Outdoor Water Use

August 5, 2008

Presenters:
Paul Bassett, LEED AP
EPA Water Sense Partner

Outdoor Water Use:

How to Identify and Correct an Inefficient Irrigation System

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Is this a good use of our resources?


Submersible Pump in Potomac River
Transfer Pond #1
Transfer Pond #2 With Pump Station
Irrigation Zone

Irrigation Association Certification

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Irrigation Audits

1. Site Inspection - System Tune-up
2. System Tests
3. Calculate a Base Schedule

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Irrigation Management

4. Implement the Investment
5. Adjust Original Base Schedule
6. Track weekly, monthly, annual water use
7. Maintain the system for optimum efficiency.

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Key Irrigation Auditor Actions

- Identify equipment problems
- Determine actual system performance based on uniformity tests
- Adjust run times according to season
- Fine tune stations to exposures
- Trim back system to minimize water use

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This Water Savings is Achieved By:

- Upgrading control systems to Weather of Soil Based Controllers
- Checking and fixing distribution equipment
- Changing distribution equipment to low application rates or drip tubing.
- Maintaining the system at peak efficiency

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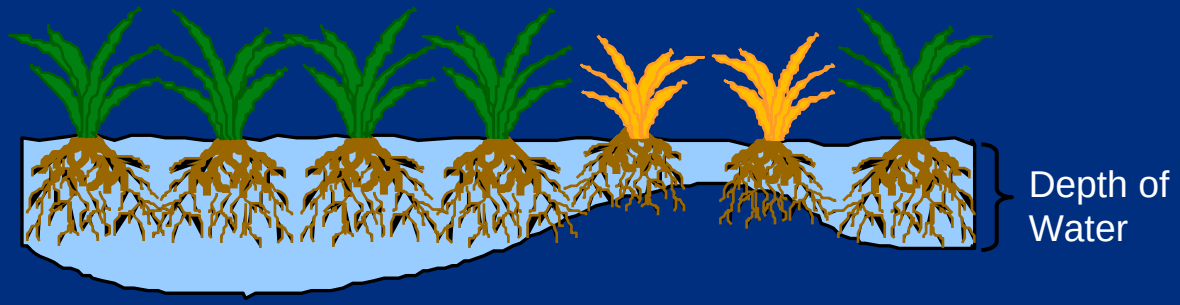
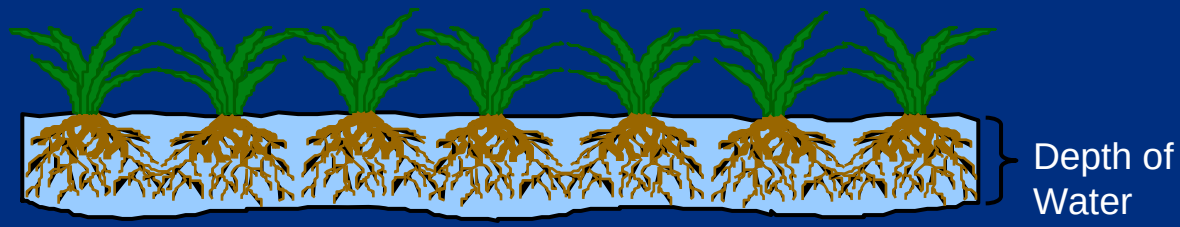
Irrigation Uniformity

POOR UNIFORMITY



GOOD UNIFORMITY (NEVER PERFECT)



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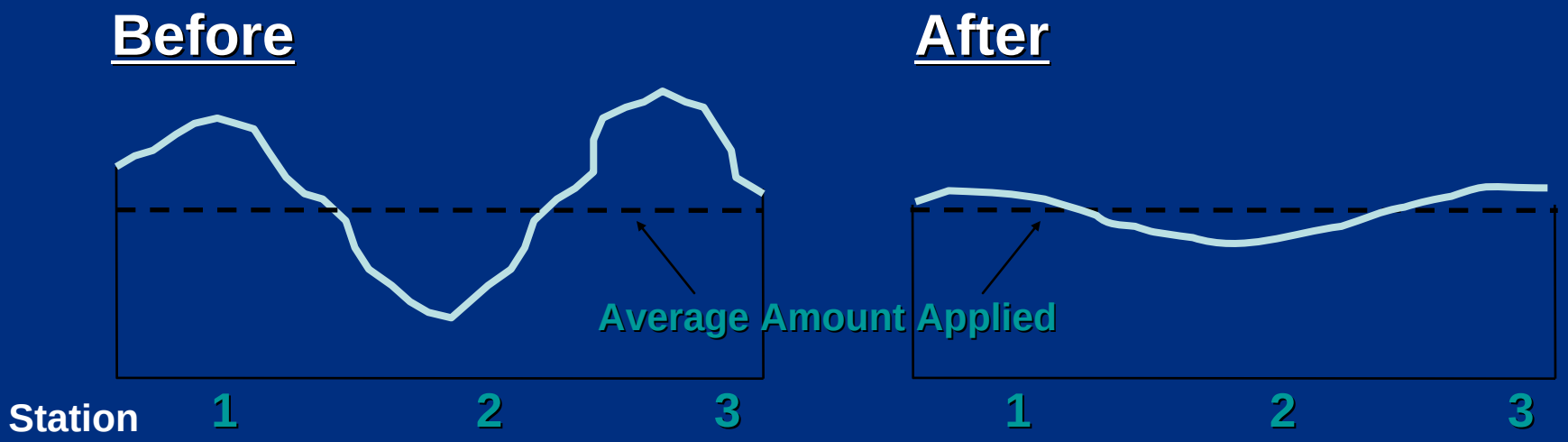
First Auditor Action

- Balance precipitation rates between stations
  - Repair distribution equipment
  - Adjust run times between stations



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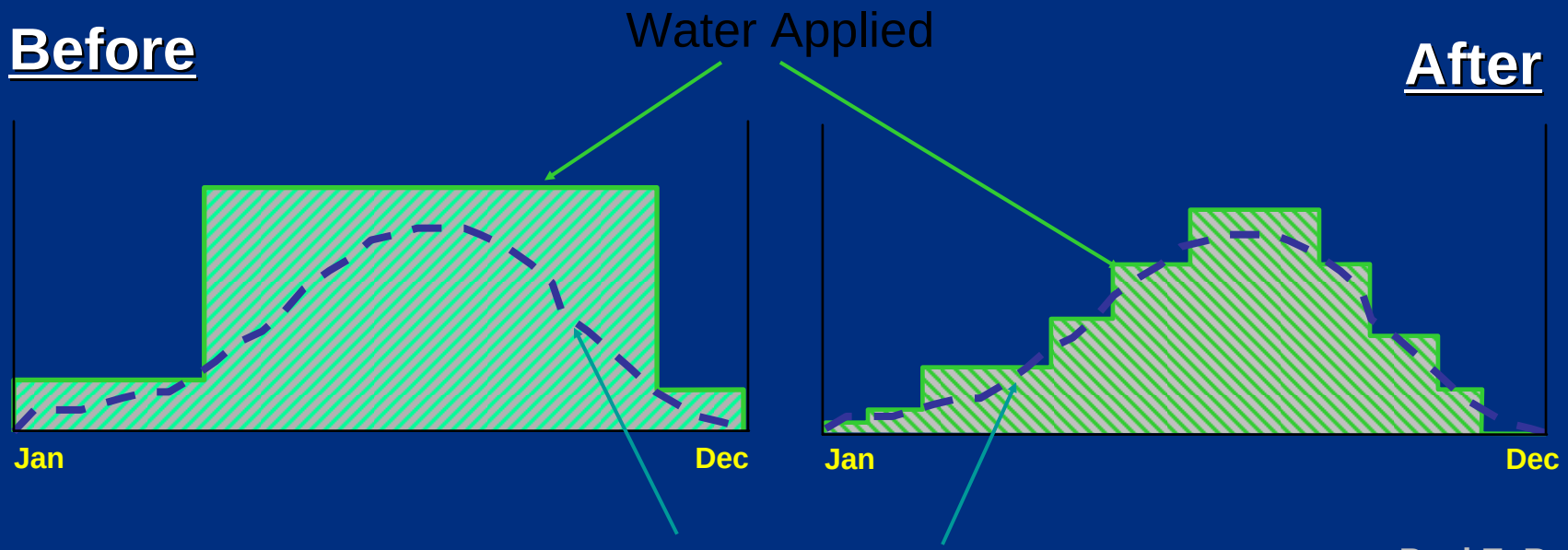
Second Auditor Action

- Adjust run times according to the season



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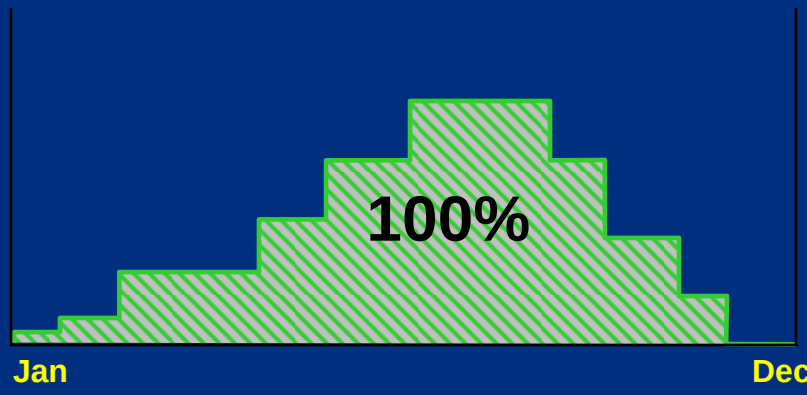
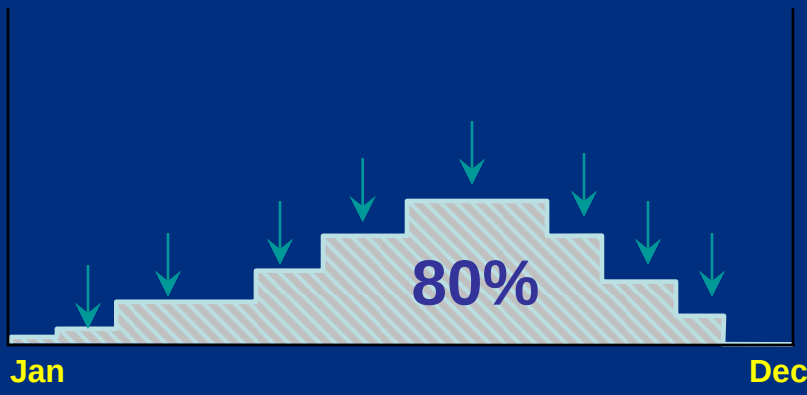
Third Auditor Action

- Trim back run times
  - Make adjustments on equipment affecting specific dry areas only

Before



After



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Site Inspection

- Step #1
  - Get the system working properly

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Data Collection During Site Inspection

- Existing As-builts for Irrigation System
- Site conditions and microclimates
- Water supply point of connection data
- Controller data
- Brand of products used
- Current watering schedule

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Site Inspection Priorities

- Minor, not major repairs
- Low heads
- Plugged heads
- Bad adjustments
- Tilted heads
- Unmatched precipitation rate
- Mix matched heads

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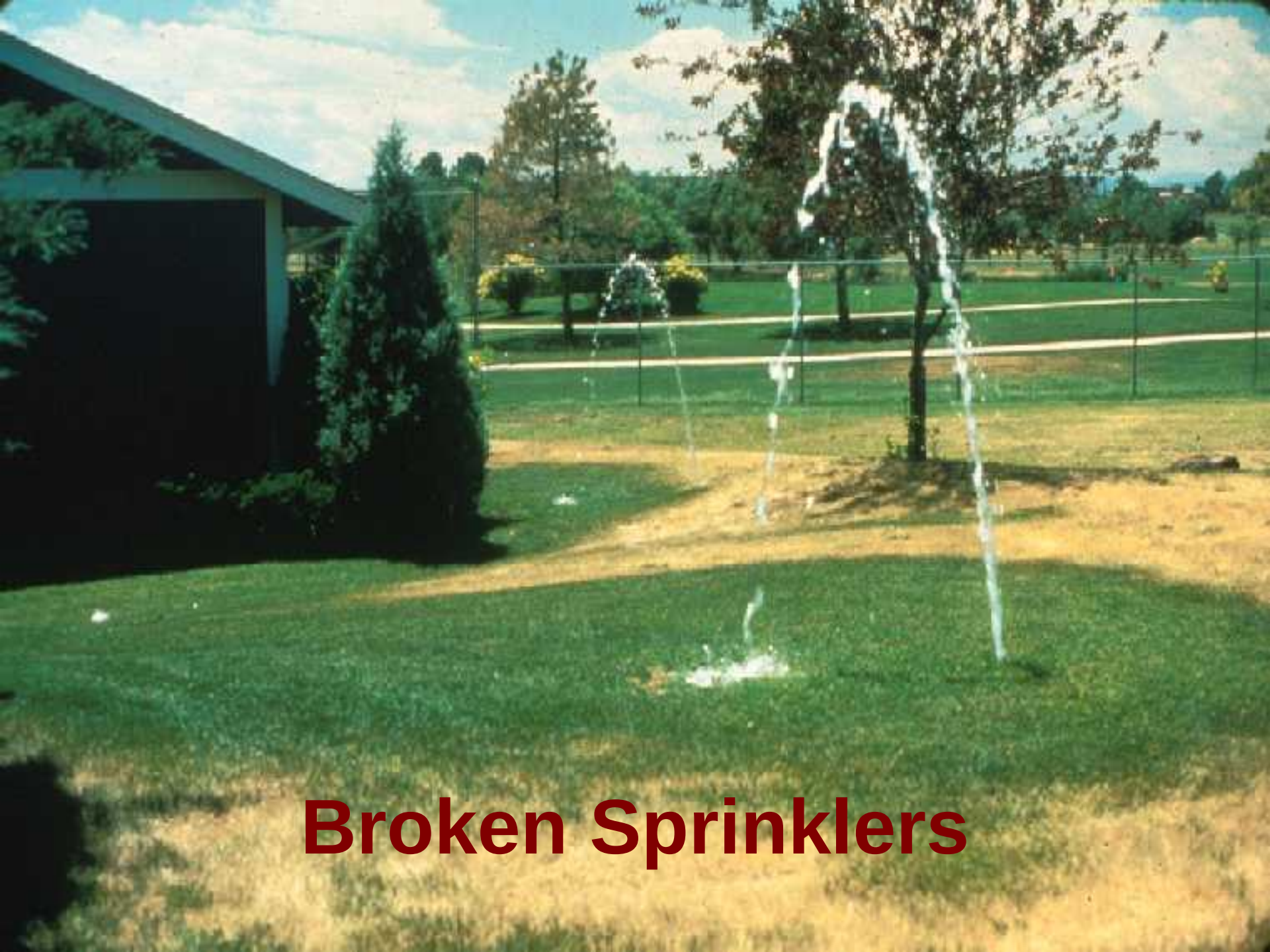
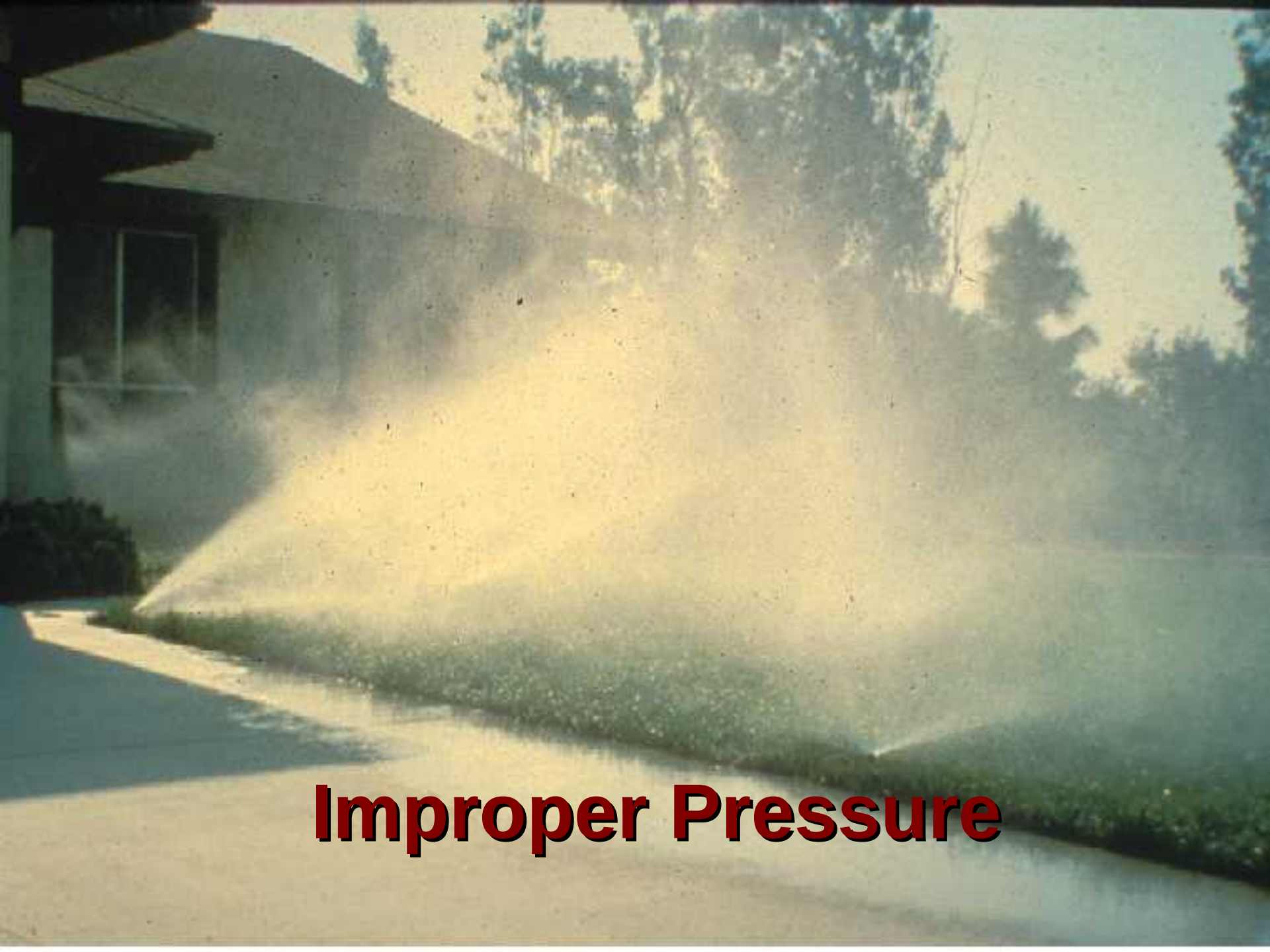
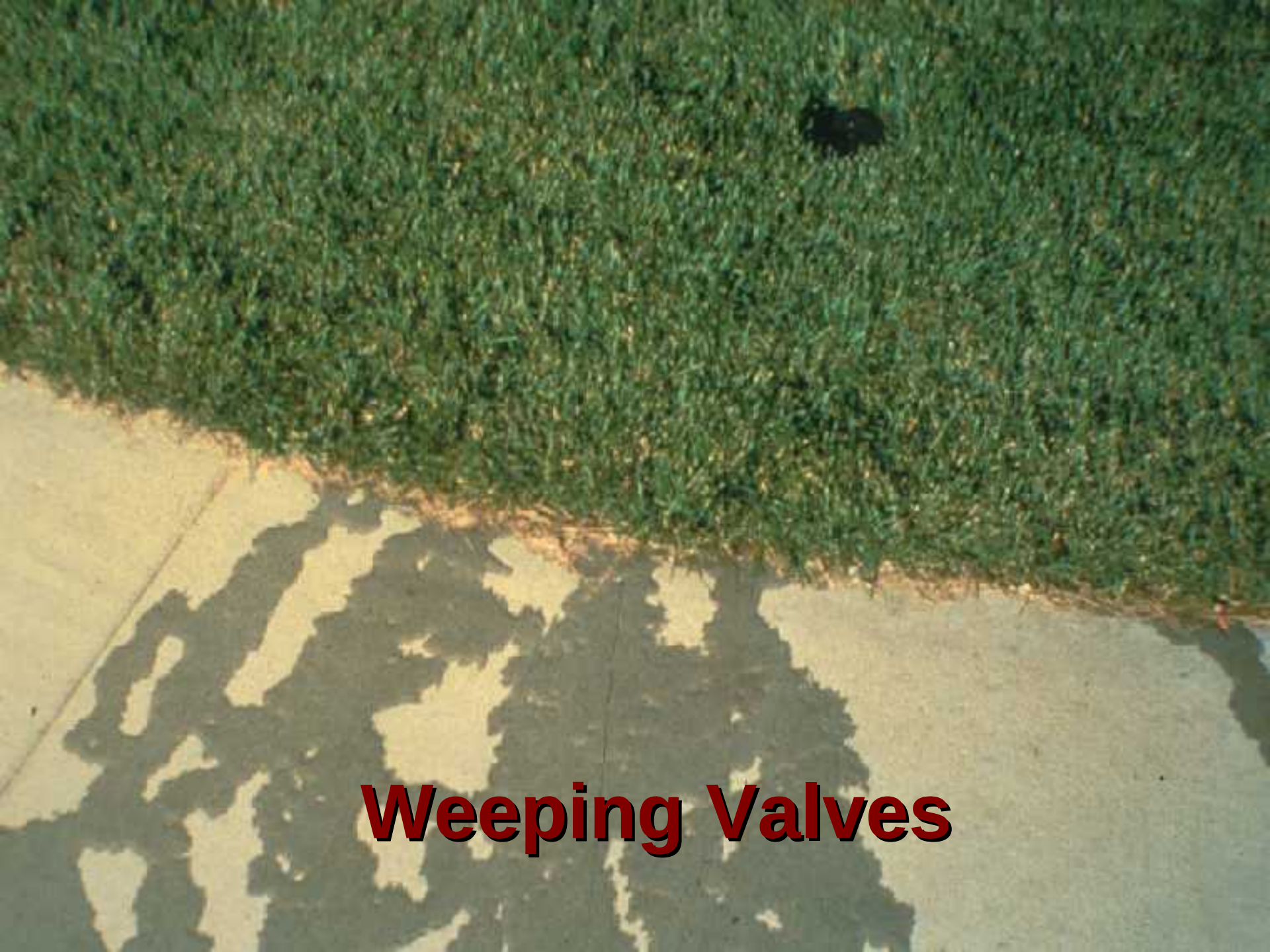

Broken Sprinklers

Bad Seals


Improper Pressure

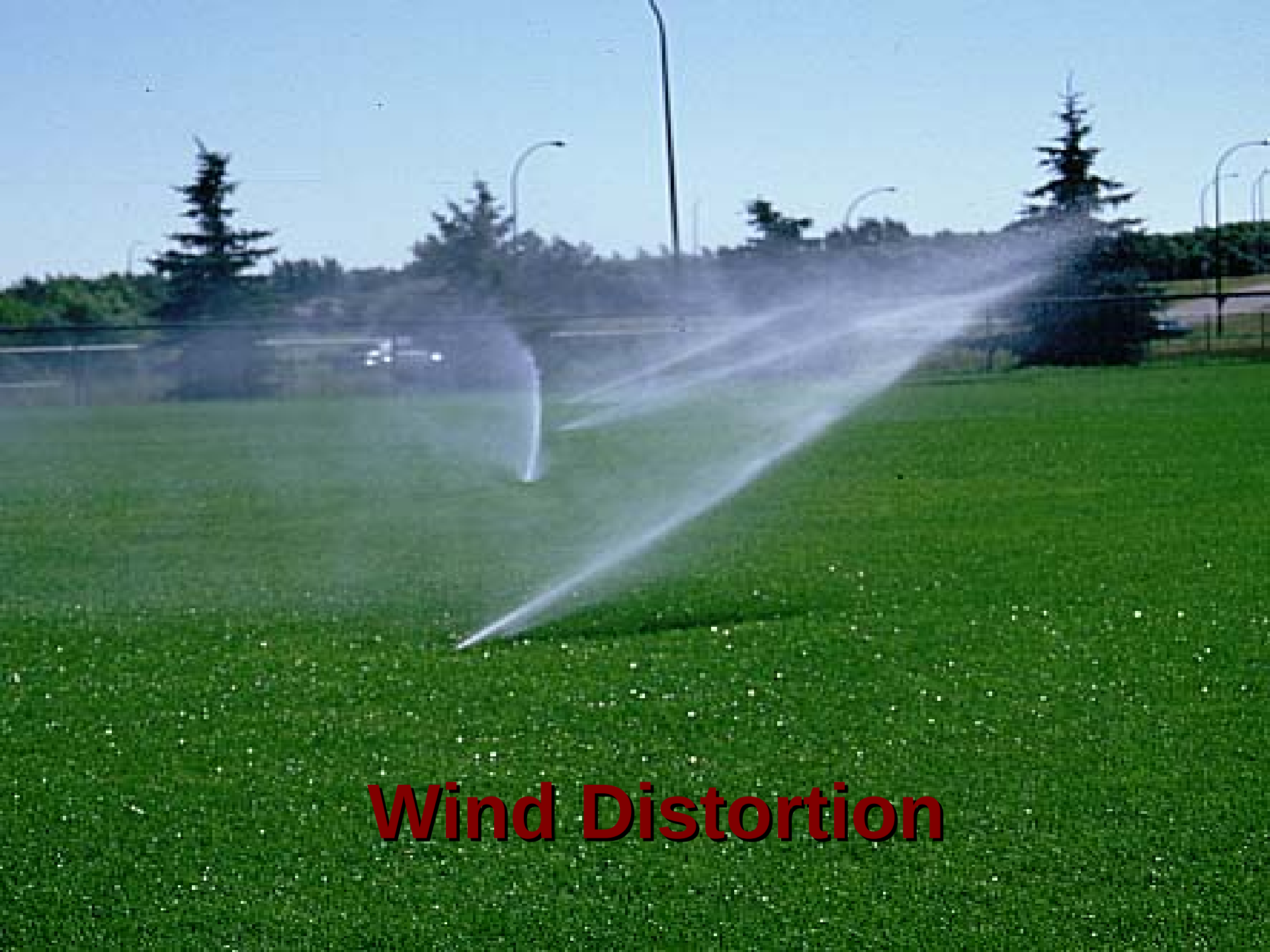

Sunken or Blocked Sprinklers
AUG 3 2004


Existing Schedules


Weeping Valves

Mismatched Sprinklers

AUG 3 2004


Wind Distortion


Misaligned Sprinklers

Irrigation System Test

- Step #2
  - Verify existing distribution uniformity (DU)
  1. Catch Cup Data Collection Procedure
  2. Portable Soil Moisture Probe Procedure

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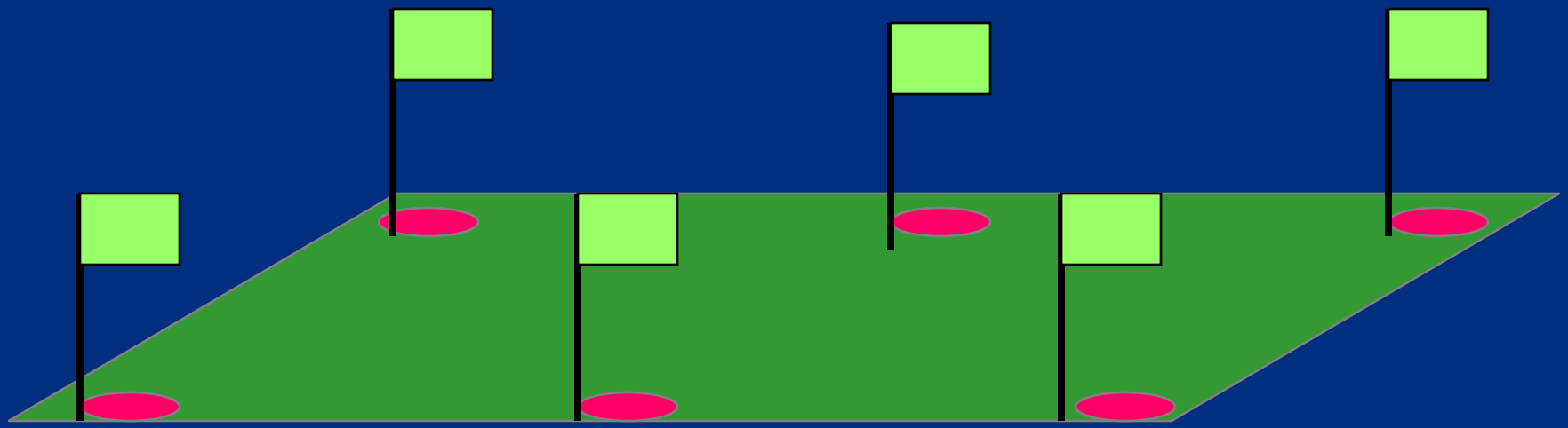
Flag Irrigation Stations



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Catch Cups

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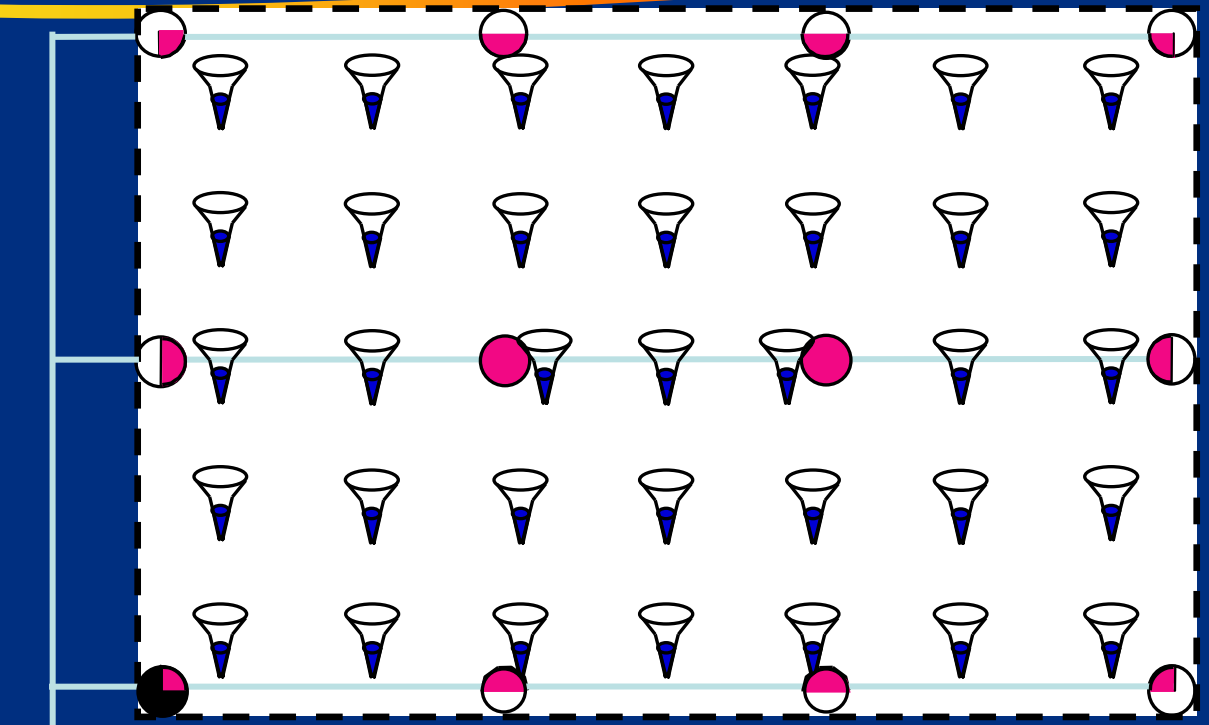
Catch Cup Placement



VALVE STATION #2

Sprinklers – Arc pattern as shown

Catch device placement

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Read the Measurement

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Portable Soil Moisture Probe

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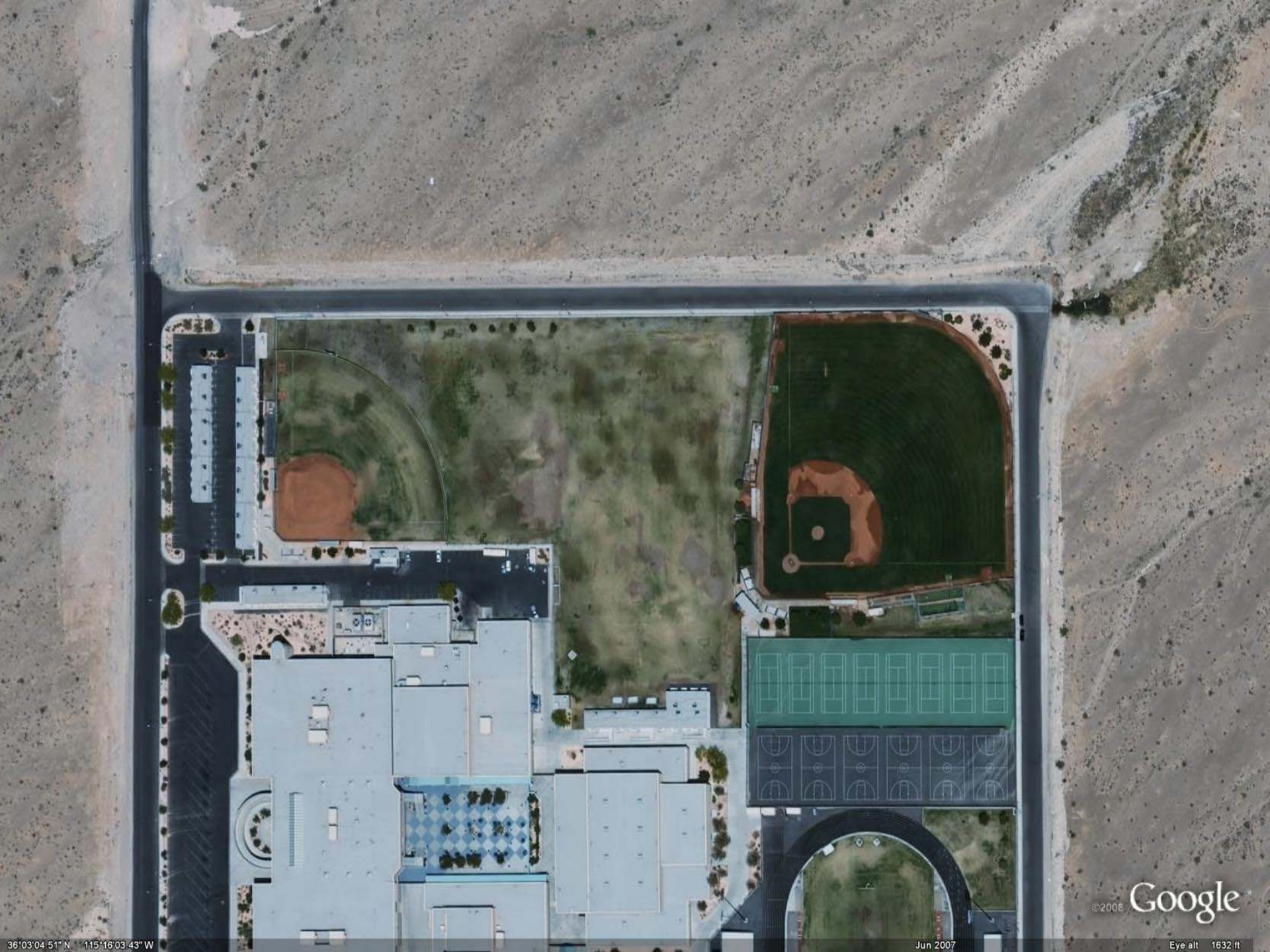

©2008 Google
36°03'04.51" N 115°16'03.43" W
Jun 2007
Eye alt 1632 ft


©2008 Google
36°03'04.51" N 115°16'03.43" W
Jun 2007
Eye alt 1632 ft

Soil Moisture Data

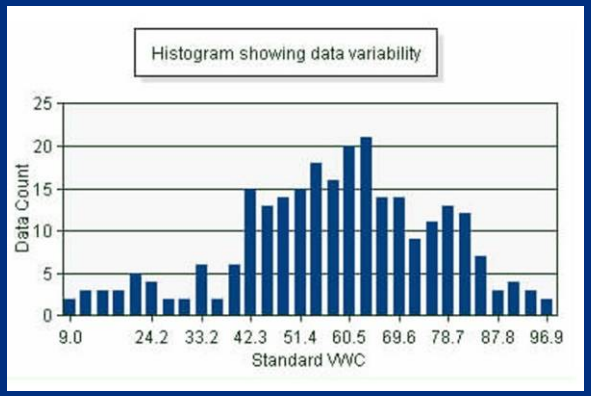
Color Legend				Count
	9.0	to	20.0	10
	20.0	to	31.0	12
	31.0	to	42.0	18
	42.0	to	53.0	55
	53.0	to	63.9	69
	63.9	to	74.9	51
	74.9	to	85.9	35
	85.9	to	96.9	12

Units of measurement are in 'Standard VWC'

Uploaded on 05/Jun/2008

Summary of Measurements

Distribution Uniformity	62.01%
Total data points	627
Average reading	63.1
Minimum value	3.1
Maximum value	99.9
Standard deviation	18.2 (68%)
Max length in feet	1243.6
Max width in feet	708.8
Area in Acres	20.19



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Check System Water Pressure

- Static pressure at main point of connection
  - Before and after the backflow preventer
- Dynamic pressure at main point of connection (downstream of backflow)
  - Operate every zone and measure pressure
- Dynamic pressure at distribution point
  - Check at closest and furthest points from the point of connection.

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Static Pressure at POC

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Check Before and After Backflow

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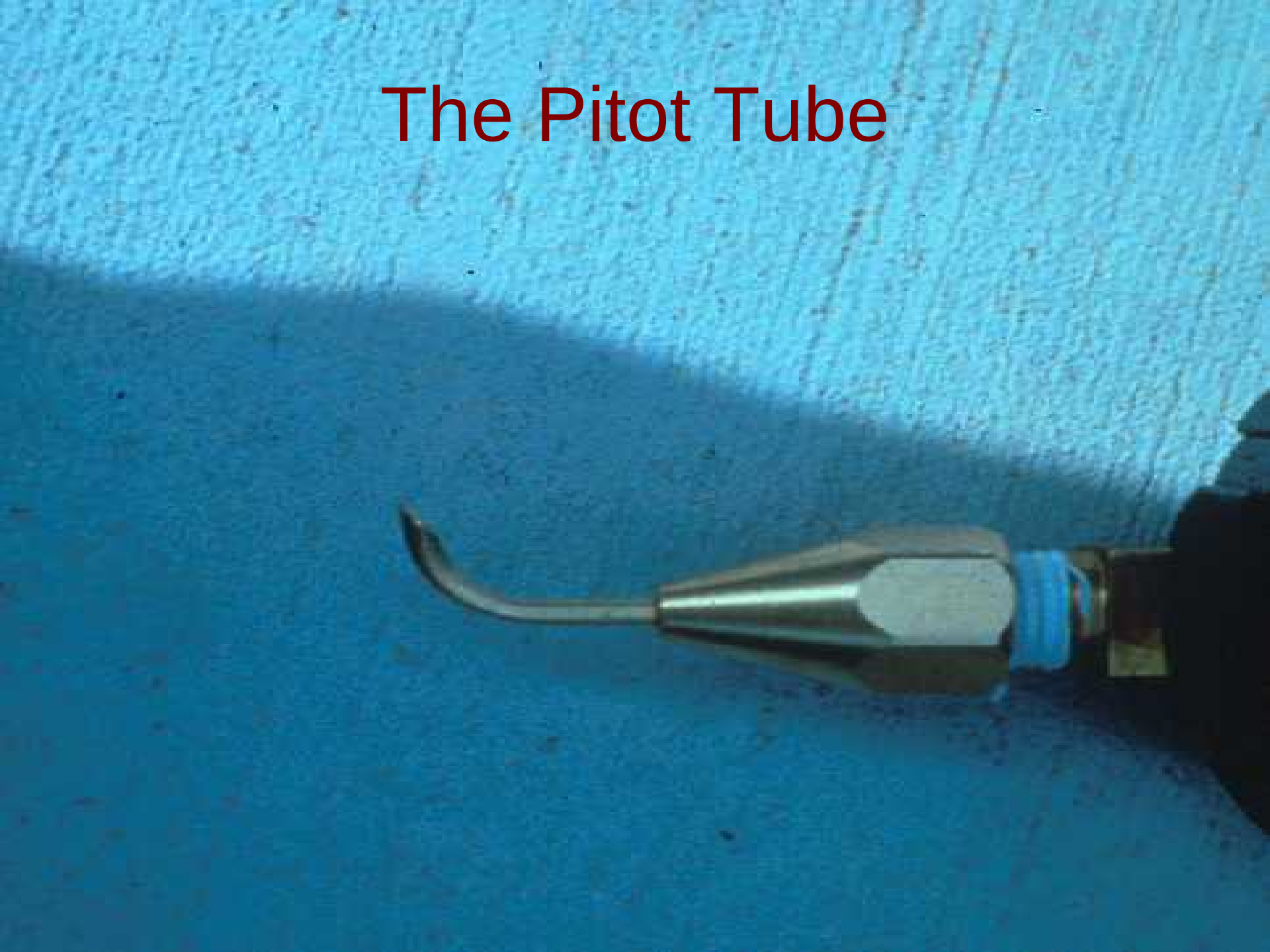
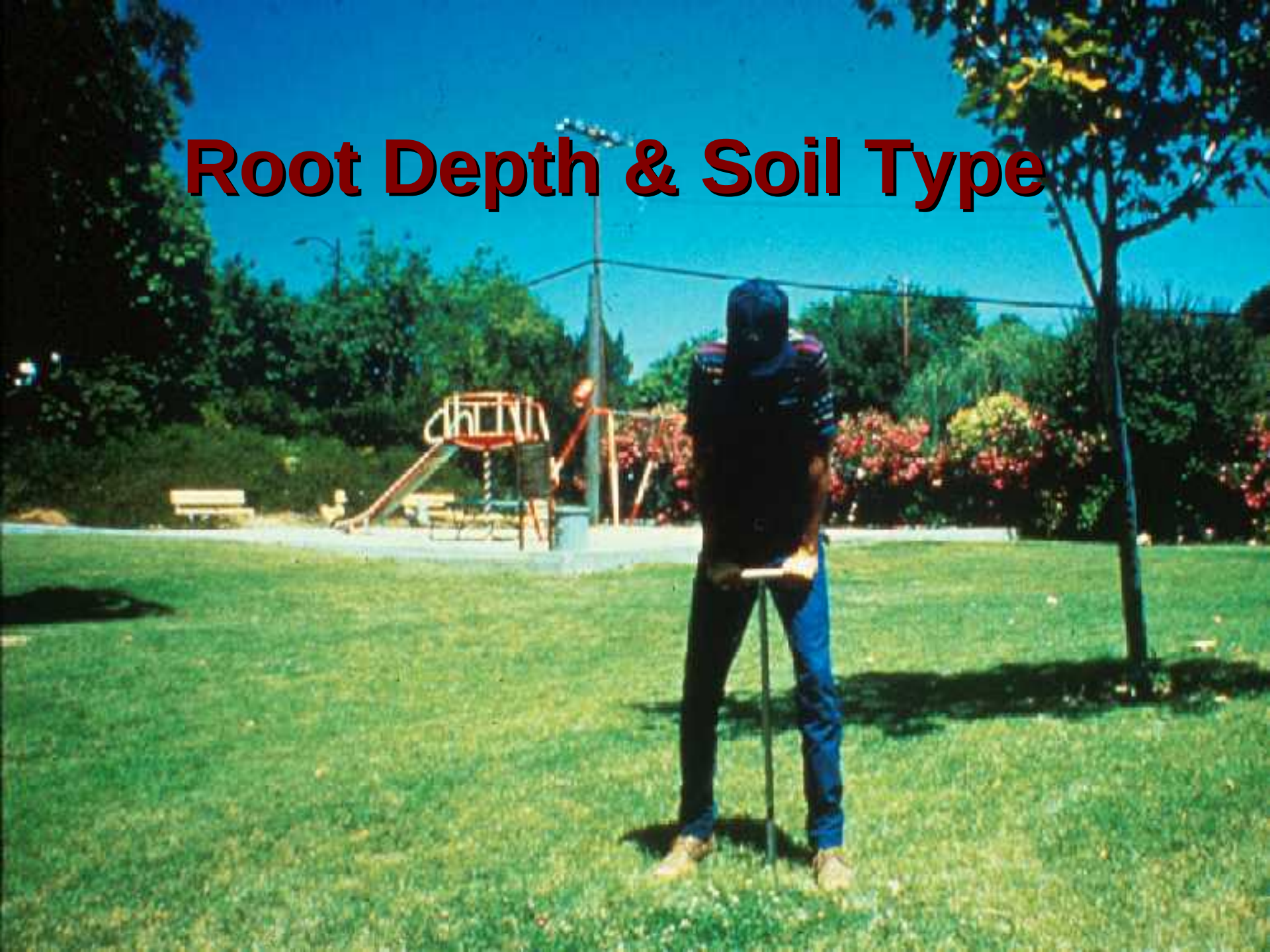
The Pitot Tube




0
20
40
60
80
100
120
140
160


Check Sprinkler Spacing


Root Depth & Soil Type

Control Enhancements

- Centralized Irrigation Controls
  - Web-Based
    - Wireless, Broadband
  - Weather Station
    - Wind Speed-Direction, Barometric Pressure, Air Temperature, Relative Humidity, Solar Radiation, Rainfall Rate
  - Hand Held Remote Controls
    - Web Enable Cell Phone
    - UHF-Wireless
  - Digital Flow Sensors
    - Analog
    - Digital output

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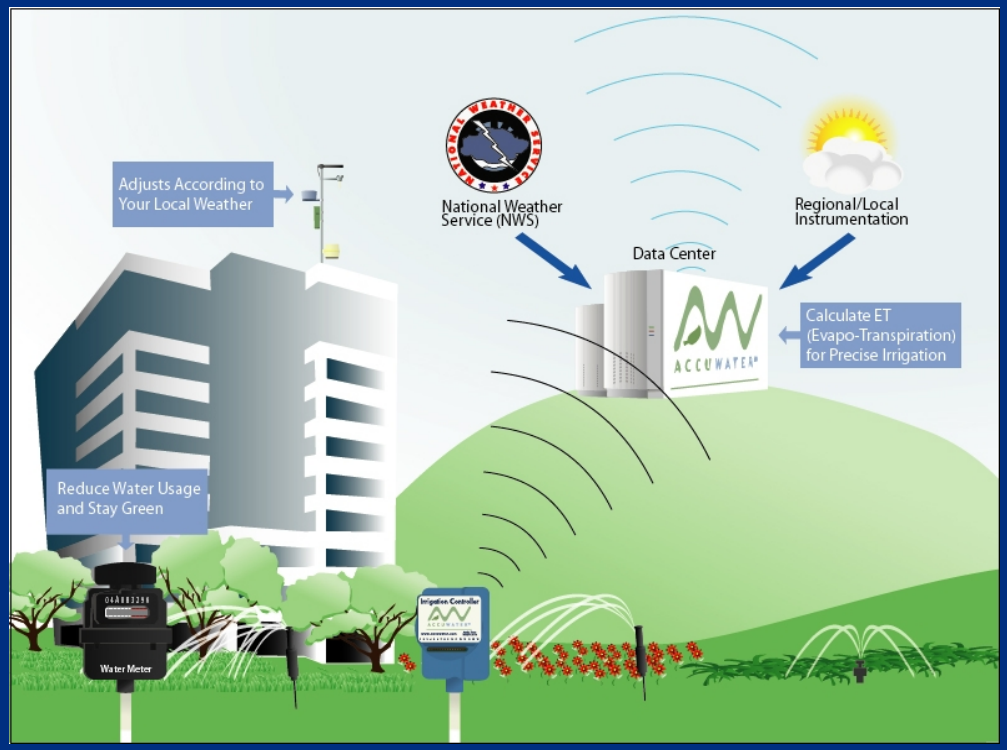
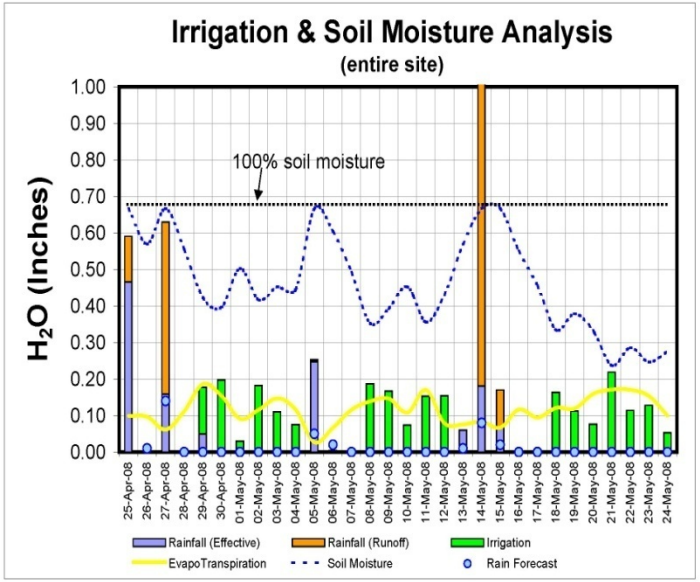
Centralized Irrigation Control





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New Technology

Weather Station

Combination Analog-Digital Flow Sensor

Web Enabled Cell Phone

Soil Moisture Sensor

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Distribution Enhancements

- Distribution System Optimization
  - Variable Frequency Drive Pumping Systems
  - Pressure Regulation
    - Control of pressure at the point of connection
  - Control Valves
    - New upgraded valves with pressure and flow regulation
  - Sprinkler Heads-Nozzles
    - Move to ensure proper spacing
    - Pressure regulation and internal check valves
    - High efficient nozzles
  - Retrofit zones
    - Install drip tubing or low application irrigation
    - Change landscaping as appropriate

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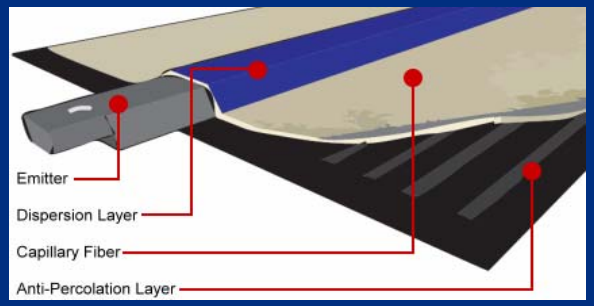
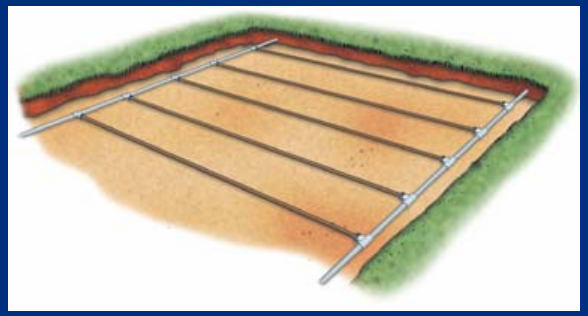
High Efficient Distribution Products



Subsurface Irrigation

Control Valves



PR Valves

Pressure Regulating Heads

VFD Pump Stations

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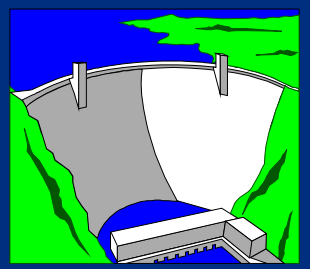
Benefits of Proper Scheduling

- Water savings = money savings
- Healthier turf and plant material
- Reduced chemical use - cleaner environment
- Less strain on distribution systems



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How Much Money Can Be Saved?

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Case Study #1

Description: 152 ac., 7 sites

Pre-audit water use = 825,418 ccf (149.6 in.)
Post-audit water use = 694,695 ccf (125.9 in.)
Water saved = **130,723 ccf (23.7 in.)**

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Case Study #1 cont.

- Value of water saved
  130,723 ccf X $0.46/ccf = $60,132
- Cost of audits
  152 ac. X $175/ac. = ($26,600)
- Net savings
  $60,132 - $26,600 = **$33,532**

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Case Study #1 cont.

- Net savings Annually = $60,132
- Investment in Upgrades = $285,415
- Investment in Audit = $26,600
- Total Investment = $312,015
- Simple Payback (years) = 5.18

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Case Study #2

Description: 180 ac., 36 sites

Pre-audit water use = 300,523,212 gal

Post-audit water use = 265,955,888 gal

Water saved = **34,567,324 gal**

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Case Study #2 cont.

- Value of water saved
  34,567,324 X $2.29 kgal = $79,158
- Cost of audits
  180ac. X $175/ac. = ($31,500)
- Net savings
  $79,158 - $31,500 = **$47,658**

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Case Study #2 cont.

- Net savings Annually = $79,158
- Investment in Upgrades = $505,470
- Investment in Audit = $31,500
- Total Investment = $536,970
- Simple Payback (years) = 6.78

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For More Information

- Would you like to know more about this session?
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- Water Management, Inc.
- 7761 Waterloo Rd. Jessup, MD 20794
- Paul_bassett@watermgt.com

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