

# UNDERSTANDING UNDERGROUND SPRINKLER SYSTEMS

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May 2022




## ***GOALS:***

- *Understand the basic components of underground sprinkler systems*
  - *Apply this information to improve lawn water management*
-

# *TODAYS TOPICS*


- *Components of the irrigation system*
  - *Sprinkler spacing and orientation*
  - *Factors that impact application rate (how fast water is being applied)*
  - *How to run the system to match plant water needs*
-



***COMPONENTS OF  
THE IRRIGATION  
SYSTEM***

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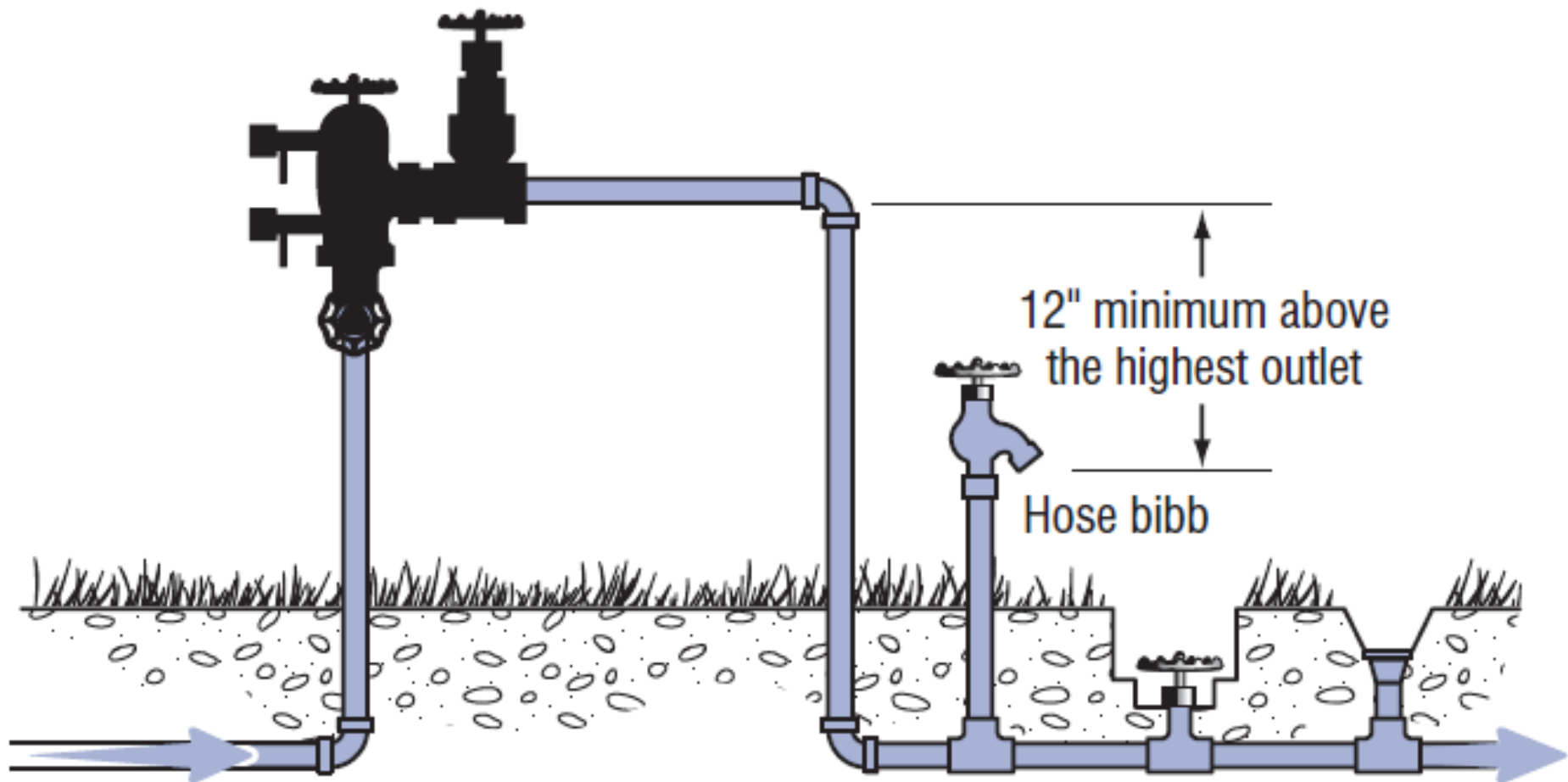
# The Water Supply

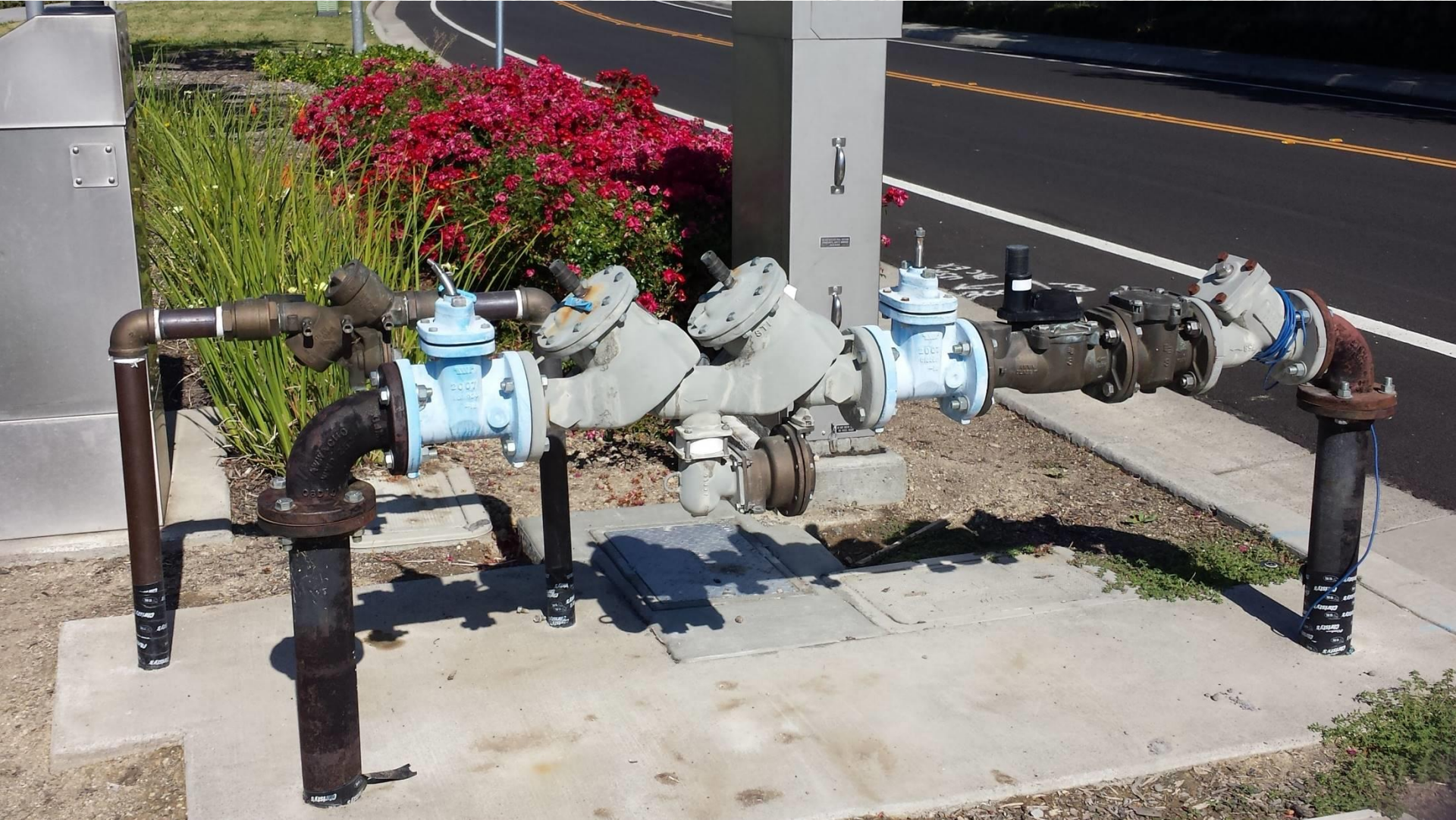
A submersible pump assembly is shown in a grassy field. The pump is a grey motor with a yellow-orange housing, mounted on a concrete base. A black hose is connected to the pump's inlet, and a white pipe with a 90-degree elbow is connected to the outlet. A grey electrical control box is visible in the background.

**Individual groundwater wells, surface water sources (streams and ponds) or public water distribution systems and this may or may not require a pump**

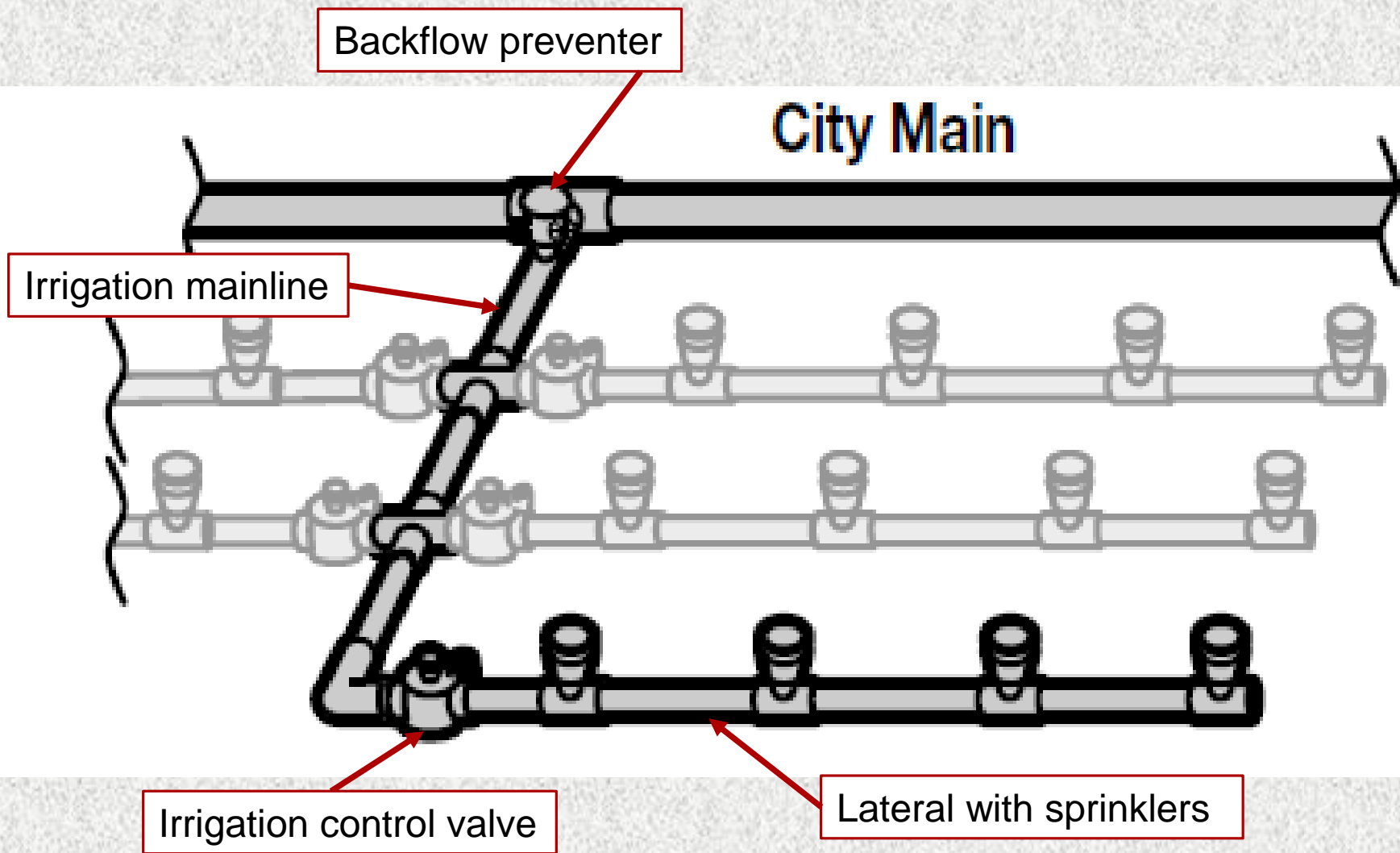


**Backflow prevention is important in all cases**









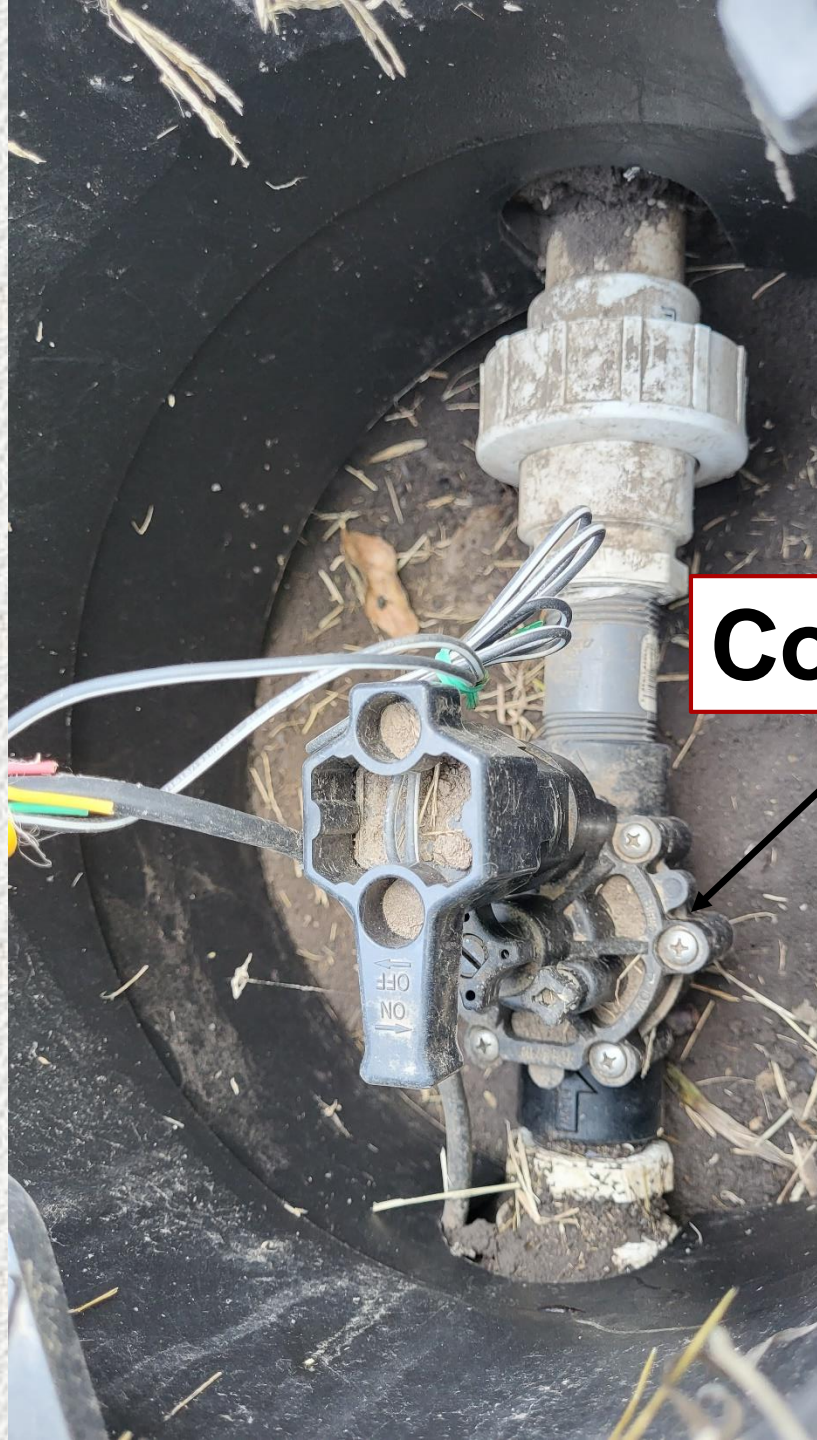
Backflow preventer

City Main

Irrigation mainline

Irrigation control valve

Lateral with sprinklers



**Control valve**





HIGHLINE

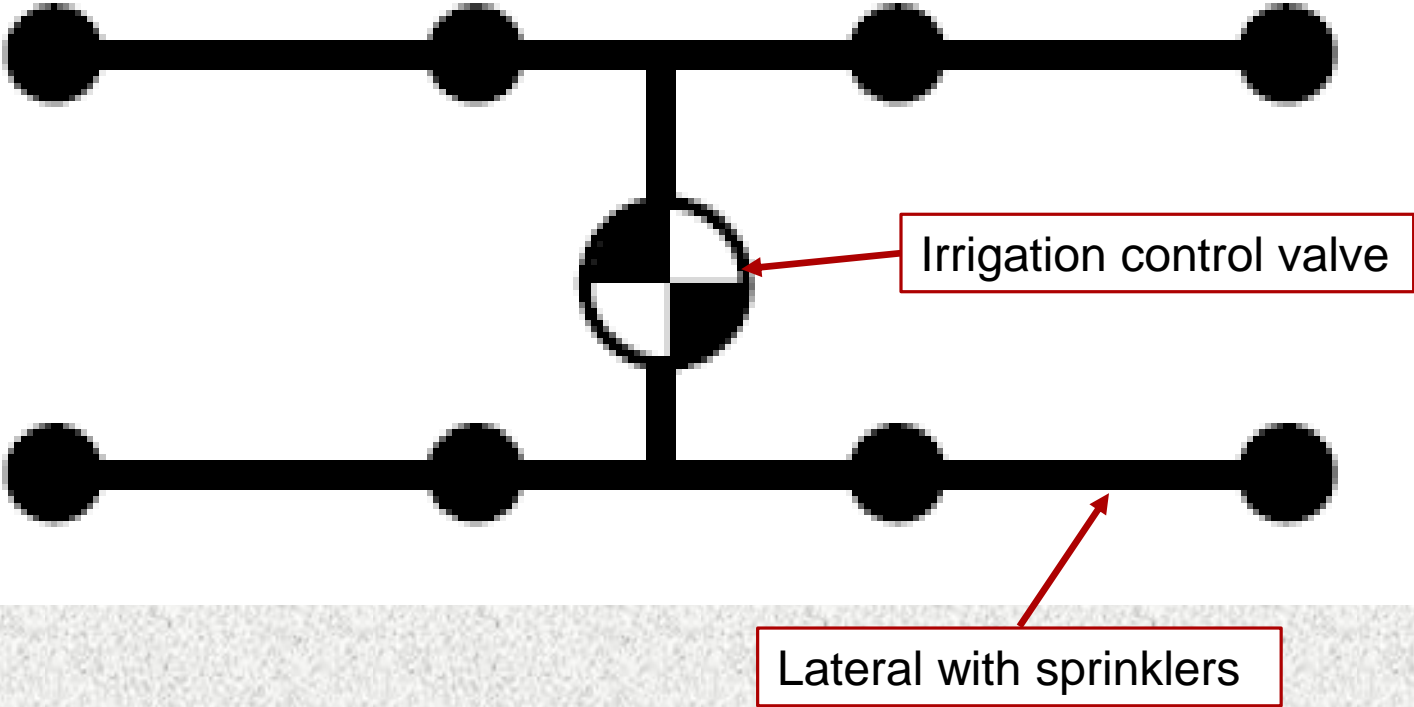
VALVE BOX

PUSH AND ROTATE

REMOVE AND ROTATE

REPLACE  
COVER PROPERLY

# Irrigation Station









**Spray Head – usually used in smaller spaces**

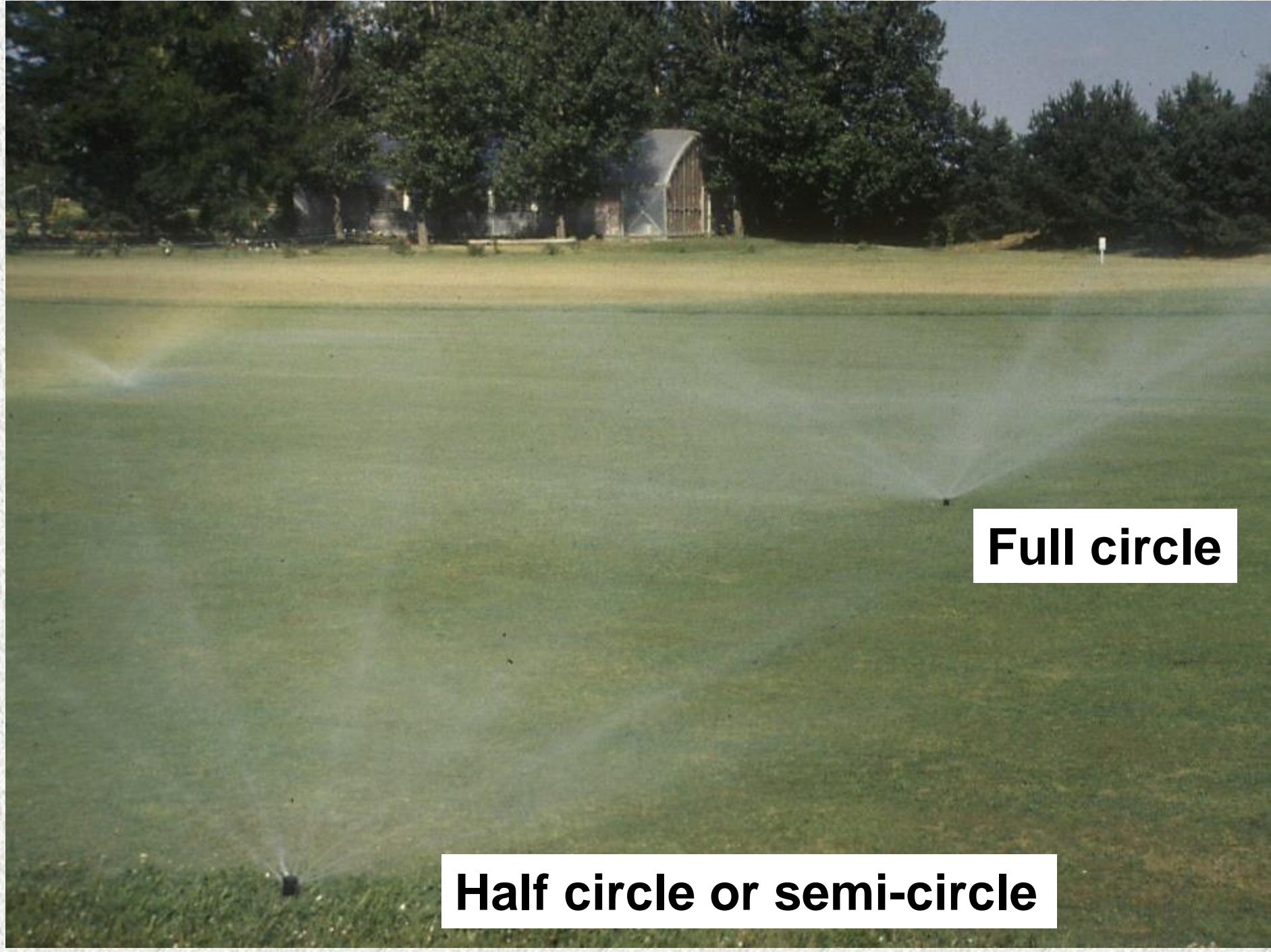




# Spray Head

- head does not rotate
- this one sprays a semi-circle





**Full circle**

**Half circle or semi-circle**

A photograph of a gear-driven rotor head irrigation system in operation on a golf course. The system consists of a central pivot point with multiple arms extending outwards, each ending in a rotor head that sprays water in a circular pattern. The water jets are captured in mid-air, creating a misty effect. In the background, a small white building is visible on the left, and a line of trees forms the horizon. The foreground shows a close-up of a black rotor head with a single water jet spraying upwards and outwards.

**Gear driven rotor head – usually used in larger areas**



**Gear driven rotor head – nozzle rotates**

**Gear driven rotor head – usually used in the largest areas**

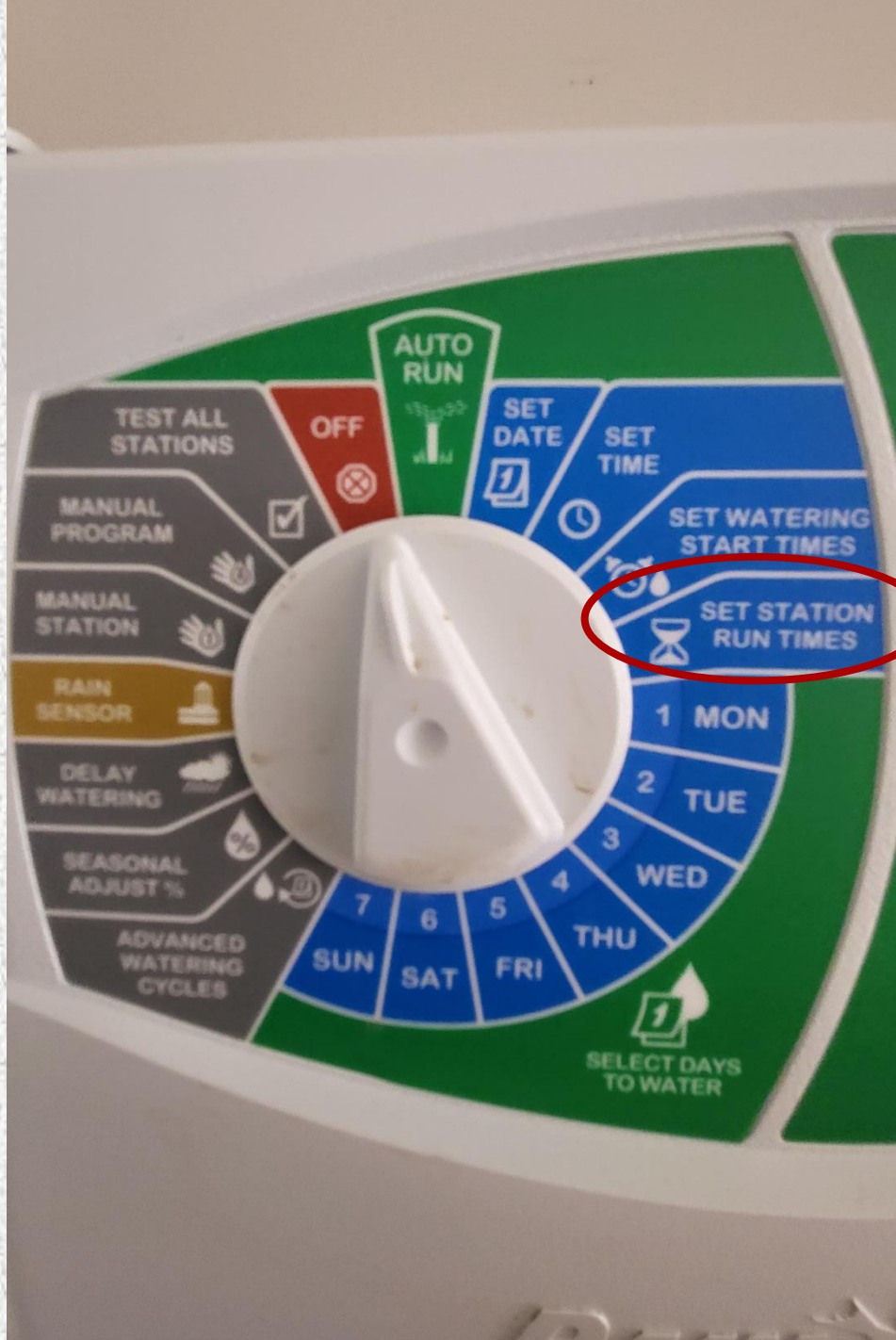


*Stations, circuits, and  
zones, oh my.....*

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*Station - a group of  
sprinklers controlled by  
one valve (same as  
circuit)*

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# *Zone*

- *An area with common water needs*
    - *Similar landscaping and microclimate*
-

# *Zone*

*- may contain one or more sprinkler stations depending on its size and the available water supply*

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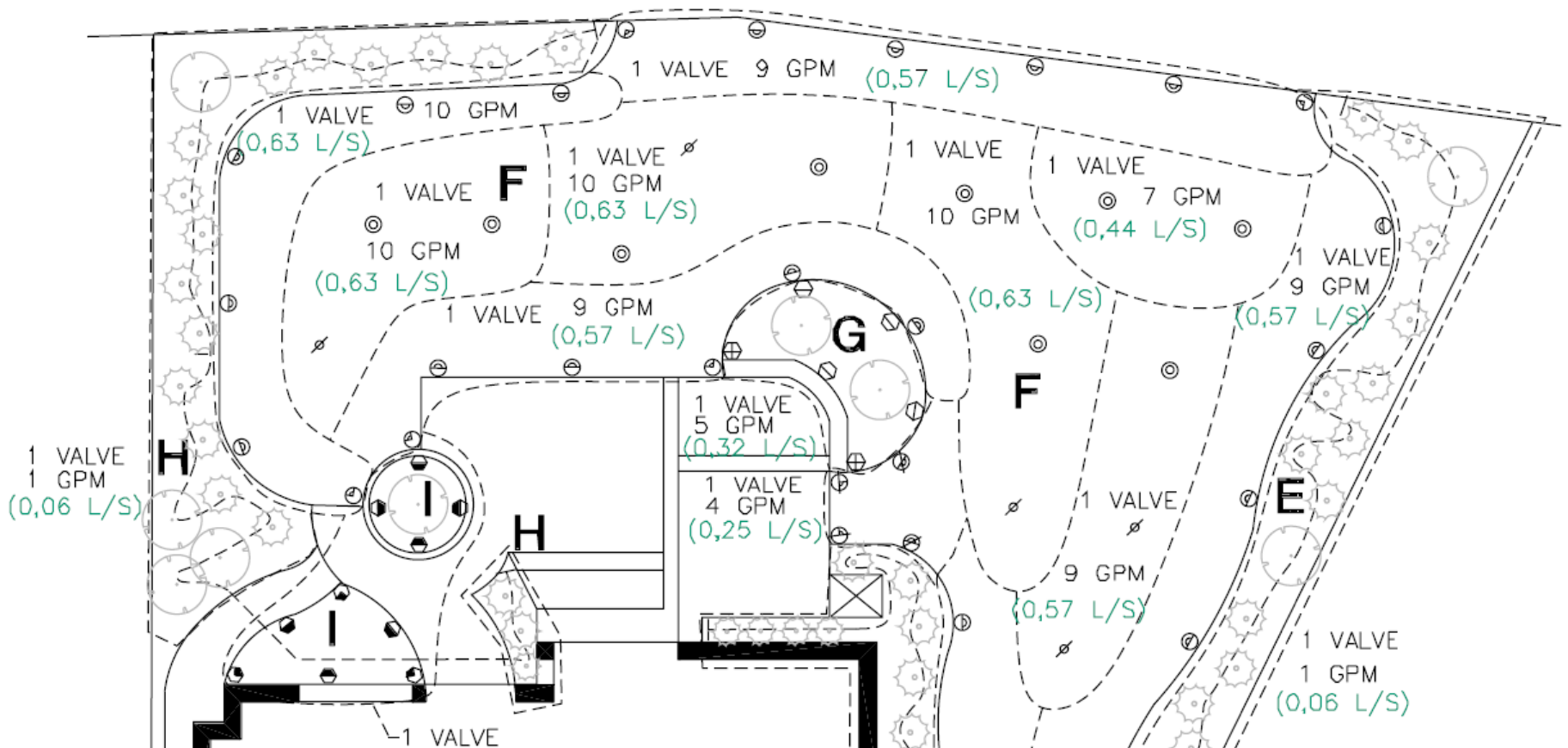
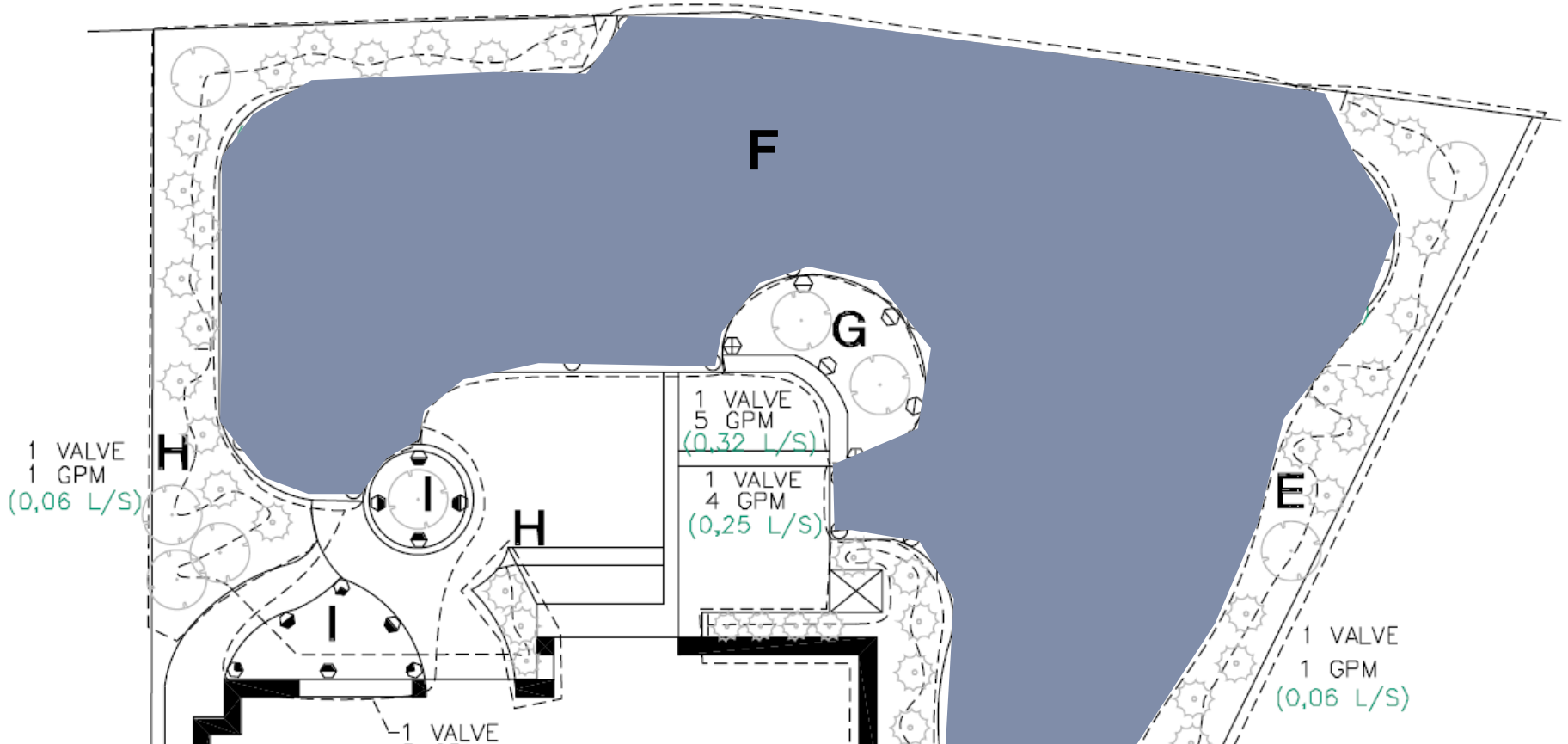


Diagram courtesy of Rainbird Corp.



One station of ten in Zone F

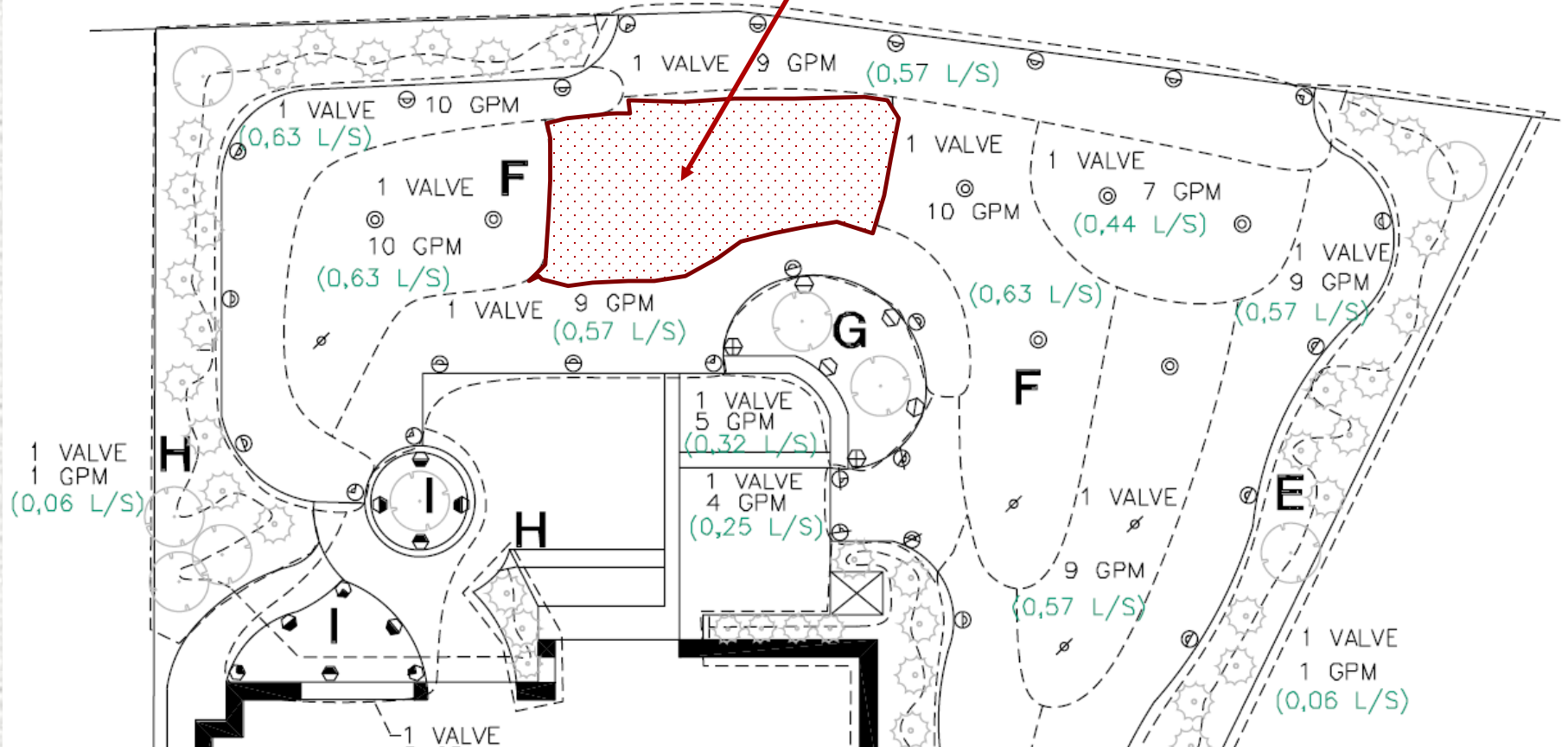
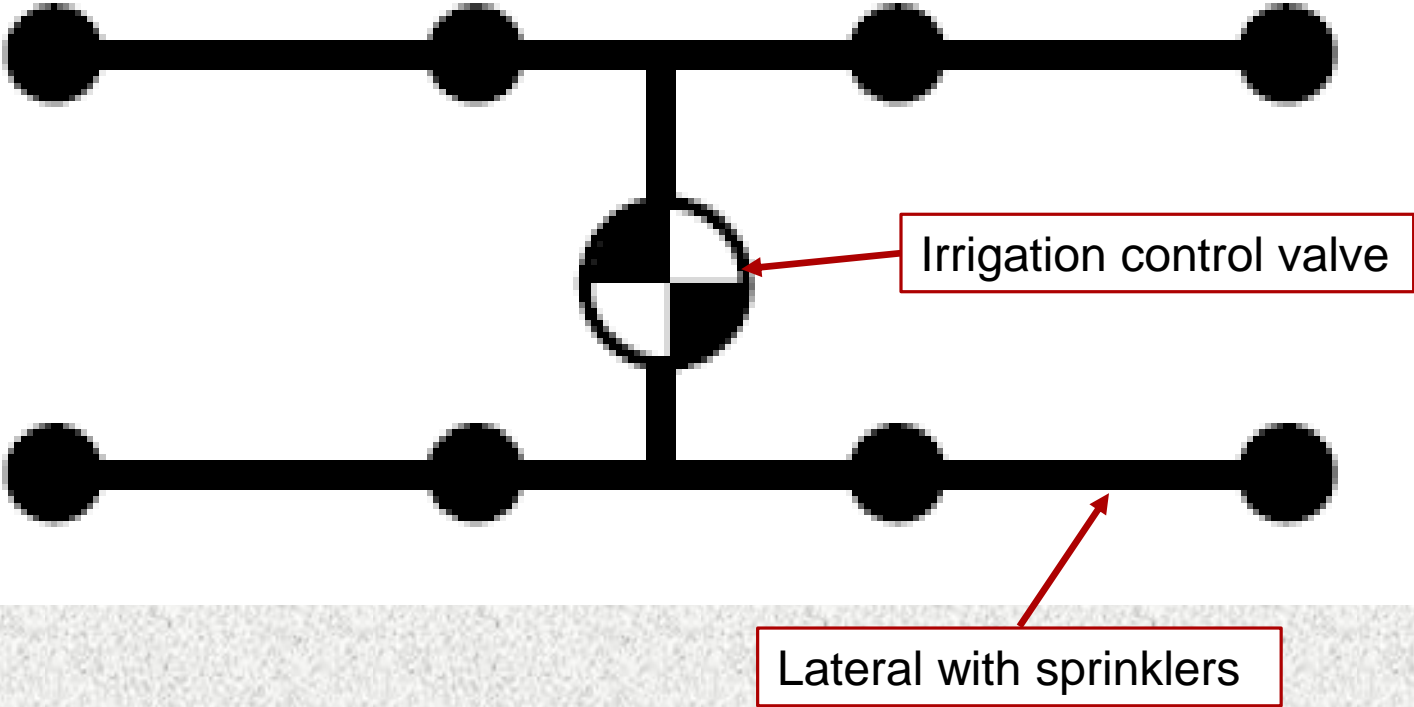


Diagram courtesy of Rainbird Corp.

# Irrigation Station



OFF

AUTO

Date / Time

Start Times

Run Times

Water Days

Weather Sensors

Personal Adjust



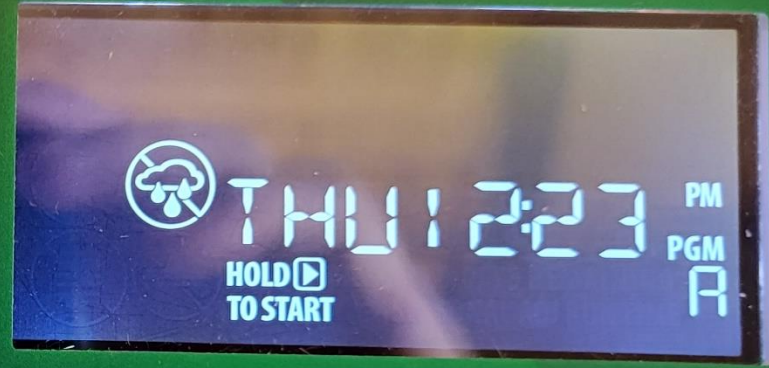
# ESP-ME3

ALARM

Program Select



A · B · C · D



LNK™ READY



Hold to Start  
Advance Station





# Questions



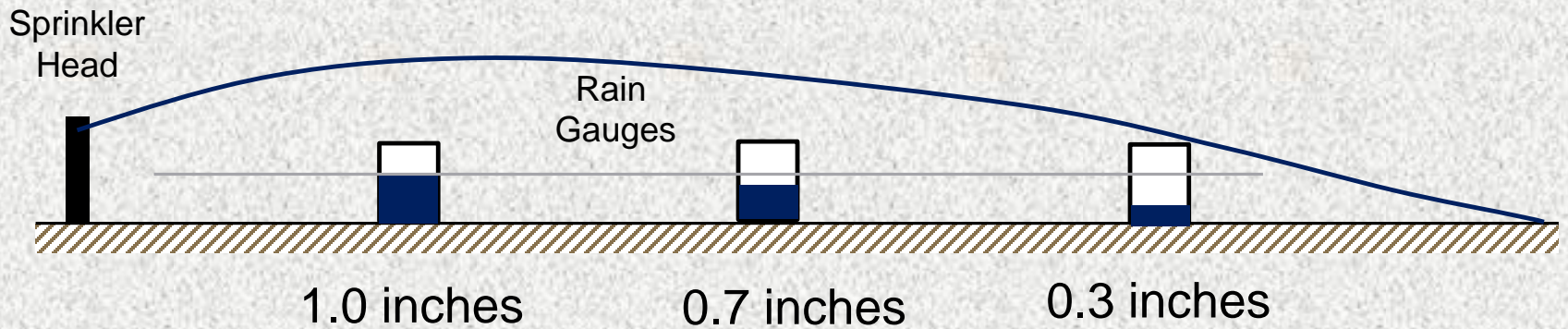


***SPRINKLER SPACING AND  
ORIENTATION***

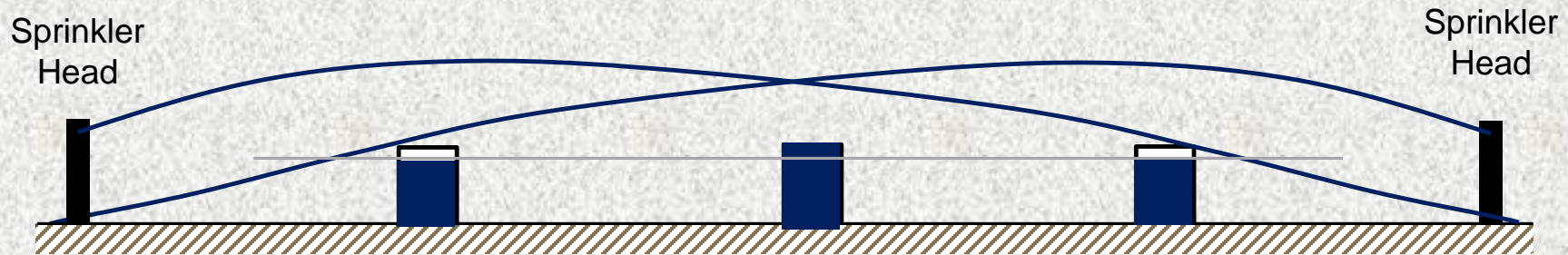
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# Single Sprinkler No Overlap

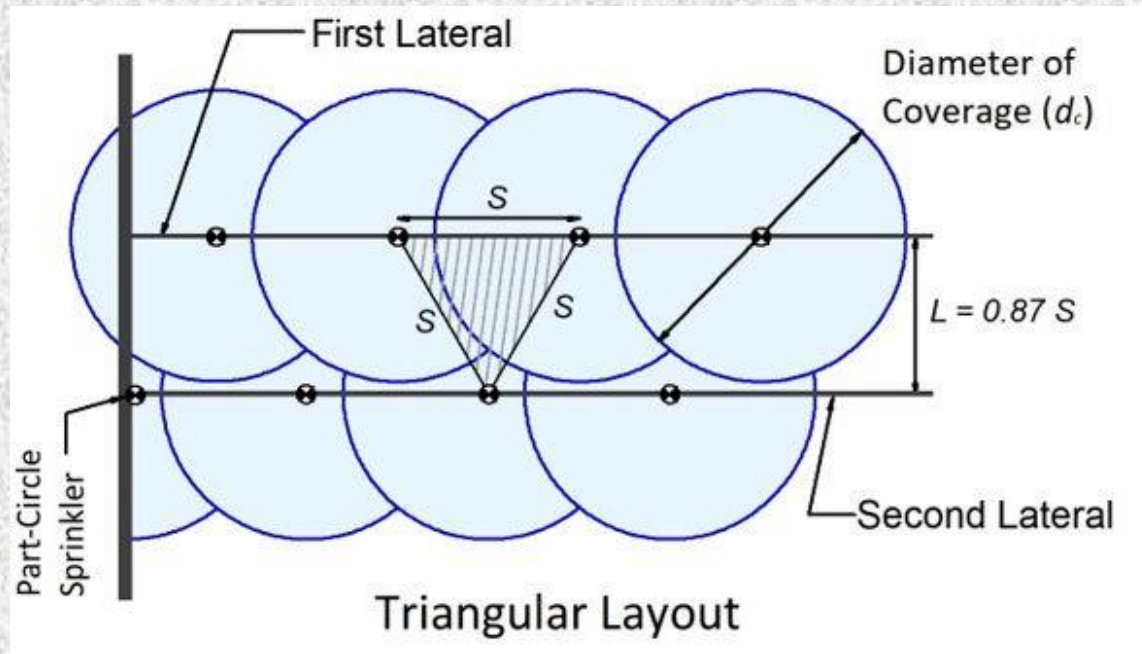


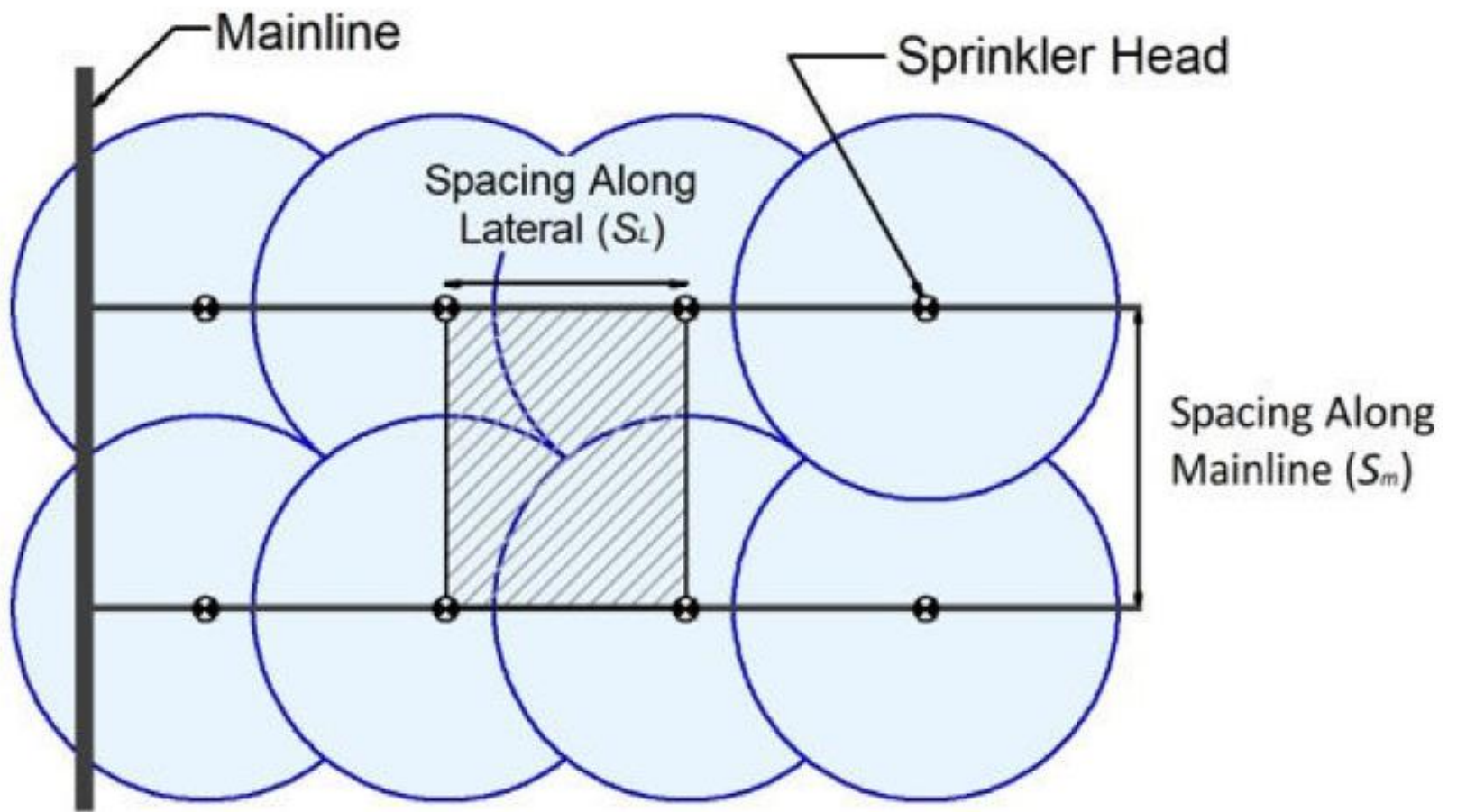
# Two Sprinklers Head to Head Coverage



From left sprinkler	1.0 inches	0.7 inches	0.3 inches
<u>From right sprinkler</u>	<u>+ 0.3 inches</u>	<u>+ 0.7 inches</u>	<u>+ 1.0 inches</u>
Total application	1.3 inches	1.4 inches	1.3 inches

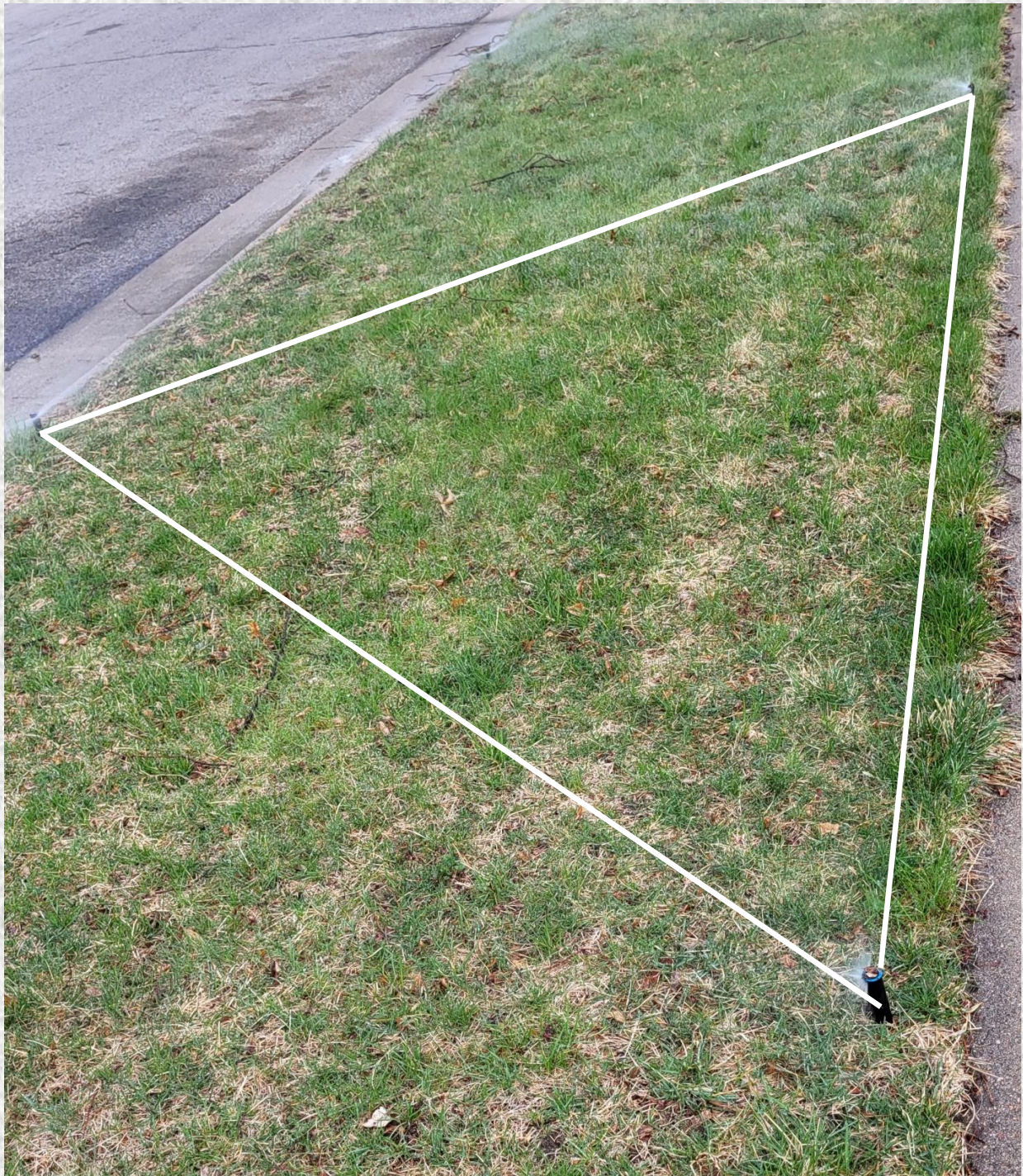






Rectangular Layout







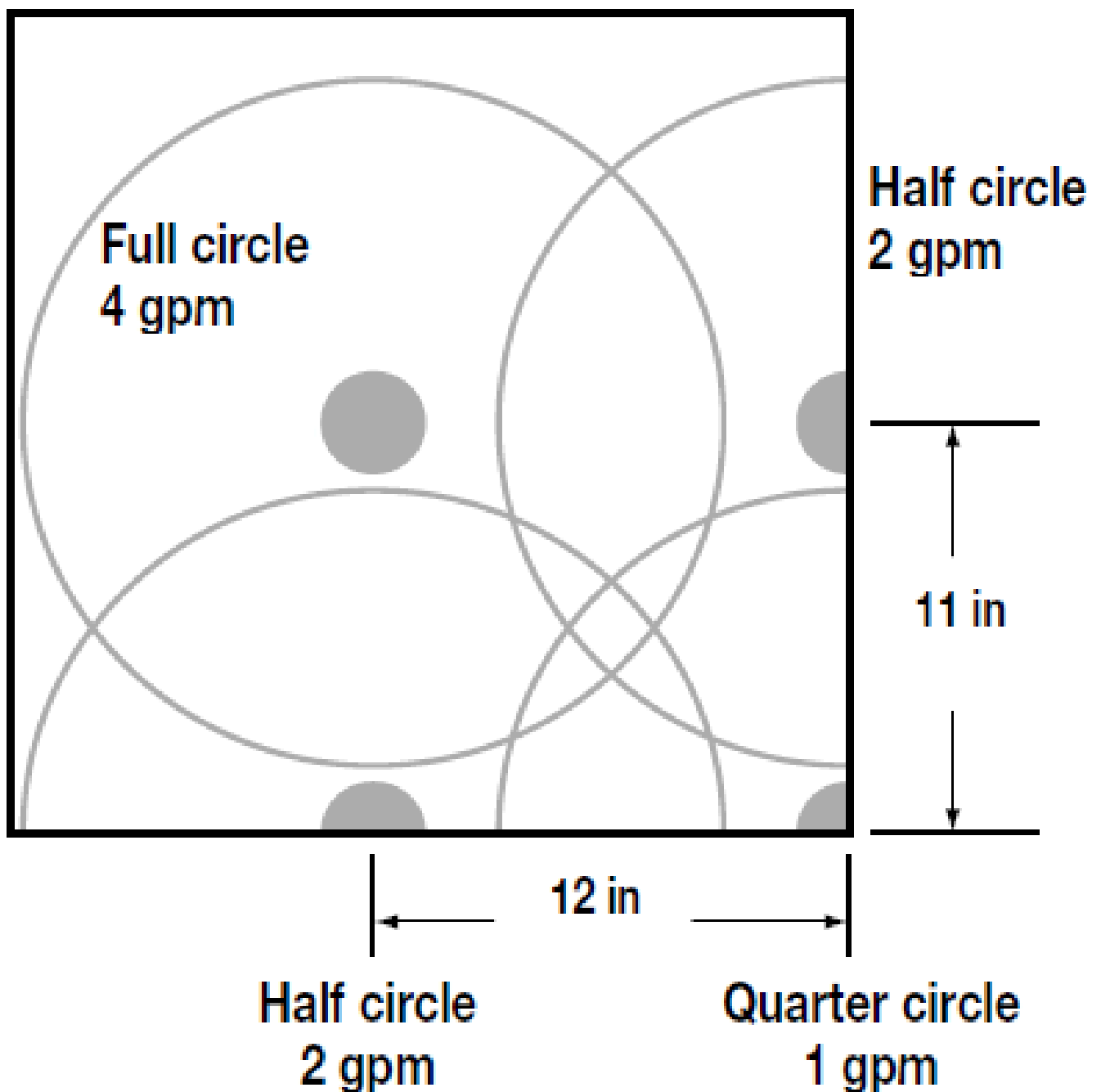


Diagram courtesy of Rainbird Corp.



## Pressure Acceptable





# Pressure Too High



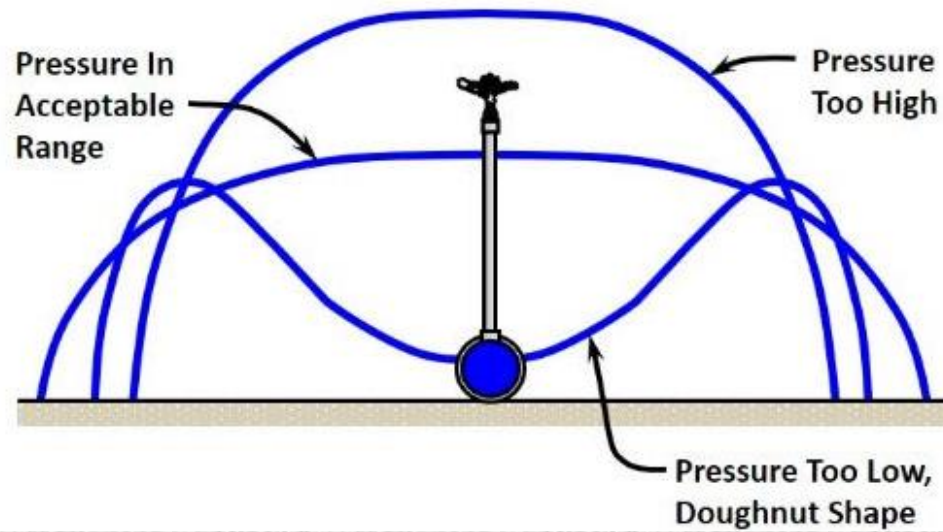
## Pressure Too Low





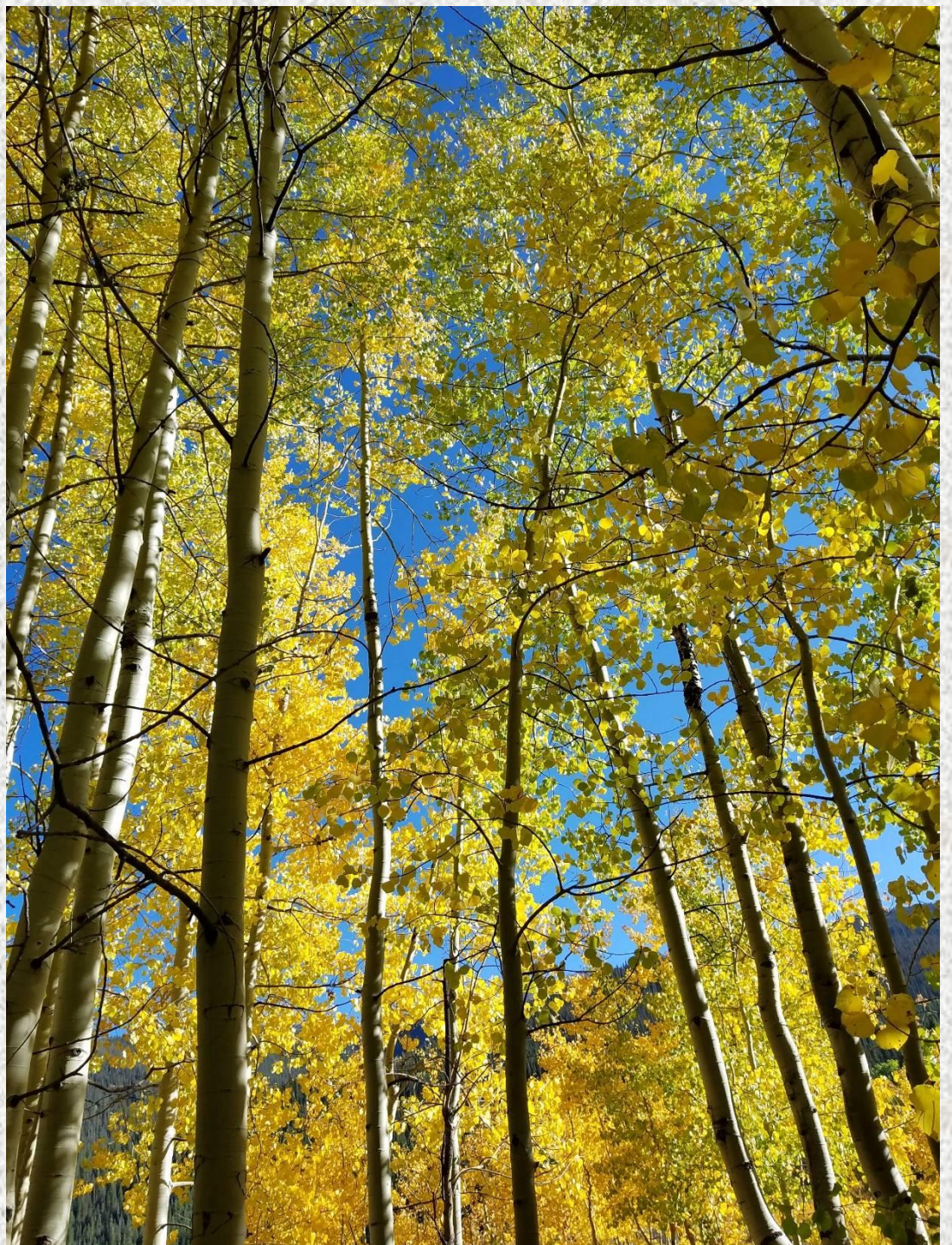


### Depth of Application Distribution





# Questions





***APPLICATION RATES AND  
RUNNING THE SYSTEM***

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# *APPLICATION RATE*

- *How fast water is being applied, such as inches per hour*
  - *Also called precipitation rate, rainfall rate, intensity.....*
-

# *Application Rate Depends on Two Things*

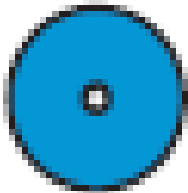

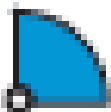
- *Head spacing*
  - *Nozzle flow rate*
-





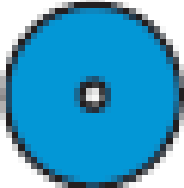


## 10 Series MPR

15° Trajectory

Nozzle	Pressure psi	Radius ft.	Flow gpm	Precip In/h	Precip In/h
<b>10F</b> 	15	7	1.16	2.28	2.63
	20	8	1.30	1.96	2.26
	25	9	1.44	1.71	1.98
	30	10	1.58	1.52	1.75
<b>10H</b> 	15	7	0.58	2.28	2.63
	20	8	0.65	1.96	2.26
	25	9	0.72	1.71	1.98
	30	10	0.79	1.52	1.75
<b>10Q</b> 	15	7	0.29	2.28	2.63
	20	8	0.33	1.96	2.26
	25	9	0.36	1.71	1.98
	30	10	0.39	1.52	1.75

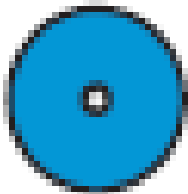


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## 5000 Series Std. Angle Rain Curtain™ Nozzle Performance

Pressure psi	Nozzle	Radius ft.	Flow gpm	■ Precip In/h	▲ Precip In/h
45	1.5	35	1.54	0.24	0.28
	2.0	37	2.07	0.29	0.34
	2.5	37	2.51	0.35	0.41
	3.0	39	3.09	0.37	0.43
	4.0	42	4.01	0.44	0.51
	5.0	43	5.09	0.48	0.56
	6.0	44	6.01	0.59	0.69
	8.0	44	8.03	0.92	1.06

Precipitation rates based on half-circle operation

■ Square spacing based on 50% diameter of throw

▲ Triangular spacing based on 50% diameter of throw

Performance data collected in cross wind conditions

## 5000 Series Std. Angle Rain Curtain™ Nozzle Performance

Pressure psi	Nozzle	Radius ft.	Flow gpm	■ Precip In/h	▲ Precip In/h
45	1.5	35	1.54	0.24	0.28
	2.0	37	2.07	0.29	0.34
	2.5	37	2.51	0.35	0.41
	3.0	39	3.09	0.37	0.43
	4.0	42	4.01	0.44	0.51
	5.0	43	5.09	0.48	0.56
	6.0	44	6.01	0.59	0.69
	8.0	44	8.03	0.92	1.06

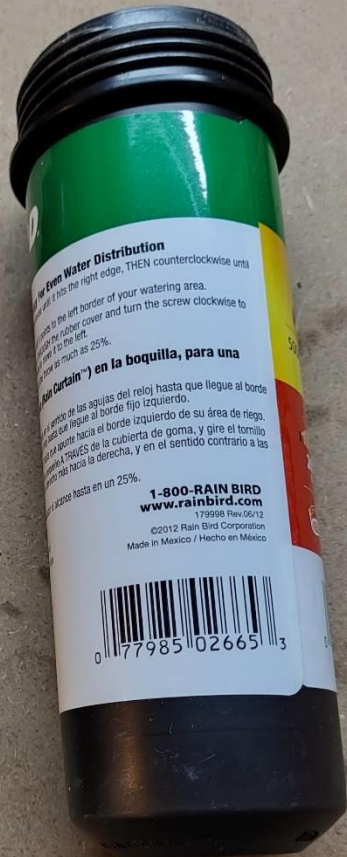
Select this  
nozzle for  
¼ circle

*Precipitation rates based on half-circle operation*

■ *Square spacing based on 50% diameter of throw*

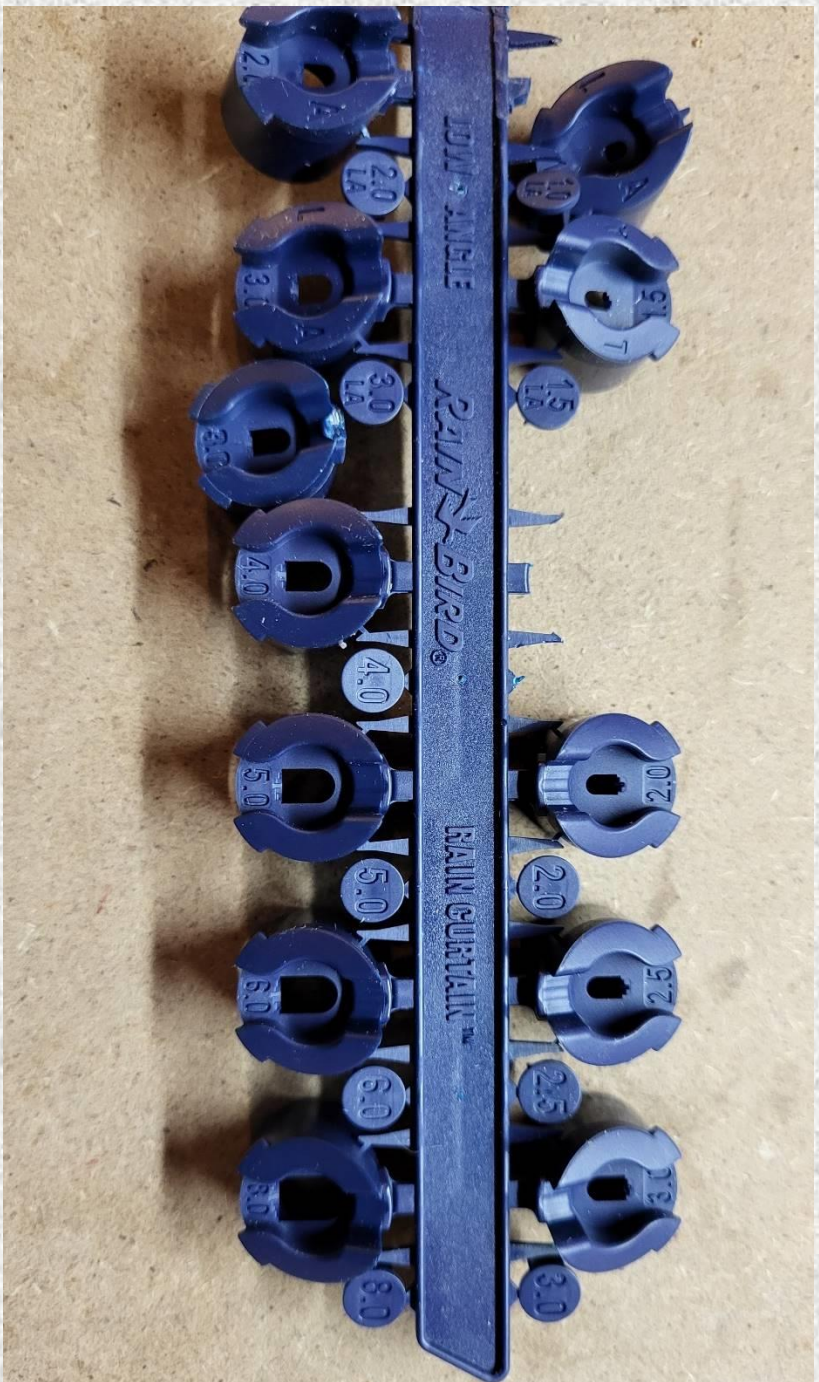
▲ *Triangular spacing based on 50% diameter of throw*

*Performance data collected in open wind conditions*













***HOW TO RUN THE SYSTEM  
TO MATCH PLANT WATER  
NEEDS***

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**ESP-Me**  
enhanced modular controller

ALERT

TEST ALL STATIONS OFF AUTO RUN SET DATE SET TIME

MANUAL PROGRAM  SET WATERING START TIMES

MANUAL STATION SET STATION RUN TIMES

RAIN SENSOR 1 MON

DELAY WATERING 2 TUE

SEASONAL ADJUST % 3 WED

ADVANCED WATERING CYCLES 4 THU

5 FRI

6 SAT

7 SUN

SELECT DAYS TO WATER

PROGRAM SELECT  
A-B-C-D

PGM A FRI 4:30 PM  
SEASONAL ADJ

◀ ▶ - +

HOLD TO MANUALLY START  
ADVANCE STATION

RAIN BIRD®

OFF

AUTO

Date / Time

Start Times

Run Times

Water Days

Weather Sensors

Personal Adjust



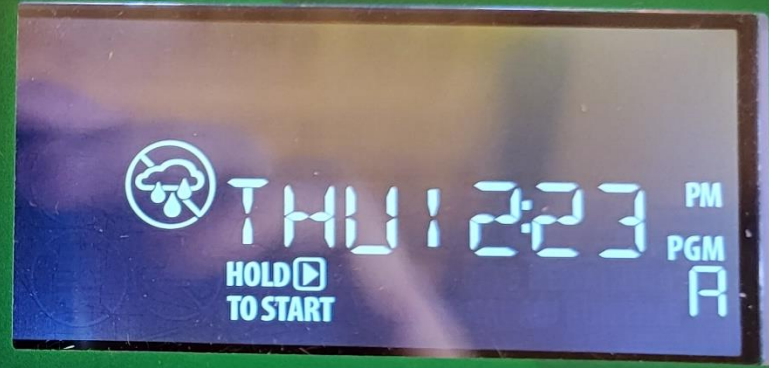
# ESP-ME3

ALARM

Program Select



A · B · C · D



LNK™ READY



Hold to Start  
Advance Station



TEST ALL STATIONS

OFF

AUTO RUN

SET DATE

SET TIME

MANUAL PROGRAM

MANUAL STATION

RAIN SENSOR

DELAY WATERING

SEASONAL ADJUST %

ADVANCED WATERING CYCLES

SET WATERING START TIMES

SET STATION RUN TIMES

1 MON

2 TUE

3 WED

4 THU

5 FRI

6 SAT

7 SUN

SELECT DAYS TO WATER




Advanced modular controller

WATERING  
START TIMES

STATION  
RUN TIMES

ON

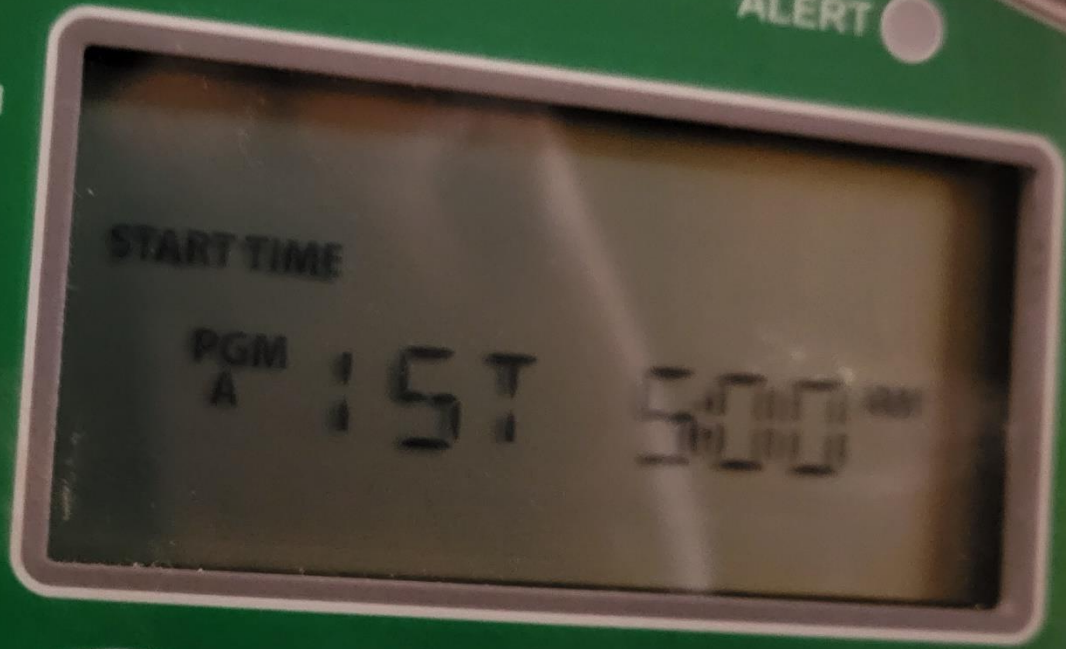
E

ALERT 

PROGRAM  
SELECT



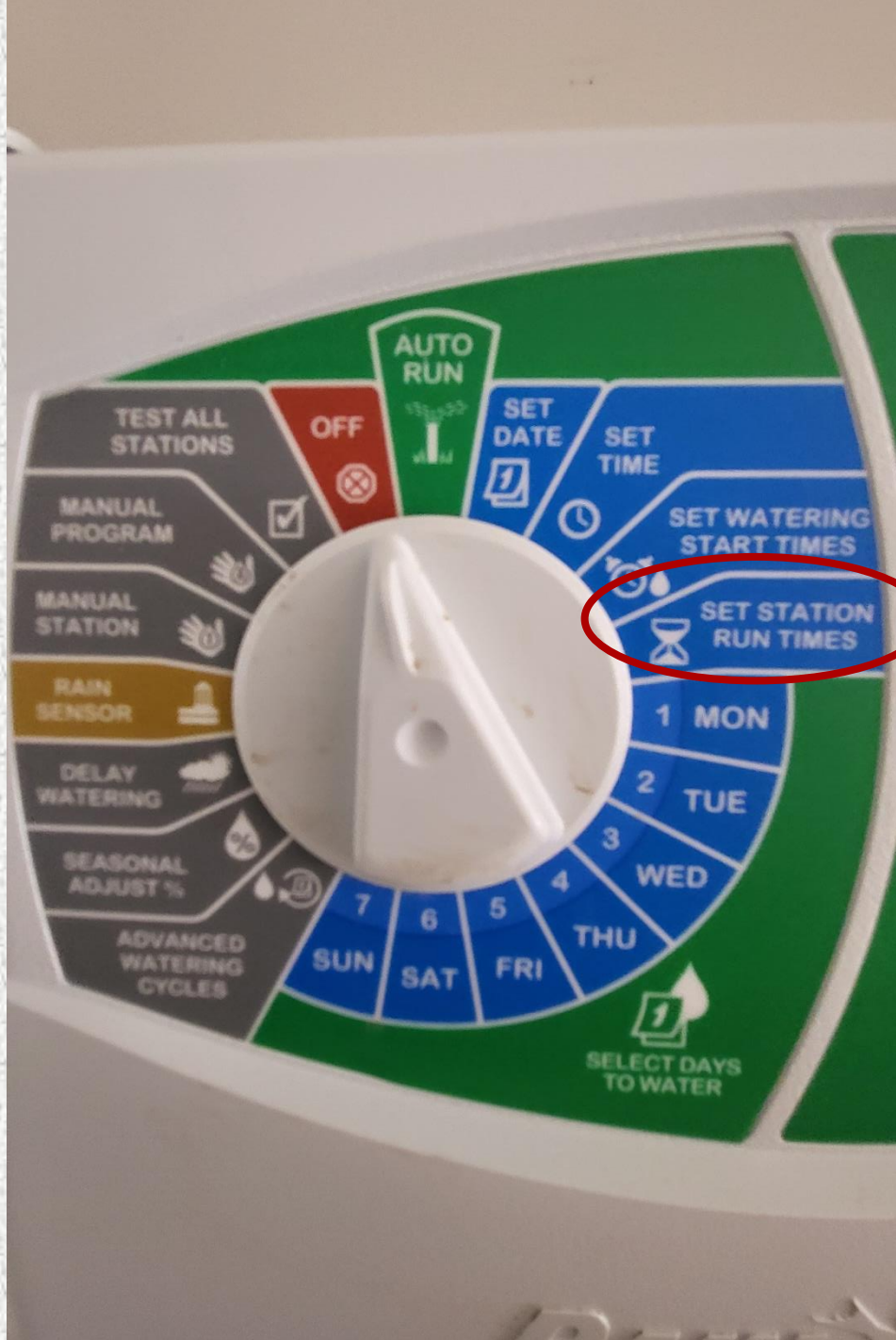
A·B·C·D



HOLD TO MANUALLY START

ADVANCE POSITION



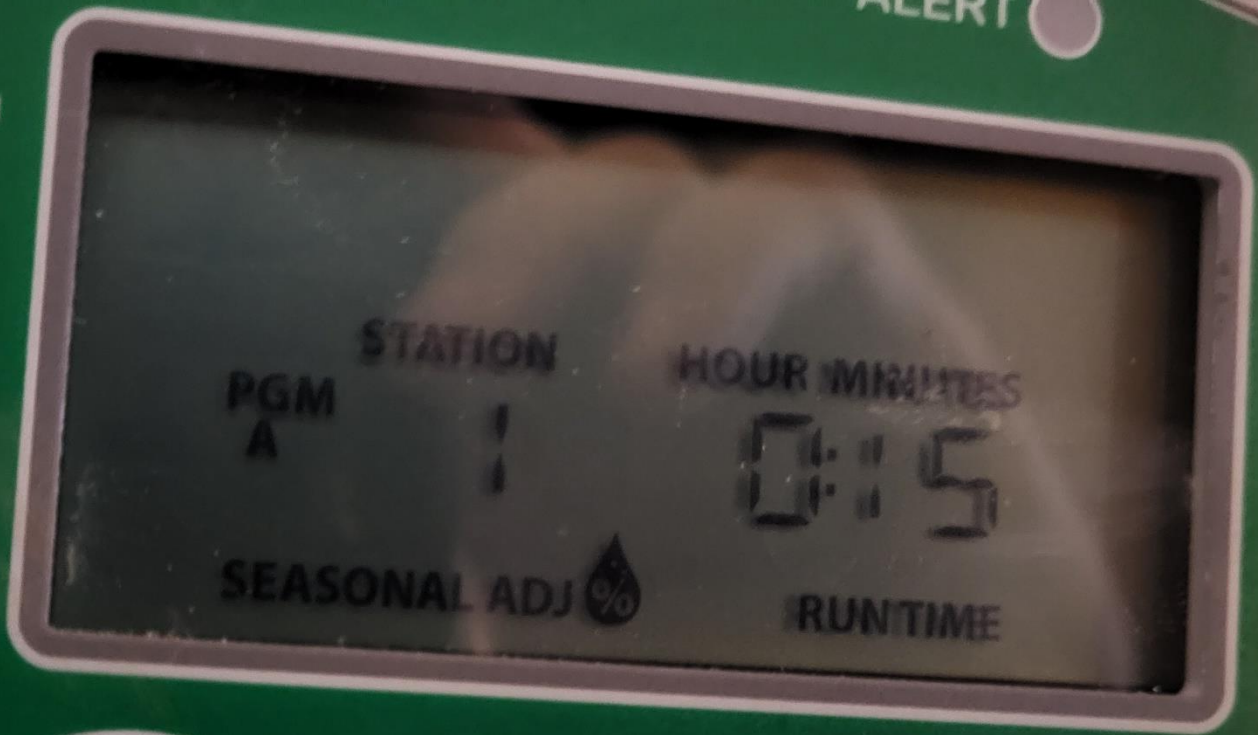


NG  
ES  
ON  
ES

PROGRAM  
SELECT



A·B·C·D



HOLD TO MANUALLY START

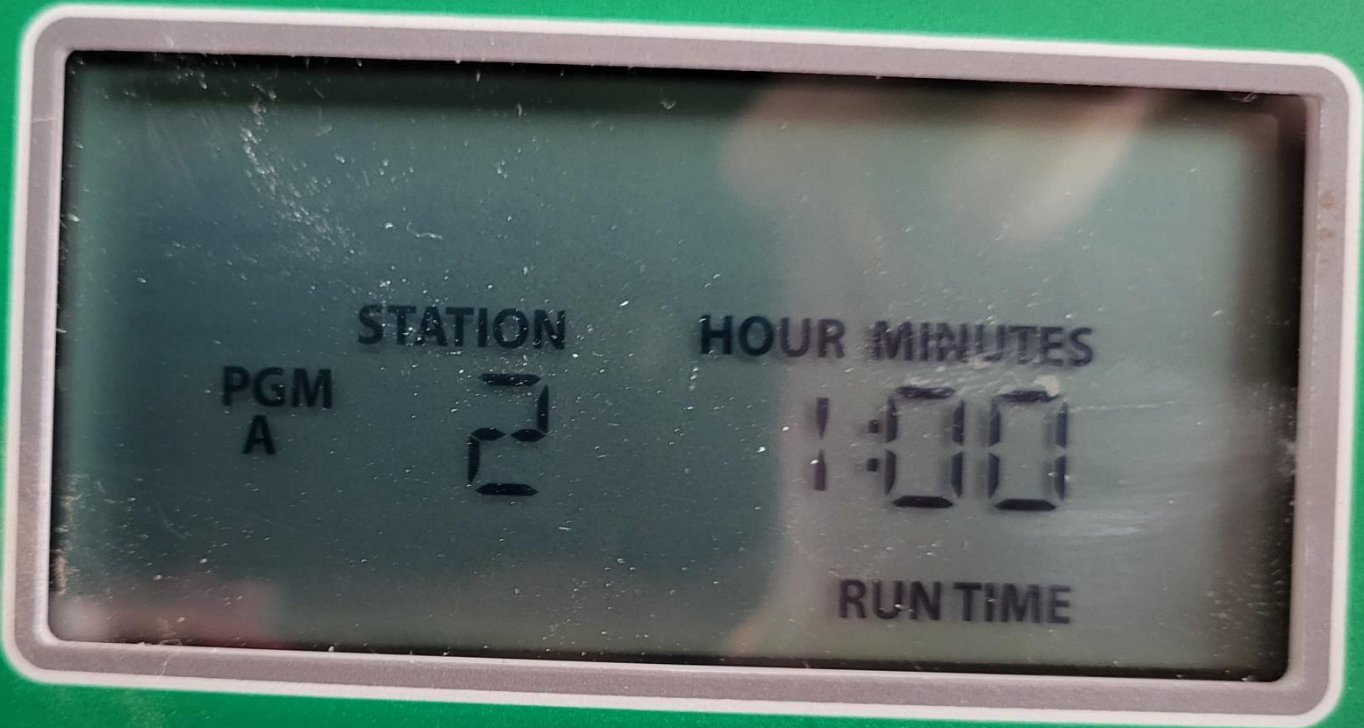
enhanced modular controller

ALERT 

PROGRAM  
SELECT



A·B·C·D



## *How Much Water Was Applied?*

- *Station 1*

$$2 \text{ in/hr} \times \frac{1}{4} \text{ hr} = 0.5 \text{ in.}$$

- *Station 2*

$$0.5 \text{ in/hr} \times 1 \text{ hr} = 0.5 \text{ in.}$$

---

# ESP-Me

enhanced modular controller

ALERT

TEST ALL STATIONS

OFF

AUTO RUN

SET DATE

SET TIME

SET WATERING START TIMES

SET STATION RUN TIMES

1 MON

2 TUE

3 WED

4 THU

5 FRI

6 SAT

7 SUN

SELECT DAYS TO WATER

MANUAL PROGRAM

MANUAL STATION

RAIN SENSOR

DELAY WATERING

SEASONAL ADJUST %

ADVANCED WATERING CYCLES

PROGRAM SELECT

A-B-C-D

MO TU WE TH FR SA SU

PGM A MON OFF

◀ ▶ - +

HOLD TO MANUALLY START  
ADVANCE STATION

# ESP-Me

enhanced modular controller

ALERT

TEST ALL STATIONS

MANUAL PROGRAM

MANUAL STATION

RAIN SENSOR

DELAY WATERING

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1 MON

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SELECT DAYS TO WATER

PROGRAM SELECT

A-B-C-D

MO TU WE TH FR SA SU

PGM A TUE ON

◀ ▶ - +

HOLD TO MANUALLY START ADVANCE STATION

# ESP-Me

enhanced modular controller

ALERT

PROGRAM  
SELECT



A-B-C-D



HOLD TO MANUALLY START  
ADVANCE STATION

**TEST ALL STATIONS**

**MANUAL PROGRAM**

**MANUAL STATION**

**RAIN SENSOR**

**DELAY WATERING**

**SEASONAL ADJUST %**

**ADVANCED WATERING CYCLES**

**OFF**

**AUTO RUN**

**SET DATE**

**SET TIME**

**SET WATERING START TIMES**

**SET STATION RUN TIMES**

1 MON

2 TUE

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SELECT DAYS TO WATER

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enhanced modular controller

ALERT

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RAIN SENSOR

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1 MON

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7 SUN

SELECT DAYS TO WATER

PROGRAM SELECT

A-B-C-D

PGM A FRI 4:30 PM

SEASONAL ADJ

◀ ▶ - +

HOLD TO MANUALLY START ADVANCE STATION

RAIN BIRD®







**Questions**

A photograph of a sunset over a large body of water. The sun is a bright orange orb on the horizon, with a shimmering reflection on the water's surface. The sky is filled with dark, dramatic clouds, some of which are illuminated from below by the setting sun, creating a range of colors from deep purple to bright orange. The foreground shows the dark silhouette of a rocky shore and some vegetation on the right side. The text "The End" is written in a clean, white, sans-serif font on the left side of the image.

The End