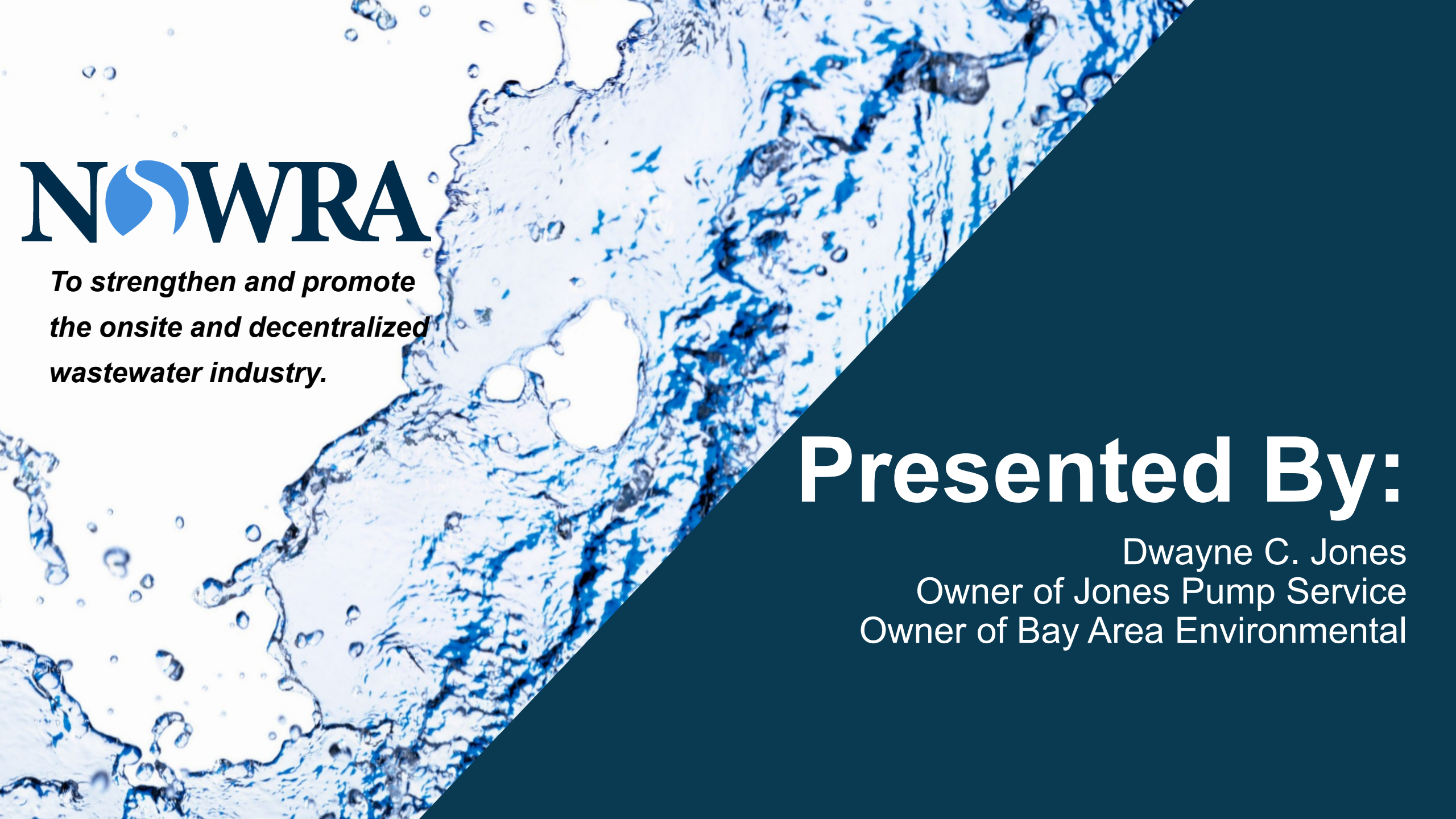




*To strengthen and promote
the onsite and decentralized
wastewater industry.*

Presented By:

Dwayne C. Jones
Owner of Jones Pump Service
Owner of Bay Area Environmental

A large, solid dark blue rectangle occupies the left side of the slide, extending from the top to the bottom and from the left edge to approximately one-third of the way across the frame.

Installation Equipment and Installation options

Ground Saw

- 2-3" wide trench
- Cuts through roots
- Used mostly in wooded areas
- Direct bury tubing
- Typically, there is no grading over the installation area



Vibratory Plow

- Fast installation
- Used for open sites
- Direct bury





Direct bury with
vibratory plow
dispersal field
installed



Trencher

- 4-6" wide trench
- Sand lined trenches
- Used in clear or wooded sites



Excavator

- 12-36" trenches
 - Sand lined trenches not an acceptable design in all areas.
 - Used for repair systems that may need to consolidate installation area. Depends on soils and loading rates
- Bed excavations
- Used for tank installation and dispersal area installation



Sand lined
trenches with
multiple runs
of tubing



Sand Mound / Micro Mound

- No stone bed needed
- 12" sand under tubing
- Tubing installed on top of sand
- Cover tubing with 2" of sand



A solid dark blue rectangle occupies the left third of the image, extending from the top to the bottom edge.

Site Layout

Site Layout

Topography of installation must be on contour to prevent ponding

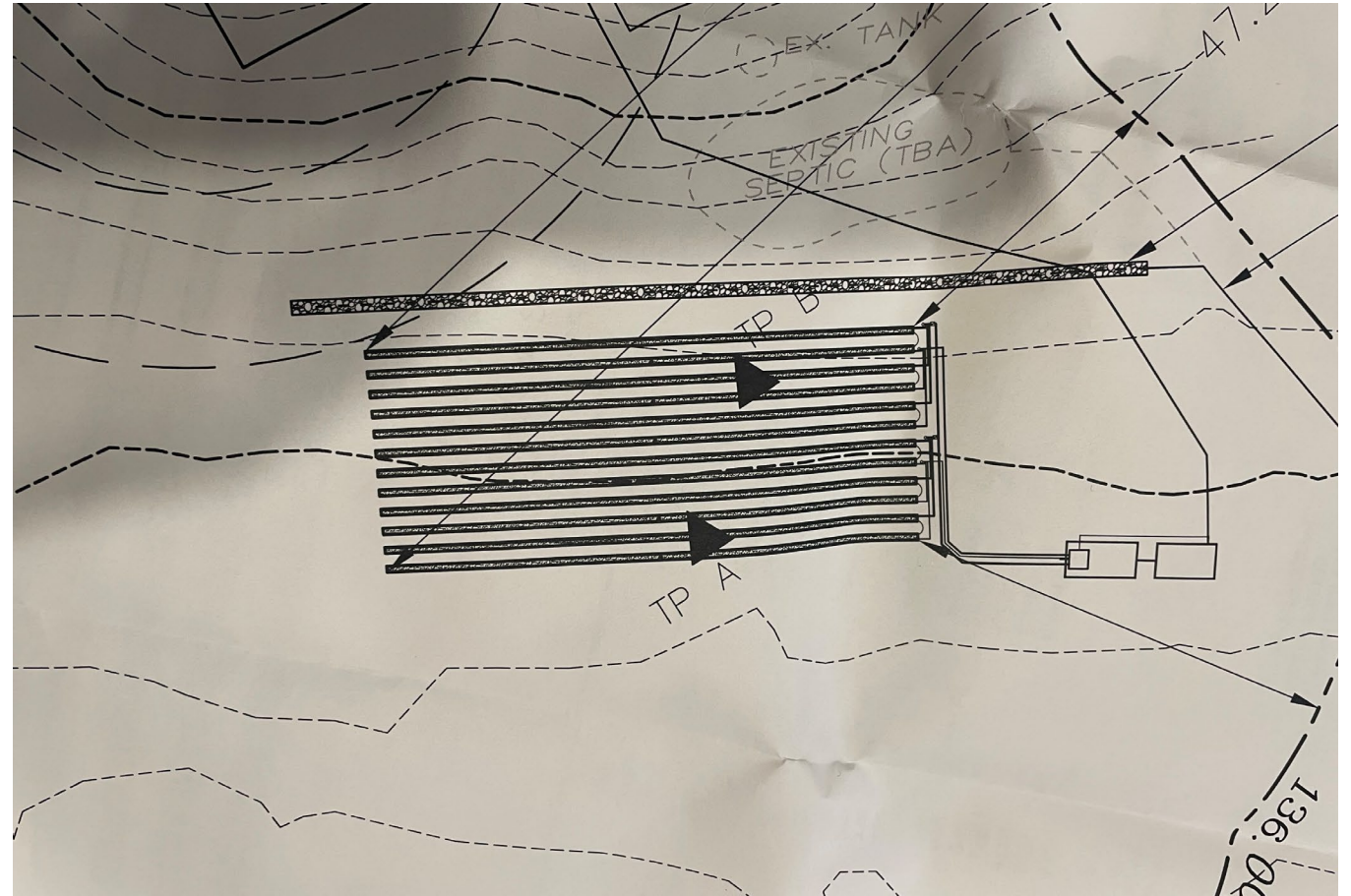
Stake area before installation begins to verify contour

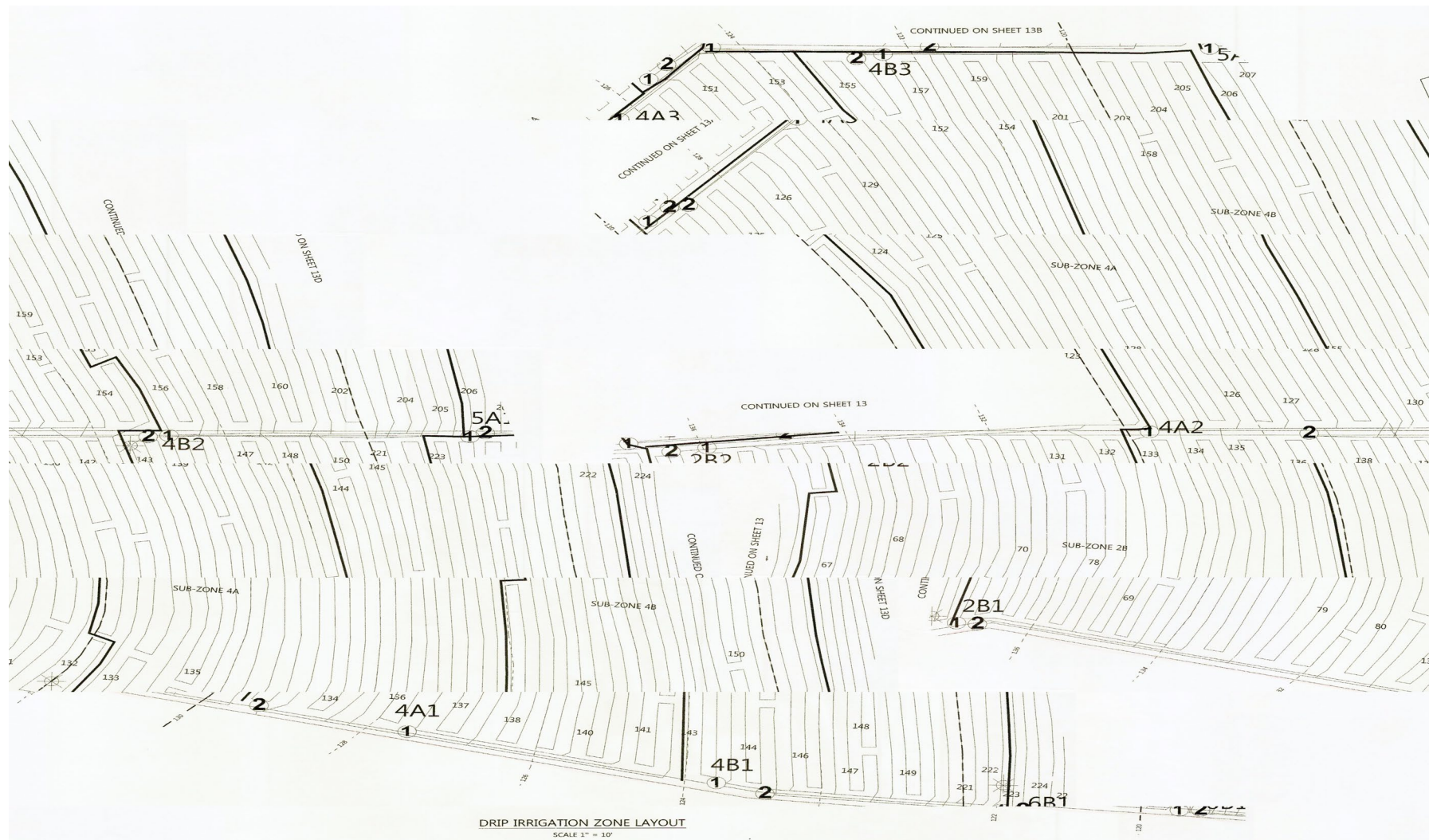
USE A LASER TO VERIFY ELEVATIONS

Trenching requires a laser to be used for entire installation

- Bottom of trenching must be level +/- 2" to prevent ponding

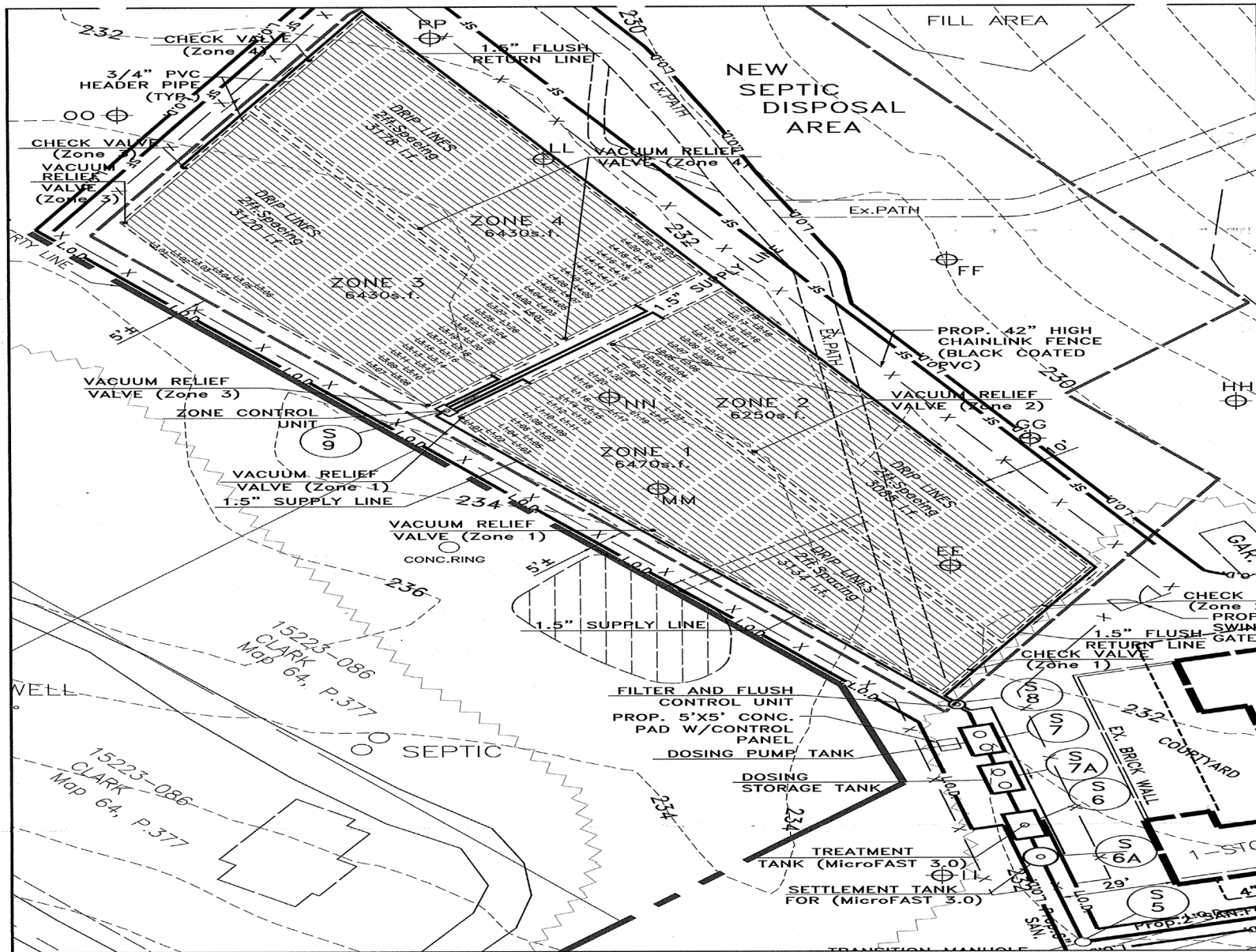
Engineers can get it right on paper, but does it match field conditions?





Site Layout

- Each zone should be identified and staked
- Each line should be staked and painted
- Tankage installation area should be identified and staked
 - Heavy equipment will not be able to run on dispersal area or toe of dispersal area
- Force main and return lines should be marked
- Installation plan should be well thought out at this point
 - Material staging area identified
 - Sequence of installation



KCW Engineering Technologies, Inc.
 3106 Lord Baltimore Drive, Suite 110
 Baltimore, Maryland 21244
 Tele (410) 281-0033
 Fax (410) 281-1065
 www.KCW-ET.com

**ST. STEPHEN CHURCH
 DRIP IRRIGATION DISPOSAL SYSTEM
 PLAN VIEW**

SCALE: 1" = 30'

8030 Bradshaw RD
 JUNE 2, 2003



Proper layout
allows for
proper
installation



Know Your Install Procedure

Read plans completely

- Important factors can be in different parts of the plans

Look at all the pictures

- Often details are in the pictures

Staging areas should be identified

Inspection requirements and inspection scheduling

Know Your Install Procedure

Know the sequence of installation

- Are tanks being installed before the dispersal fields
- Are the dispersal fields being installed before the tankage

There are times at the end of the dry season that the dispersal area is installed before the tanks to get the installation done before the season is over.

Tanks can be installed anytime during the season, but the soil moisture must be acceptable for the dispersal fields to be installed.

Field Testing Soil Moisture

Do not proceed with construction if:

- wire/pencil is $\frac{1}{8}$ inch in diameter
- wire/pencil is 2 inches long without crumbling
- Moisture content is above plastic limit

This slide from CIWT



A solid dark blue rectangle occupies the left third of the image, extending from the top to the bottom edge.

Installation

Do not make turns on drip disposal installation or toe of installation area with equipment

- Always plan on turns out of dispersal area
- Sand can be installed with skid loader, but must travel straight in and straight out
- Always avoid rutting and compaction
- No rubber-tired skid loaders or backhoes
- Even smaller type walk behind material handlers not permitted to be making turns in dispersal area
- Installation must be when soil moisture is at its lowest to allow for equipment travel that is necessary

Dirt & Plastic Shavings are the Enemy

- Tape ends of piping or tubing that will be exposed during construction
- Always be mindful of dirt or sand getting into piping during installation
- It only takes a small grain of sand to make solenoid valves malfunction
- Use shears to cut pipe and tubing



- Emitters can become clogged with dirt, causing low dosing flows
- Particles can break loose over time that are caught in piping and cause flow problems
- Always check gpm during O&M visit

Installation must be on contour

- Trench bottom or sand mound must be on contour

Tubing itself does not have to be perfectly level, but should be as close as possible

- Not all emitters have to be facing down
- Tubing does not necessarily have to be straight.

Rub your fingers over tubing during installation to feel for any abnormalities such as cuts or kinks.

Installation must be on contour

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Manifold Installation

Side Feed Manifold

- vertical supply piping
- leaning forward to allow for draining



Top Feed Manifold

- All pipes above supply and return lines drain into tubing



Manifold Installation

- All lines drain back into tubing when pump shuts off
- Check valve on common return line facing towards hydraulic unit
- Loops are elevated to drain back into tubing – This prevents freezing and redistribution when pump shuts off
- Tubing is straight into manifold piping – tubing installed at an angle can kink when backfilled

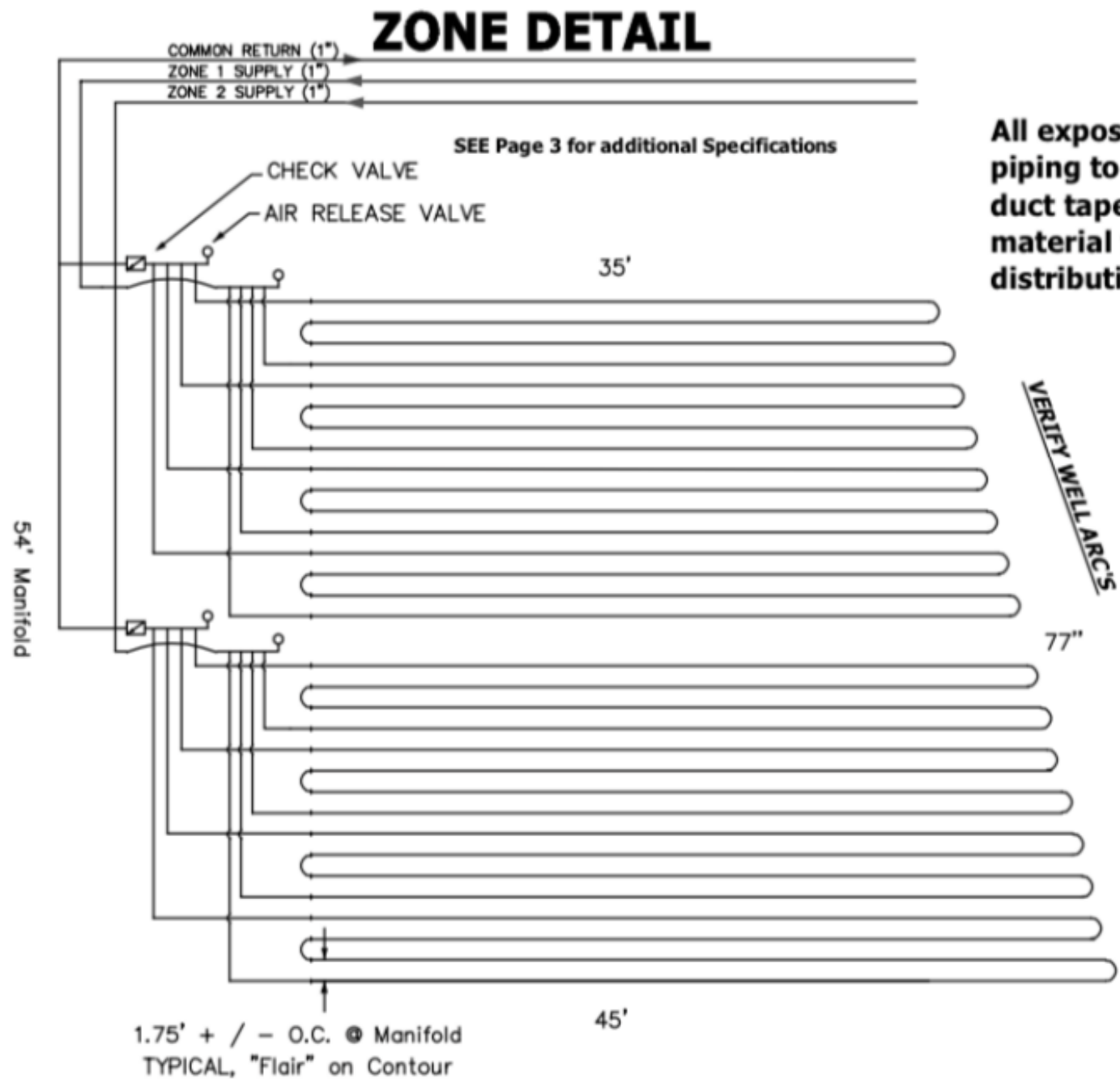
Slope



Check Valve Installation

- Check valves will be installed on return lines
- Check valve is designed to keep effluent from the return lines from flowing back into a zone that is not being energized
- Arrow on check valve should always point toward the hydraulic unit

Slope



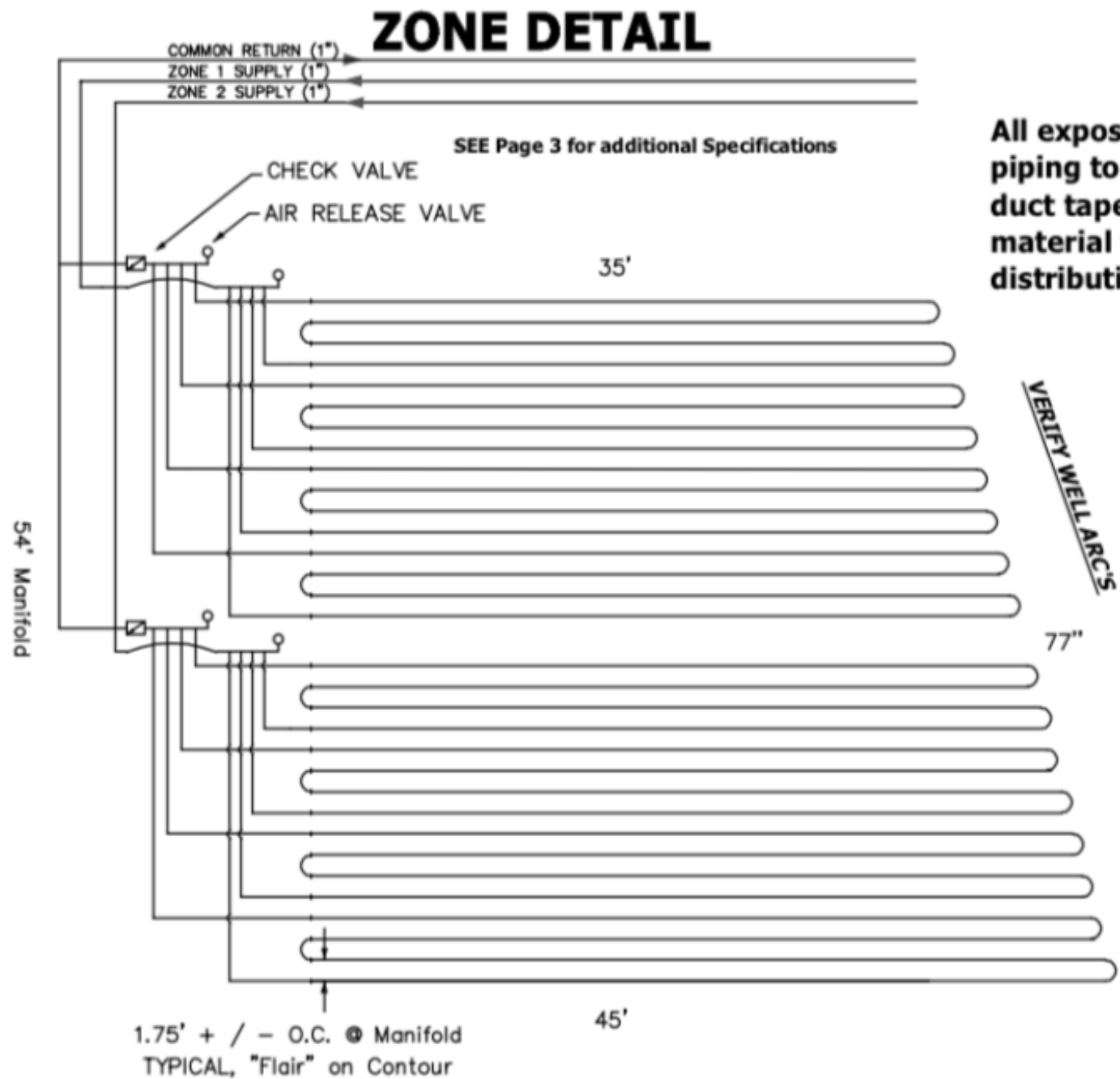
All exposed tubing and piping to covered with duct tape to prevent material from entering distribution system.

READ ENTIRE DESIGN / Plan Installation carefully

Air Relief valves

- Air relief valves are like check valves to allow air to escape from tubing and to allow air back into tubing.
- Proper air relief placement allows for equal distribution when dose begins and when the dose is finished.
- If air can not enter the system after shut off the tubing will not drain properly and allow for un equal distribution.

Slope



All exposed tubing and piping to covered with duct tape to prevent material from entering distribution system.

READ ENTIRE DESIGN / Plan Installation carefully

Air relief on supply



Air relief on return



Installing the Hydraulic Unit

- Hydraulic unit should be installed to avoid water ponding in the housing
- Soil should be mounded around the hydraulic unit enclosure to avoid freezing and to shed water
- When placing the enclosure over the hydraulic unit be sure to allow for repairs and O&M procedures





Large hydraulic unit is called a rack. This rack is installed inside a climate-controlled building with the control panel



Remote Zone Valve

- Used in place of package hydraulic unit when trenches are a far distance away from hydraulic unit or rack
- When trenches are at a lower elevation than the hydraulic unit or rack.
- Each zone valve will have its own solenoid.
- Surge protection should be used to protect the solenoids.
- It's a good practice to install a pair of spare wires to each zone valve.
- Electrical specifications for wire size needs to be followed for proper wire sizing.
- Each zone valve will need its own yard box for protection



Remote zone valve with yard box enclosure



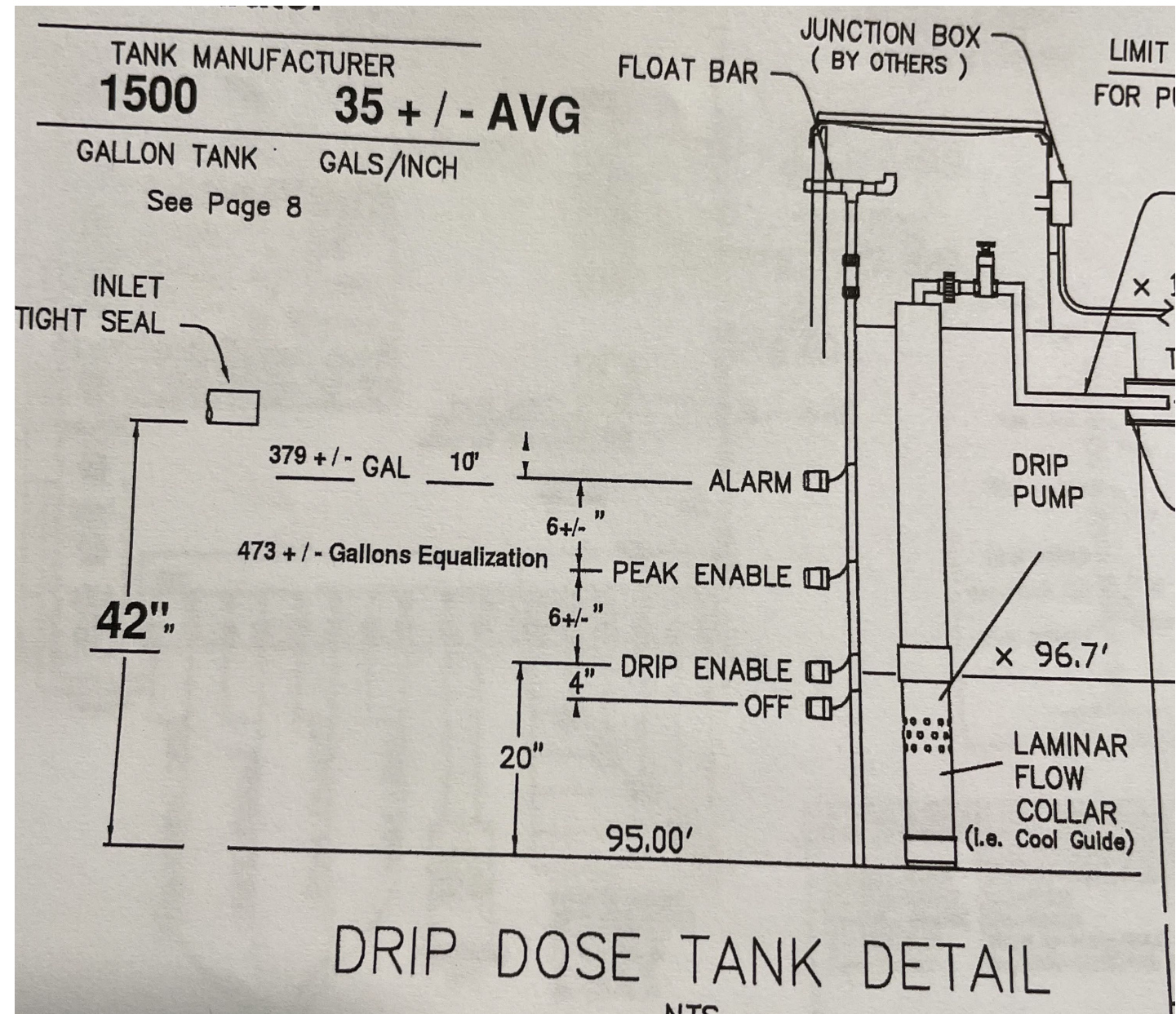
Mechanical switching valve used in place of electronic solenoids.



- Use heavy duty glue
 - Light duty glue allows for piping and tubing to blow apart
 - Separations of glued joints can happen for at least 1 year with the wrong strength of glue
- Always use primer
- Not like a typical LPD, the system can be under high pressure
- Any force main or return fittings must be pressure fittings

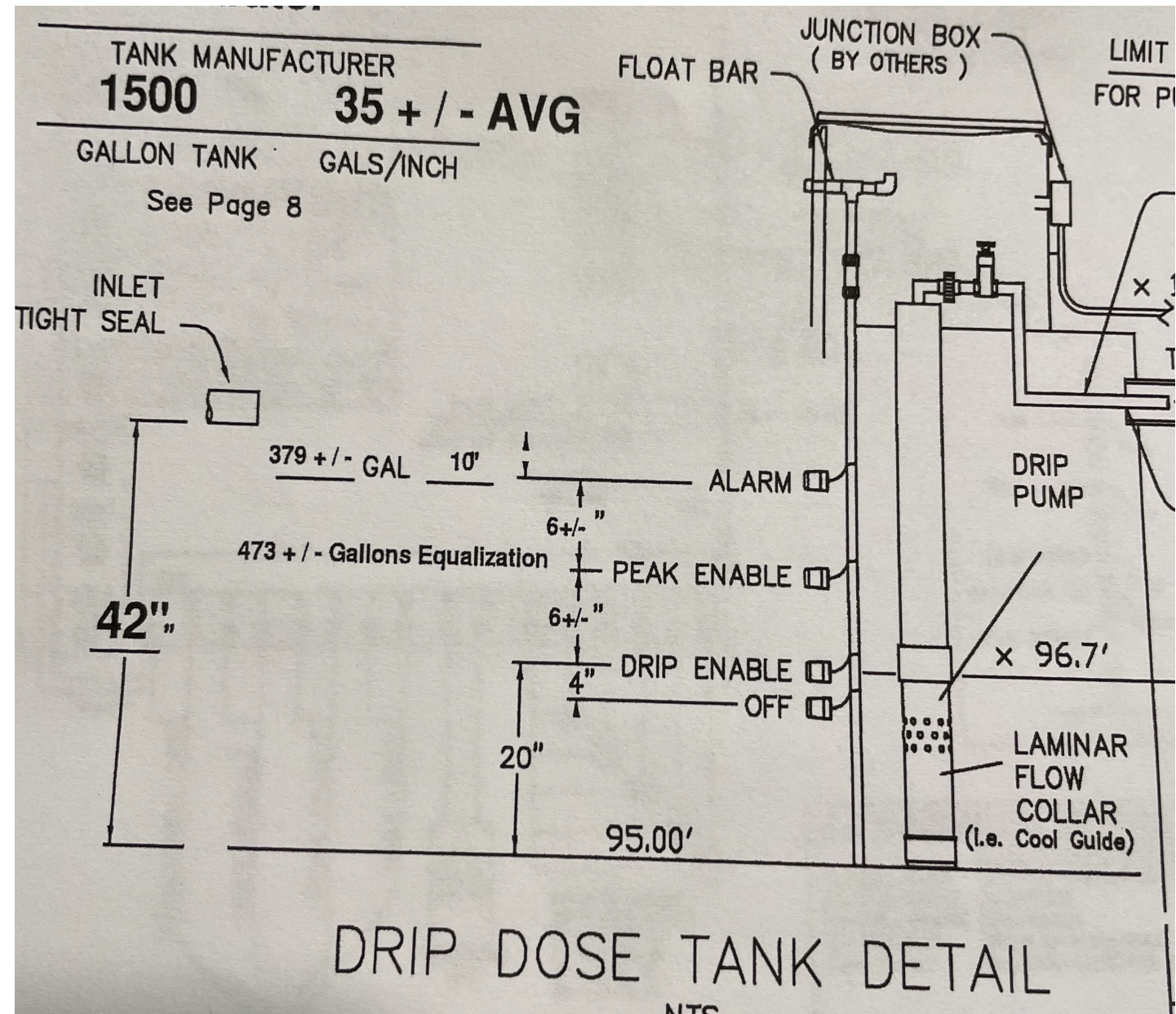
FLOAT SETTINGS

- Redundant off float needs to be set high enough that the pump intake stays submerged
- Distance from redundant off to enable needs to be set to allow for one dose from enable on to redundant off
- Rest times and float separation from enable float to peak float should allow for average flow
- Rest times and float separation from peak float to alarm float should allow for higher than average flows to peak daily flow.



FLOAT SETTINGS

- Alarm should be activated when the peak daily flow plus one gallon is met.
- Dose tank should be sized so that when the alarm is activated there is 24 hours of usable area remaining in the tank.
- Engineer may specify sea level elevations.
- If sea level elevations can not be met, relevant separation should be followed.



Control Panel Installation

- Place control panel so that control panel can be operated and at the same time is accessible to hydraulic unit
- Control panel set 3' or higher from the ground surface to the bottom of the panel
- Eye level is ideal



Control panel installation options

Installed inside of climate-controlled building



Installed outside with cover from weather



Control Panel Installation

- Be sure your electrician is educated and aware of sequence of operation.
- Keep schematic with the control panel.
- If there is an operations manual, it should be left with the control panel.
- Manufacturers are always willing to help with control panel issues.
- Color coded wiring always makes trouble shooting and repair task easier.



Operation & Maintenance

Walk the Site

Look for:

- Wet spots
- Holes dug by animals
- Proper care of vegetation
- Lush vegetation
- Damage to the dispersal area – rutting, compaction

Site Conditions

- Large sites may take all day to complete operations check.
- Animal damage may include ground hogs.
- Damp spots could be indication of leaks in the tubing or conveyance lines.
- Damp or wet spots should be reported immediately.
- Vegetation conditions should be recorded.
- Damage to soil by commercial mowers or other traffic should be reported and repairs made as needed. Future damage should be avoided.



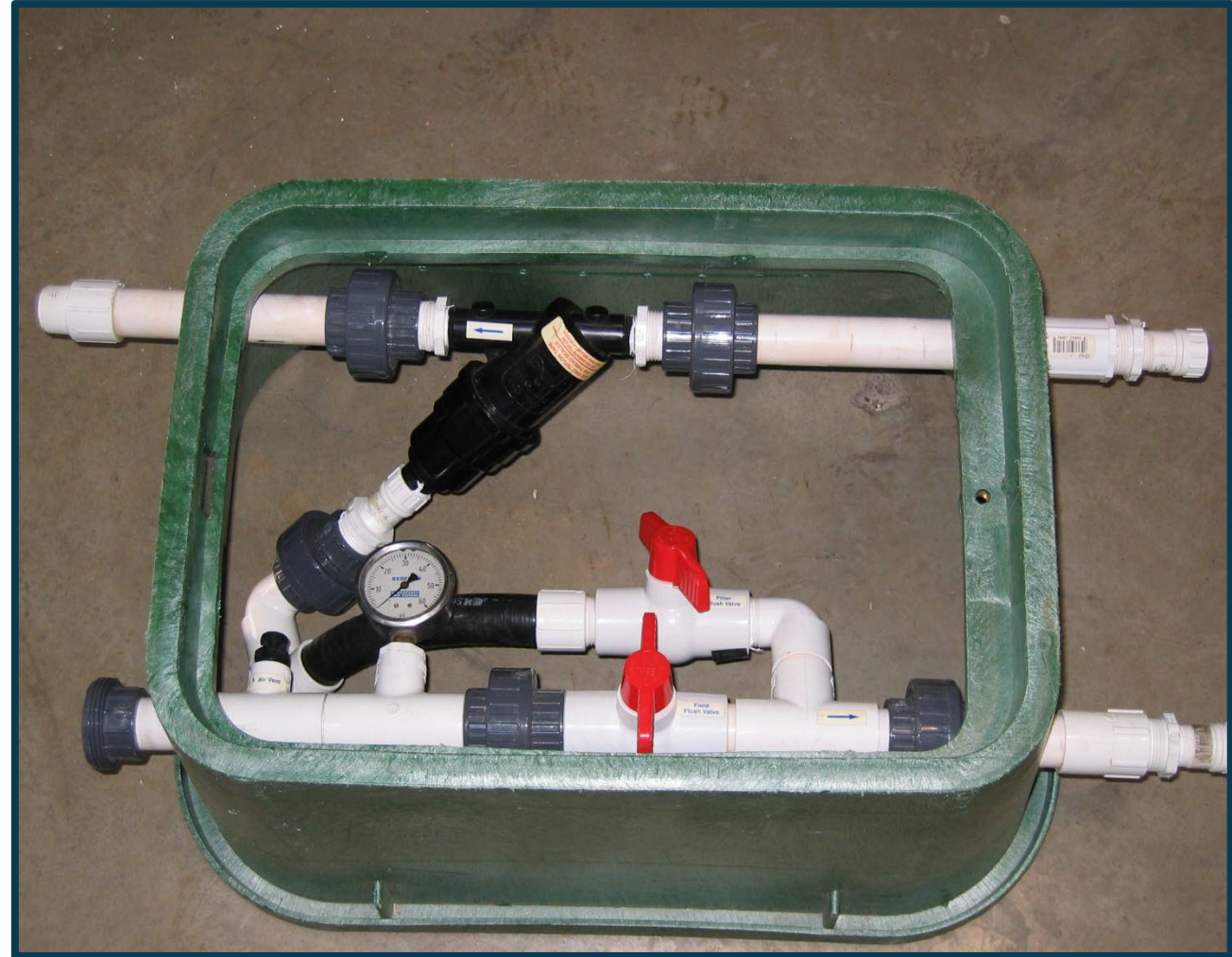
Clean Filters

- Filters filter 100-120 microns
- Filters must be in place to keep emitters from becoming clogged
- Panel can be programmed to backwash filters at predetermined intervals
- Manual cleaning on a regular schedule may be necessary
- Even filters that are automatically backwashed must be cleaned every service visit
- Clogged filters will affect dosing flow

Disc Filter



Screen Filter



Disc Filter Set up

Large flow system



Small flow system



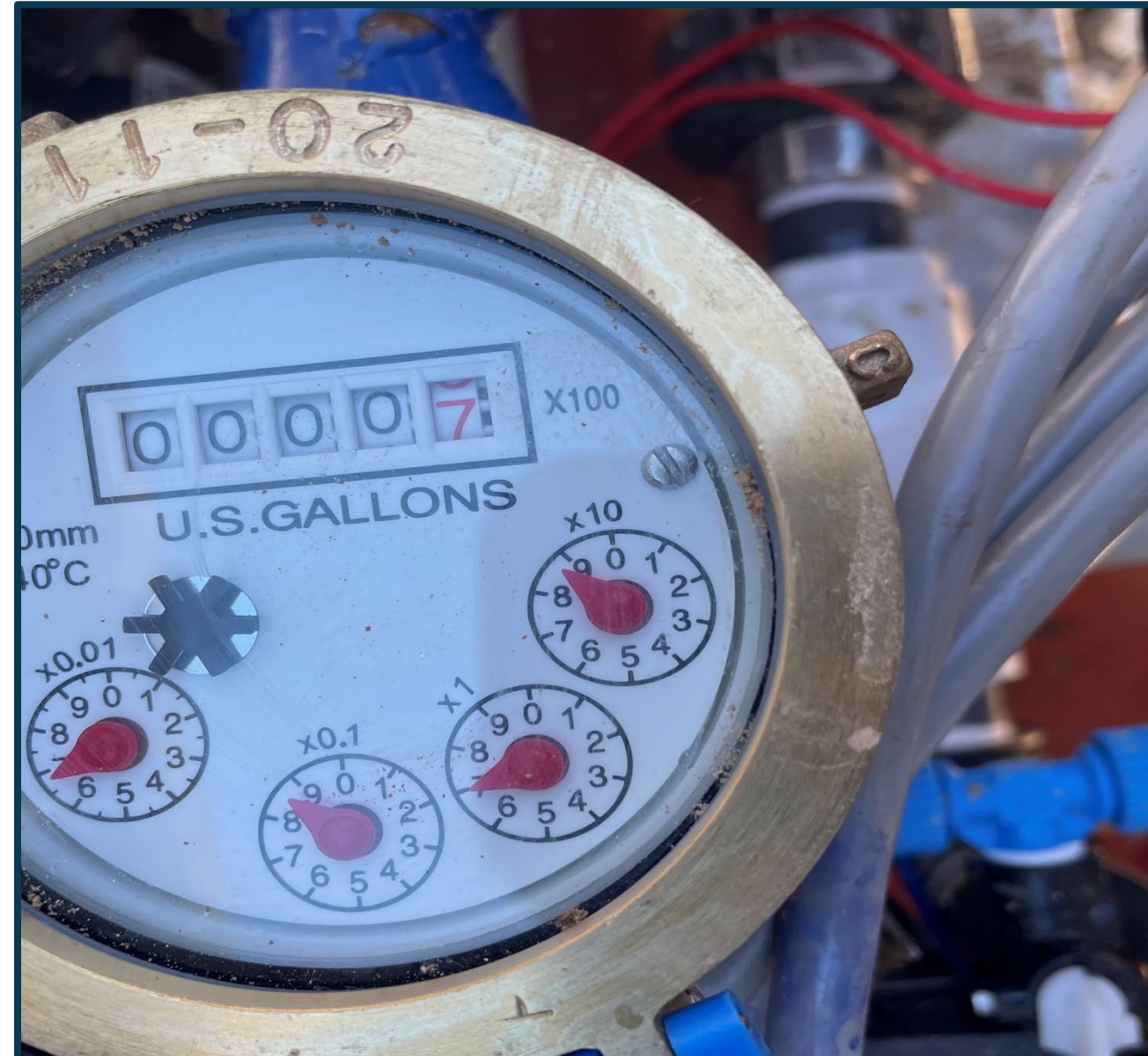
Reading the Flow Meter and Documenting the Total Flow

- No matter the reason you are on site, always read the meter and document reading
- For regular service visits, compare reading to the last visits' readings
- Can divide flow by number of days since last reading and calculate gallons per day use

Reading the Meter

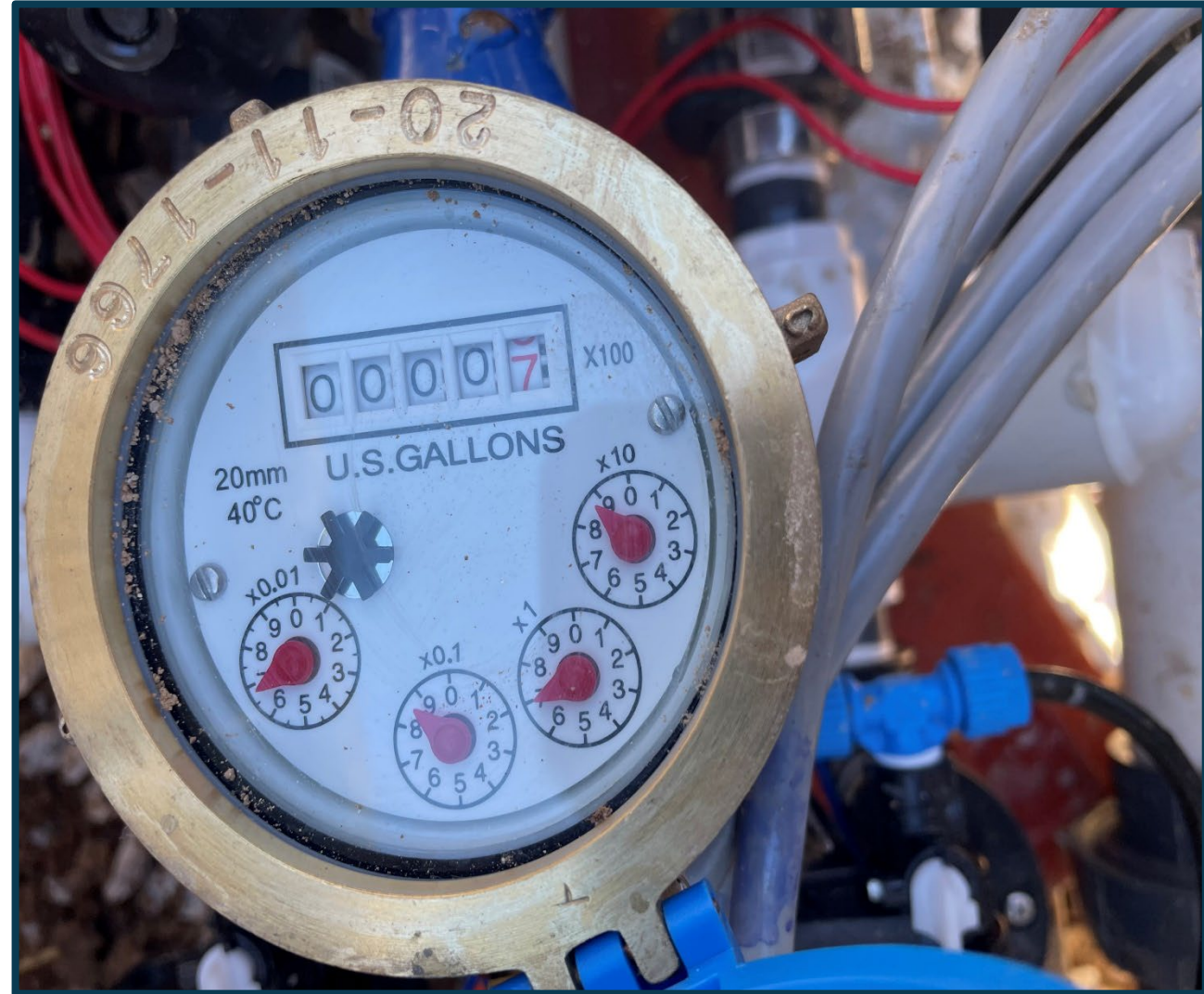
Start at highest number on the meter

This meter is reading
686.86



Reading Flow on a Meter

- Low flow gallons per minute can be read by counting number of revolutions on x0.1 space (field dosing)
- High flow gallons per minute can be read by counting number of revolutions on x1 space (field flushing)



Data from the Meter

High field dose flow can mean:

- 1 – Break in the piping or tubing
- 2 – Grit in flush return valve
- 3 – Grit in filter flush valve
- 4 – Compromised check valve

Data from the Meter

Low field dose flow can mean

- 1 – Grit in zone valve not allowing valve to open completely
- 2 – Clogged filter
- 3 – Clogged pump screen
- 4 – Clogged tubing or piping
- 5 – Clogged emitters

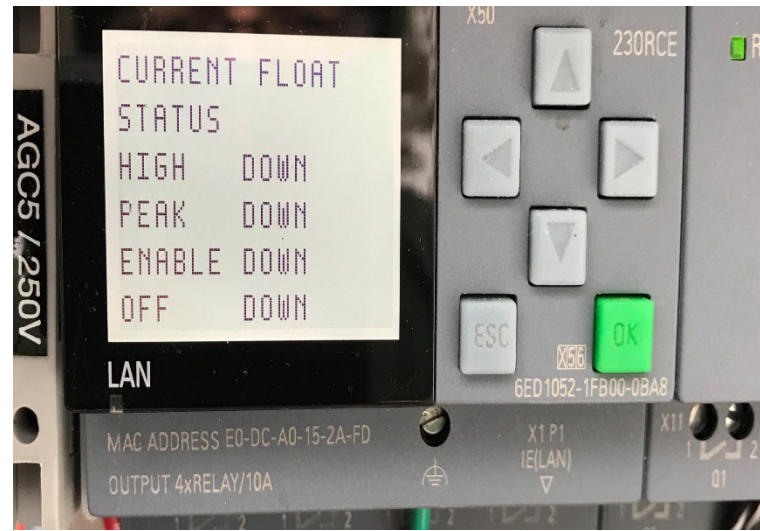
Data from the Meter

- Always compare meter information collected during a visit to the meter data collected at last visit
- Compare data collected to original start up numbers

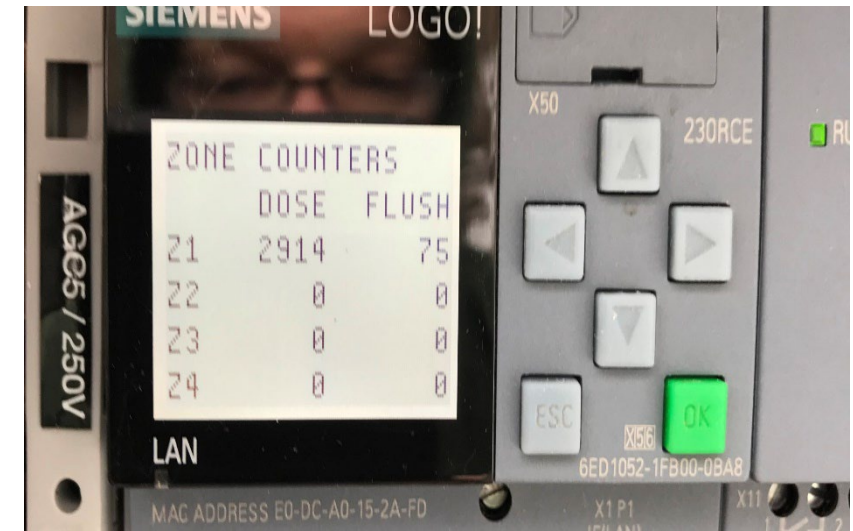
Collecting data from the control panel



- High water event counter
- ETM shows how long the alarm float has been activated



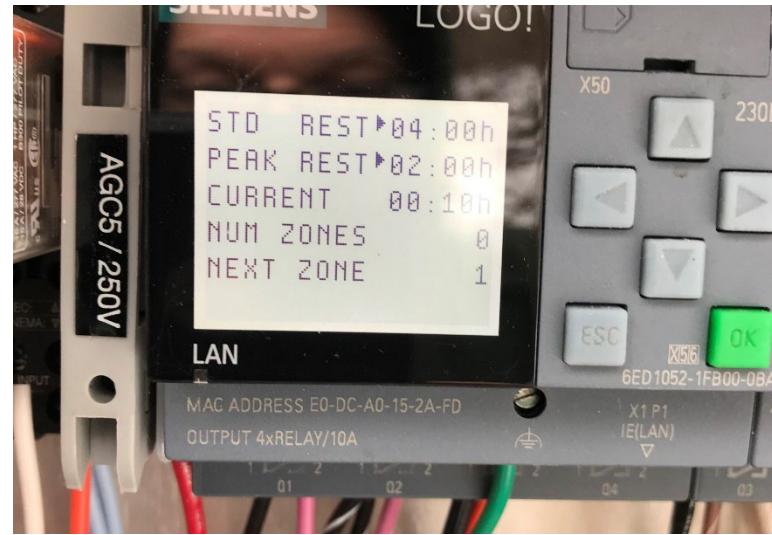
- Float status
- Helps determine if there are any faulty floats



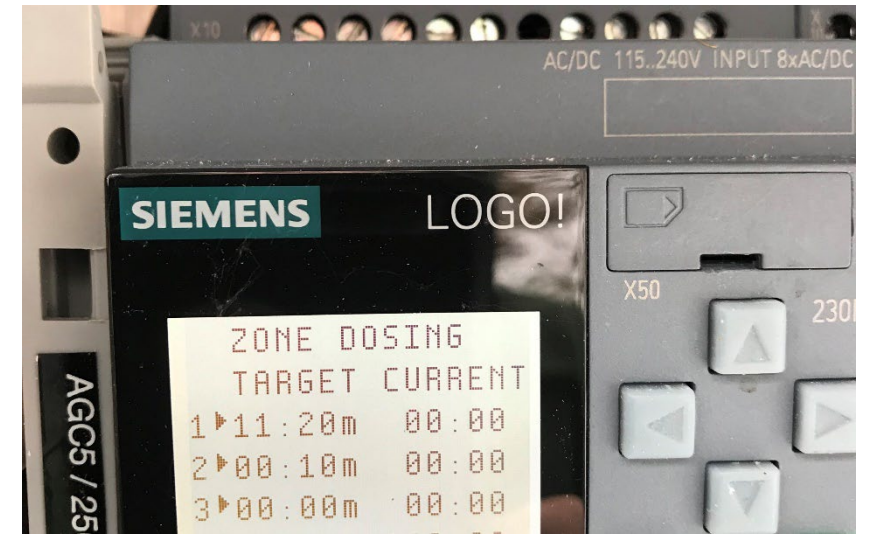
- Zone counter will let you know if there is a faulty zone valve or wiring



- Can program field flush intervals
- This panel is programmed to field flush every 14 days



- Rest times determined by engineer soil work and field dosing quantities



- Dosing times determine pump run time
- Dosing flow determined by number of emitters

Pump Counts

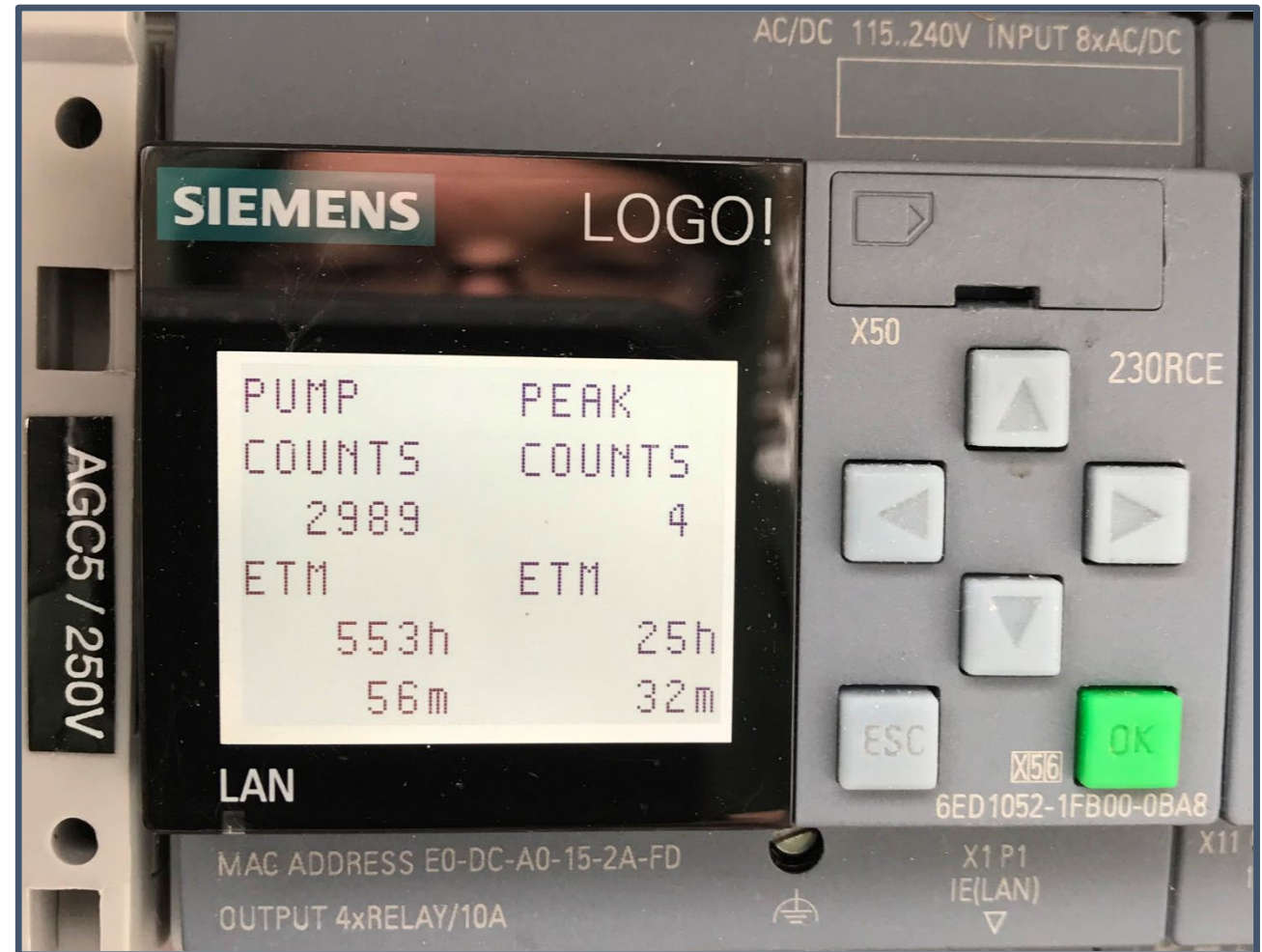
- Number of pump events when enable float is activated

Peak Counts

- Number of pump events when peak float is activated

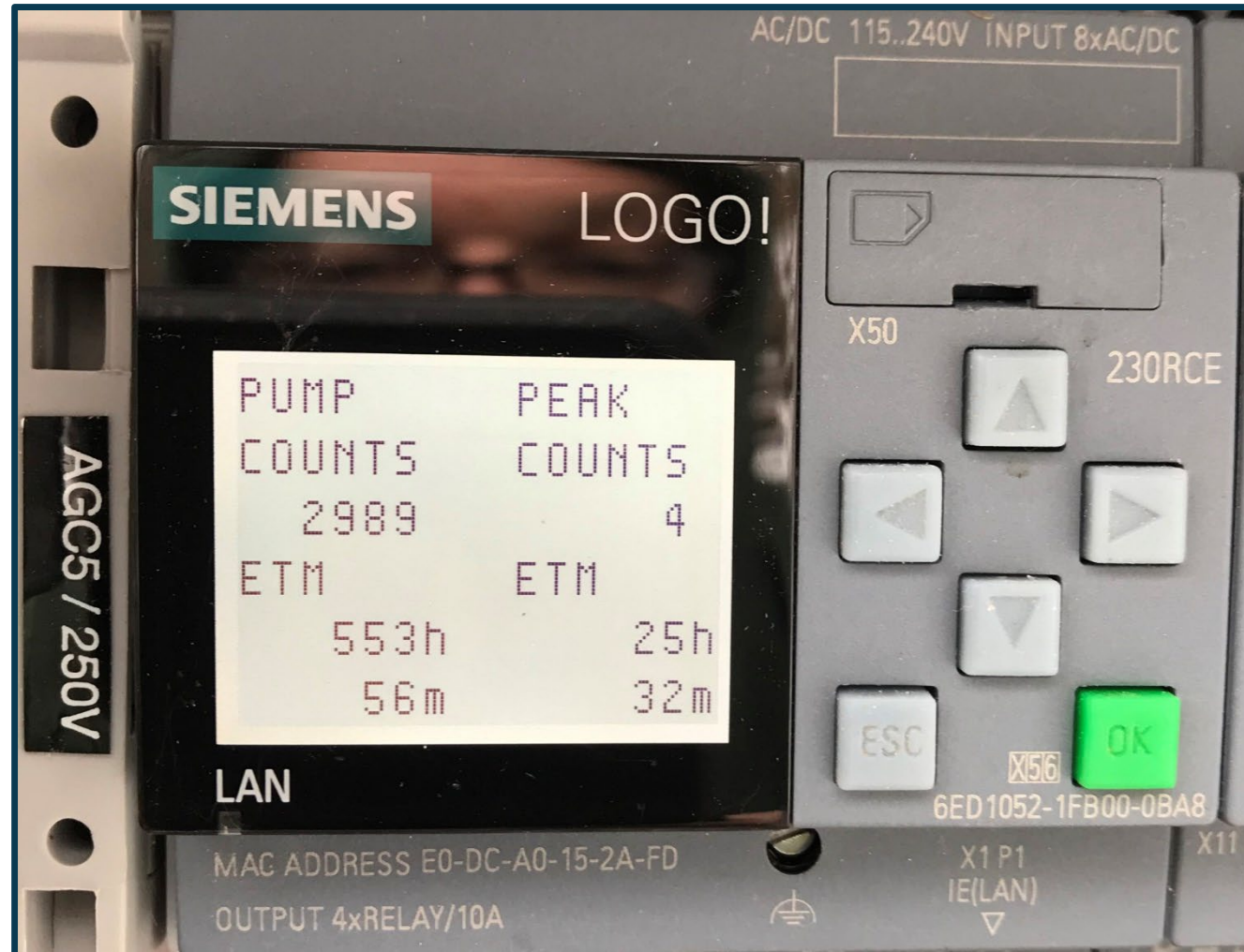
ETM

- Records time float is activated not time pump has run



High peak counts

- Leaking toilet
- High water usage in the house
- Storm water intrusion



Control panel with mechanical elapsed time meters and event counters



Control panel operation

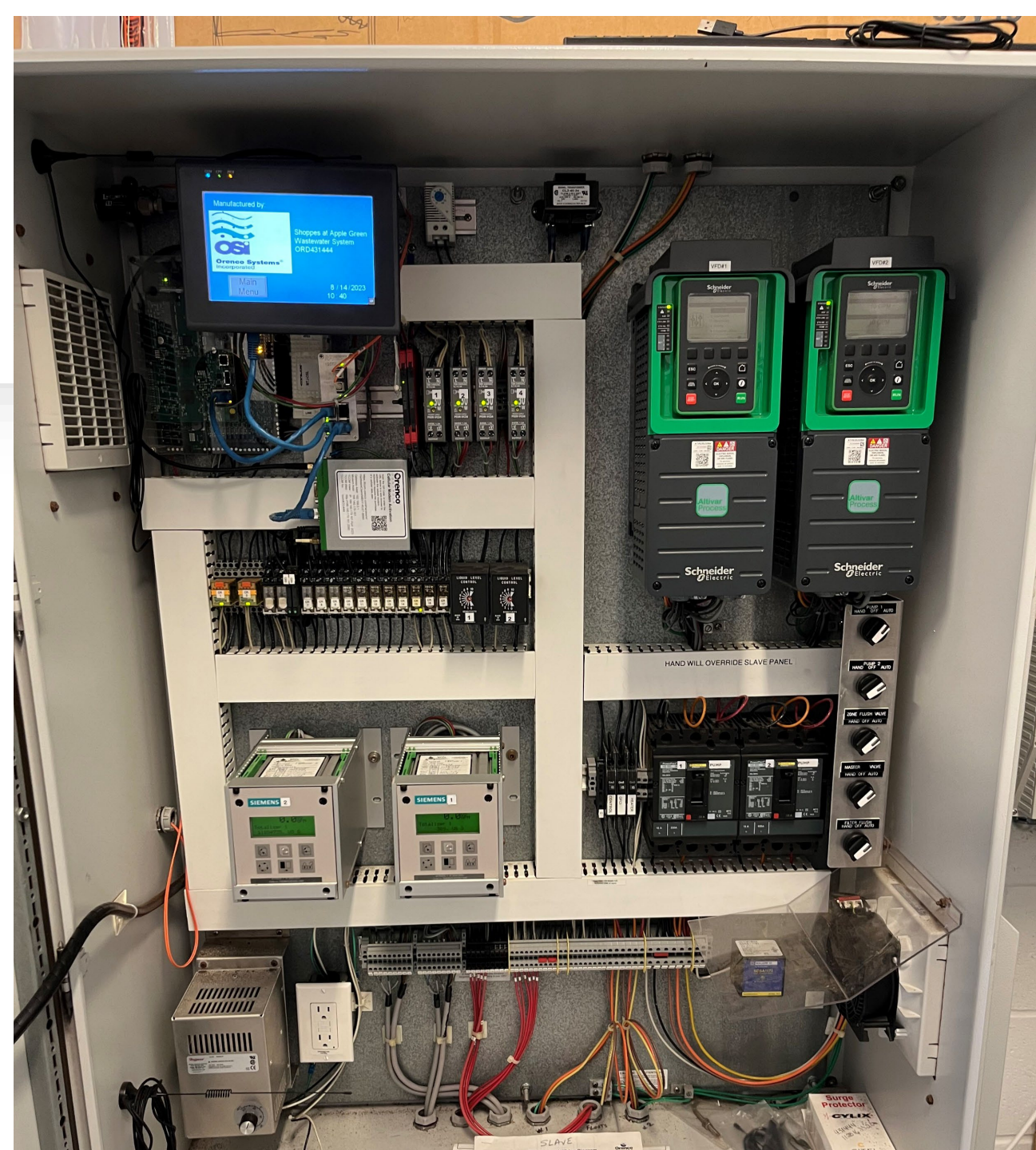
Technician has to have a remote reader for this panel. Reader allows operator to gather data and operate panel.

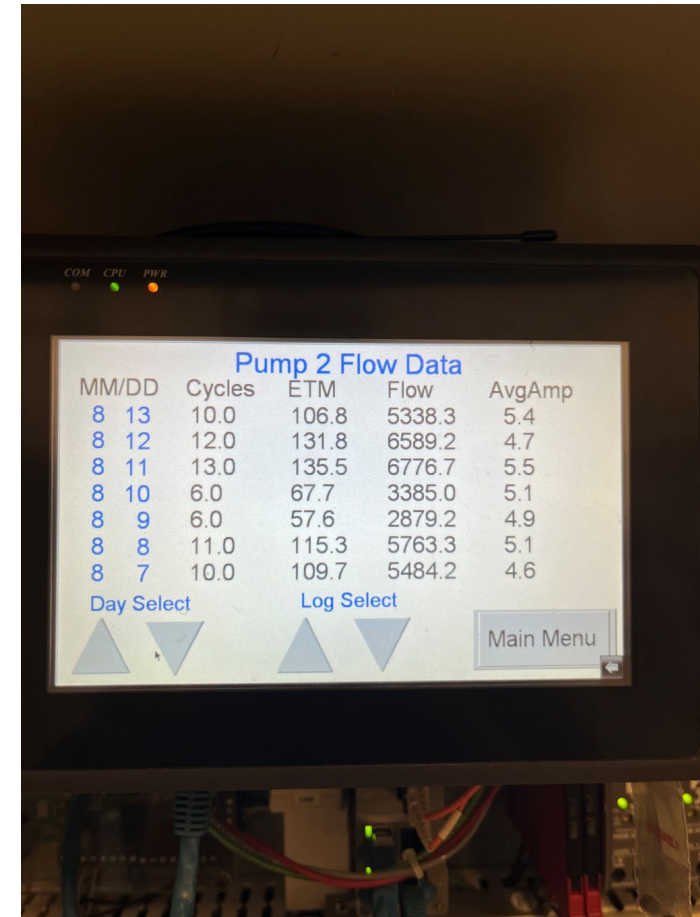
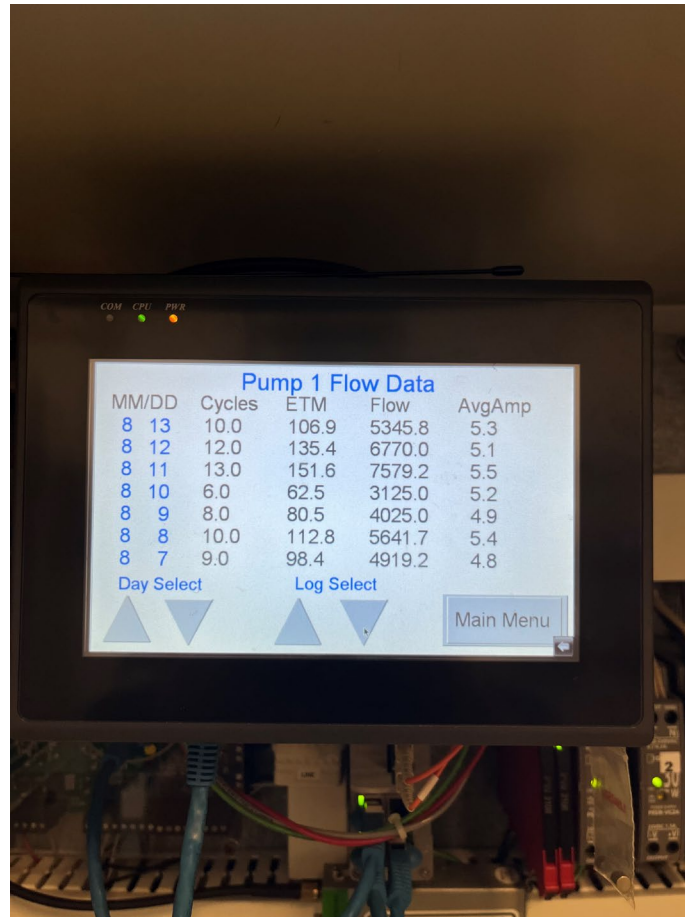
This panel can also be accessed remotely.



Panel configurations vary by designer and size of drip system

- This particular panel incorporates flow reading digitally into panel
- There is a PLC to retrieve pump run times – average flow – zone dosing times – and other information
- Drip field is about 2,000 feet away so this primary panel also operates a secondary panel
- All information can be remotely retrieved





Data from the Control Panel

- If you are on the site for any reason, record all the data from the control panel
- Compare data collected during visit to data collected from last visit to determine any problems
- Problems caught early may save alarm calls

Education & Documentation

- Have a meeting with the property owner to review the system and operational requirements
- Communicate with treatment plant operator on a regular basis to discuss wastewater quality and quantity
- Educate the property owner about how sensitive the dispersal area is to rutting, compaction and components being compromised
- Send a letter to the property owner if there are any repairs needed
- Always record/document everything anytime you visit the property