

Water Wise Landscape Design



Supplemental Reference / Reading

CMG GardenNotes

- #410, *References and Study Questions: Water Wise Landscape Design*
- #411, *Water Wise Landscape Design: Design Steps*
- #412, *Water Wise Landscape Design: Selecting Turf Options*
- #412, *Principles of Landscape Design: Design Principles*
- #413, *Worksheet: Water Wise Landscape Design*
- #414, *Homework: Water Wise Landscape Design*

Books

- *Basic Elements of Landscape Architecture Design*. Norman K Booth. ISBN: 0881334782
- *Landscaping Makes Cents: Smart Investments That Increase Your Property Value*. Frederick C Campbell and Richard L Dube. ISBN: 0882669486
- *Landscaping Your Home*. William R. Nelson. ISBN: 0875639607
- *Residential Landscape Architecture: Design Process for the Private Residence*. Norman K Booth and James E Hiss. ISBN: 0131140647
- *Xeriscape Handbook*. Gayle Weinstein. Fulcrum Publishing. 1999. ISBN 1-55591-346-6
- *Xeriscape Plant Guide*. Denver Water, Fulcrum Publishing. 1996. ISBN 1-55591-253-2

Web

- *Value Landscaping for Financial and Environmental Sustainability* – Add your yard’s inputs and the software calculates the cost to install and maintain the landscape. Developed by Utah State University Extension and the Central Utah Water Conservancy District – VLE.CUWCD.COM

Curriculum developed by David Whiting, Department of Horticulture & LA (retired), Colorado State University, and Jeffry de Jong, Horticulturist, Victoria, BC, Canada.. Artwork by David Whiting; used by permission.

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Learning Objectives

Working through design as a process, the student will be able to craft a water wise landscape design. At the end of this class, the student will be able to:

1. Outline the six steps in the landscape design process. Explain how the process is important to potential water savings.
2. Discuss opportunities and limitations as it relates to site analysis.
3. Explain how a garden theme defines the landscape around family values, needs and wants.
4. Describe hydrozoning and its role in potential water savings and plant selection.
5. Match lawn options with design needs and use.
6. Describe the use of rectilinear, curvilinear and angular design styles.
7. Describe how to refine a preliminary design for efficient irrigation efficiency.
8. Describe the interplay of *line, color, texture* and *form* with *scale, balance, simplicity, variety, emphasis* and *sequence* to create *unity* in the design.
9. Explain hints to mix and match plants creating pizzazz.

Review Questions

1. List the seven principles of water wise gardening. Explain the take home message of each.
2. Describe the steps in the landscape design process.
3. Describe site analysis considerations in the following areas:
 - Soil tilth
 - Grading and drainage
 - Microclimate
 - Existing vegetation
 - Extension Landscape
 - Potential for irrigation
4. Explain “opportunity or restraint” as it relates to site analysis.
5. Describe considerations in family analysis. How does potential irrigation figure into family analysis?
6. Discuss the purpose of the landscape story line (theme). What does the story line and theme bring to the design process?
7. Describe the purpose of the hydrozone bubble drawings.
8. Describe how hydrozones fit into the design process. For existing landscapes, explain why we go back to the hydrozone bubble drawings step to evolve a more water efficient landscape.
9. Describe the concept of “practical turf areas”. What factors should be considered in matching a turf type for a specific site?
10. In Colorado where multi-year drought routinely occurs, how could community expectation about the lawn care change during a water shortage?
11. Discuss the following points about Kentucky bluegrass.
 - KBG makes a great low input lawn option.
 - KBG water use and growth slows as the soil begins to dry down.
 - KBG irrigation demand varies significantly between cultivars.
 - KBG goes dormant under summer water stress.
12. Discuss the following points about turf-type tall fescue lawns.
 - Tall fescue may or may not be deeper rooted.
 - Tall fescue cannot sow growth as soils dry down.
 - Tall fescue cannot go dormant under water stress.
 - Tall fescue makes a great lower input lawn option
13. Discuss the following points about turf-type Buffalo grass.
 - Summer green will be dependent on rain and irrigation.
 - Buffalo grass will be dormant fall through spring, reducing seasonal water demand

14. Describe the “feeling” of rectilinear, curvilinear and angular design. What determines which style would be appropriate?
15. Describe how to refine the preliminary design for efficient sprinkler irrigation. List criteria for efficient sprinkler layout.
16. In developing the plant potential lists for each hydrozone, explain the following concepts about water wise gardening.
 - Hydrozoning and xeriscaping is not a Phoenix style rock landscape.
 - Hydrozoning is not just purchasing and planting xeric plants around the landscape with other plants.
 - Even xeric plants require routine irrigation during establishment.
 - Hydrozoning is not against irrigated “people space” concepts.
17. Define the following design terms:
 - Balance
 - Color
 - Emphasis
 - Form
 - Line
 - Scale
 - Sequence
 - Simplicity
 - Texture
 - Unity
 - Variety
18. Describe how the following *forms* affect eye movement and emotional feelings.
 - Weeping
 - Horizontal or spreading
 - Rounded
 - Pyramidal
19. Describe how to balance *simplicity* with *variety*. Describe how to use *simplicity* to bring *unity* to the design.
20. How does distance impact texture? In a distant corner, how should textures sequence? In a kidney-shaped planting bed how should texture sequence? In a texture sequence, how should leaf size change and the proportion of plant numbers changes?
21. How do various colors speak to you?
22. Explain differences in warm and cool colors.
23. Describe how to sequence warm colors and cool colors.
24. In mixing colors in a bed, what is the design trick to a natural “life” to the bed?
25. Describe how to mix and match plants.



CMG GardenNotes #411

Water Wise Landscape Design: Steps

- Outline: Seven principles of water-wise landscaping – page 1
What is “landscape design”? – page 2
Steps to creating practical and pleasing outdoor living space – page 2
- Step 1. *Site Analysis identifies* opportunities and limitations of the property. – page 3
 - Step 2. *Family Analysis* creates a story line, bringing unity into the landscape. – page 6
 - Step 3. With bold *lines*, delineate softscape and hardscape areas, creating outdoor rooms. – page 8
 - a. Define macro-use of space with *hydrozone bubble drawings*. – page 10
 - o Bubble drawings, page 10
 - o Hydrozoning, page 11
 - o Creating practical turf and non-turf areas. – page 12
 - b. Refine macro-space (lawn areas, flowerbeds, vegetable garden, patio, etc) with bold *lines*, in *rectilinear*, *curvilinear*, or *angular* design style. – page 13
 - c. Refine preliminary design for efficient irrigation. – page 14
 - d. Delineate micro-spaces with connecting paths, plants, and hardscape features. – page 19
 - Step 4. Develop plant consideration lists based on hydrozones. – page 20
 - Step 5. Fitting elements into the design based on the design principles. – page 21
-

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

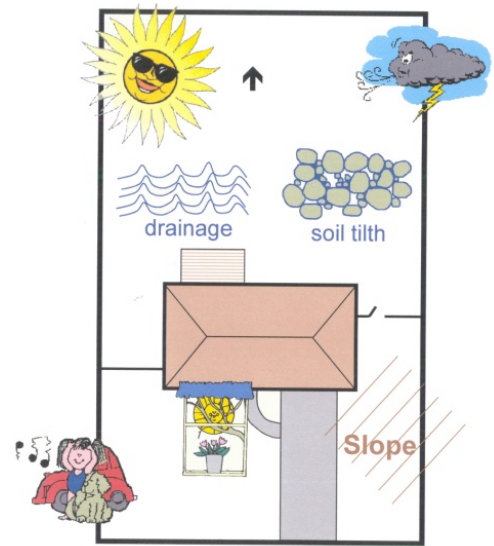
1. *Site analysis* identifies opportunities and limitations of the property.
2. *Family analysis* creates a story line, bringing unity into the landscape.
3. With *bold lines*, delineate softscape and hardscape areas, creating outdoor rooms.
 - a. Define macro-use of space with *hydrozone bubble drawings*.
 - 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.



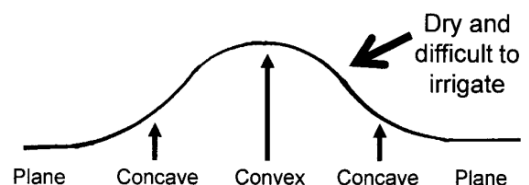
Soil Tilth – most landscape plant problems are soil related!

- 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



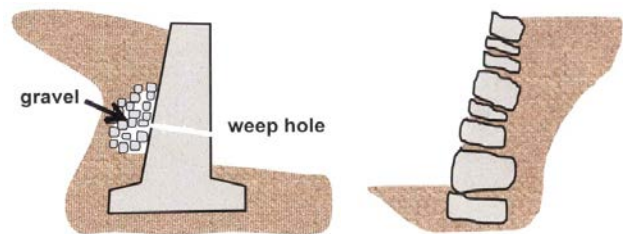
Acceptable Slope

- 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

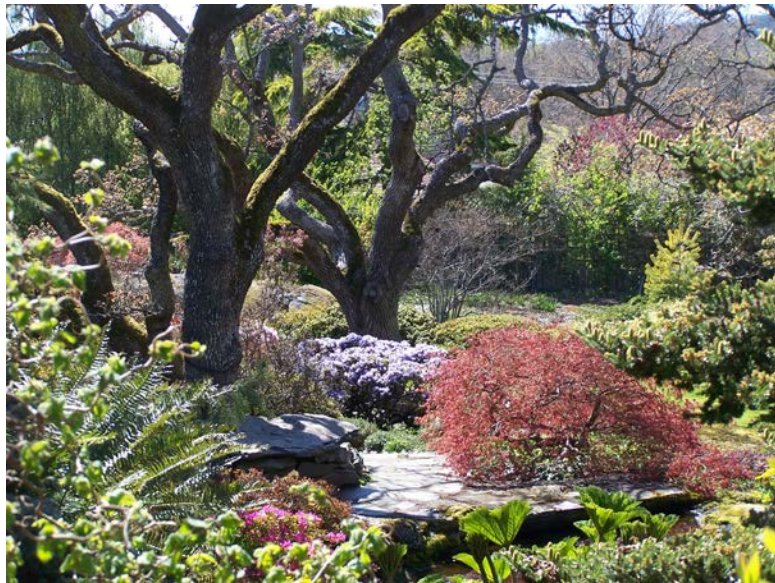
- Subdivision covenants
- Views to frame or mask
- Noise
- Neighborhood landscape style
- Privacy and security

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?

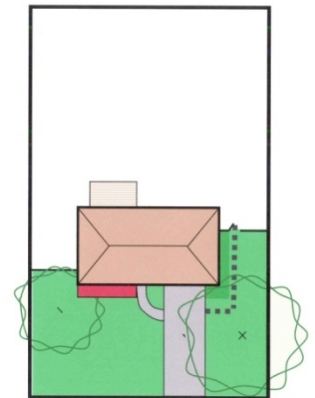


Figure 9. The *public area* is the portion of the yard in open view by others. It may have HOA or community standards that influence the design

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?

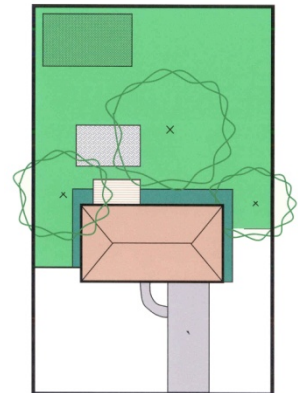


Figure 12. The *private area* is typically the family's primary outdoor living space.

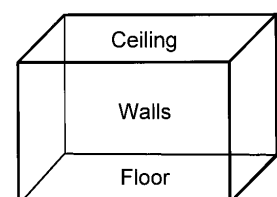
Utility areas serve specific nonlandscape functions such as the dog run and parking. They need to fit into the function of the landscape design.

- 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.

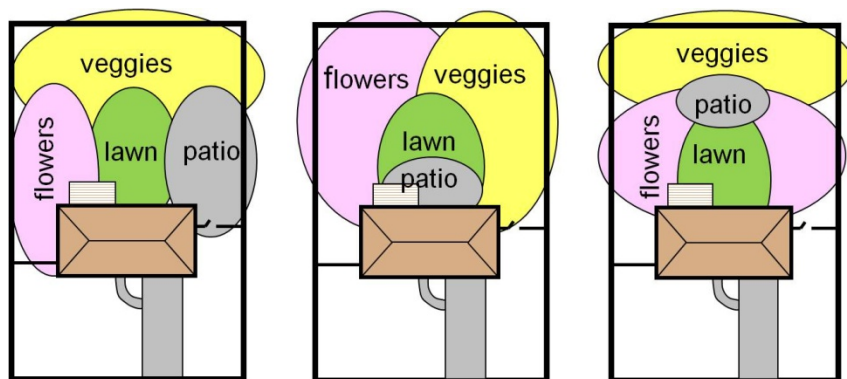
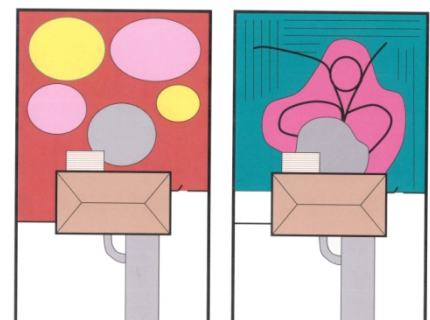


Figure 14. Examples of bubble drawings for a back yard with people space (patio and lawn rooms), vegetable room, and flower room.

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

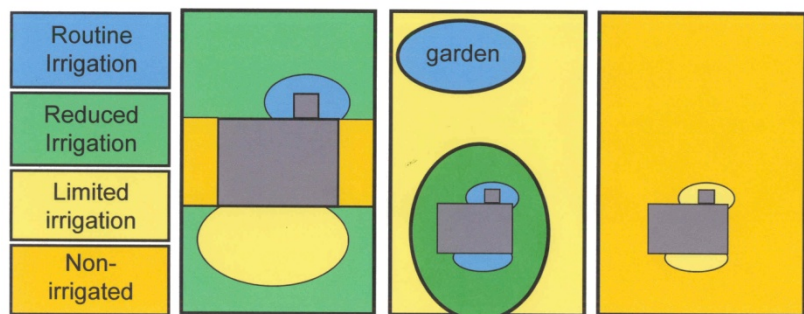
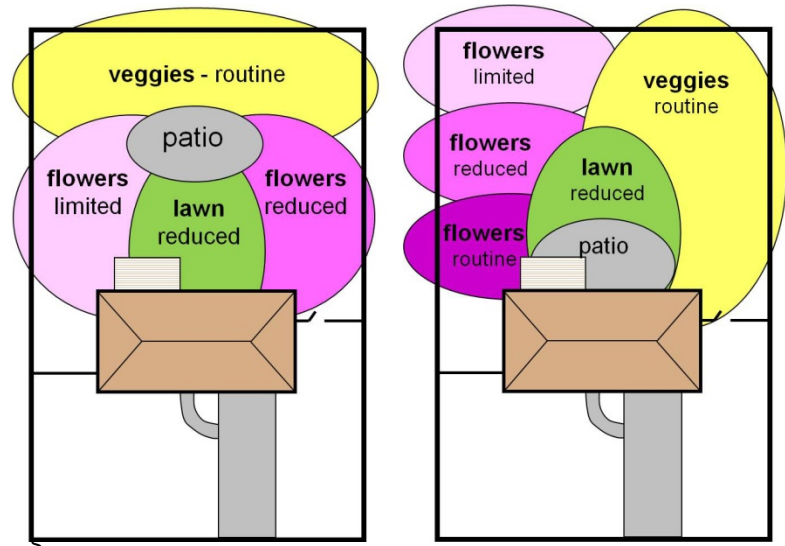


Figure 16. Examples of yards with various styles of hydrozones – Left: yard with reduced irrigated lawn in front and back, limited irrigation shrub and flower bed in front yard, routine irrigation flower bed around patio in back yard and non-irrigated side yards. Center: larger property with a patch 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).

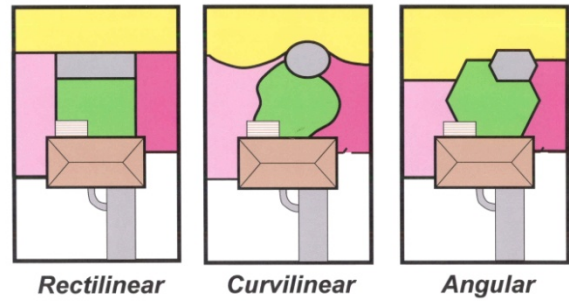
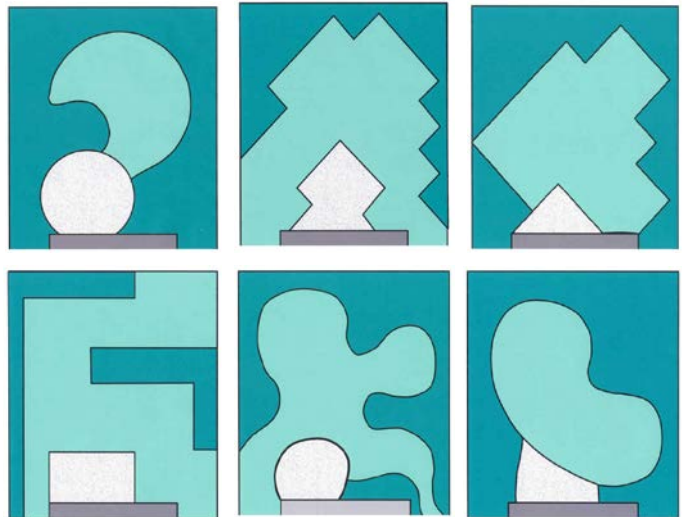


Figure 19. Notice how lines connect and define space. The different styles bring various feelings to the site. Some are calming and relaxing whereas others stimulate action. Which design style fits the story line?



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.

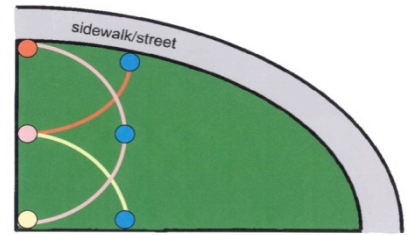


Figure 20. Head- to-head coverage is a minimum standard for water savings. Water from each head reaches the neighboring heads. A 10 to 20% overlap may give even better uniformity.

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.

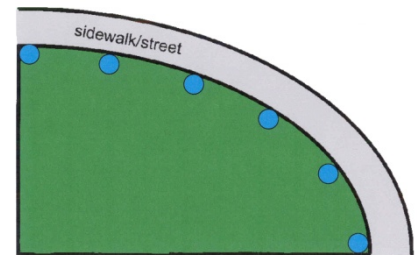


Figure 21. Another water saving standard is to **line out** the irrigated area from the non-irrigated area by watering from the outside inward.

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.

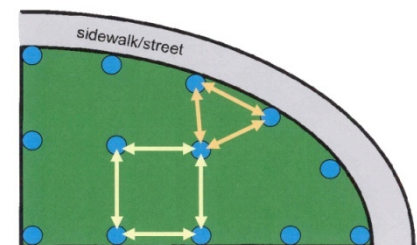
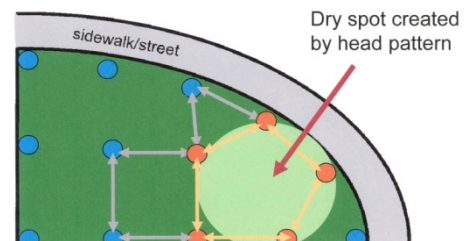


Figure 23. Avoid placing heads in pentagon shaped patterns, it creates dry spots and the entire lawn will be overwatered to compensate. Pentagon-shaped patters frequently pop up in irregular shaped areas.



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.

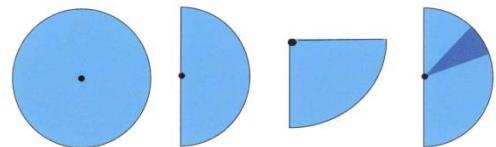
6. Use recommended water pressure.

- 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]

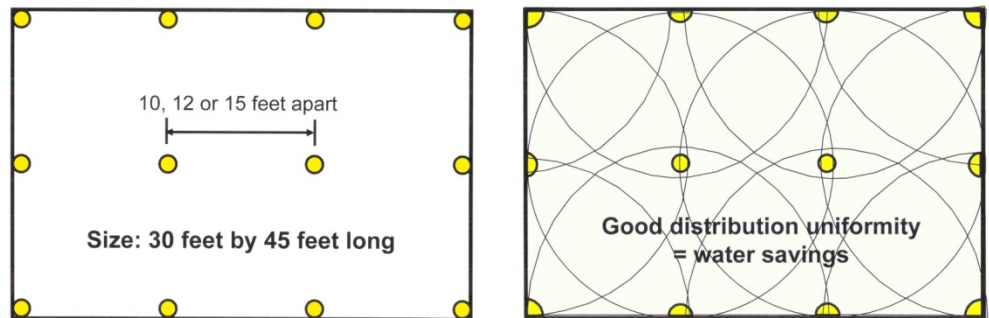


Figure 25. Left: For this 30-foot wide by 45-foot long area, pop-up spray heads could be used at 15 foot centers. Right: quarter head would be place in the corners, half heads along the sides and full circle heads in the center. With head to head coverage, this would give a good efficiency for water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

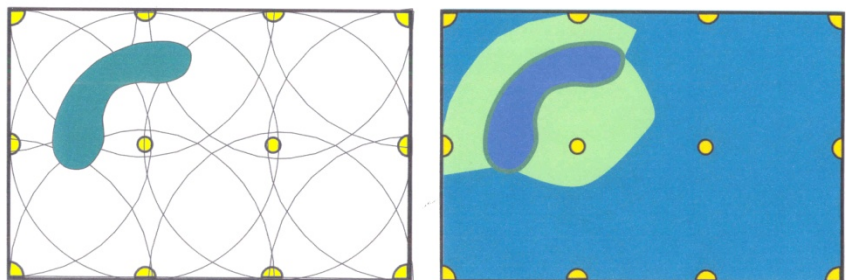


Figure 26. If a flower/shrub bed was added to this sprinkler layout, it will interfere with water distribution. The lawn areas around the bed will be dry, and the rest of the lawn will be over watered to compensate. The flower/shrub bed will be rather wet from the intercepted water.

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.

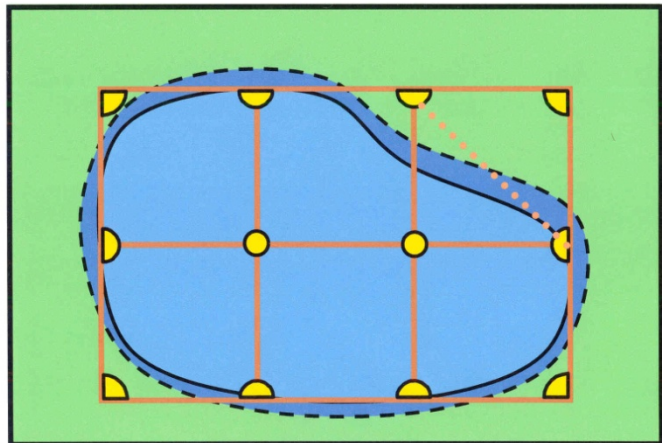


Figure 27. To walk the talk of being water wise, adjust the line in the preliminary design for improved irrigation efficiency. In the drawing the blue area represents a lawn that will be sprinkler irrigated surrounded by a mixed flower shrub beds with drip irrigation. The original line is indicated with 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]

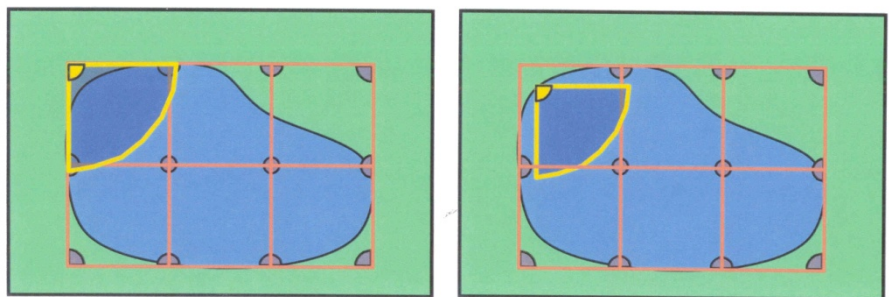


Figure 28. In small areas, notice how the sprinkler heads must stay on the grid lines. Plant materials along the edge of the lawn area must be kept short to allow for water delivery and must be tolerant of the water levels given the lawn. Right: If the head is moved in to the edge of the lawn (blue area),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

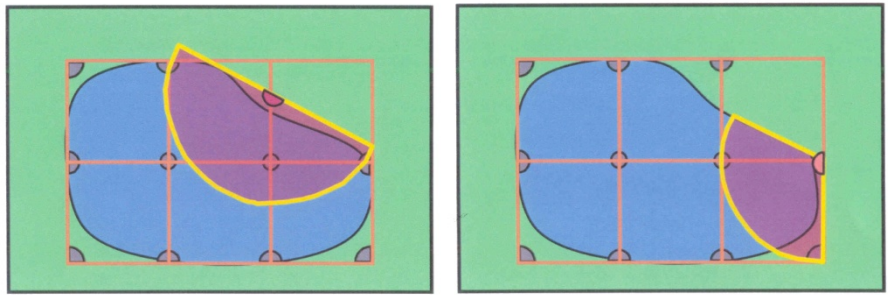


Figure 29. As drawn, the sprinkler head in the upper right hand corner could be eliminated. Drawing left and right show adjustments in placement and arc of adjacent heads. Note: for head to head coverage in this small area, all heads stay on the grid line. As drawn, the final head placement is given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

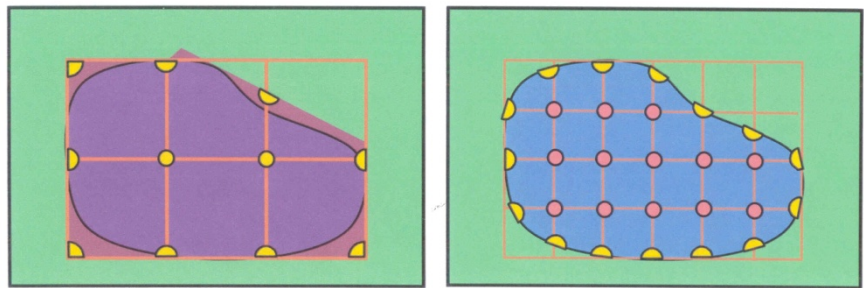


Figure 30. Left: Illustration of sprinkler layout for a lawn area 30 by 45 feet with pop-up spray heads at 15-foot intervals. Notice how heads stay on the grid line. The head in the upper right corner was eliminated with adjustments made in placement and arc of neighboring heads. Notice the overspray 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

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 rocked 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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Revised October 2014



CMG GardenNotes #412

Water Wise Landscape Design: Selecting Turf Options

Outline: Benefits of grass – page 2
Turf selection: Creating practical turf areas – page 3
 Grass and water use – page 3
 If the turf is deeper rooting – page 4
 Kentucky bluegrass – page 4
 Turf type tall fescue – page 5
 Buffalograss – page 6
 Comparative seasonal water requirement – page 6

For additional information on turf selection, refer to Dr. Tony Koski's website at <http://csuturf.colostate.edu> and the following *CMG GardenNotes*:

- #561, Turfgrass Species Selection Guidelines
- #562, Best Turf Varieties: Variety Recommendations for Bluegrass, Ryegrass, Tall Fescue, Fine Fescue, Buffalograss and Bermudagrass
- #563 Hybrid (Kentucky X Texas) Bluegrass for Turf Use in Colorado
- #564, Fine Fescues for Lawns
- #565, Buffalograss Lawns
- #566, Sources of Grass Seed, Sod, and Plugs for Colorado Lawns

Water-wise landscaping is not anti-turf, but about matching turf selection to the design needs and use of the site.

With Colorado's continued population growth, water use becomes a critical issue. Water conservation helps 1) reduce total water demand, and 2) reduce the extensive cost of expanding a community's water infrastructure.

In a typical community, water use more than doubles during the summer irrigation season. On a statewide perspective, landscape irrigation accounts for 7 to 10% of Colorado's total water use.

Benefits of Grass

Healthy grass is an aesthetic asset and a factor in property value. It provides a backdrop for other landscape elements pulling the landscape design together.

The growing body of evidence points to the positive health and environmental contributions made by lawns and other grassy areas. A healthy, vigorous lawn with high plant density provides the following benefits:

- **Conversion of CO₂ to O₂** – Twenty-five square feet of actively growing grass produces enough oxygen for one person per day.

On a global basis, grasslands of the northern hemisphere are second to the tropical rain forests in the CO₂ to O₂ conversion.
- **Pollution breakdown** – Microorganisms found in the soil of actively growing turf, breakdown organic pollutants, including air contaminants, pollen, and pesticides.
- **Wind erosion** – Grass cover prevents wind erosion of soil, trapping dust and pollen.
- **Water quality** – Turfgrass areas play a significant role in reducing surface water runoff, a key factor in *non-point-source* pollution in the landscape setting.
 - An average golf course of 150 acres can absorb 12 million gallons of water during a 3-inch rainfall.
 - A thick turfgrass allows 15 times less runoff than does a lower quality lawn.
 - A healthy, dense stand of turfgrass can reduce runoff to almost zero.
 - Compared to a garden or field planted to row crops, grassy areas reduce soil erosion by 84 to 668 times.
 - To protect surface water quality, direct surface runoff onto grassy areas allowing for natural filtering in the biologically active turf soil.
- **Soil structure** – Actively growing grass supports soil organism activity that improves soil structure.
- **People space** – Turf is basic “people space” with a cool, dirt-free activity space for children and adults.
- **Element of landscape design** – Turf brings unity to a landscape design and provides a neutral background to set off flowers and shrubs.
- **Property values** – Turf quality influences property appeal and marketability.
- **Fire defense zone** – Irrigated mowed lawns is an important aspect of fire management in communities. Dry, unmowed grass/weeds become a major fire hazard.

Turf Selection: Creating Practical Turf Areas

High input lawns are a habit in American and European landscapes since the days of King Louis of France. However, does the property use require the perfect green lawn with high inputs or would a moderate quality lawn with reduced inputs or a low input lawn be acceptable for the site?

Many lawn care problems arise from management differences between high, moderate and low input lawns. For many gardeners, there is a conflict between expectations and inputs. Table 1 summarizes difference in high, moderate, and low input lawns.

Table 1. Comparison of High, Moderate, and Low Input Lawns			
	High Input	Moderate Input	Low Input
Wear tolerance	best	good	limited
Appearance	best	good	limited
Water	high	moderate	limited
Exposure	sun	sun to partial shade	sun
Fertilization	spring and fall	primarily fall	fall
Species	<ul style="list-style-type: none"> ○ Select KBG cultivars ○ Perennial rye ○ Turf-type tall fescue 	<ul style="list-style-type: none"> ○ Select KBG cultivars ○ Turf-type tall fescue ○ Buffalo grass 	<ul style="list-style-type: none"> ○ Select KBG cultivars ○ Blue grama ○ Buffalo grass

Grass and Water Use

Contrary to popular belief, there is no magic lawn type that delivers top quality with minimal inputs. The quality of any turf is directly dependent on the amount of summer rainfall and supplemental irrigation it receives.

A lawn's tolerance or resistance to drought is a complex situation. A "drought tolerant" specie may or may not use and/or require less water depending on many factors. Factors contributing to drought tolerance include:

- Species (including its actual water use, rooting depth, and ability to go dormant)
- Soil tilth and soil oxygen levels (rooting depth)
- Wind and sun exposure (actual water use)
- Mowing height (high mowing leads to deeper roots).
- Traffic, (any lawn is intolerant of traffic when dry).
- Salt levels in soil and irrigation water.
- Previous irrigation pattern (frequency and watering depth).

The bottom line is that species selection is secondary to irrigation management in water savings. A more drought tolerant lawn species will not use less water if managed like a high input lawn!

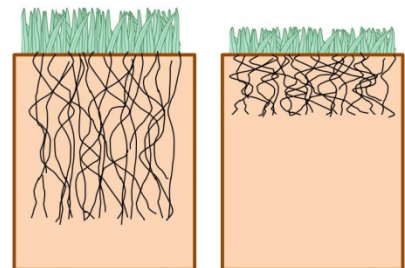
Since Kentucky bluegrass, turf-type tall fescue, and Buffalograss make up 99% of home lawns in Colorado, this *CMG GardenNotes* only looks at these options. For additional information on turf species, refer to *CMG GardenNotes #561, Turfgrass Species Selection Guide*.

If A Turf Is Deeper Rooting

If a turf is deeper rooting:

- It requires less frequent irrigation (i.e., stays greener longer between irrigations).
- However, it will also require a heavier/deeper irrigation to recharge the rooting zone, so actual water use is not necessarily reduced.
- Deeper rooting may or may not be an irrigation savings technique depending on the frequency of soaking summer rains and the irrigation pattern. If the area can depend on frequent soaking summer rains, the deeper rooting cultivars can be an advantage to keep the grass green between rain events. If the lawn is automatically watered two or three times a week, potential rooting depth is a moot point. [Figure 1]
- Many gardeners mistakenly assume that deep rooting is a water savings because irrigation is needed less often. However, the frequency of irrigation is not the primary factor to consider. The issue is total water consumption.

Figure 1. Deeper rooting means less frequent irrigation, but heavier irrigation to replenish the rooting zone. It should not be interpreted as a water savings.



Kentucky Bluegrass Makes a Great Lower-Input Turf Option.

- Kentucky bluegrass, KBG, is the standard for home lawns due to the rich blue-green color and its high tolerance for wear.
- Water use primarily depends on the gardener's irrigation management. On a community wide basis, we use twice the amount of water that the KGB lawns actually need. Research studies show that the most gardeners actually do a good job of irrigation management. However, in any neighbourhood, some gardeners apply four to ten times the amount of actually needed by the lawn.
- With KBG, water use and growth actually slows when the soil begins to dry down. However, to capitalize on this dry down requires careful irrigation management rather than automatic irrigation on fixed days of the week.
- Irrigation demand varies significantly between cultivars. Some deeper rooting cultivars require less frequent irrigations. Some cultivars demand 25% less total water.

- KBG goes dormant with water stress. Summer dormant KBG is a standard in many parts of the eastern United States. Just not in the arid west! Will summer dormant with green lawns in the spring and fall work for the site?
- Bottom line: It is not the KBG that demands the heavy irrigation but rather the gardener's management style.
 - High input KBG makes a great “people space” for high use areas like a ball field with lots wear and tear. Few home lawns have this high traffic situation demanding high inputs.
 - Moderate input KBG (irrigated at 80% ET) fits the need for most home lawns where a beautiful green lawn is desired.
 - When irrigated at 60% ET, KBG makes a thinner carpet. This may be well suited for lower use areas.
 - Where summer dormant is acceptable, KBG makes a great minimal input lawn. It needs to be greened up in the cooler weather of spring and fall with rainfall and supplemental irrigation. [Figure 2]
 - The public objection to summer dormant lawns is that so many are found in un-kept yards that become the neighborhood weed patch.

Note: the term “ET” stands for *evapotranspiration* which is an actual measurement of the water use of the lawn (or crop) based on crop growth, temperature, wind, humidity, and solar radiation.

Figure 2. A weed free, summer dormant KBG lawn. Public objection to summer dormant KBG is that so many are simply no maintenance yards becoming the neighborhood weed patch.



Turf-Type Tall Fescue Makes A Great Lower Input Turf Option.

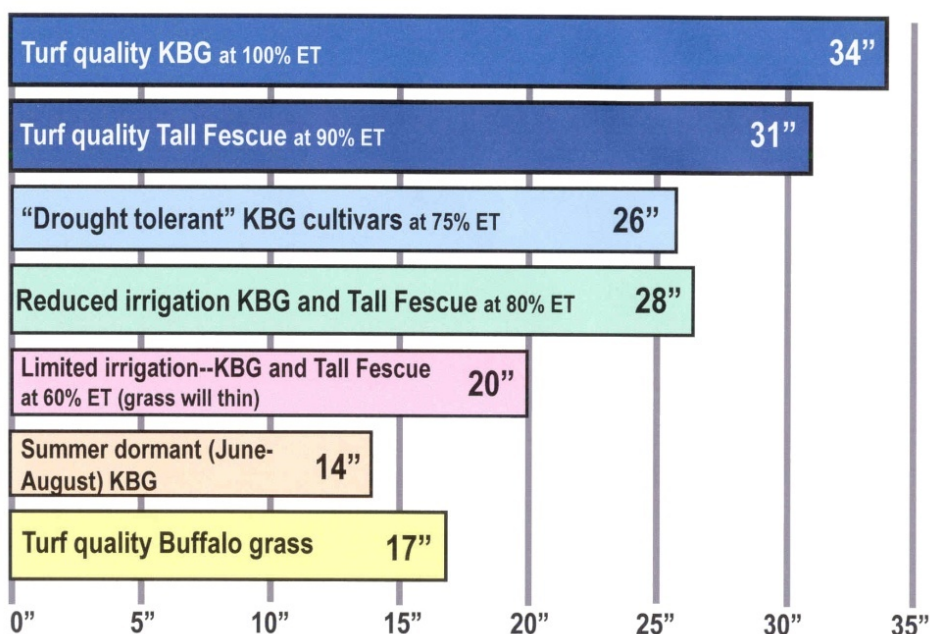
- Turf type tall fescue may be deeper rooted than KGB, depending on soil tilth (oxygen levels), cultivars, and irrigation pattern. This means it may go longer between irrigation, but should not be mistaken as water savings.
- Tall fescue cannot slow growth and water use as the soil dries down. Actual water use may be significantly higher than KBG.
- Tall fescue cannot go dormant. In summer dry spells, it requires irrigation.
- Based on ET, actual water use of turf-quality tall fescue is only 10% less than the ET for KBG. Irrigation management plays a larger role in water use than species selection. Switching from a KBG to a turf-type tall fescue lawn will not save water! Water savings comes in the management of the irrigation.
- Tall fescue makes a great reduced-input turfgrass for site where top quality turf is not essential for the landscape design.

Buffalograss Quality Is Dependent on the Amount of Summer Rain and Irrigation It Receives.

- Being a warm season grass, Buffalograss will be dormant brown from early fall (first frost) to late spring in Colorado.
- To be green in the summer, water use for Buffalograss is about 1 inch of rain and irrigation per week. To remain green in Colorado summers, Buffalograss generally requires irrigation to supplement natural rainfall.
- Turf-quality Buffalograss requires 50% less rain and irrigation per season than KBG. This reduction is due, in part, from being dormant in the spring and fall.

Comparative Seasonal Water Requirement

Figure 3 illustrates the comparative season water requirement (including summer rainfall and irrigation) of lawn options. The typical lawn receives twice the amount of irrigation required for high input KBG. [Figure 3]



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Revised October 2014



CMG GardenNotes #413

Water Wise Landscape Design: Principles of Landscape Design

Outline: Unity – page 1
 Line – page 2
 Form – page 3
 Texture – page 3
 Color – page 4
 Scale – page 5
 Balance – page 6
 Simplicity and Variety – page 7
 Emphasis – page 9
 Sequence – page 10

The principles of landscape design include the elements of *unity*, *scale*, *balance*, *simplicity*, *variety*, *emphasis*, and *sequence* as they apply to *line*, *form*, *texture*, and *color*. These elements are interconnected.

Landscape design is a process of developing practical and pleasing outdoor living space. For additional information on the process, refer to *CMG GardenNotes* #411, **Water Wise Landscape Design Steps**.

***Unity* is the Quality of Oneness.**

Unity attracts and holds attention. It organizes view into orderly groups with emphasis. Unity starts with the *story line* developed in the *family analysis*, step 2, in the design process. For additional details on Family Analysis, refer to *CMG GardenNotes* #411, **Water Wise Landscape Design Steps**.



Figures 1 and 2. Unity develops from the story line. Here in Jeff de Jong's garden a story line around "sacred space gardening" creates unity with the feeling of peace and tranquility.



***Line* Connects and Defines the Space, Creating Outdoor Rooms**

Lines are a powerful design element that define rooms and connect people to the landscape. For a professional touch, use sweeping bold lines and curves rather than small zigzags and small wavy curves. Lines develop through Step 3 in the design process, *With Lines, Delineate Softscape and Hardscape Area Creating Outdoor Room*. For additional details on Step 3, refer to *CMG GardenNotes #411, Water Wise Landscape Design Steps*.

Figure 3. Notice the strong use of "line" here in the Japanese Garden at Butchart Gardens, Victoria BC. The path (primary line) invites you into the garden. Secondary lines form the beds.



Figure 4. In this private garden, the "line" formed by the edge of the pond creates an amazing space as the plants reflect in the water. The line defines the space and pulls you into the landscape.



Form Includes the Three-Dimensional Mass.

Form is determined by the line, direction, and arrangement of branches and twigs. The resulting mass influences the scale. For unity, repeat the topography form in plant forms. [Figure 5]

- **Horizontal and spreading** forms emphasize the lateral extent and breath of space. They are comfortable because it corresponds with the natural direction of eye movement.
- **Rounded** forms are most common in plant materials. They allow for easy eye movement and create a pleasant undulation that leads itself to plant groupings.
- **Vase-shaped** trees define a comfortable “people space” beneath the canopy.
- **Weeping forms** lead the eye back to the ground. What is below the weeping form often becomes a focal point.
- **Pyramidal** forms direct the eyes upward, so use sparingly. Grouping pyramidals will soften the upward influence. They will look more natural in the surroundings with foliage to the ground.



Figure 5. Forms (left to right) columnar, oval, vase, weeping, pyramidal, rounded

Texture is Fine/Coarse, Heavy/Light, Thin/Dense, and Light/Shade.

Texture can be defined as the relationship between the foliage and twig size, and the mass of the plants. Closeup, texture comes from the size and shape of the leaves, the size of twigs, spacing of leaves and twigs, the colors and shading, the gloss or dullness of leaves. At a distance, texture comes from the entire mass effect of plants and the qualities of light and shadows. [Figure 6]

Figure 6. Texture changes with distance. Up close, texture comes from the size and shape of leaves and twigs, plus the coloring and shading. At a distance, it comes the mass and play of light.



Figure 7. Four season gardening is all about texture gardening. Without the summer color, texture becomes the primary design element.



Figure 8. Texture rules here in the Japanese Garden at Butchart Gardens, Victoria, BC. Notice how the fine texture created by the moss plays with the coarse texture of the tree trunks and lantern. In Japanese gardening, the lantern is a symbol that this is sacred space, leave your cares and worries behind.



Color Gives Greatest Appeal, and Evokes the Greatest Response.

How does color speak to you? What colors work for the landscape story line?

Color is powerful in creating mood and feeling. *Color therapy* is a popular topic in our rapid paced modern world. What moods and feeling do various color create for you? What colors work for the landscape story line? What moods and feeling do you want in the garden? Is it a room for relaxation and healing or a room for action activities? Examples of common color feelings include the following:

Red

Passion
Courage
Power
Wealth
Motivation
Fame

Yellow

Joy
Happiness
Communication
Inspiration
Sunshine
Optimism

Blue

Imagination
Calm
Serenity
Relaxation
Compassion
Reflection

Green

Harmony
Beginnings
Prosperity
Nature
Growth
Healing

Orange

Enthusiasm
Joy
Exuberance
Interaction
Fun
Captivation
Sex

Purple

Intuition
Devotion
Respect
Peace
Spirituality
Awareness
Deity
Royalty

White

Purity
Innocence
Faith
Benevolence
Honesty
Grace

Pink

Love
Sweetness
Uplifting
Happiness
Tenderness
Enticement

What color schemes work for the landscape story line? [Figure 9]

Cool colors

Less conspicuous
Restful
Recede
Suggest distance
Low scale

Warm colors

Conspicuous
Cheerful
Stimulating
Come forward
High scale

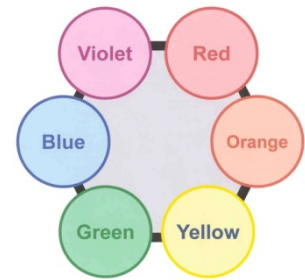


Figure 9. Color is the most powerful of the design elements. Choose colors carefully to create the mood desired in the story line.

Scale Evokes Emotional Connection and is Closely Related to Color.

Absolute scale relates to the comparative value of landscape elements to a fixed structure (house). [Figure 10]

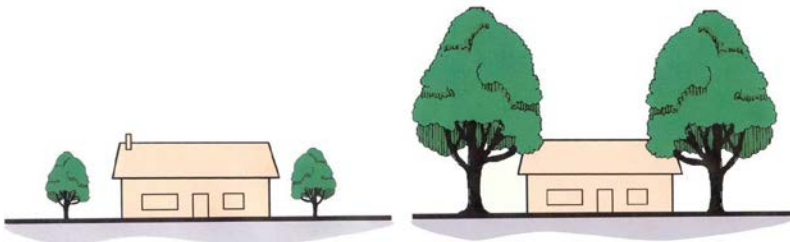
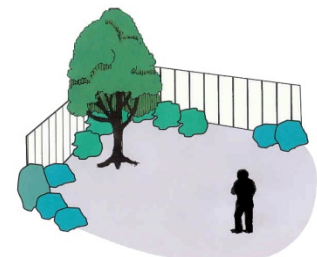


Figure 10. In absolute scale, the small trees on the left drawing give the feeling that the house is large. On the right drawing, the large trees give the feeling that the house is small. Both houses are the same size.

Relative scale relates to comparative sizes or “values” of objects in the landscape. Relative scale is very emotionally charged and closely linked to color. It may create a feeling of relaxation and peacefulness or one of energy and action. [Figures 11-13]

Figure 11. Relative scale compares the size or "value" of the landscape elements. Perception of tree size is based on the relative size of the person. Being emotionally charged, relative scale can create feelings of action or relaxation.



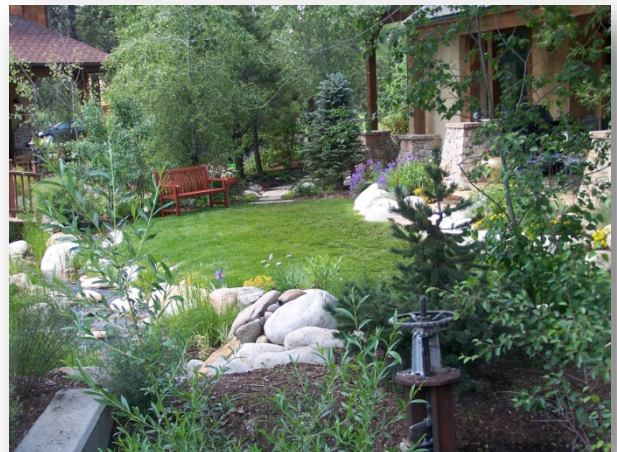
- **High scale** promotes action. It is used around large buildings and in large spaces to fill the space. Use of high scale in small spaces makes the space feel smaller. [Figure 12]

Figure 13. Here in the fountain area at Butchart Gardens, scale is high with the brightly colored flowers. The action feeling of high scale helps move people through.



- **Low scale** is relaxing and calming. It is used in the home landscape to give a feeling of peace and relaxation. [Figure 13]

Figure 13. In this private garden in Steamboat Springs, CO, the low scale creates a relaxing, renewing atmosphere.



***Balance* is Equilibrium on Left and Right Sides.**

Formal balance repeats the same left and right, giving stability, stateliness, and dignity. [Figures 14 and 16]

Figure 14. Formal Balance



Informal balance differs from left to right giving curiosity, movement, and feels alive. [Figures 15 and 17]

Figure 15. Informal Balance



Which gives the “feeling” desired by the story line and design?

Figure 16. The stately Italian Garden at Hatley Park, Victoria, BC, is a great example of formal balance.



Figure 17. The Herb Garden at Government House, Victoria, BC, is an excellent example of informal balance being relaxing and free flowing.



Simplicity and Variety

Simplicity and variety work together to balance each other. **Simplicity** is a degree of repetition rather than constant change, creating unity. **Variety** is diversity and contrast in form, texture, and color preventing monotony. [Figures 18-22]

- For simplicity, repeat some plant materials in sweeps and groupings.
- For variety, fill in with other plants.
- Avoid creating a horticultural zoo (one of this, two of that)!
- Zipper plantings (like red-white-red-white) lack simplicity and variety.

Figure 18. In this simple drawing, *simplicity* is gained with the shrub row repeating the same plant materials. *Variety* is added with the tree.



Figure 19. For simplicity, repeat some plant materials in sweeps and groupings. Fill in with other plants for variety.

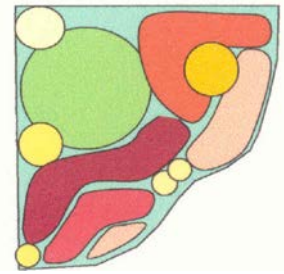


Figure 20. Simplicity is created by several hundred Hosta in this large bed. Variety is created by placing some in clusters of pots. - Innis Gardens, Columbus, Ohio



Figure 21. At Abkhazi Garden, Victoria, BC, simplicity is created with the row of purple heather and the lawn (the "Yangtze River"). Variety is created with an assortment of plant materials on the rocky hillside.



Figure 22. In this park, people enjoyed taking pictures of the various flowerbeds. However, they did not take pictures of this zipper planting (same elements repeated over and over again) finding it monotonous.



Emphasis is Dominance and Subordination of Elements.

The human mind looks for dominance and subordination in life. As we look at a landscape from any direction, we need to see dominance and subordination of various elements. If we do not find it, we withdraw from the landscape. Some gardens lack the dominant element. Others suffer with too many dominate elements screaming to be the focal point. [Figure 23-25]

Emphasis can be achieved through different sizes, bold shapes, groupings, and the unusual or unexpected. What is the focal point?

Figure 23. Emphasis is achieved with the tree being dominant and the shrub grouping being subordinate.



Figure 24. In this private garden, emphasis is added with the blooming Astelbe.



Figure 25. Ornamental grass often adds emphasis to a garden spot.

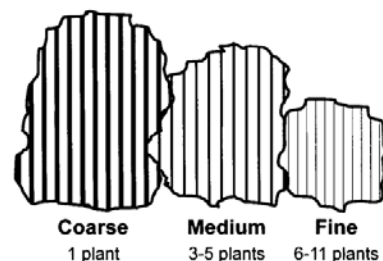


Sequence is the Change or Flow in Form, Color, Texture, and Size Giving Movement or Life.

Sequence with Texture

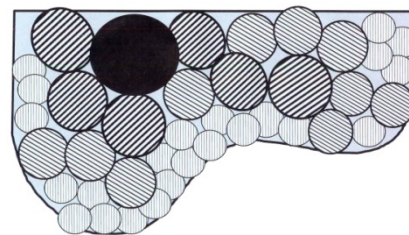
Change leaf size of adjacent different plants by at least one-half. Use proportionally larger numbers of fine textured plants. [Figure 26]

Figure 26. In texture sequence, change leaf size of adjacent different types of plants by at least one-half. Use more of the finer textured plant.



In a flower/shrub bed, use coarser texture, larger plants in the back; sequencing to finer textured, smaller plants in the front inside-curve. [Figure 27]

Figure 27. In texture sequence, place the fine texture plants in the inside curve and the coarse texture plants opposite. This is the way Mother Nature would do it. Look at the river. The sand bank is on the inside curve and the cliff opposite.



- Texture and distance – Texture becomes finer with distance. In a distant corner, place finer textures in the corner, sequencing to coarser textures on the arms. [Figure 28]

Figure 28. Textures get finer with distance. Place the fine textured plants in the distant corner with coarser textured plants toward the viewer.



Sequence with Color

There are few basic rules on how much warm and cool colors to use. However, watch that the scale does not become too commanding. More is NOT better. As a rule-of-thumb, the designs needs 90% green to set off the 10% color.

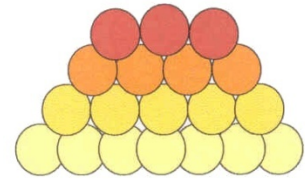
Darkest shades and the purest intensity dominate and should be used at the focal point. Using cool colors in contrast is more effective than sequences. Warm color work best in sequence.

Color Sequence

1. Decide what color(s) will be used.
2. Decide if light or dark will dominate. – The darker or more intense (pure) the color, the more it will show up and dominate the scene.

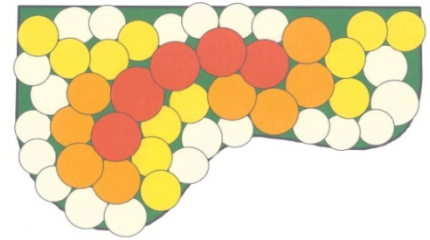
3. Calculate the number of plants of each color using this rule-of-thumb.
 - a. Establish the largest amount of dark/dominant color that will be used.
 - b. Select the next lighter shade and increase the number of plants by 1/3.
 - c. Select the next lighter shade and increase the number of plants by 1/3.
 - d. Continue the ratio to the lightest color. [Figure 29]

Figure 29. In color sequence, increase the number of plants by 1/3 as the design moves from the dominant color to subordinate colors.



- Grouping for best effect – Kidney or crescent shaped groupings create a natural flowing design. [Figure 30]

Figure 30. In color sequence, crescent shapes of colors give a natural flow.



Color Contrasts

- **Monochrome light/dark color contrasts** – Use 1/3 one shade and 2/3 the other shade. [Figure 31]
- **Complementary color contrasts** – Use 1/3 one color and 2/3 the complementary color.

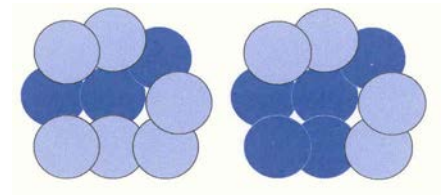


Figure 31. In color contrasts, use 2/3 of one color for dominance and 1/3 of the other color for subordination. Not half and half.

Create effective plant combinations by paring opposites

To create plant combinations with pizzazz, pair opposites. [Figures 32 to 35]

- | | |
|-----------------|-------------------|
| ○ Fine/Course | ○ Short/Tall |
| ○ Round/Upright | ○ Thugs/Dainty |
| ○ Small/Large | ○ Color contrasts |

Figure 32 to 35. Examples of great pairing.





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

- #410 References and Review Questions: Water Wise Landscape Design
- #411 Water Wise Landscape Design Steps
- #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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