Landscape Irrigation Efficiency

IWAC Meeting

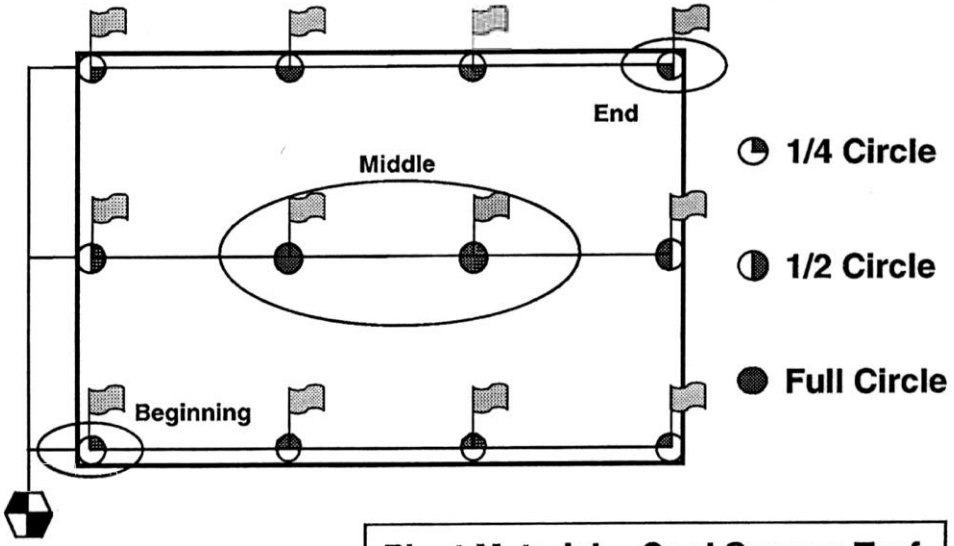
February 14, 2017

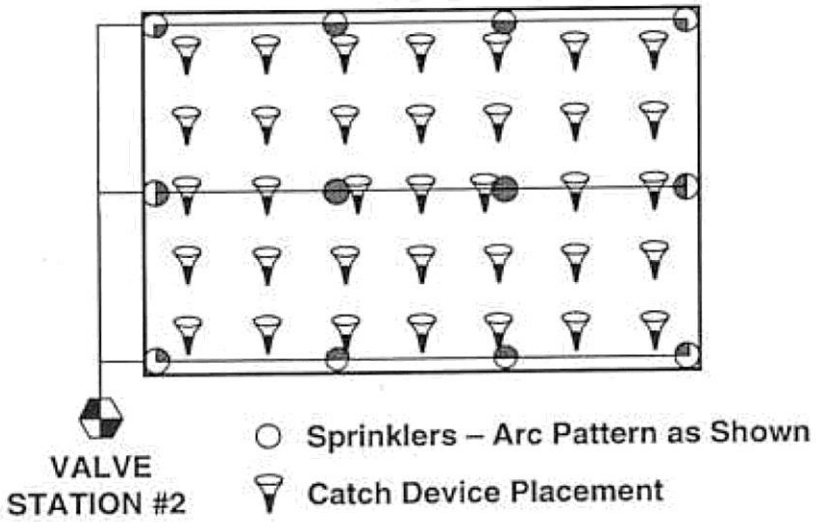
Background

- Approximately ½ of the water we use annually is applied to landscapes
- Through education and planning, it is estimated that landscapes can be well maintained using 20-50% less water

Distribution Uniformity

- Distribution Uniformity (DU) is a key indicator of the performance of an irrigation system
- DU measures how uniformly an irrigation system applies water to the landscape
- Simple catch can trials can be conducted on any type of irrigation system and the data is used to calculate the distribution uniformity for the system
- DU is calculated as the ratio of the average irrigation volume applied to the driest quarter of the landscape (or grid) and the average volume applied across the whole landscape (or grid)


End
Middle
Beginning
1/4 Circle
1/2 Circle
Full Circle
Valve
Station #2
Plant Material: Cool Season Turf
Soil: Loam
Root Zone: 8 in.


VALVE
STATION #2
Sprinklers – Arc Pattern as Shown
Catch Device Placement

Calculate DU

EXAMPLE

- Can Readings (mm):

25	15	20	10	15
20	25	28	22	18
17	10	14	7	18
19	14	12	9	18
16	15	23	13	22

- Step 1: Order the can results from the smallest number to the largest number: **7, 9, 10, 10, 12, 13**, 14, 14, 15, 15, 15, 16, 17, 18, 18, 18, 19, 20, 20, 22, 22, 23, 25, 25 and 28.
- Step 2: Take the lowest quarter (in bold) and find their average. Then find the average of all the can readings. The average of these numbers is: (7+9+10+10+12+13)/6 = 10.2. The average of all the can readings is 17.0.
- Step 3: Calculate DU using the equation. DU = 10.2 /17.0 = 0.6 or 60%

Importance of Distribution Uniformity

DU %	Water the plant needs	÷	DU Decimal	=	Amount of water you need to keep the dry areas green
30%	1 inch	÷	0.3	=	3.33 inches
50%	1 inch	÷	0.5	=	2.00 inches
70%	1 inch	÷	0.7	=	1.42 inches

Excellent (Achievable)	Good (Expected)	Poor (Common)
75%	60%	50%

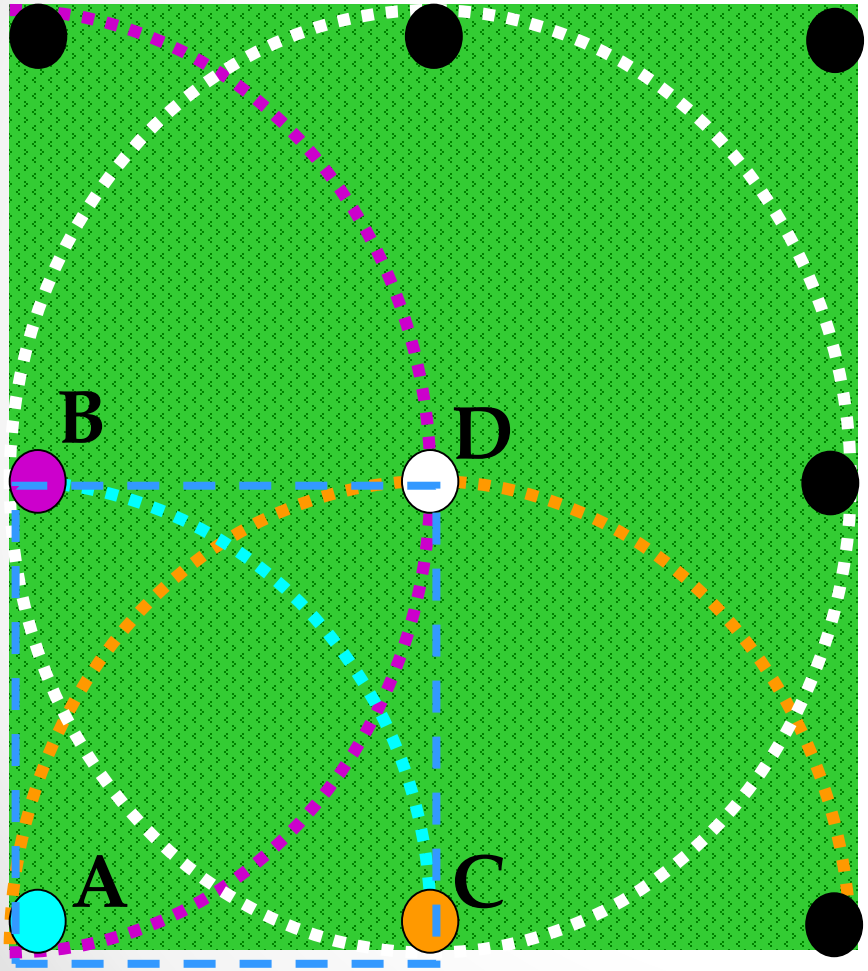
Efficiency

- Efficiency of various irrigation methods:
  - Subsurface drip – 90%
  - Surface drip (micro) irrigation – 85%
  - Large rotors – 70%
  - Small rotors – 65%
  - Spray heads – 50%
- Matched Precipitation Rate (MPR)

Matched Head Precipitation

- Matched precipitation heads allow full circle, half circle and quarter circle sprinkler heads to be used together to provide a uniform coverage of an irrigated area
- The flow rates of the nozzles are proportional to the degree of arc covered.
  - For example, the flow rate of a quarter circle spray is equal to one-quarter that of a full circle spray. The flow rate of a half-circle spray is equal to one-half that of a full circle spray.
- Heads must spray head to head.

Matched Precipitation Rate



Proportionate GPM

A = 1 gpm

B = 2 gpm

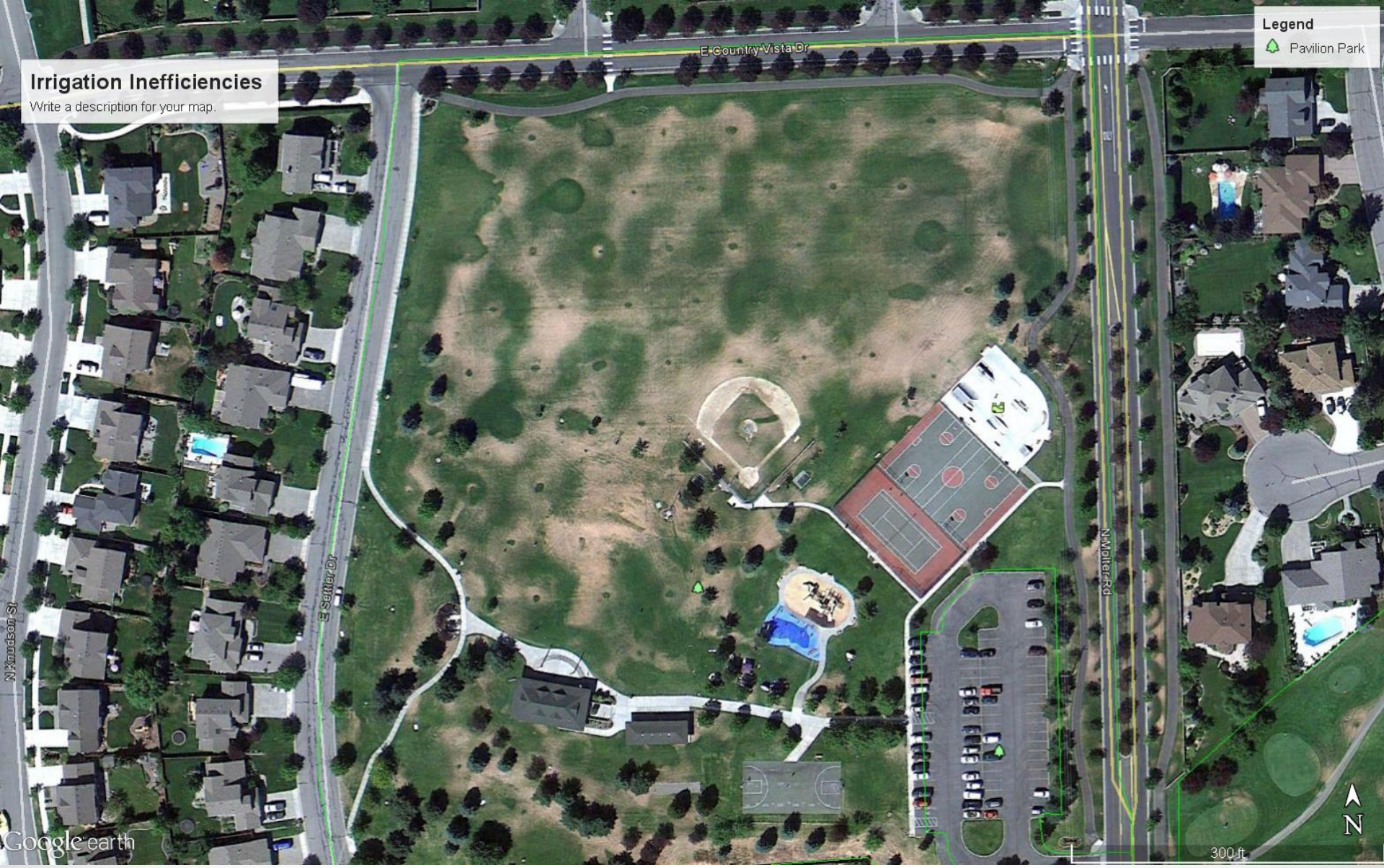
C = 2 gpm

D = 4 gpm

Therefore, each head is applying 1 gpm into the area within the spacing.


Irrigation Inefficiencies
Write a description for your map.
Legend
Liberty Lake Elementary School
N Mitchell Rd
N Mitchell Ct
E Country Vista Dr
Google earth
N
200 ft

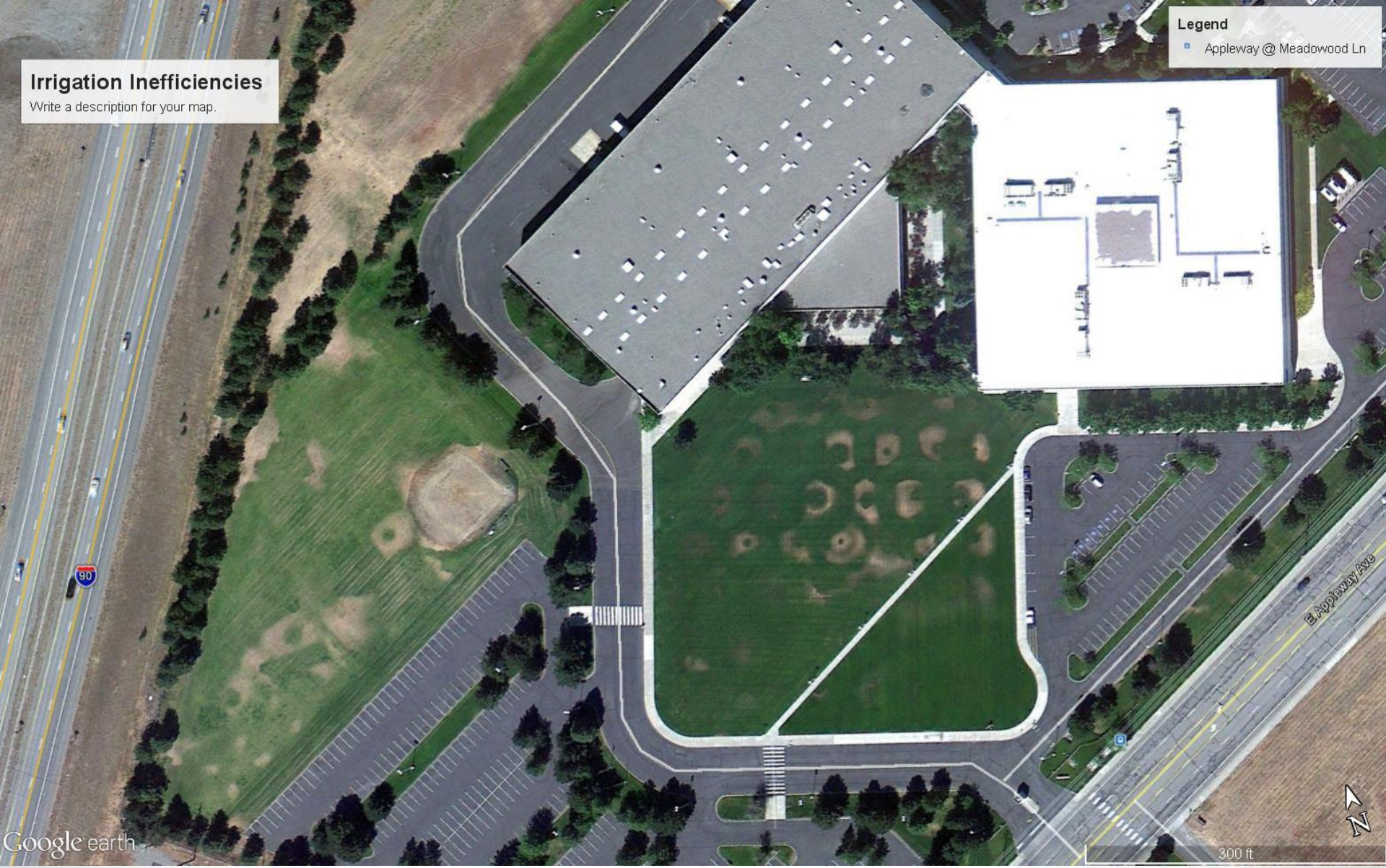
2011


Irrigation Inefficiencies
Write a description for your map.
Legend
Pavilion Park
E Country Vista Dr
E Settler Dr
N Hudson St
N Molter Rd
Google earth
300 ft
N

2011


Irrigation Inefficiencies
Write a description for your map.
Legend
Country Vista @ Lib Lk Rd
Liberty Lake
E Country Vista Dr
N Liberty Heights Ln
N Liberty Lake Rd
N Carry Dr
N
400 ft
Google earth

2011


Irrigation Inefficiencies
Write a description for your map.
Legend
Appleway @ Meadowood Ln
E Appleway Ave
90
Google earth
300 ft
N

2011


Irrigation Inefficiencies
Write a description for your map.
Legend
Rocky Hill
E Ludlow Ave
N Winrock St
E Autumn Crossing Ave
N Winchester Ct
E Mission Ave
N Terrace Ln
N
200 ft
Google earth

2011

2011

- Audited in June 2005. System efficiency (DU) was 44%
- Implemented landscape measures. Reduced water by 36% the following year.

2006

Proposal

- Develop a regional Model Efficient Irrigation Design Standard
- Hire consultant to prepare Model
- WaterSense (EPA Partnership Program) has labeled certification programs in the following specialties:
  - Irrigation System Design
  - Irrigation System Installation and Maintenance
  - Irrigation System Audits
  - Filed Notices of Intent to develop and/or revise specs for soil moisture control technologies and landscape irrigation sprinklers
    - Now have a draft spec for spray sprinkler bodies
    - Final product specs for weather based irrigation controllers
    - Outdoor irrigation product labeling/specs in development similar to toilets, faucets, etc.

Model Examples

- California Department of Water Resources - Model Water Efficient Landscape Ordinance
- Arizona Department of Water Resources - Tucson Active Management Area
  - Adapted from the California State Model Water Efficient Landscape Ordinance to meet the needs of the Tucson Metropolitan Area
- Water-Efficient Landscape Design - A model landscape ordinance for Colorado's communities utilizing a water conservation-oriented planning approach
- Standards for Landscape Irrigation in Florida

Questions