Trickle Irrigation Design for Blueberries

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Blueberries with Drip Irrigation

Irrigation

- Soil should be damp but not wet
- ¼”/day
- Insufficient moisture will reduce the bud formation for next year’s crop
- Drip irrigation with point source emitters.

Site Development

- Rows in a North-South direction
- Raised bed (6-8 inches high) prior to planting.
- Recommend 9-14’ (**12**’) between rows and 4-6’ (**5**’) between plants.
  - *a 5’ by 12’ spacing was used for the ½ ac and 4 ac irrigation designs*

Site Development

- Raised beds
  - Better drainage
  - Roots develop above compacted wet zones

Prior to Planting

- High organic matter soils.
- Distribute peat or composted pine bark down row
- Do not substitute sawdust, hay or compost as this will stunt or slowly kill your plants.
- Incorporate peat with soil
  - Peat tilled uniformly into entire bed
- Dig a deep hole
  - 24” wide x 18” deep
  - Mix 1 gal peat in bottom of hole with soil

Planting

- Plant in late fall or early spring
- Set plants at the same depth that they grew in the nursery and firm soil around the roots.
- Set plants ~ 2 to 3 inches above level ground to enhance drainage
- Water plants to settle soil around the root system.

Mulching

- Apply to a depth of 4-6 inches and reapplied when it rots to a depth of 3 inches.
- Remulching is necessary every year or two.
- Blueberry roots grow at the mulch/soil interface and if the mulch decomposes too much and is not replaced the roots will be exposed.
- Mulch is applied in a 3-4’ wide band down the row.

Mulching

- Moderates soil temperature,
- Conserves moisture,
- Releases nutrients,
- Helps with weed control.
- Use
  - woodchips,
  - sawdust,
  - pine needles,
  - straw

Mulching

Laurel Fork

Simple Designs

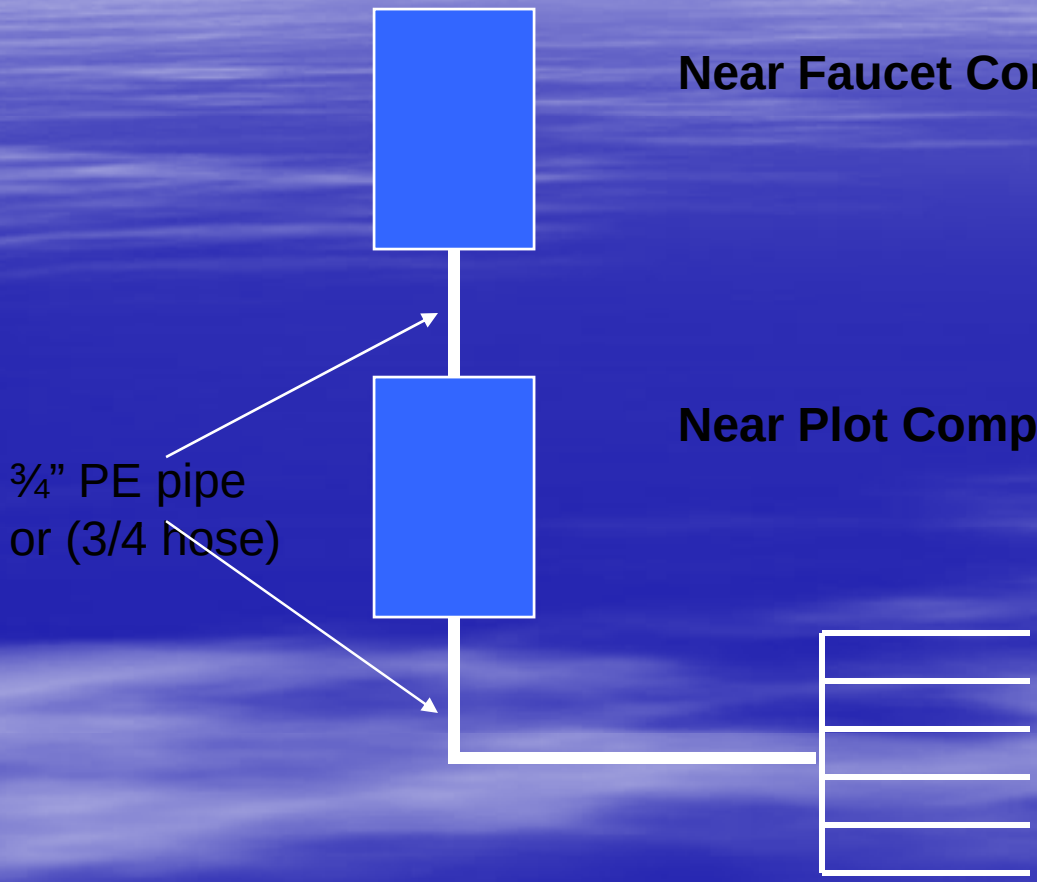
- Home water supply
  - outdoor faucet for ½ ac plot
  - 5/8-in water meter for up to 4 ac
- Pond water supply

Advantages

- Simple to install
- Simple to operate
- Ability to automate
  - Reduce operation man-hours
  - Employ “pulse drip irrigation”
  - Decrease water usage
  - Potential increase in yield

Half Acre Blueberry Drip Irrigation System

Overall schematic

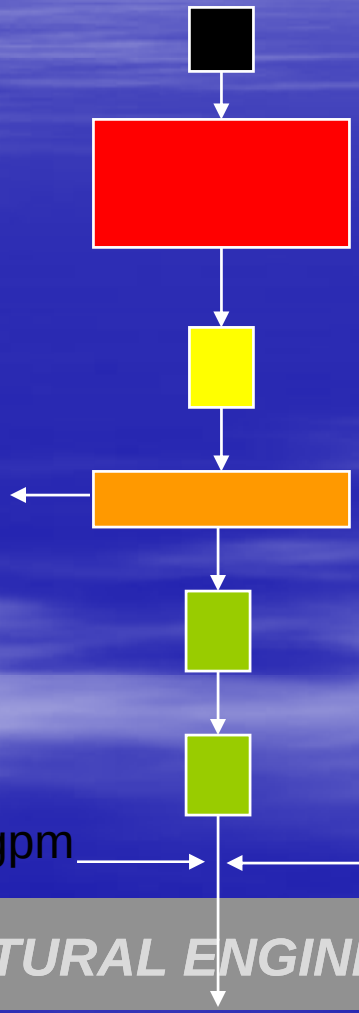


Near Faucet Components

Near Plot Components

½ Acre drip lines

Near Faucet Components



Faucet (supply)

One Station controller
Battery powered (optional)

Atmospheric vacuum breaker

¾” 150 mesh screen **filter** and
Flush valve

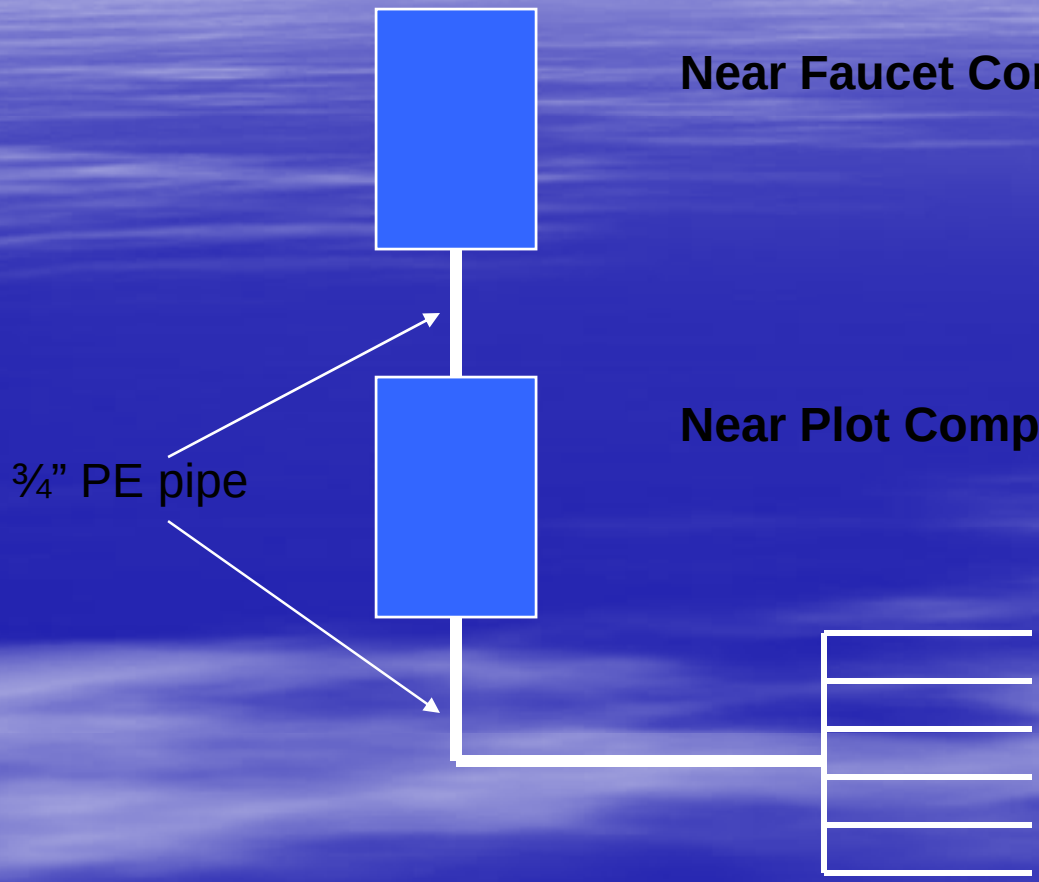
¾” x ¾” FHS comp (or ¾” hose)

¾” comp. elbow

¾” PE pipe

To ¾” PE or ¾ hose

Overall schematic



Near Plot Components

¾” PE or ¾” hose

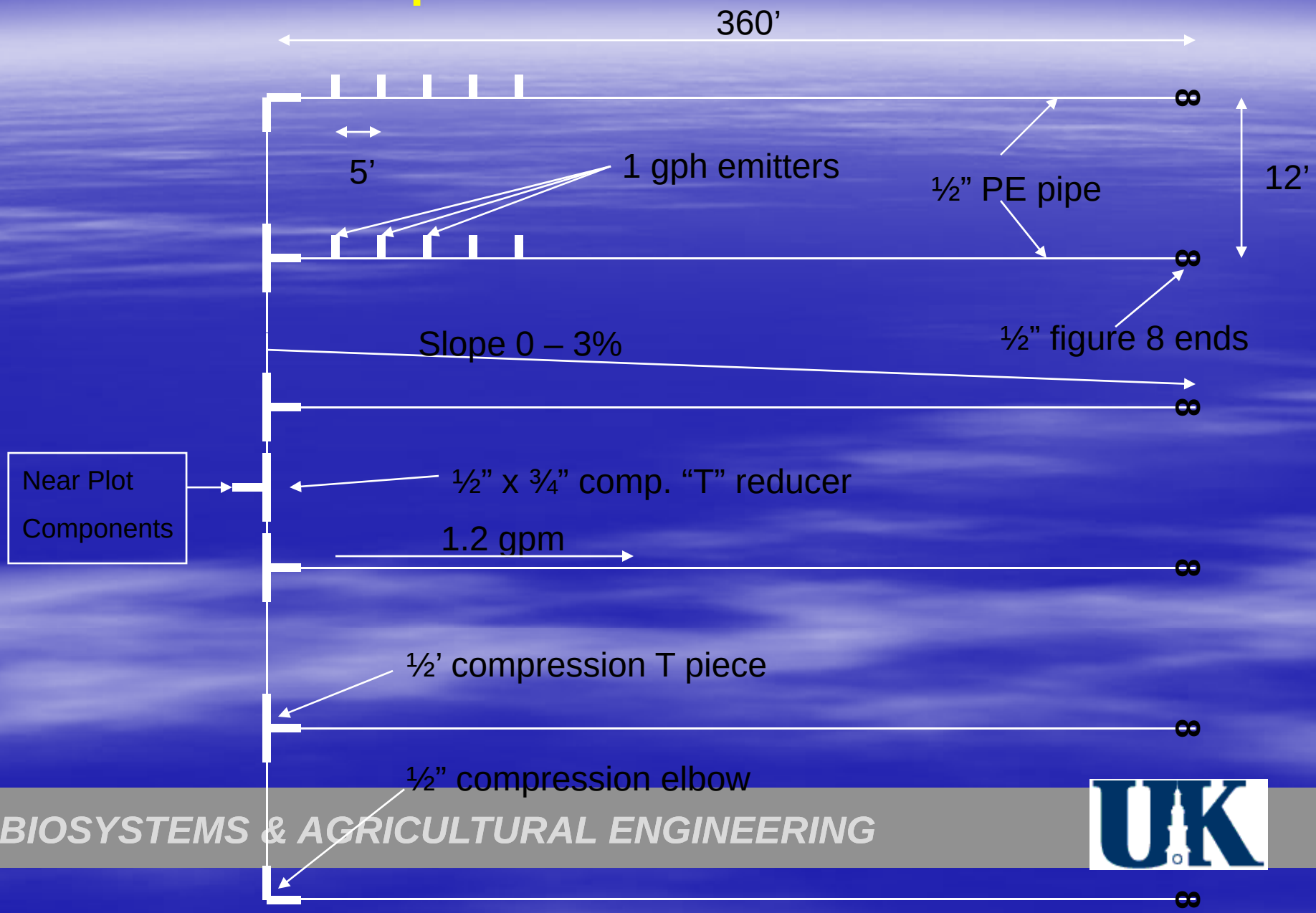
¾” x ¾” comp. MHT

25 psi **pressure reducer**

¾ x ¾ FHS comp.

To drip irrigation

Drip Lines for ½ acre



Operating Time

- ¼” water/day (***maximum****)
- 3 gal/day/plant (5 ft plant spacing)
- 1 gal/hr emitter – 3 hours
- Options
  - 2 times per day for 1 ½ hour
  - ***3 times per day for 1 hour***
  - ***6 times per day for ½ hour***
  - 12 times per day for 15 min (pulse irrigation)
- *Note these are expected to be the maximum irrigation rates during critical growing conditions

Maximum Water Usage
½ Ac Plot

- 1/4 in/day – max. application rate
- ~ 1,300 gal/day

4 Acre Blueberry Drip Irrigation System

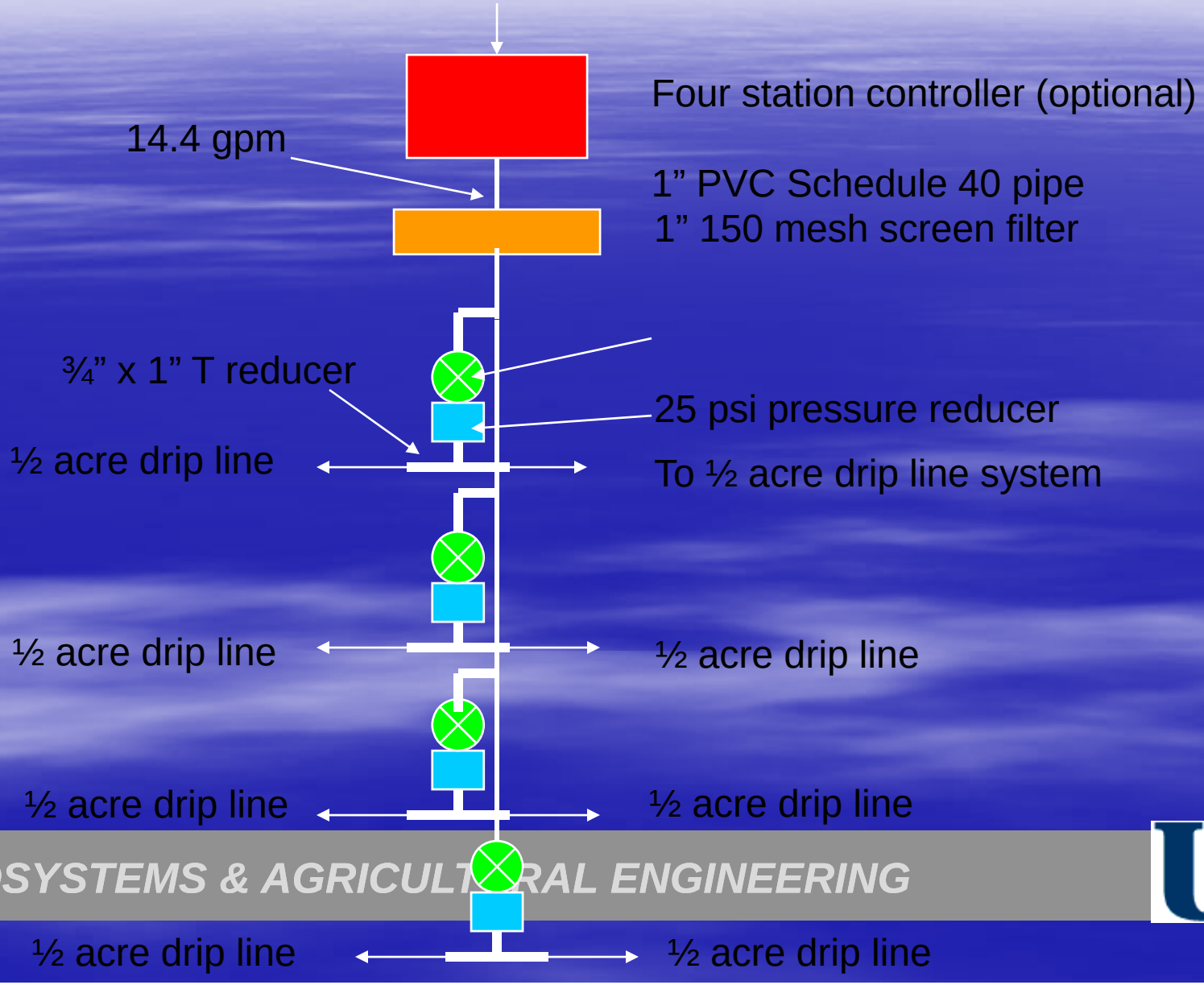
House Water supply

- 5/8” water meter (15 gpm)
- Connect to water line (usually 3/4” copper)
- Use 1” PVC or PE for main line (15 gpm)
  - lose ~ 5 psi/100 ft
  - depending on pressure at the house (usually 60 to 90 psi) restrict house to plot distance to ~ 400 ft)

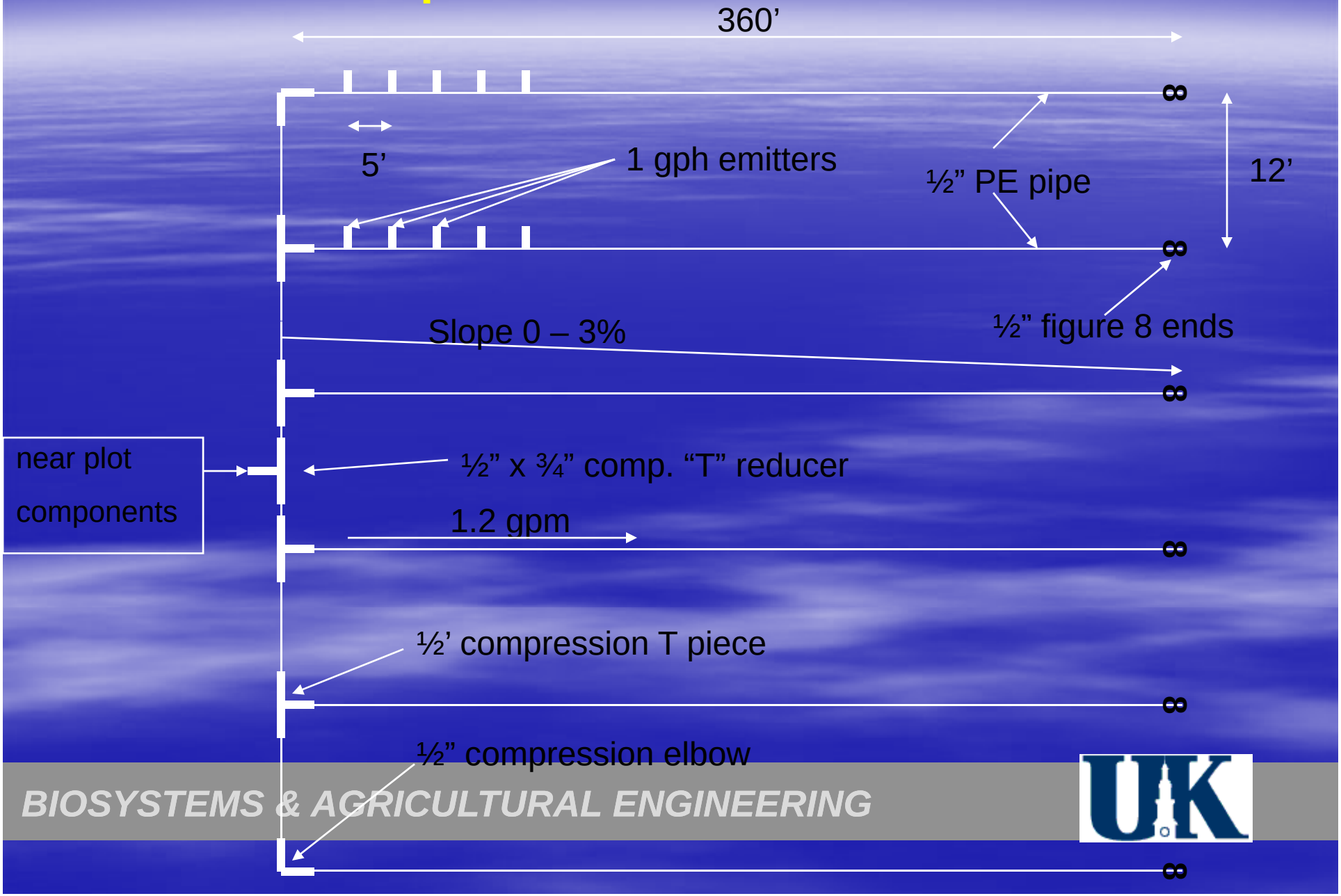
Pond Water Supply

- ~ ½ BHP electric pump
- 1 ¼" to 1 ½" main pipe (@14.4 gpm)
  - 1 ¼ " PVC Sch. 40 pipe ~ 1.5 psi loss/100 ft
  - 1 ½" PVC Sch. 40 pipe ~ ¾ psi loss/100 ft
- OR
- ¾ BHP electric pump
- 1 " PVC or PE pipe (~5 psi loss/100ft @ 14.4 gpm)

4 Acre Drip Irrigation System



Drip Lines for ½ acre



Automation Components

- Irrigation controller
- Solenoid valves and valve box
- Direct burial underground wire and water-proof connector
- Pump start-switch (if pump used)
- Electricity

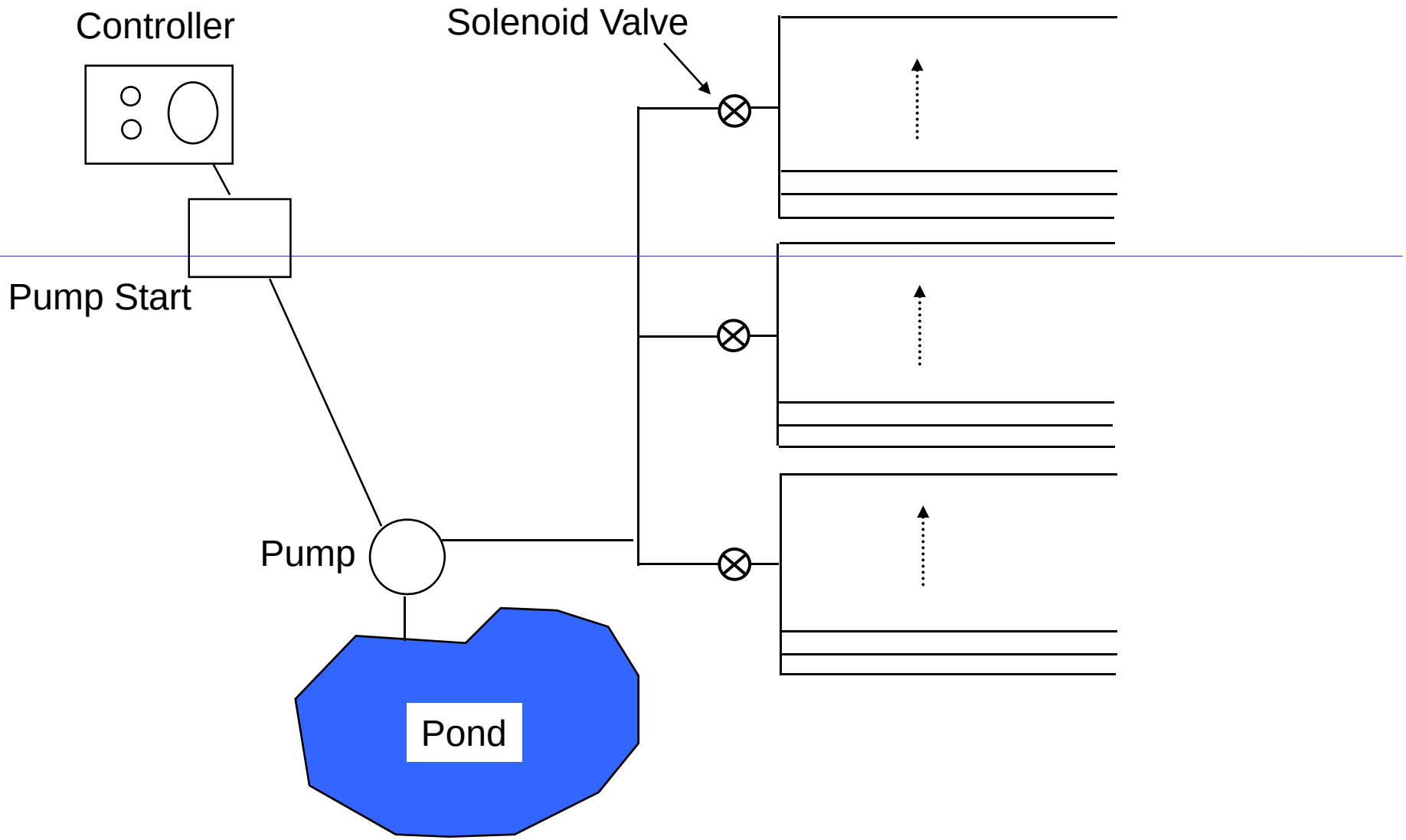
Irrigation Controller

- Brain of the irrigation system
- Tells each valve
  - when to come on
  - how long to run
- In a nutshell
  - sophisticated clock
- Reduces voltage from 120V to 24V

How a Controller Works

- Sends an electric signal to the valve in each zone
- Solenoid valve receives the signal and tells valve to open
- Following scheduled duration of operation, controller sends another signal
- Solenoid valve turns off
- Proceed to next irrigation zone

System Layout



Programmed Information

- Set of watering instruction
  - Watering days
  - Time of day to start
  - Sequence of operation (zone 1, 2, . . . 12)
  - Length of time in each zone
  - Multiple start times per day
  - Run times from 1 to 60 minutes (alternatively, 0.5 to 18 hours)
  - Activates pump

Solid-state Controller

Solenoid Valve

Pressure Loss – 1”

GPM	Solenoid Valves	
	Globe	Angle
10	**1.9**	1.0
20	**3.3**	2.0
30	6.1	3.0

Valve Boxes

Type of Wire

- Direct burial wire (identified as UV wire)
- Must carry 24V to 30V
  - Safety
  - Controller (transformer) reduces 120V to 24V
- Plastic coated
- Solid copper
- Single or multi-strand
- Multiple colors (white for common wire)

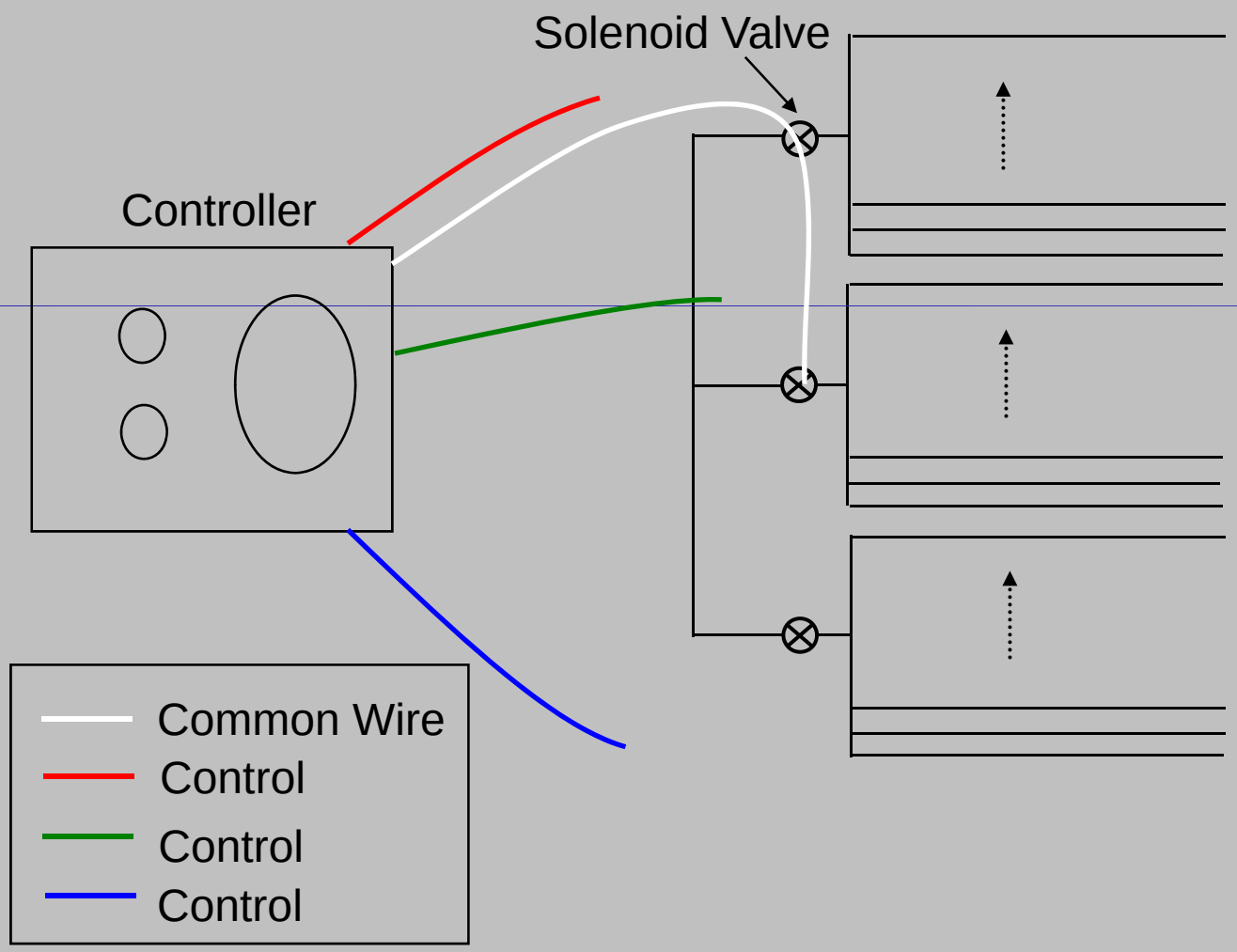
Wire Sizing

- Distance between controller and valve

Only good if common and control wires are same gauge

Gauge	Allowable Distance (ft)
18	**3,000**
16	4,800
14	7,700

Wire Layout


Solenoid Valve
Controller
Common Wire
Control
Control
Control

Wire Connectors

- Caution! Placing electric tape around a wire nut will NOT provide a waterproof seal!
- Two basic types of wire connectors
  - Wire nut with self-contained epoxy seal
  - Wire nut without self-contained epoxy seal (user must add epoxy)

Irrigation Scheduling

- Traditionally, ½ hours to 3 hours per zone
- Problem
  - Field observations show some of the irrigation water infiltrates below root depth if watering last more than 20 minutes
  - Due to macropores (cracks in soil from decayed roots, worm holes, etc.)
  - Macropores enable water to quickly infiltrate to depths of 1 ft to 3 ft (or greater)

Pulse Irrigation

- Ideal when used with an Automatic Irrigation System
- Water is applied for 15 minutes at a time
- Water is applied many times throughout the day
- Benefits
  - Reduce water usage
  - Reduce loss of fertilizer
  - Potentially increase yield

Questions?