drippers is an effective method to manage the differing water needs. Although this works to a small degree, the concept is basically flawed. The two gallon per hour drippers will have significantly larger wetting zones than the half gallon per hour dripper. However, plants with the higher water need (two gallon/hour drippers) do not necessarily have a larger root spread. Likewise, plants with the lower water need (half gallon/hour dripper) will not necessarily have a smaller root spread. (In fact, a large root spread is what makes some plants more xeric). The factor missing here is irrigation frequency to match the water needs.

In simple terms irrigation is done by areas not plant by plant. **Hydrozoning** groups plants with similar water needs, and then actually irrigates each group in the landscape to match the water needs of the grouping.

In developing bubble drawing, factor in the irrigation needs (hydrozones). [Figure 16]

- Areas of routine irrigation – watered every 2 to 4 days.
- Areas of reduced irrigation – watered every 4 to 14 days.
- Areas of limited irrigation – watered during dry spells once plants are established.
- Nonirrigated areas

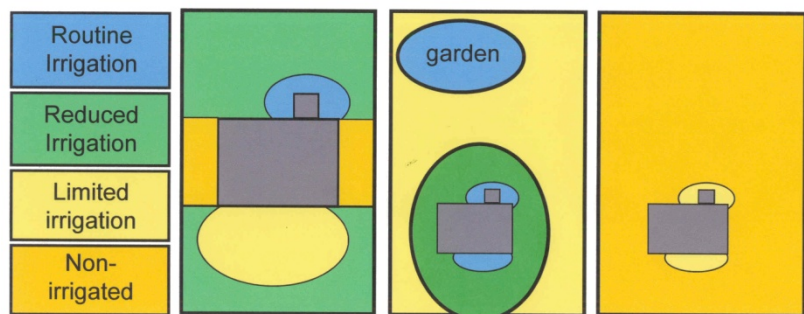
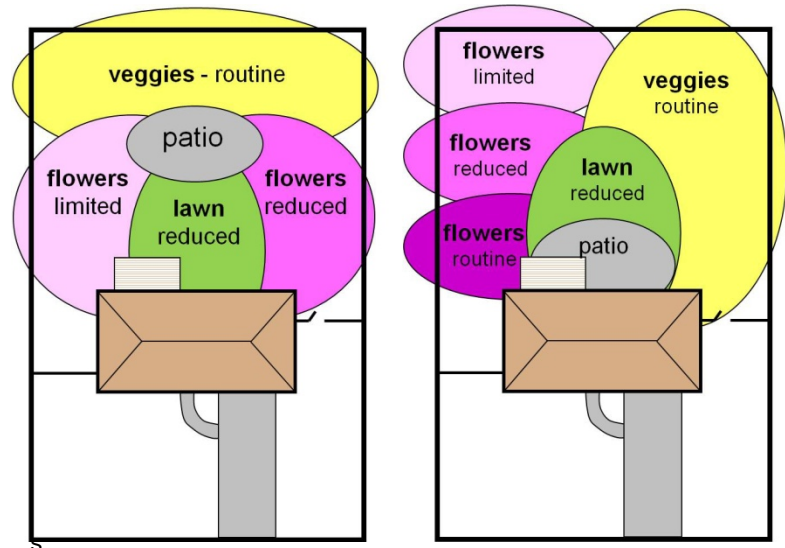


Figure 16. Examples of yards with various styles of hydrozones – Left: yard with reduced irrigated lawn in front and back, limited irrigation shrub and flower bed in front yard, routine irrigation flower bed around patio in back yard and non-irrigated side yards. Center: larger property with a patch of lawn in the front and back yard while much of the property has limited irrigation. Right: Yard is basically nonirrigated with small limited irrigation flowerbeds near house in front and back.

**Hydrozones Base on Irrigation Need [Figure 17]**

- Lawns—Routine irrigation
- Lawns—Reduced irrigation
- Lawns—Limited irrigation or non-irrigated

- Mixed flower and shrub beds—Routine irrigation
- Mixed flower and shrub beds—Reduced irrigation
- Mixed flower and shrub beds—Limited irrigation
- Vegetables – routine irrigation
- Tree fruits – reduced irrigation
- Small fruits – routine irrigation
- Nonirrigated areas



of hydrozone bubble drawings. Note the multiple hydrozone zones for flowers.

Note: A common incorrect belief is that lawns are high water user and shrubs and flowers are low water users. Actually, the water demand of Kentucky bluegrass is lower middle class when placed in an ordered list of water demands for landscape plants. The typical lawn receives twice the amount of water that it actually needs.

### Creating Practical Turf and Nonturf Areas

Water wise gardening is not anti-turf, but about selecting the turf type to match the use of the property. This is a change from the typical western landscape where most of the property is covered with high-input lawn.

#### What turf type matches the design objectives and use of the site?

- **Routine irrigation** with high performance Kentucky bluegrass and turf-type tall fescue – For high traffic areas with lots of wear and tear, like ball fields. While most home lawns are managed this way, few actually have the wear and tear to justify the high inputs.
- **Reduced irrigation** with Kentucky bluegrass and turf-type tall fescue – This reduced water use actually matches the need of most home lawns, keeping it summer green.

- **Minimal irrigation** with summer dormant Kentucky bluegrass or Buffalograss – Quality of the lawn depends on the amount of rain and irrigation the grass actually receives.
- **Non-irrigates** sites with Buffalograss or blue grama grass – quality of the lawn depends on the amount of rain the grass actually receives.

For additional information on turf options in Water Wise Design, refer to *CMG GardenNotes* #412, **Selecting Turf for Water Wise Landscapes.**

### What turf type matches the community's water supply?

Some communities lack the water resources for routine landscape irrigation. Here limited or non-irrigation may be the only practical options.

Other communities have good water resources to support landscape irrigation needs. However, even these communities may lack the water resources during western drought cycles. In dry years, the community may need to accept lower levels of inputs and drier lawns.

### **Step 3b. Refine Macro Space (lawn areas, mixed shrub and flowerbeds, vegetable gardens, patio, etc.) with Bold Lines in Rectilinear, Curvilinear, or Angular Design Style.**

#### Which design style fits the theme?

- **Rectilinear** style has straight lines and right angles in square and rectangular shapes. It is described as bold, orderly, organized, and stately; or stuffy, uncreative, and controlling. [Figures 18 & 19]
- **Curvilinear** style replaces the straight line and right angles with bold sweeping curves. (Avoid wavy lines as this does not create the bold line for a strong design.) It is described as natural, free flowing, and friendly; or lacking form and structure. [Figure 18 & 19]
- **Angular** style uses the straight lines but with a variety of angles and directions. It is described as modern, action oriented, and bold; or hectic, chaotic, and disorganized. [Figures 18 & 19]

Most people have a love/hate relationship to the three styles. Select the style that created the feeling or mood desired from the story line. A common question is "May styles be mixed?"

- Basically no, as it weakens the feelings created by the style and destroys unity.
- However, a front yard could be one style and the back yard another style. In large properties, various areas may have different styles.
- The property line and the home style do not dictate the landscape style.
- It is recognized that a rectilinear deck and raised bed garden boxes may be found in an otherwise curvilinear design.

Figure 18. Examples of styles for a backyard with patio (gray), flower beds (pink), and vegetable garden (yellow).

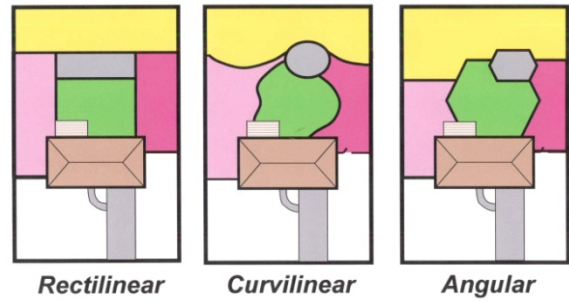
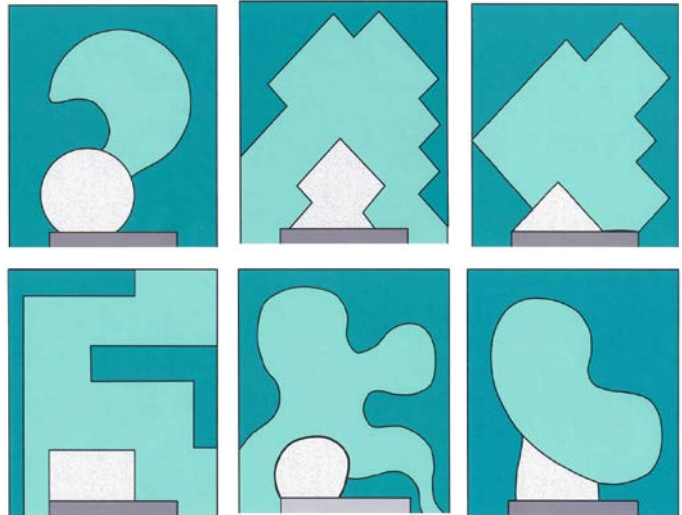


Figure 19. Notice how lines connect and define space. The different styles bring various feelings to the site. Some are calming and relaxing whereas others stimulate action. Which design style fits the story line?



### **Step 3c. Refine Preliminary Design for Efficient Irrigation**

Of all the principle of water wise landscaping, irrigation efficiency has the greatest water saving potential for most home gardeners. On a community basis, gardeners apply twice the amount of water that plants actually need. This is due to poor irrigation system design, management, and maintenance.

Efficiency in irrigation is based on uniformity of water delivery. In any irrigation zone, spots that receive more water will be overwatered to keep spots that receive less water green.

Drip irrigation systems are great for mixed flower and shrub beds, perennials, small fruits, and vegetables. Drip irrigation is not an install and forget it type of system. Like any irrigation system, maintenance is required. Sprinkler irrigation is more suited for large trees and lawn areas.

### **Sprinkler Irrigation: Design Criteria for Uniform Water Delivery**

- Uniformity of water delivery = water savings

## 1. Head-to-head coverage [Figure 20]

- Spray from each head must reach neighboring heads.
- A 10 to 20% overlap may give better uniformity.
- Less than head to head coverage (while popular to reduce installation costs) significantly increases water use for the life of the system.

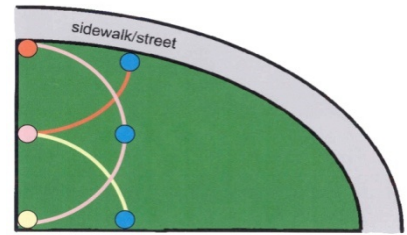


Figure 20. Head- to-head coverage is a minimum standard for water savings. Water from each head reaches the neighboring heads. A 10 to 20% overlap may give even better uniformity.

## 2. Line-out along nonirrigated areas. [Figure 21]

- Another standard for water savings is to water from the outside in.
- Do not water from the center out onto nonirrigation areas. The nonirrigated area will be watered or a dry edge will be found along the edge of the lawn.
- Although lining out requires more sprinkler heads with higher installation costs, it is a primary water saving technique, reducing water use.

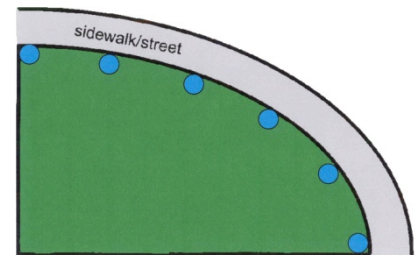


Figure 21. Another water saving standard is to **line out** the irrigated area from the non-irrigated area by watering from the outside inward.

## 3. Fill in with heads in square and triangle patterns. [Figures 22 & 23]

- For uniform water distribution, fill in heads in square or triangle patterns. The overlap gives the most uniform delivery.
- Avoid pentagons (five- sided) patters and this creates a dry spot.

Figure 22. For uniform water delivery, fill in heads in square or triangle patterns.

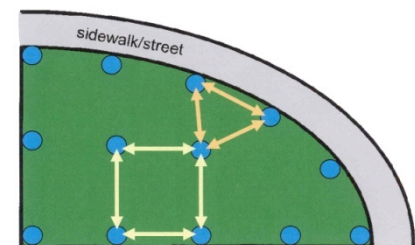
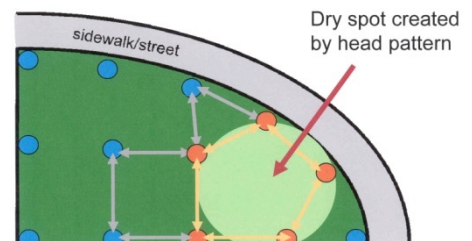


Figure 23. Avoid placing heads in pentagon shaped patterns, it creates dry spots and the entire lawn will be overwatered to compensate. Pentagon-shaped patters frequently pop up in irregular shaped areas.



**4. Use uniform type, brand, and style of heads in each irrigation zone.**

- Spray heads apply water a 1 to 2½ inches per hour.
- Rotor heads apply water at ¼ to ¾ inches per hour.

**5. Avoid sprinkler irrigation of small irregular shaped areas.**

- To walk the talk of being water wise, avoid sprinkler irrigation on small irregular shaped areas.
- Minimum width of sprinklers is generally is five to ten feet wide.
- In design, avoid sprinkler irrigation on smaller areas. Design these for drip irrigation, hand watering, or nonirrigation areas. Or avoid creating small irregular shape areas all together in the design process.

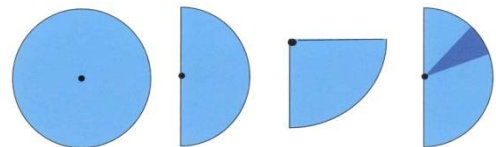
**6. Use recommended water pressure.**

- A mist cloud around a sprinkler head indicates excessive pressure, increasing evaporation and total water usage.
- A pressure regular is standard on newer homes. This is typically located where the water line enters the home, just beyond the shut-off valve. It can be retrofitted into the water line in older home.
- Most sprinkler heads in the home garden trade are designed to work at 30 to 40 psi, and generally do not have internal pressure regulators.
- Heads use on commercial/industrial properties may work with much higher pressures and these more expensive heads generally have a pressure regular built into the head.
- Many cities deliver water at 30 to 40 psi. However much higher pressures are common. With pressure above 80 psi, automatic valves may have trouble closing.

**Typical sprinkler patterns** [Figure 24]

- Full circles
- Half circles giving a straight line.
- Quarter circles giving a right angle for square corners
- Adjustable arc (the angle can be manually set); however, these are less uniform in delivery.
- Other patterns (like strip head) lack good uniformity in water distribution.

Figure 24. Sprinkler heads come in full circle, half circle, quarter circles, and adjustable arc.





## Fitting sprinkler patters into the design

**Pop-up spray heads** are spaced at eighth to fifteen-foot intervals (depending on interchangeable nozzle installed). They have a high water deliver rate, around two inches per hour, often leading to surface run-off. They are used for small areas.

**Rotor heads** are spaced at 15 to 45 or more foot intervals (depending on the head). They have a lower delivery rate, around half-inch per hour, causing less surface run-off. These are use for large open areas.

For example, a 30-foot by 45-foot area would have pop-up spray heads at 15-foot intervals, with quarter heads in the corners, half heads along the sides and full circles in the center. [Figure 25]

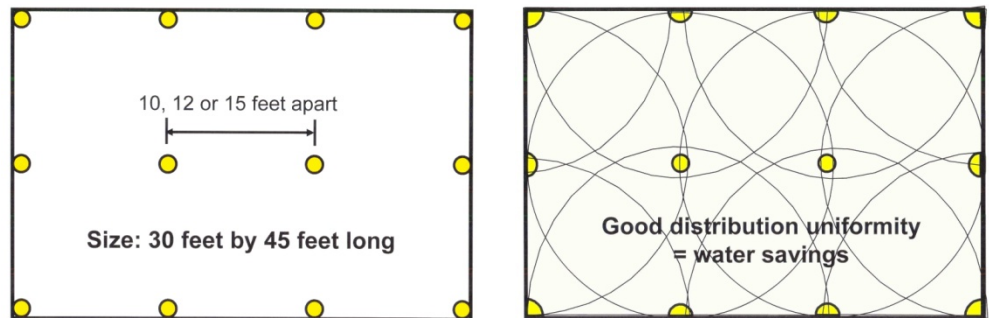


Figure 25. Left: For this 30-foot wide by 45-foot long area, pop-up spray heads could be used at 15 foot centers. Right: quarter head would be place in the corners, half heads along the sides and full circle heads in the center. With head to head coverage, this would give a good efficiency for water delivery.

If a flowerbed was added to the area, blocked spray creates a dry area around the bed and a very wet planting bed from the intercept water. In water wise design, AVOID blocking sprinkler delivery with flowers and shrubs. [Figure 26]

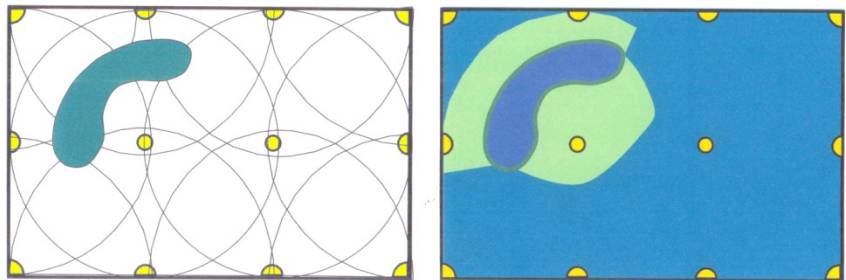


Figure 26. If a flower/shrub bed was added to this sprinkler layout, it will interfere with water distribution. The lawn areas around the bed will be dry, and the rest of the lawn will be over watered to compensate. The flower/shrub bed will be rather wet from the intercepted water.

In water wise landscaping design, overlay the sprinkler layout onto the design. **Then adjust the lines of the design for efficient irrigation layout.** [Figure 27]

## Remember

- Head-to-head coverage with up to 20% overlap
- Line out nonirrigated areas
- Place heads in square and triangle patterns
- For small areas, use pop-up spray heads at 15-foot centers. For open large areas, use rotor type heads spaced at 15-45+ foot centers depending on the site and heads used.
- Avoid sprinkler irrigation on spaces less than five to ten feet wide.

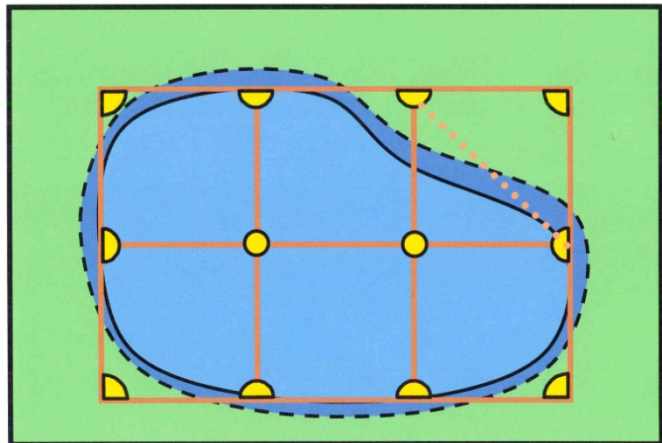


Figure 27. To walk the talk of being water wise, adjust the line in the preliminary design for improved irrigation efficiency. In the drawing the blue area represents a lawn that will be sprinkler irrigated surrounded by a mixed flower shrub beds with drip irrigation. The original line is indicated with the dotted line. Then the sprinkler grid pattern was over-laid. With head-to-head coverage, note that some lawn areas are outside of the water delivery zone. Sliding the heads out to compensate will significantly increase water use with the lack of head-to-head coverage. A better solution is to move the line inside the sprinkler delivery pattern. As redrawn, this minor adjustment could reduce water use by 30 to 50%!

In small areas, sprinkler heads cannot follow the curves. Instead, they stay on the grid lines. In water wise design, draw primary lines, and then overlay the sprinkler system looking at patterns. Adjust the head placement (staying on the grid) and redraw lines for maximum water savings. [Figures 28-30]

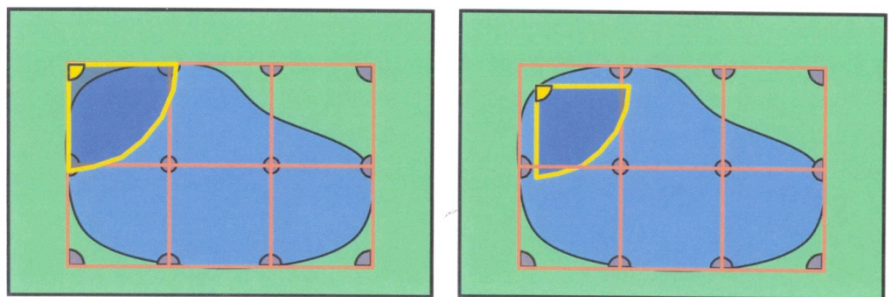


Figure 28. In small areas, notice how the sprinkler heads must stay on the grid lines. Plant materials along the edge of the lawn area must be kept short to allow for water delivery and must be tolerant of the water levels given the lawn. Right: If the head is moved in to the edge of the lawn (blue area), it creates coverage problems along the edge. As drawn, the final head placement is given in Figure 28 left.

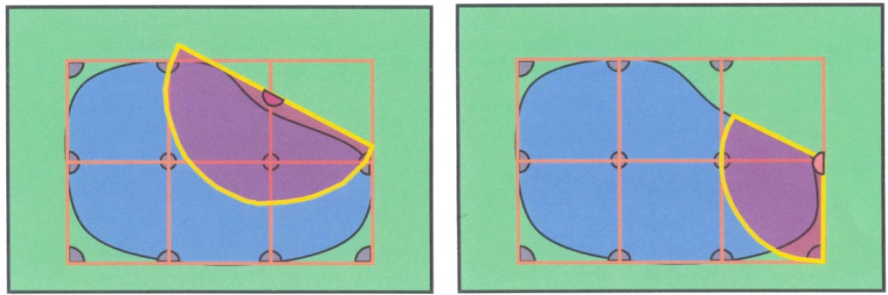


Figure 29. As drawn, the sprinkler head in the upper right hand corner could be eliminated. Drawing left and right show adjustments in placement and arc of adjacent heads. Note: for head to head coverage in this small area, all heads stay on the grid line. As drawn, the final head placement is given in Figure 23 left.

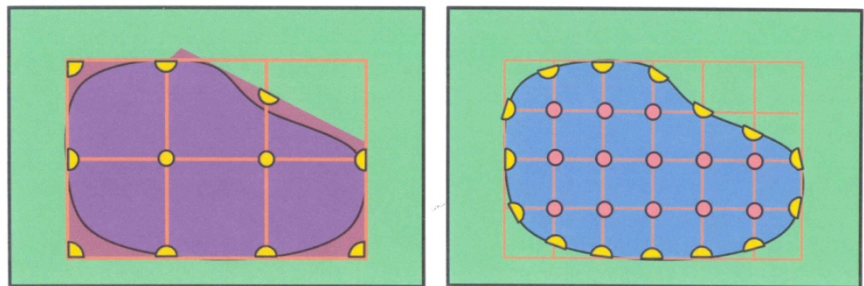


Figure 30. Left: Illustration of sprinkler layout for a lawn area 30 by 45 feet with pop-up spray heads at 15-foot intervals. Notice how heads stay on the grid line. The head in the upper right corner was eliminated with adjustments made in placement and arc of neighboring heads. Notice the overspray of the sprinkler system on the edges of the flower/shrub bed. Any plant materials in this area would be low ground cover types and acceptable to the watering level of the lawn.  
 Right: Illustration of sprinkler layout for a 60 by 90 foot lawn area with pop-up spray heads at 15-foot centers.  
 Rotor heads: In the large 60 by 90-foot lawn area, rotor heads could be used at 30-foot spacings. With rotor heads the layout would be like the illustration on the left.

### **Step 3d. Delineate Micro-Spaces with Connecting Paths, Plants, and Hardscape Features**

With the primary lines refined for efficient landscape irrigation, we are now ready to continue developing the design plan with secondary lines defining beds, paths and other features.

#### **How do people move through the garden rooms?**

- Paths direct people around a garden and are an effective way to deal with soil compaction from foot traffic.
- Paths also eliminate self discovery of the garden.
- A threshold or peak-hole is also an invitation to enter and explore.

## Step 4. Develop Plant Consideration List Based on Hydrozones

### Create a Potential Plant List for Each Hydrozone

Why a potential list? Plant materials need to be identified by hydrozone so they can be grouped by water need. Flexibility in the design process at this point in time allow for exciting new plants, not previous on the list, that one finds at the nursery. Flexibility may also be needed when the desired plants are not available or are in poor quality.

Information sources on plant water needs include the following:

- CSU Extension Fact Sheets and *CMG GardenNotes*
- *Xeriscape Plant Guide* by Denver Water, Fulcrum Publishing
- X-rated plant lists at [www.gardencentersofcolorado.org](http://www.gardencentersofcolorado.org)

### Water Wise Landscaping in Colorado's Semi-Arid Climate

- On sites where landscape irrigation is not desirable or possible, focus on natural growth.
- Xeriscaping is not a rock pile. A rock over landscape is environmentally unfriendly, creating heat sinks and limiting carbon dioxide conversion into oxygen.! [Figure 31]

Figure 31. Xeriscaping does not need to be a rock pile.



- Even xeric plants need rain and/or irrigation during establishment.
- Gardens with limited to no irrigation will thrive in years with heavy rainfall and decline in dry years.
- Water wise concepts support irrigation for “people space”.

## **Step 5. Fit Elements into the Design Based on the Design Principles of *Line, Color, Texture, Form, Unity, Scale, Balance, Simplicity, Variety, Emphasis and Sequence.***

With the primary lines on the page, defining outdoor rooms, it is now time to decorate the rooms with various plants and hardscape features. This discussion on landscape design continues in *CMG GardenNotes* #412, **Principles of Landscape Design**.

### **Additional Information – *CMG GardenNotes* on Water Wise Landscape Design**

- #410 References and Review Questions: Water Wise Landscape Design
- #411 Water Wise Landscape Design
- #412 Water Wise Landscape Design: Selecting Turf Options
- #413 Water Wise Landscape Design: Principles of Landscape Design
- #414 Worksheet: Water Wise Landscape Design
- #415 Homework: Water Wise Landscape Design

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- o Colorado Master Gardener *GardenNotes* are available online at [www.cmg.colostate.edu](http://www.cmg.colostate.edu).
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- o Colorado State University, U.S. Department of Agriculture and Colorado counties cooperating.
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