



KEYS TO IRRIGATION EFFICIENCY

Improve Performance and Lower Your Bills

IRRIGATION EFFICIENCY

- ① A basic term used to
 - ① Characterize irrigation system performance
 - ① Evaluate irrigation water use
 - ① Promote better or improved use of water resources

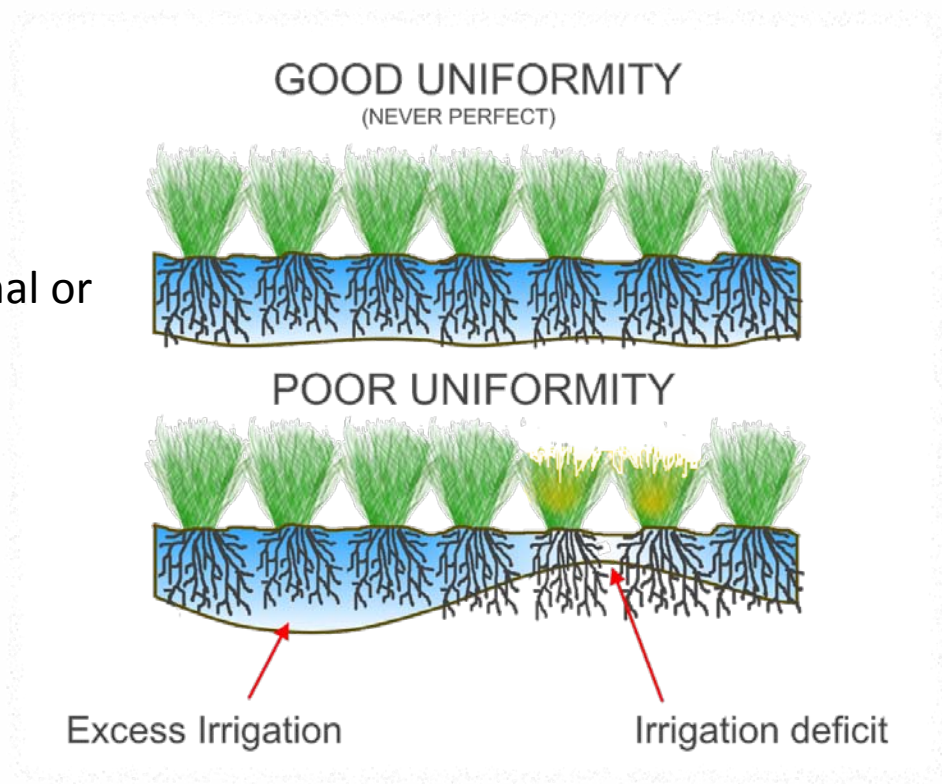


IRRIGATION EFFICIENCY

- ⦿ Irrigation efficiency is affected by
 - ⦿ System design and installation
 - ⦿ Long-term maintenance practices
 - ⦿ Management of the irrigation system to apply the correct amount of water when needed

IRRIGATION EFFICIENCY

- ① Distribution Uniformity is a measurement of sprinkler system performance
- ① Expressed as either a decimal or percentage



IRRIGATION EFFICIENCY

Sprinkler Type	Achievable	Target	Historical
Rotor Sprinklers	0.75 – 0.85	0.65 – 0.75	0.55 – 0.65
Spray Sprinklers	0.65 – 0.75	0.55 - 0.65	0.45 – 0.55



IRRIGATION EFFICIENCY

⊙ Example of low Distribution Uniformity

DU	Plant Requirement	Irrigation Requirement
0.50	6 inches	8.5 inches

- ⊙ Water required for 6 inches over 1 acre
 - 163,000 gallons
- ⊙ Water required for 8.5 inches over 1 acre
 - 231,000 gallons
- ⊙ Value of 68,000 gallons in water budget billing
 - \$387.00

FOUR KEYS TO IRRIGATION SYSTEM EFFICIENCY

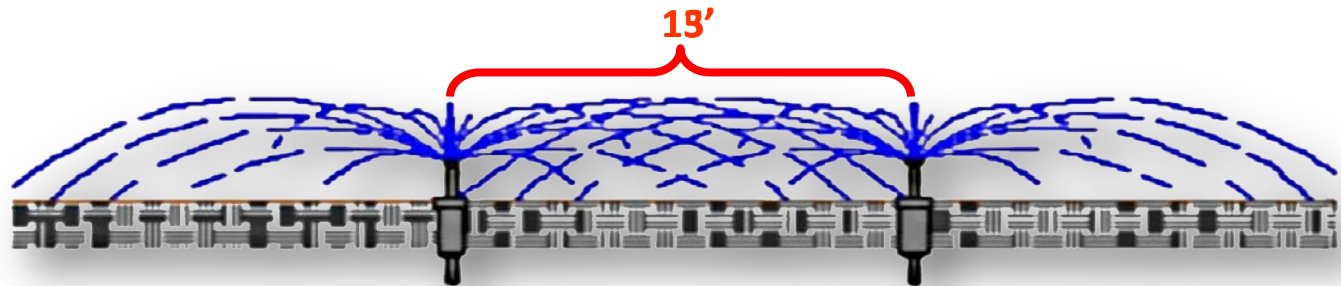
IRRIGATION SYSTEM EFFICIENCY

- ④ Four Keys to Efficient Irrigation Systems
 - ④ Head Spacing
 - ④ Proper Pressure
 - ④ Matched Precipitation Rates
 - ④ Maintenance

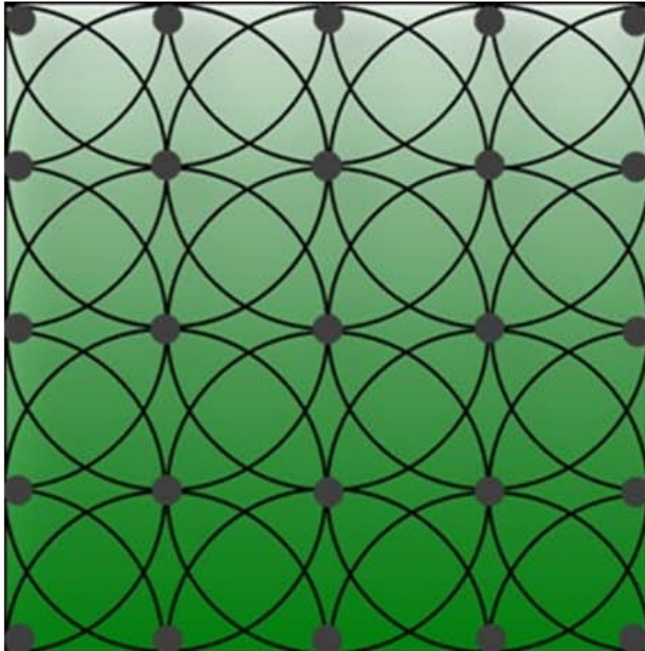


HEAD SPACING

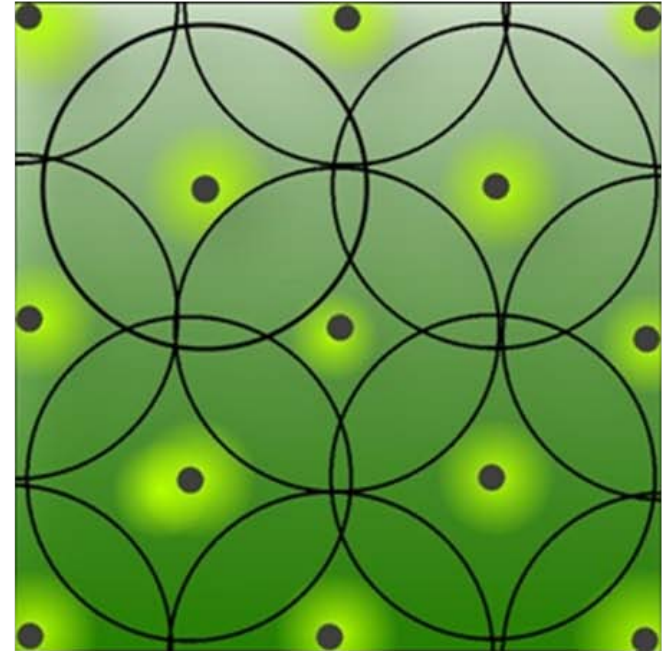
- ⊙ Determined during the design and installation of the system
- ⊙ Goal is head-to-head coverage



HEAD SPACING



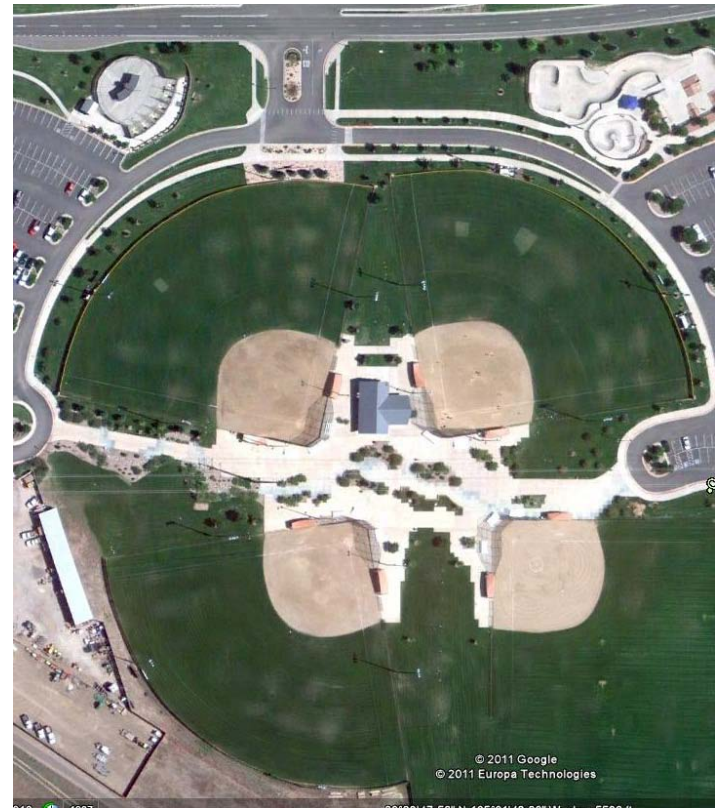
**FULL COVERAGE: HEAD-TO-HEAD SPACING.
SPRAY FROM EACH HEAD TOUCHES THE
NEXT SPRINKLER OVER THE ENTIRE AREA.**



**SPACING IS NOT HEAD-TO-HEAD. NOT FULL
COVERAGE, MANY MISSED AREAS & DRY
SPOTS.**

HEAD SPACING

- ⦿ Causes of poor sprinkler spacing
 - ⦿ System design and/or installation
 - ⦿ Heads relocated during maintenance
 - ⦿ Nozzle changes made during maintenance



HEAD SPACING

- ⊙ Solutions
 - ⊙ Physically move heads
 - ⊙ Change nozzle size
 - ⊙ Must consider flow rates and precipitation rates
 - ⊙ Retrofit to rotary nozzles

PRESSURE

- ⦿ Sprinkler heads and nozzles are designed to operate within a specific pressure range
- ⦿ High and low pressures can result in decreased performance
 - ⦿ Misting or fogging (high)
 - ⦿ Increased flow rates and precipitation rates (high)
 - ⦿ Decreased radius or throw pattern (low)
 - ⦿ Decreased uniformity (high/low)

PRESSURE



PRESSURE

- ⦿ Causes of pressure problems
 - ⦿ Leaks or obstructions in the sprinkler system
 - ⦿ Valve malfunctions
 - ⦿ Changes in water distribution system
 - ⦿ Poor design



PRESSURE

- ⦿ Solutions
 - ⦿ Pressure regulating valves
 - ⦿ Pressure regulating heads
 - ⦿ Repair leaks or obstructions in the sprinkler system
 - ⦿ Repair valve malfunctions
 - ⦿ Add sprinkler zones
 - ⦿ Change sprinkler nozzles



MATCHED PRECIPITATION RATES

- ⊙ Precipitation Rates
 - ⊙ Measurement of the rate that sprinklers apply water
 - Measured as inches per hour (in/hr)
 - ⊙ Different sprinkler types apply water at different rates
 - Rotors = 0.5 in/hr; Sprays = 1.5 in/hr



MATCHED PRECIPITATION RATES




- ⦿ Matched precipitation is having all sprinklers on a zone applying water at the same rate
 - ⦿ Never mix rotors and sprays on the same zone; impossible to achieve matched precipitation
- ⦿ Achieved through nozzle selection
 - ⦿ Some spray nozzles are matched precipitation across the product line
 - ⦿ Not across manufacturers

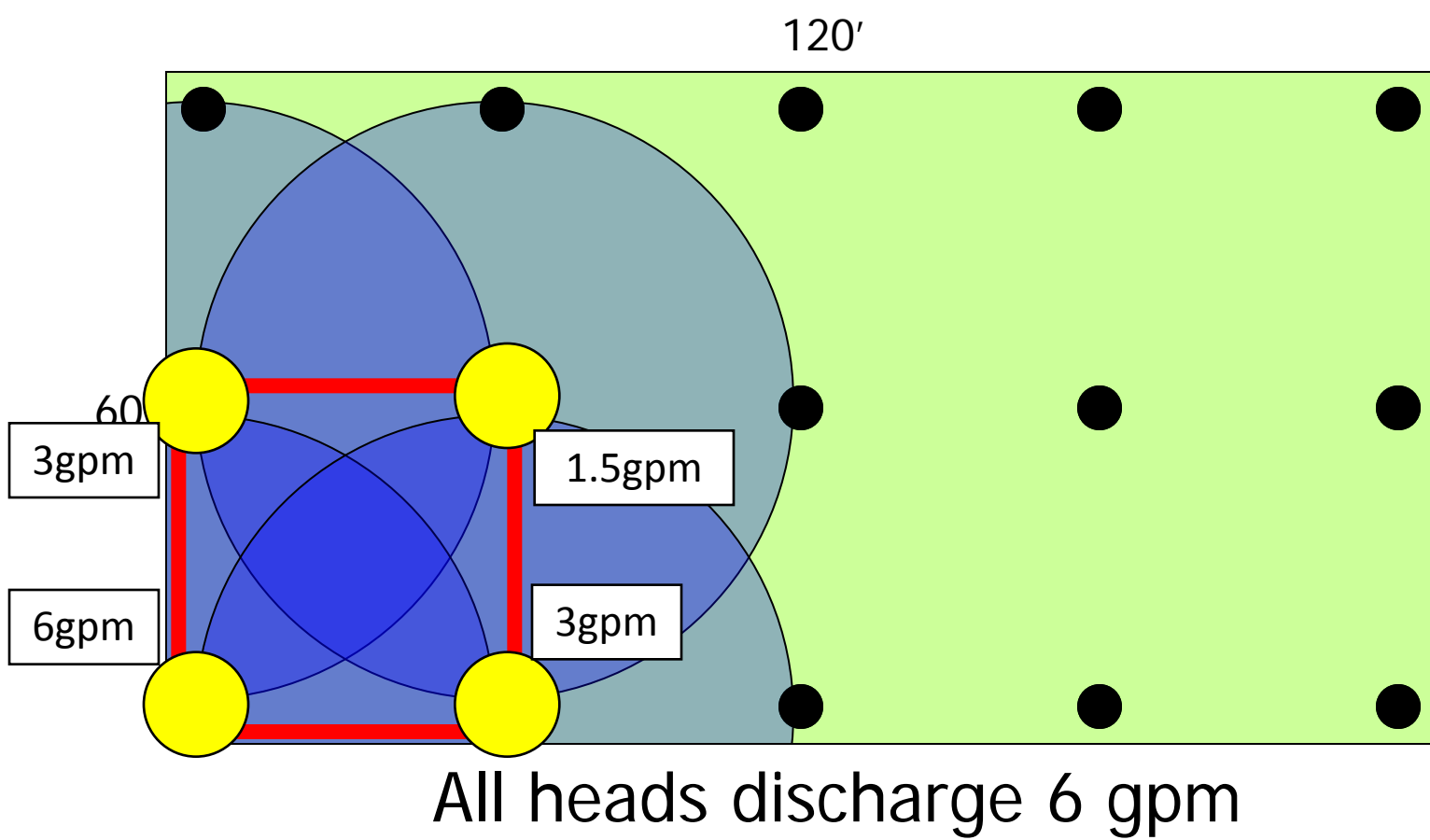
MATCHED PRECIPITATION RATES

- ⊙ Achieved through nozzle selection
 - ⊙ More difficult to achieve matched precipitation with rotors and often not done
 - ⊙ To achieve matched precipitation with rotors
 - Different nozzles must be used for different arcs
 - Similar arcs must be zoned separate from different arcs



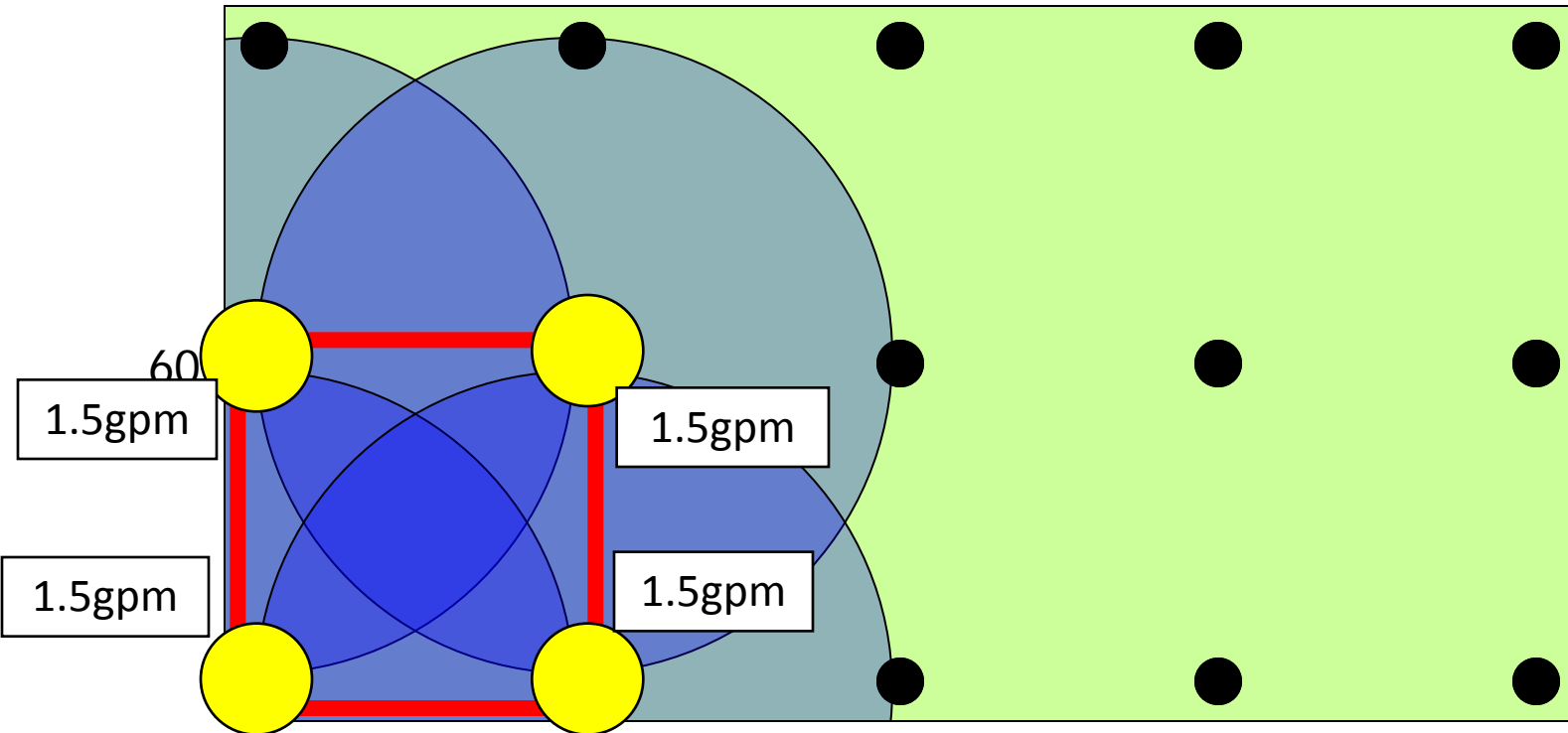
SPRAY TYPE NOZZLES

15 Foot Radius						
Fixed (Quarter, Half, Full)						15
Trajectory: 28°						●
Color Code: Black						
Arc	Pressure PSI	Pattern	Radius ft.	Flow GPM	Precip in/hr	
90° 	20	Q	14'	0.78	1.53	1.77
	25		15'	0.88	1.51	1.74
	30		15'	0.97	1.67	1.92
	35		16'	1.06	1.59	1.84
180° 	20	H	14'	1.51	1.48	1.71
	25		15'	1.69	1.45	1.67
	30		15'	1.80	1.59	1.84
	35		16'	2.02	1.52	1.75
360° 	20	F	14'	3.04	1.49	1.72
	25		15'	3.41	1.46	1.69
	30		15'	3.75	1.61	1.85
	35		16'	4.07	1.53	1.76
	40		17'	4.36	1.45	1.68



NOT MATCHED PRECIPITATION

120'



Full circle flow = 6 gpm
Half circle flow = 3 gpm
Quarter circle flow = 1.5 gpm

MATCHED PRECIPITATION

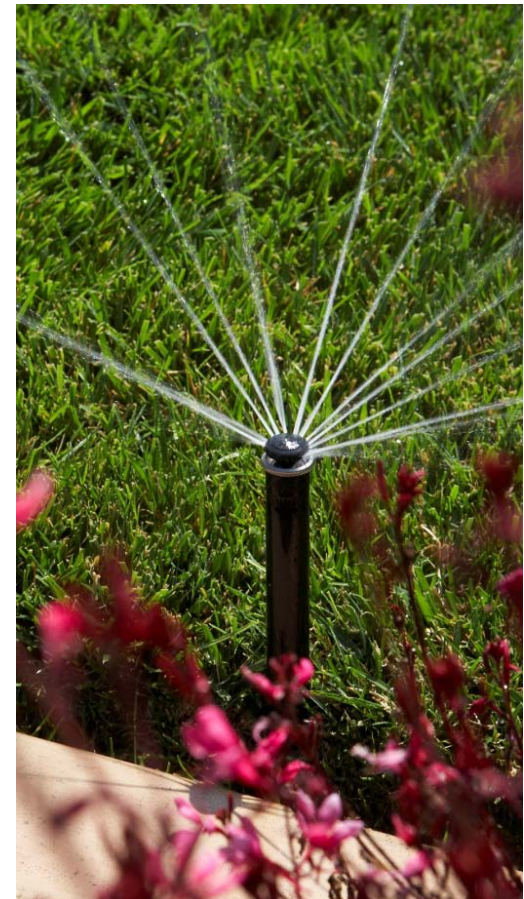
MATCHED PRECIPITATION RATES

- ⊙ Causes for not having matched precipitation rates
 - ⊙ Poor design and/or installation
 - ⊙ Poor maintenance practices
 - ⊙ Mixed heads on zone



MATCHED PRECIPITATION RATES

- ⦿ Solutions
 - ⦿ Change nozzles
 - ⦿ Used matched precipitation rate nozzles
 - ⦿ Use rotary nozzles
 - ⦿ Matched precipitation any arc, any radius



MAINTENANCE

- ① An irrigation system that was perfectly designed and installed will become less efficient over time
- ① A continuous maintenance program can keep an irrigation system operating efficiently
- ① Walk-through's to identify problems should be performed regularly

MAINTENANCE

- ⊙ Common problems associated with lack of maintenance
 - ⊙ Repairs made with different equipment
 - ⊙ Sunken or tilted heads
 - ⊙ Misaligned heads
 - ⊙ Obstructions
 - ⊙ Broken heads



MAINTENANCE



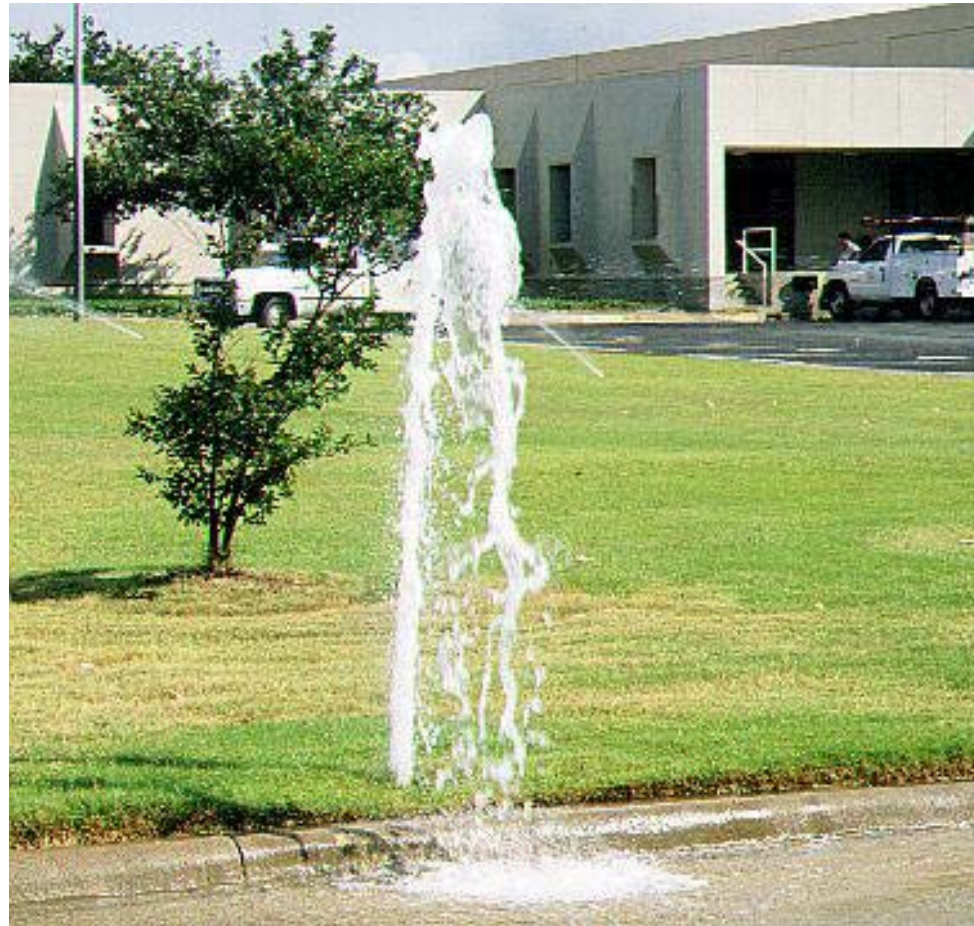
MAINTENANCE



MAINTENANCE



MAINTENANCE



IRRIGATION EFFICIENCY

- ① An efficient irrigation system will help reduce water use and lower water bills
- ① Attention to these four factors will help improve irrigation system efficiency
 - ① Head Spacing
 - ① Pressure
 - ① Matched Precipitation
 - ① Maintenance



