



AMERICAN
Manufacturing Company, Inc.

2025 Onsite Wastewater SUPER Conference of Pennsylvania

TWO STATEWIDE CONFERENCES IN ONE!

February 2 – 4, 2025 | Camp Hill, PA

**PERC RITE® DRIP DISPERSAL
SYSTEM DESIGNS
BY: BRYAN ALLEN, P.E.**



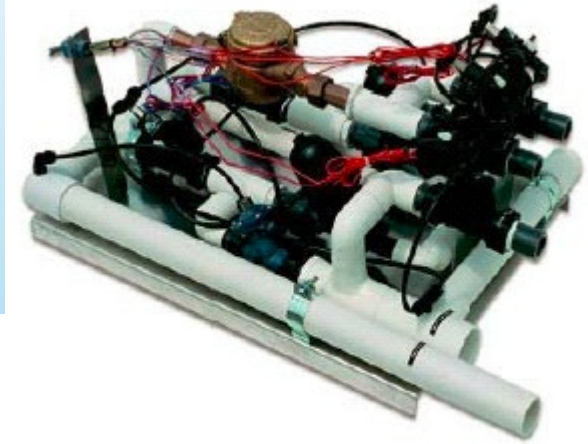
What is Drip Dispersal?

**Subsurface land
application system
for dispersal of
wastewater
effluent.**



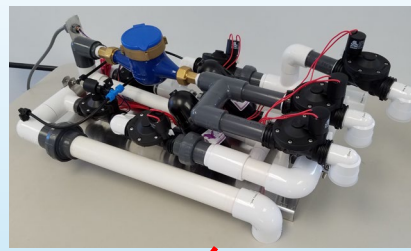
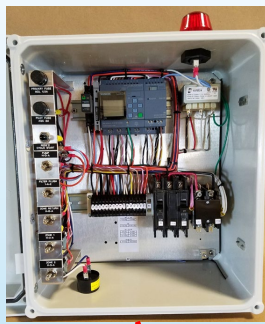
Keys to Success

- Pressure Compensating Emitters
- Disc Filtration
- Automatic Controls

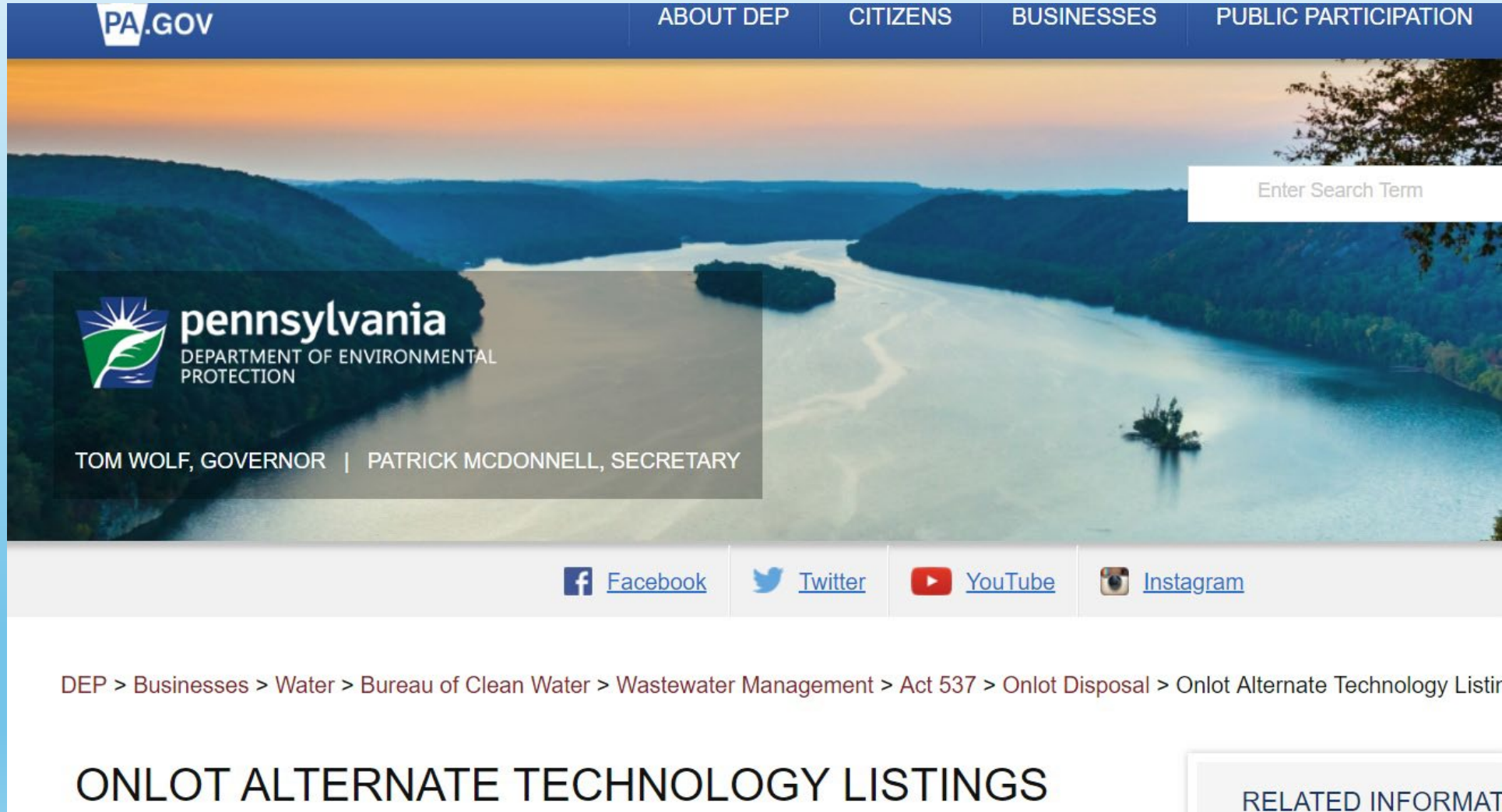


Fully Automatic Filters





www.DEP.PA.GOV



PA.GOV

ABOUT DEP CITIZENS BUSINESSES PUBLIC PARTICIPATION

Enter Search Term

 **pennsylvania**
DEPARTMENT OF ENVIRONMENTAL
PROTECTION

TOM WOLF, GOVERNOR | PATRICK MCDONNELL, SECRETARY

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DEP > Businesses > Water > Bureau of Clean Water > Wastewater Management > Act 537 > Onlot Disposal > Onlot Alternate Technology Listings

ONLOT ALTERNATE TECHNOLOGY LISTINGS

RELATED INFORMATION

ONLOT ALTERNATE TECHNOLOGY LISTINGS

System Name	Manufacturer
Advanced Filtration System (PDF) (12/12)	Organic Systems, Inc.
Aluminum Filtration (PDF) (02/14)	Organic
Aluminum Filtration Area (PDF) (03/16)	Organic
Drip Distribution (PDF) (02/14)	FlowStar Systems, Inc.
Drip Distribution PERC-RITE micromound (PDF) (03/12)	American Manufacturing Co. Inc.
Drip Distribution PERC-RITE primary effluent (PDF) (03/12)	American Manufacturing Co. Inc.
Drip Distribution PERC-RITE secondary effluent (PDF) (02/14)	American Manufacturing Co. Inc.
Drip Distribution (PDF) (03/12)	JNW Technologies, Inc.
Drip Distribution (PDF) (02/15)	JNW Technologies, Inc.
Drip Distribution (PDF) (03/12)	JNW Technologies, Inc.
Drip Distribution (PDF)	JNW Technologies, Inc.

- Three American Perc Rite® Listings.
- Three different applications.
- All three use the same Perc-Rite package drip system and equipment.

Pennsylvania On-lot Alternate Technology Listings

Commonwealth of Pennsylvania
Department of Environmental Protection (DEP)
Bureau of Point and Non-Point Source Management
Harrisburg, PA

Issued to: American Manufacturing Co, Inc.
PO Box 97
Elkwood, VA 22718-0097
Phone: 800-345-3132
www.americanonsite.com

Technology: American PERC-RITE® (PERC-RITE primary effluent)

Classification Type: Alternate technology (Listing #A2010-0005-0002)

Classification Date: January 4, 2010, March 1, 2012

Commonwealth of Pennsylvania
Department of Environmental Protection (DEP)
Bureau of Point and Non-Point Source Management
Harrisburg, PA

Issued to: American Manufacturing Co, Inc.
PO Box 97
Elkwood, VA 22718-0097
Phone: 800-345-3132
www.americanonsite.com

Technology: American PERC-RITE® (PERC-RITE secondary effluent)

Classification Type: Alternate technology (A2014-0022-0002)

Classification Date: February 6, 2004 (ASG)
February 24, 2014

Commonwealth of Pennsylvania
Department of Environmental Protection (DEP)
Bureau of Point and Non-Point Source Management
Harrisburg, PA

Issued to: American Manufacturing Co, Inc.
PO Box 97
Elkwood, VA 22718-0097
Phone: 800-345-3132
www.americanonsite.com

Technology: American PERC-RITE® (PERC-RITE micromound)

Classification Type: Alternate technology (Listing #A2010-0006-0002)

Classification Date: January 4, 2010, March 1, 2012

Advantages of Drip Dispersal

- **Drip in Buffers – Typ. 10 foot set-back from property lines.**
- **Out-of-Sight, Out-of-Mind (Aesthetics)**
- **Drip 365 days/ year**
- **Eliminate Stream Discharge, Spray Irrigation & Large Elevated Sand Mounds**
- **“Groundwater Recharge”**
- **Slopes up to 25% or more!**
- **Complete and Fully Automatic Systems**

- **Ideal for Community/Cluster Systems**
- **Ideal for Single Family Homes**
- **Ideal for Churches & Schools with irregular flow (utilize flow EQ).**



- 
- **Flow Range: 100 gal/day up to – 1 MGD**
 - **Wooded or open sites w/ varying slopes.**
 - **Lends itself to passive recreation.**

"Perc • Rite"®

By American Manufacturing Company, Inc.

Aerial Photo: Drip Fields – Open Site



**Drip Tubing
installed
along contour**

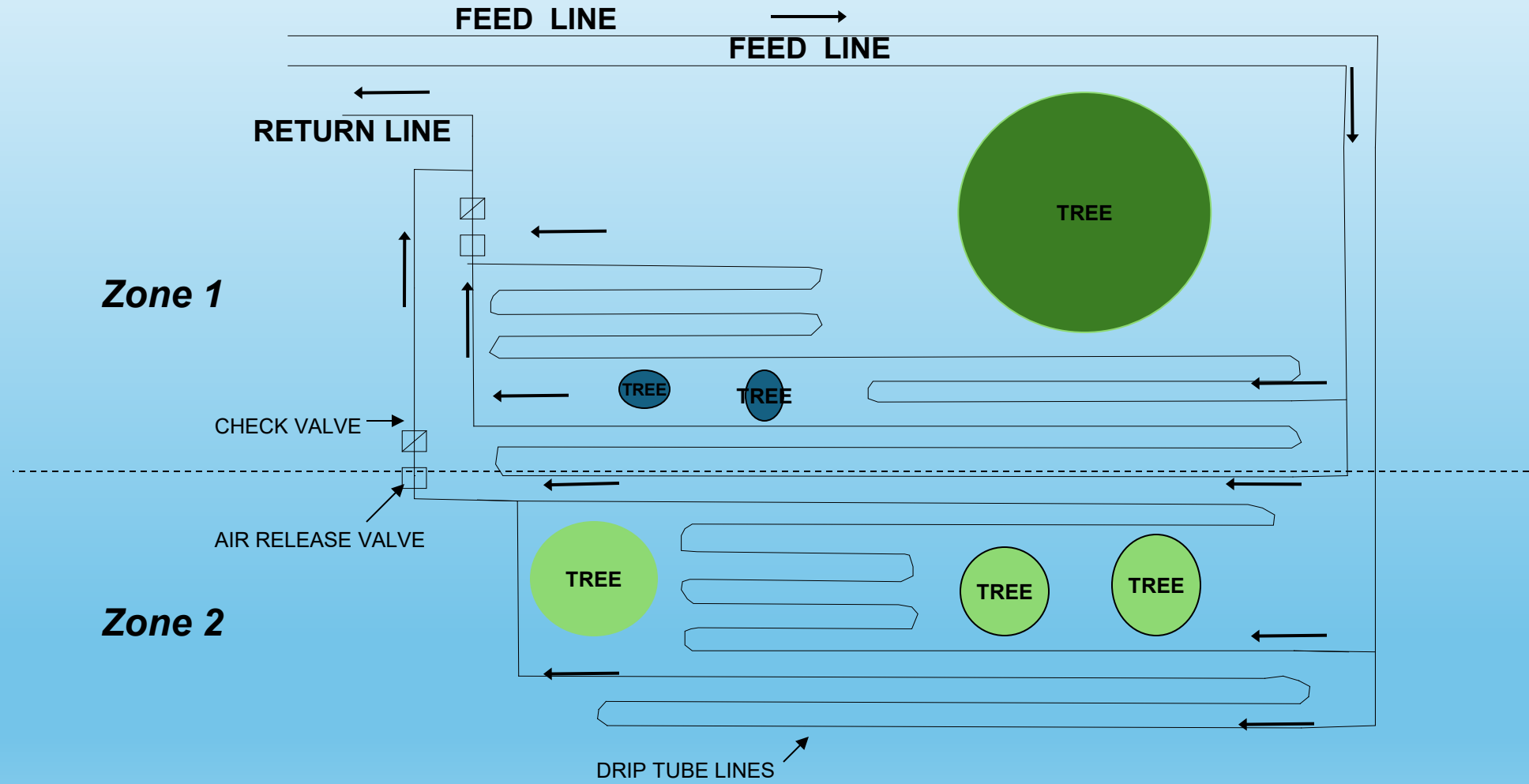
PAINT OR FLAG AT LEAST EVERY OTHER RUN



Drip Fields – Wooded Site



DRIP ALLOWS YOU TO WORK AROUND TREES



Installation

Vibratory Plow w/ Tubing Feeder Attachment



- Typical tubing depth of 6"-12"
- Typical center-to-center spacing of 1'-3' (2' typical)

Installation in Open Field with Minimal Site Disturbance



Installation with Multi-Blade Plow



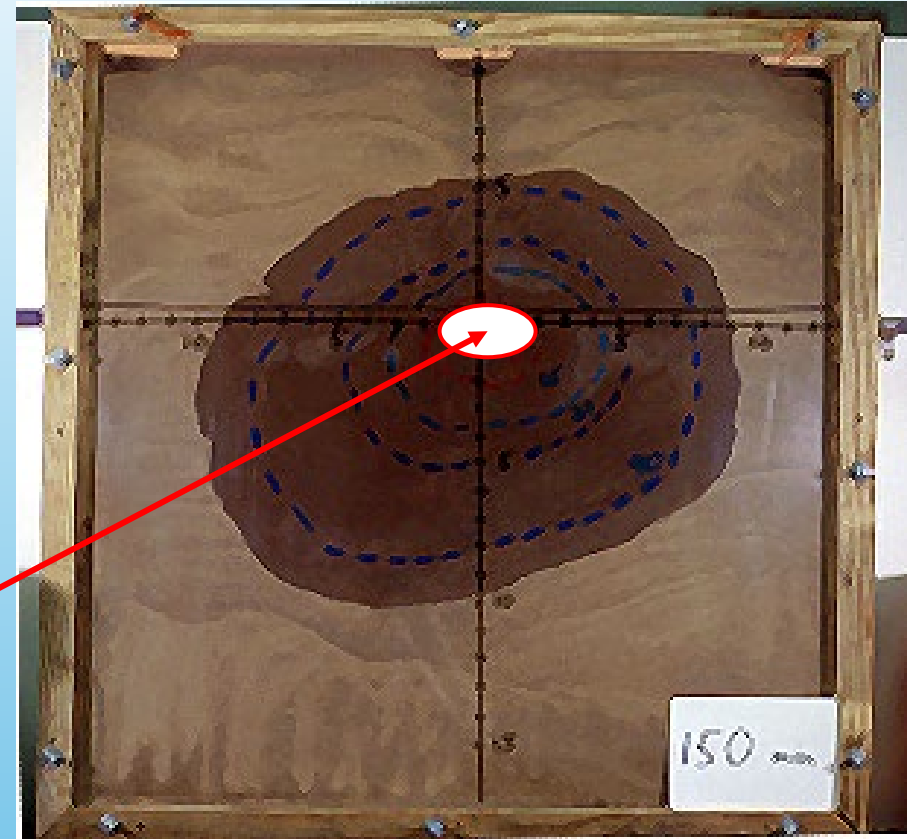
- Variable width settings.
- Ideal for large open landscapes.

Water Movement Through Soil

- Wet to dry
- Water moves radially until saturated
- At saturation gravity moves water down
- From large pores to small pores

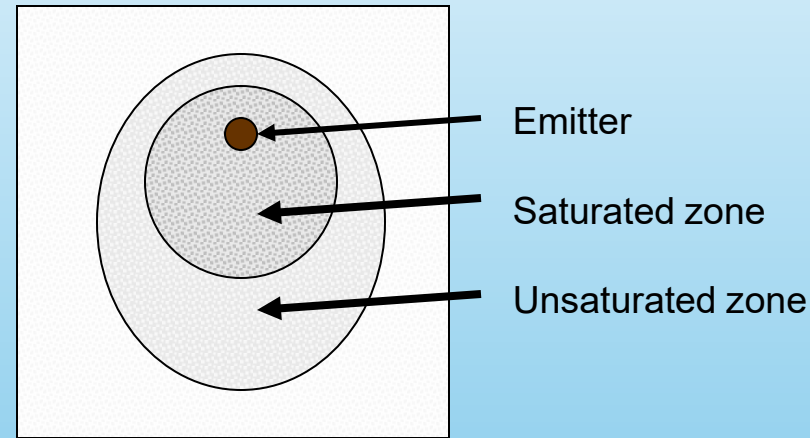
Capillary Action

Note: Typical Run Time for a Residential Drip Cycle is less than 10 minutes. 10-12 oz per emitter.



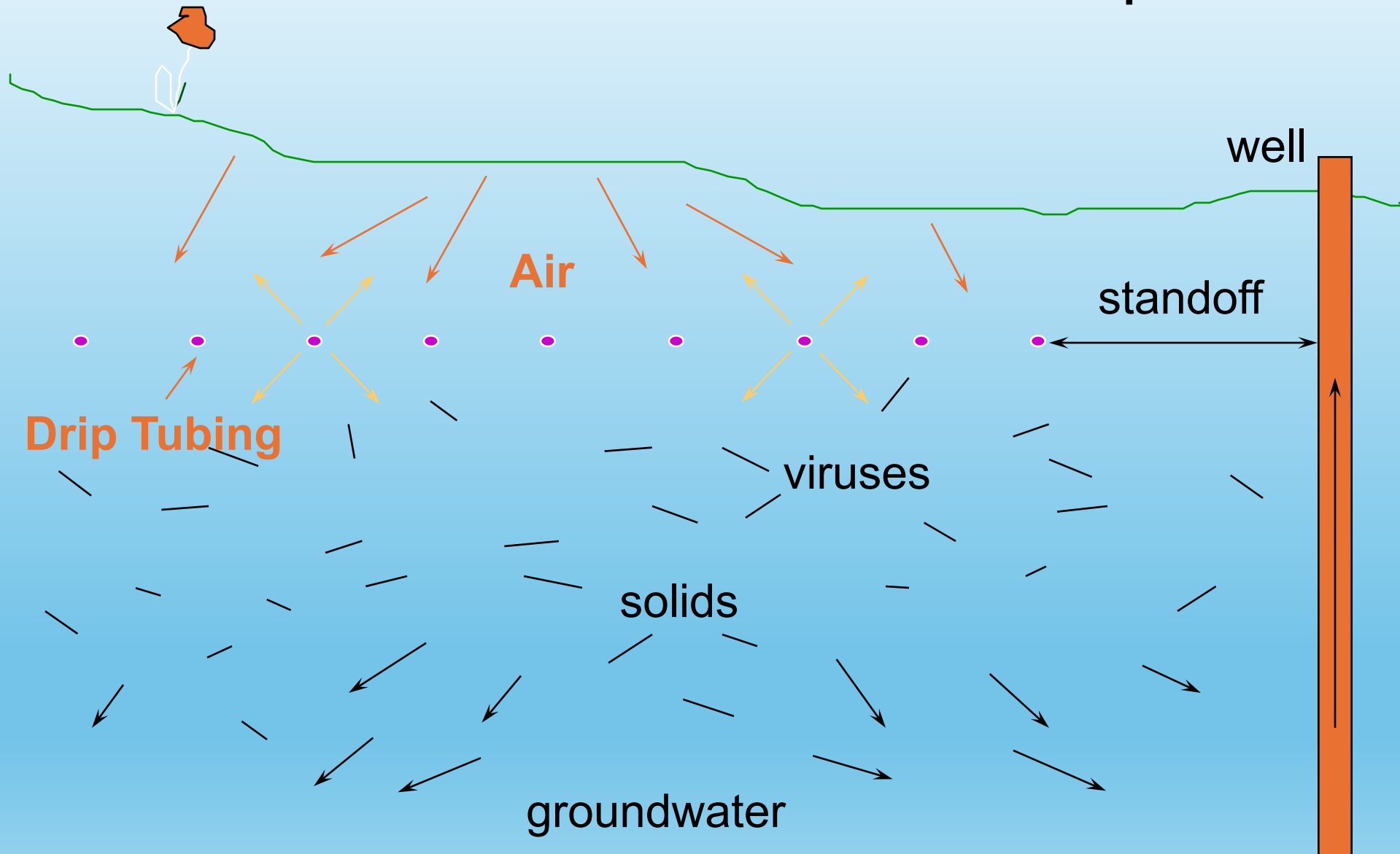
After 150 minutes of constant flow the wetting front has extended 10" to each side and below the emitter. It has extended 6" above the emitter. Flow is by unsaturated flow at the outer edge of the wetting front and saturated flow closer to the emitter.

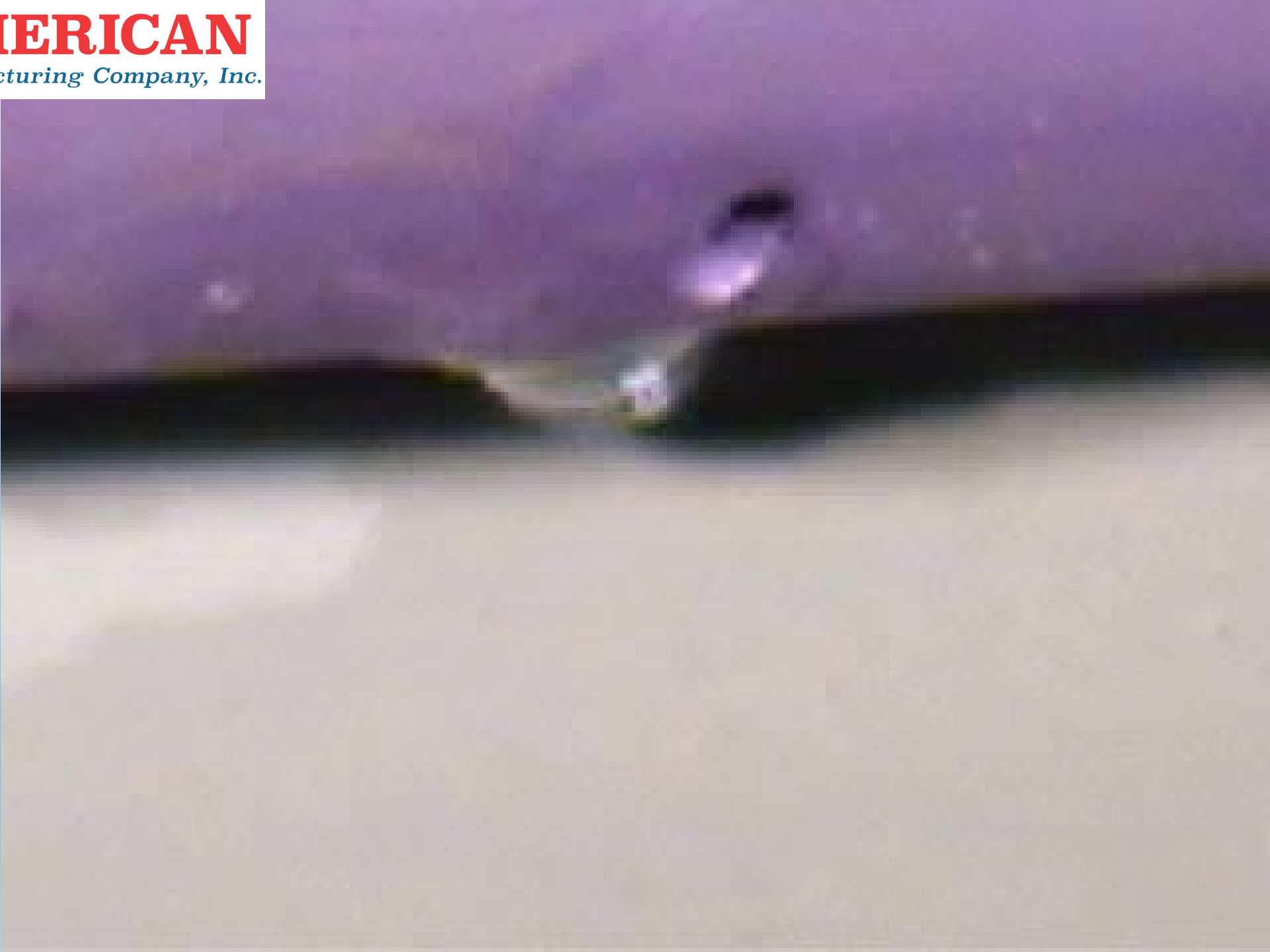
DRIP CONCEPT



Drip irrigation is a type of micro irrigation. The philosophy of water application is one of frequent, low pressure applications of water for plant growth. This is accomplished with tubing containing emitters which allow the water to leave the tubing in droplets. In wastewater applications very even distribution over the absorption area is possible. **Frequent small doses allows the soil to remain in an aerobic condition.**

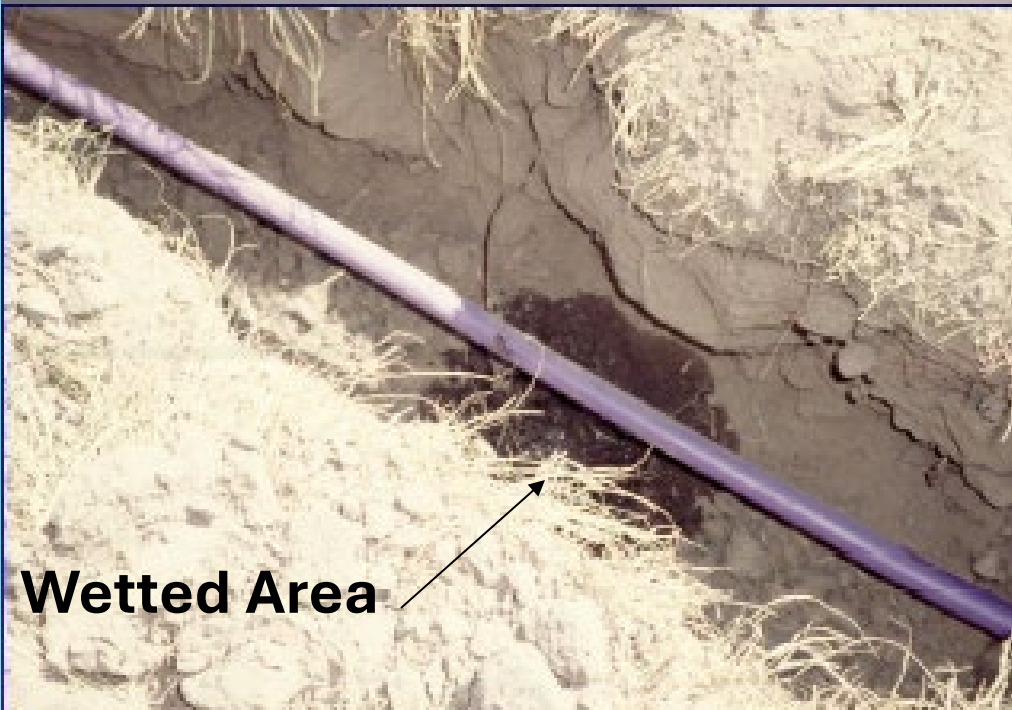
Soil Treatment with Drip







**800 Micron
Opening**



Wetted Area

1000' Roll of Drip Tubing

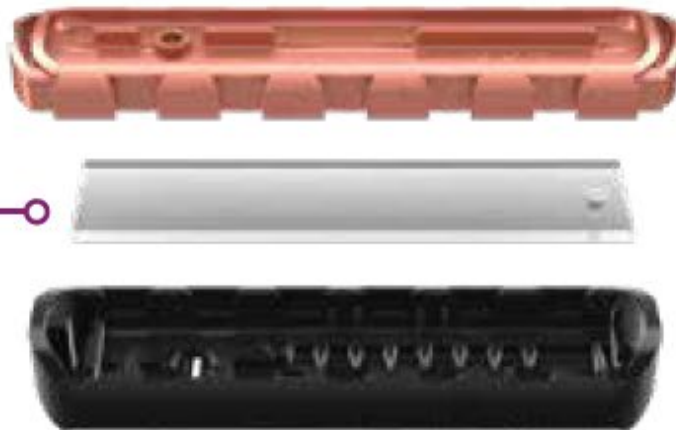


WASTEWATER DIVISION

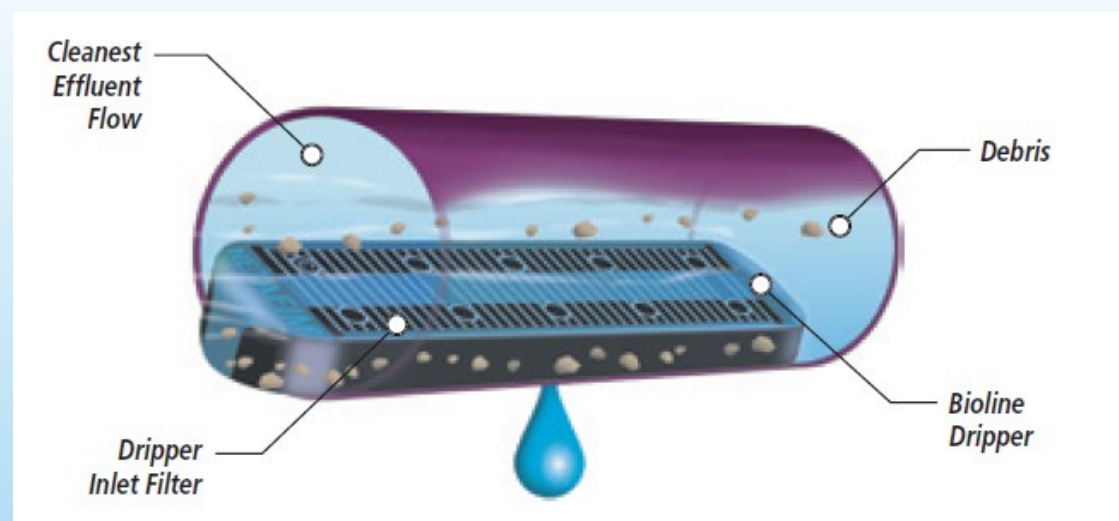
BIOLINE® DRIPLINE

THE WORLD'S MOST ADVANCED CONTINUOUS
SELF-CLEANING, PRESSURE COMPENSATING DRIPLINE
SPECIFICALLY DESIGNED FOR WASTEWATER

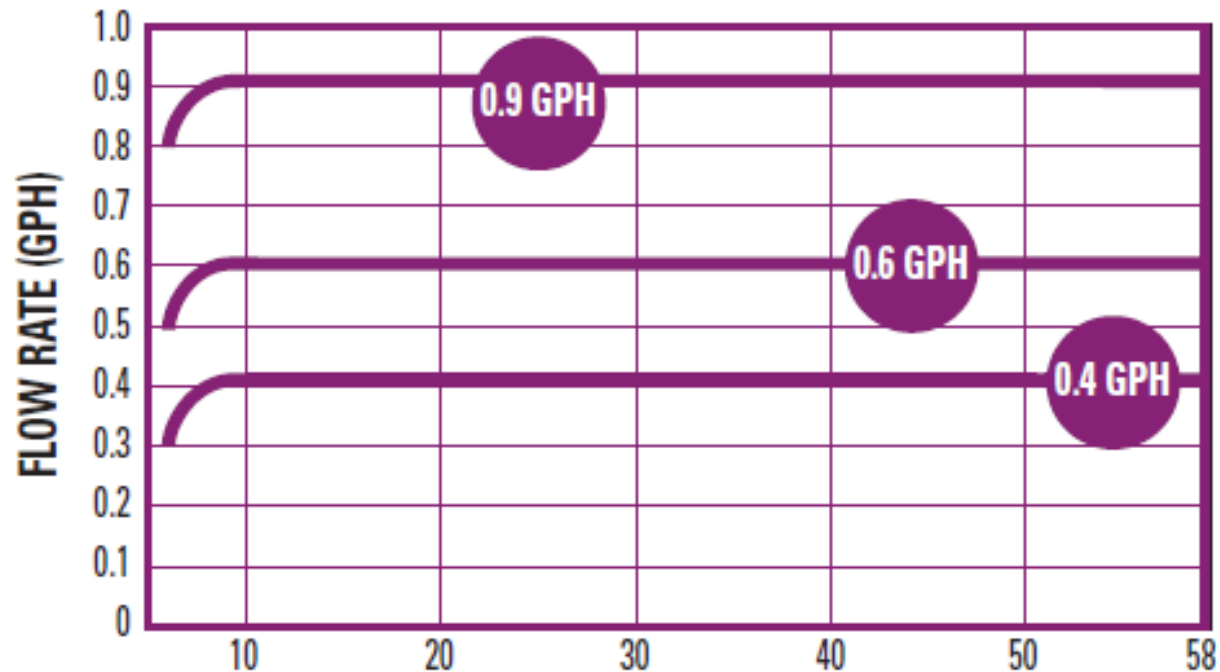
Copper oxide is
impregnated into the
emitter serving as a
natural antimicrobial
agent to help prevent
microbial activity.



Netafim Pressure Compensating Emitters, 0.6 gph



DRIPPER FLOW RATE VS. PRESSURE



****Rated for use
with wastewater

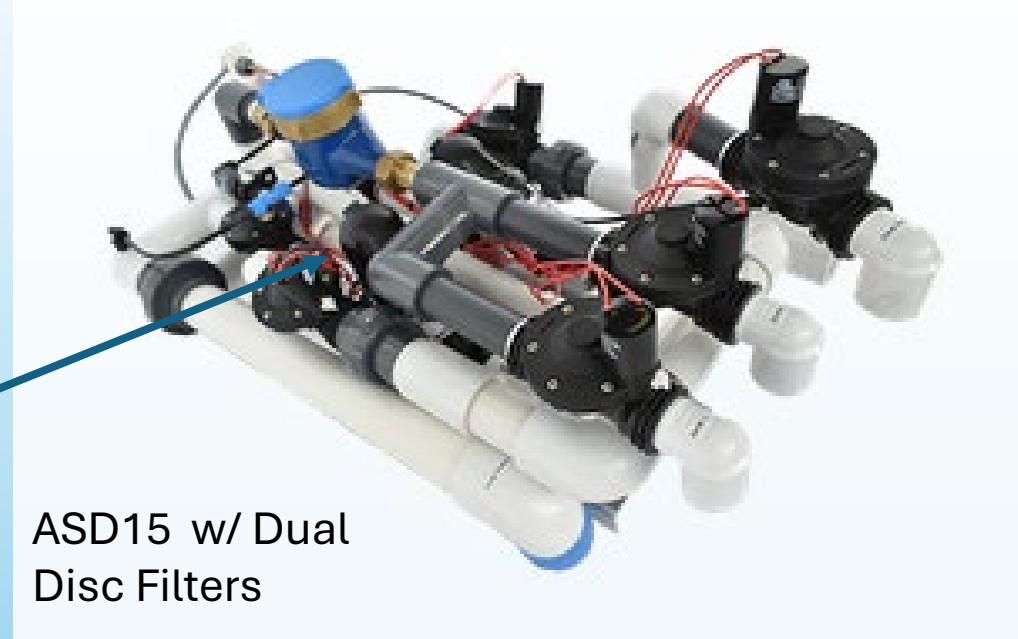
*****Rated for
use sub-surface

PRESSURE (psi)

Between 0 and 7 psi, the dripper functions as a turbulent flow emitter, ensuring that the nominal design flow is not exceeded at system start-up.

Disc Filtration

- Mechanical barrier to protect emitters
- Auto flushed at pre-set time, volume or differential pressure settings.
- Back Flushes each filter for 15-20 seconds.
- 115 micron filtration 7 to 1 filtration ratio



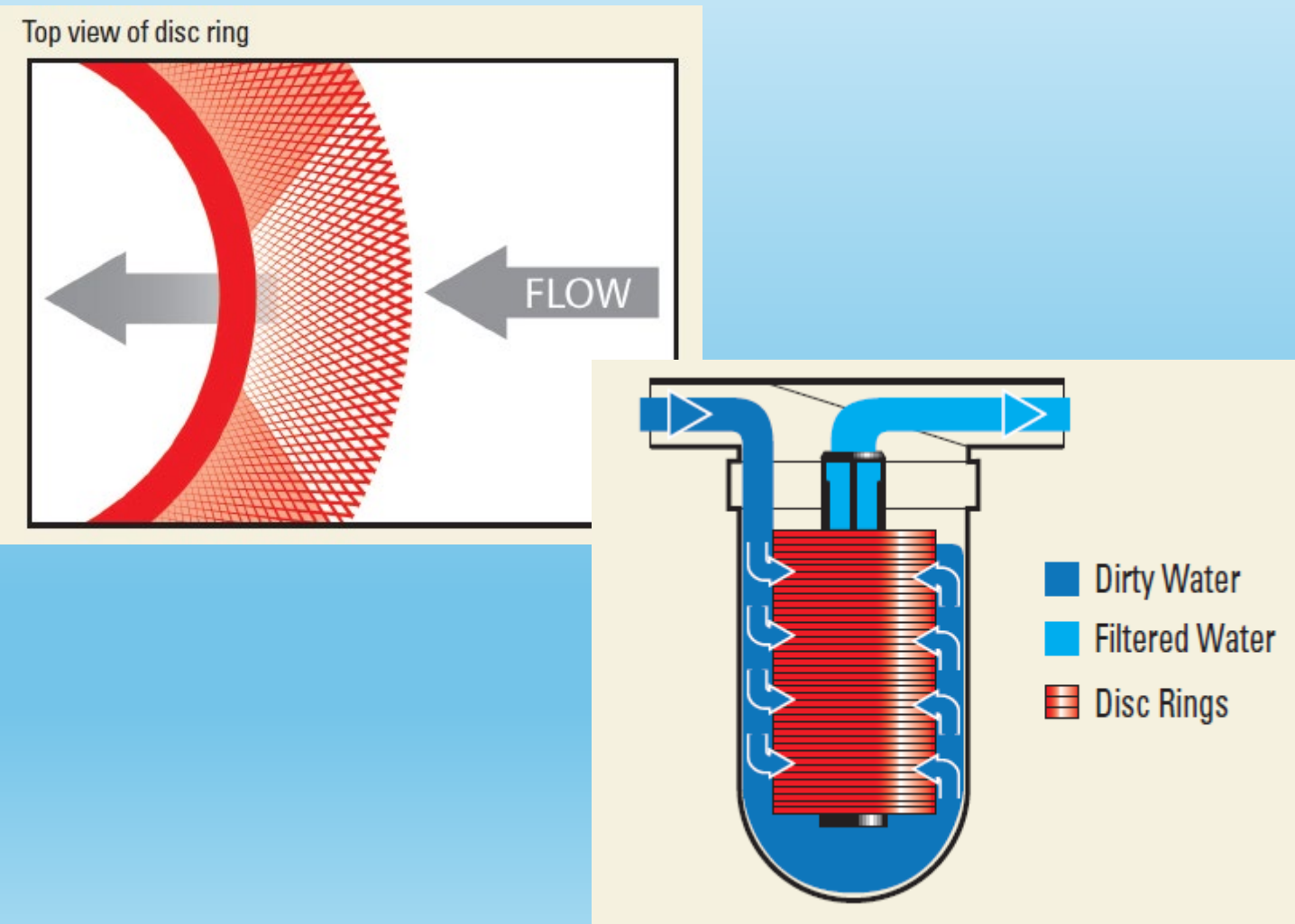
ASD15 w/ Dual
Disc Filters



MESH/MICRON		
MESH	MICRON	DISC COLOR
040	400	Blue
080	200	Yellow
120	130	Red
140	115	Black
200	55	Green

Substitute *** in Model Number for proper mesh.

Disc Filtration: How it works...



THE FILTERING PROCESS

Grooved, compressed plastic disc rings produce a deep filtration process. As dirty water is pumped into the filter and pressure increases on the outside of the filter, the water pressure compresses the rings together tightly.

Grooves in the disc rings crisscross, forming a three dimensional network that traps particles. The number of crisscrossed intersection points on each groove varies, depending on filtration grade. The turbulence in the varying paths and the large number of intersections create an environment where particles are eventually trapped.

This design filters the dirty water thoroughly, not only on the outer surface of the cylindrical disc filter, but through the entire depth of every ring's grooves. The result is a larger, more efficient filtering area (when compared to screen filters) with more debris being captured and cleaner water exiting from the filter.



DRIP DISPERSAL SYSTEMS

RESIDENTIAL PERC-RITE®



Simple, Economical & Innovative, Wastewater Dispersal Technology

EQUIPMENT SELECTION & SIZING

American “Perc-Rite” single family home drip system (Model ASD 15 – 15 gpm)

- **Two 115 micron disc filters**
- **1-4 drip zones**
- **600-1200 LF tubing per zone**
- **4800 LF maximum**
- **hydraulic unit in heated enclosure**

Note: Pennsylvania requires a minimum of two drip zones per system.

HYD UNIT MODEL:
ASD15-2 ZONE

FLOW
METER

FILTER
VALVES

DISC
FILTERS

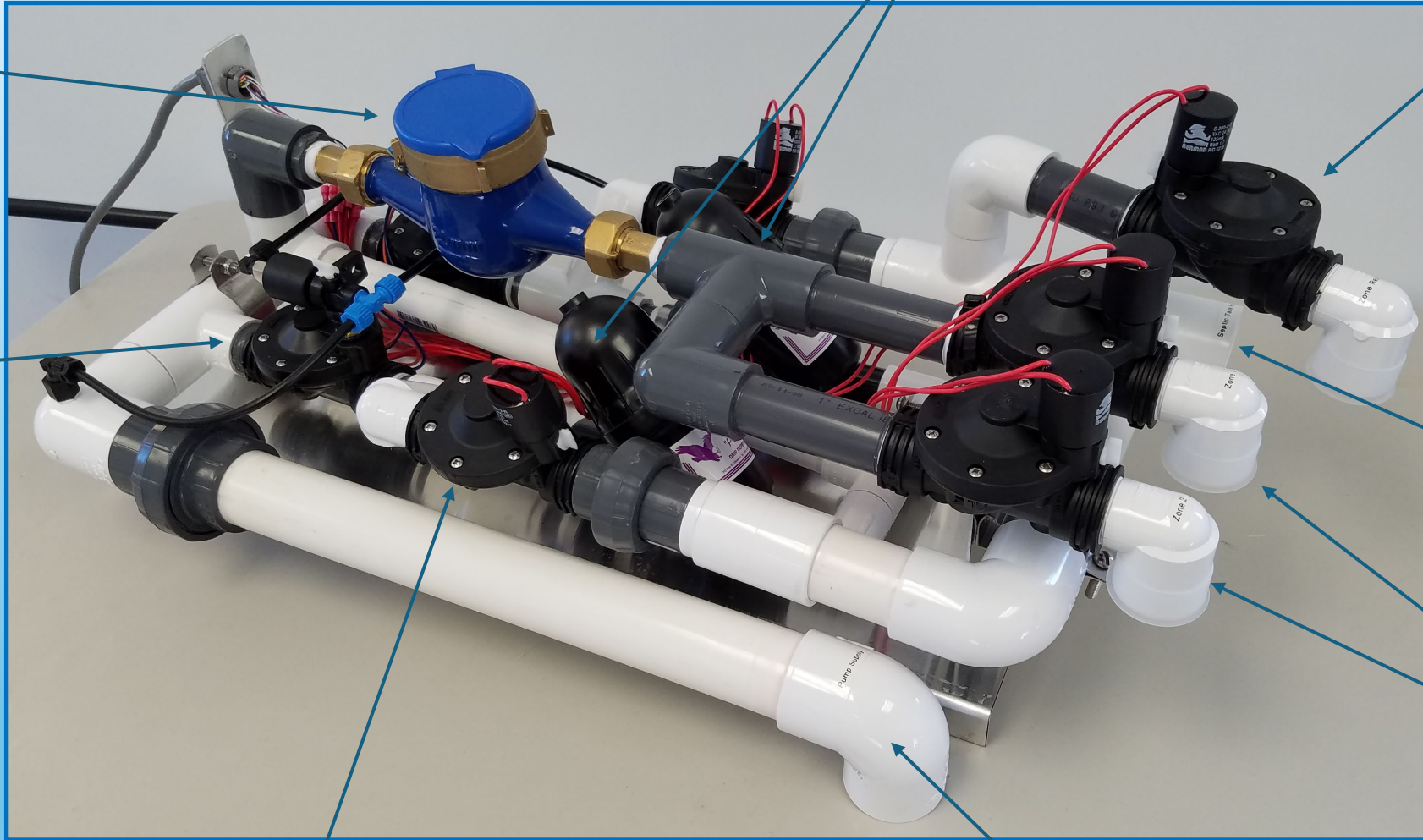
ZONE
RETURN
VALVE

SEPTIC
TANK
RETURN

ZONE
VALVES

BACKFLUSH
VALVES

SUPPLY
FROM PUMP



**Perc-Rite® Residential
Drip Dispersal**

Engineering Specifications

CalcTool

Standard Zone Detail Table

Lift & Distance Table
Instructions**Perc-Rite® Commercial
Drip Dispersal****Wastewater System
Controls****Commercial Sand Filters****Disinfection Systems
Chlorination & UV****Pump Systems****Engineering Tables &
Charts****Drawings, AutoCAD &
PDF**

Engineering Specifications

Filtration Units

- › AWD15 WASHDOWN FILTER UNIT SINGLE OR REMOTE ZONES
- › AWD15 WASHDOWN FILTER UNIT MULTI ZONE
- › ASD15 FILTRATION UNIT

Control Panels

- › DPO Drip Controller

Pumps & Coolguide

- › COOLGUIDE LAMINAR FLOW COLLAR
- › FLOAT TREE
- › PUMP CURVE



DRIP CONTROLLER SPECIFICATION - DPO LOGO

The controller shall be enclosed in an outdoor electrical control box located near and connected to the hydraulic unit. The control panel shall be powered by 115 or 230 volt supply and the microprocessor shall have 120V and 24V AC inputs and relay outputs for automatic operation of the Perc-Rite® Drip System. When in the "Hand" or "Off" position, the manual switches (Hand-Off-Auto) provided with the control panel, shall completely bypass the microprocessor. The "Hand" position will allow manual operation of each component for operational verification or in the event of a microprocessor failure.

The PERC-RITE® DRIP SYSTEM pump control panel shall be equipped with four float switches to control the timed doses to be discharged. The four float switches, "Redundant Off", "Standard Dose Enable", Peak Dose Enable" (optional), and "High Level" function as follows:

Redundant Off Float operation - The water level must be high enough to overcome the "Redundant Off" (first & bottom) float in order for the pump to be permitted to run. The redundant off float shall be redundant to the timer to stop the pump.

Standard Dose Enable float operation - When the water level rises high enough to overcome the "Standard Dose Enable" (second) float and the time clock has timed out the preset (and adjustable) time delay of 180 minutes (rest between dosing cycles for two zone designs) the pump will activate and the lead zone is dosed. The pump will continue to run for the length of time as adjusted on the pump run timer and then shut off. The pump will remain off until the internal time clock again times out after which the pump will activate (as long as the "Standard Dose Enable" float is still up) and will run until the pump run timer finishes timing out. This process will repeat until the water level drops below the "Standard Dose Enable" float and the pump run timer has timed out. The pump will continue to run when the float is disabled in order to allow the timer to time out and turn the pump off.

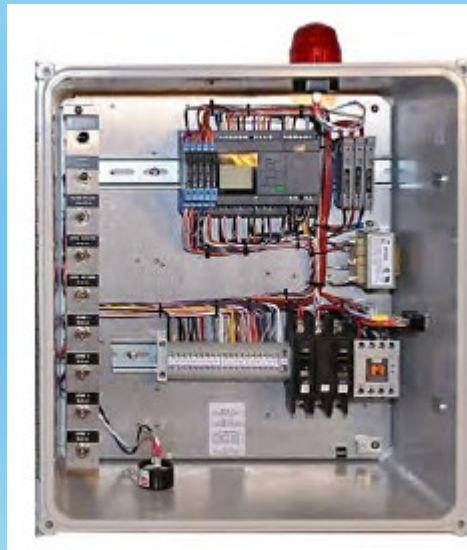
Peak Dose Enable float - The control system shall be equipped with a "Peak Dose Enable" circuit to manage peak flows and up to "design water use". If the rising water level activates the "Peak Dose Enable" (third) float and the preset (and adjustable) time delay has exceeded 108 minutes ("Peak Dose Enable" rest between cycles for two zone designs), the lead zone will be dosed. When the peak circuit has been deactivated the normal pumping cycle will resume. The "Peak Float" shall provide a redundant feature for the "Standard enable float". In the event of a "Standard enable float" failure, the "Peak Enable Float" will continue to allow automatic operation of the system. High Level - If the water level rises enough to overcome the "High Level" (fourth) float, the audiovisual alarm will activate. The audio portion of the alarm may be silenced by pressing the Test-Normal-Silence switch (located on the outside of the control panel) to the silence position. The alarm circuit will auto reset when the "High Level" float returns to its normal (down) position. The high-level alarm float shall a wide-angle float in order to latch the alarm signal.

The control shall be UL 508A listed, inspected and labeled. The control shall include NEMA rated enclosures, color coded wiring, electrical schematics, a sequence of operation datasheet, and numbered terminal blocks. Manufacturer shall have 10+ years' experience in both design and manufacturing of wastewater systems and shall provide technical and installation support by an 800 number phone access.

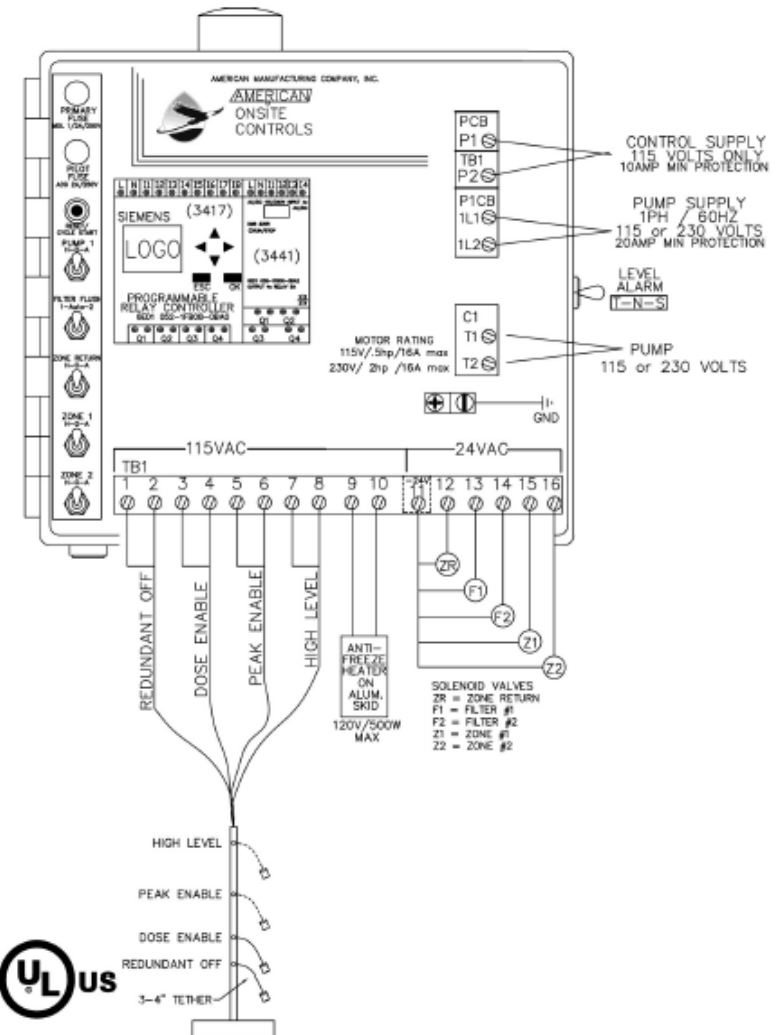
The options in the control shall be as detailed in the Model Number. The control shall be manufactured by American Manufacturing Company, Inc., of Elwood, Va.

CONTROL DP0-B9510 / B9530 SERIES

- NEMA4X ENCLOSURE
- IEC RATED PUMP CONTACTOR
- PLC WITH ADJUSTABLE PUMP RUN & REST TIMERS
- HIGH LEVEL AND LOW LEVEL ALARMS
- AVAILABLE FLOAT FAIL ALARM
- HAND-OFF-AUTO TOGGLE SWITCHES FOR ALL ZONES, PUMPS AND ZONE MASTER (IF APPLICABLE)
- PUMP & CONTROL BREAKERS
- AUDIO VISUAL ALARM
- U.L. APPROVED AND LABELED



DP0 2 FILTER SIMPLEX 2 ZONE





TYPICAL PERC RITE DRIP CONTROL MODELS:

DP0-B9510-2Z (2 FILTER, 2 ZONE, SIMPLEX PUMP)

DP0-B9510-4Z (2 FILTER, 4 ZONE, SIMPLEX PUMP)

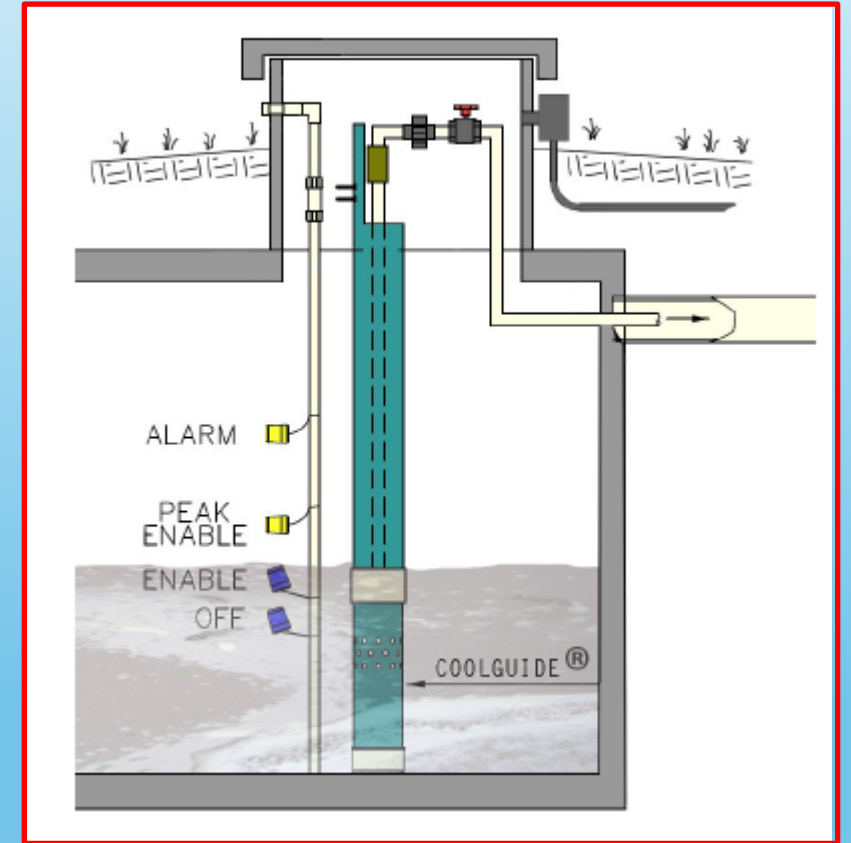
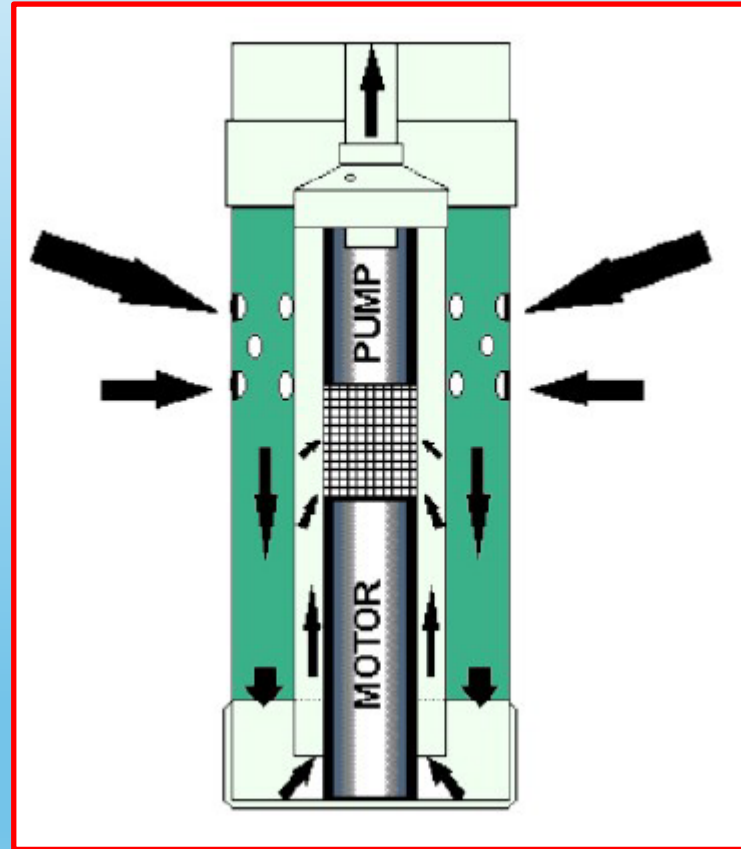
DP0-B9510-2ZX29 (2 FILTER, 2 ZONE, SIMPLEX PUMP WITH
TEMPERATURE MONITOR SENSOR)

DP0-B9510-4ZM (2 FILTER, 4 ZONE, ZONE MASTER, SIMPLEX
PUMP)

DP0-B9530-4Z (2 FILTER, 4 ZONE, DUPLEX PUMP)

MANY OTHER OPTIONS AVAILABLE

COOL GUIDE™15 OR 25 Laminar Flow Collars

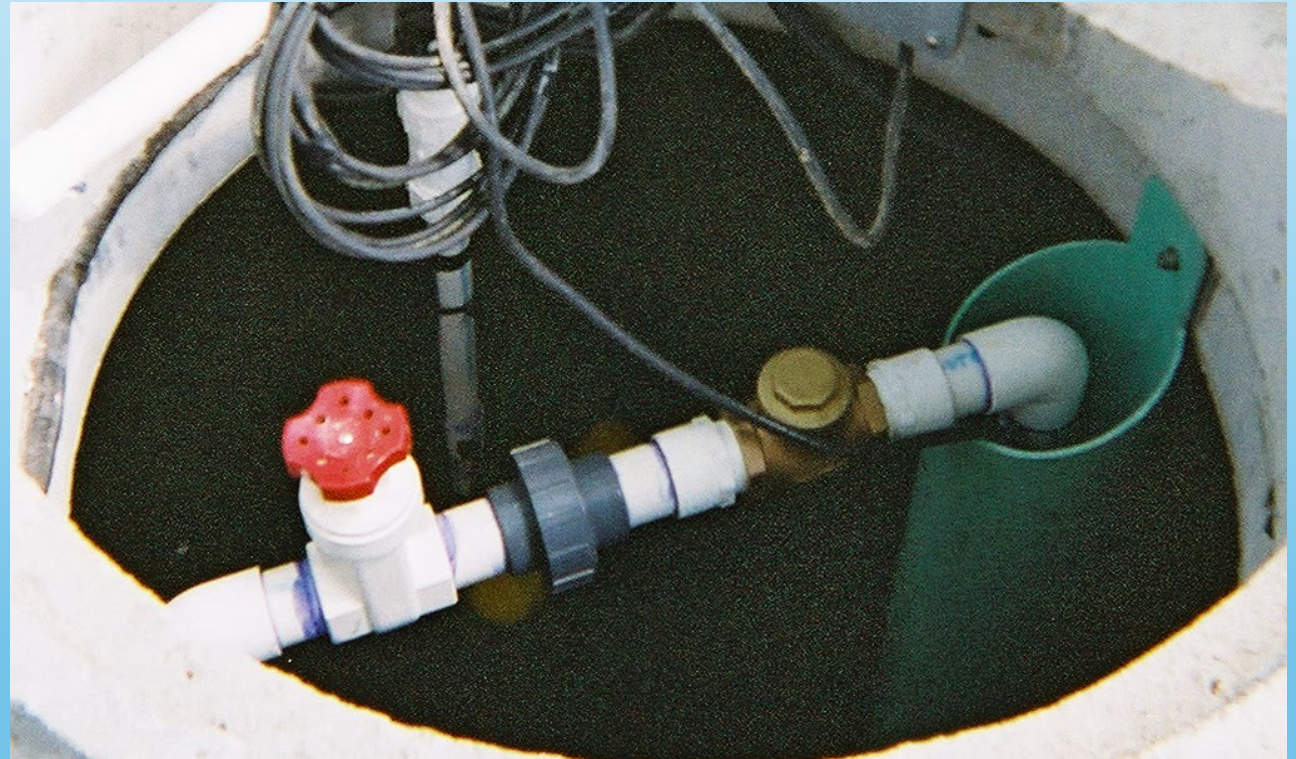
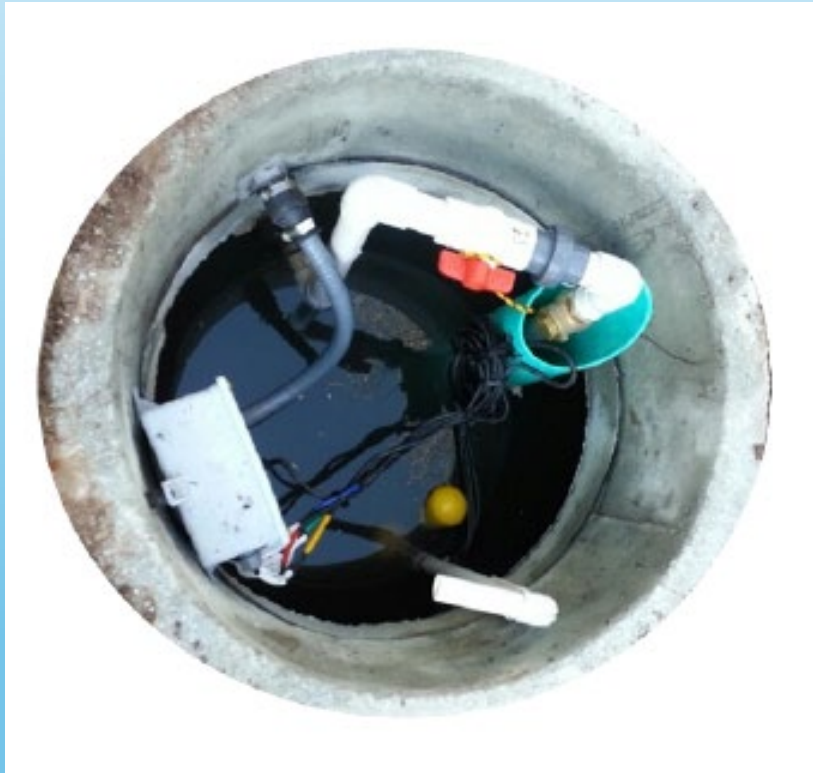


AMERICAN COOLGUIDE™



DUPLEX COOL GUIDES & PUMPS

AMERICAN COOLGUIDE™



SIMPLEX COOL GUIDES & PUMPS



State Parks
Campgrounds
Small Subdivisions

**American “Perc-Rite” light commercial
drip system (Model ASD 25 – 25 gpm)**

- **1500 gpd to 18,000 gpd**

Gas Stations

Convenient Stores

Schools & Churches





DRIP DISPERSAL SYSTEMS

LIGHT COMMERCIAL PERC-RITE®



15-GPM & 25-GPM

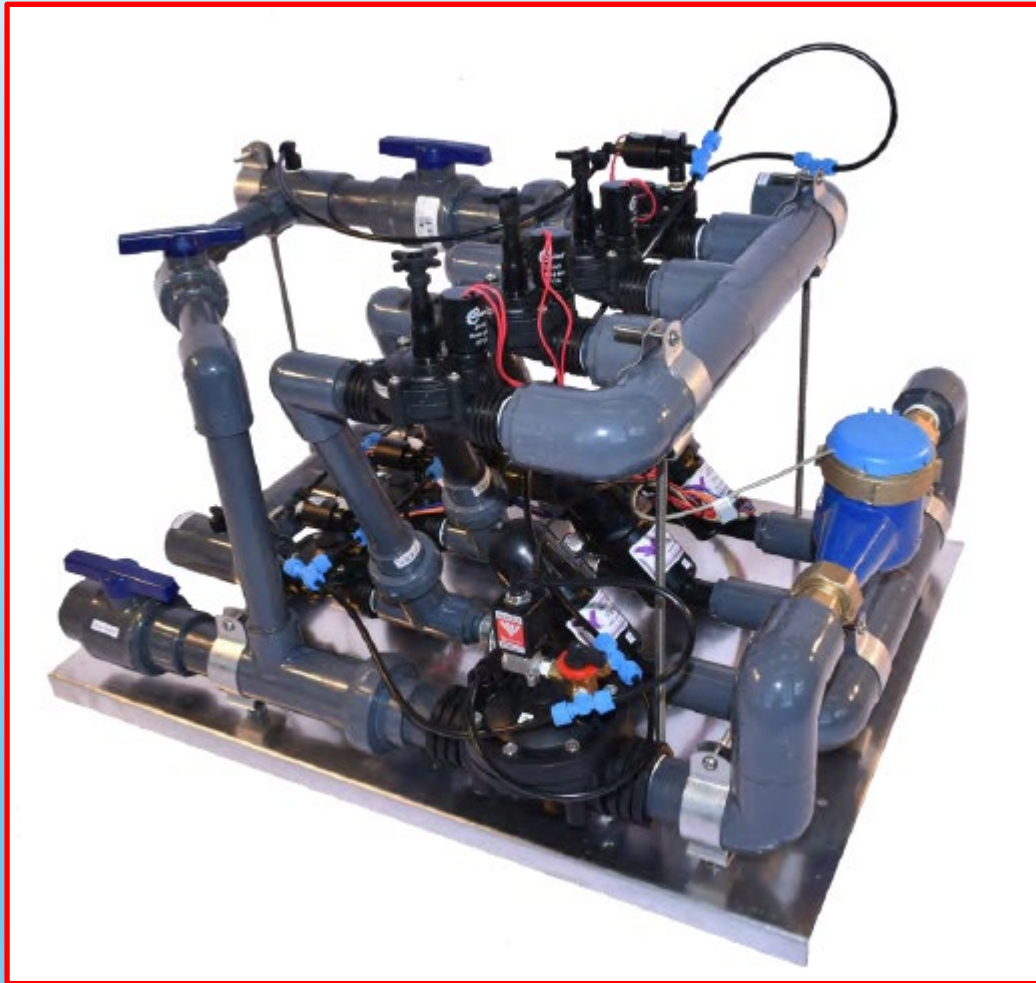
Simple, Economical & Innovative, Wastewater Dispersal Technology

EQUIPMENT SELECTION & SIZING

American “Perc-Rite” light commercial drip system (Model ASD 25 – 25 gpm)

- **Three 115 micron disc filters**
- **Up to 16 drip zones**
- **Up to 2400 LF tubing per zone**
- **Can do 18,000 GPD with 50% pump run time. Duplex pumps.**
- **hydraulic filter unit in heated enclosure**

ASD25 -25 GPM, 3 FILTER HYD UNIT

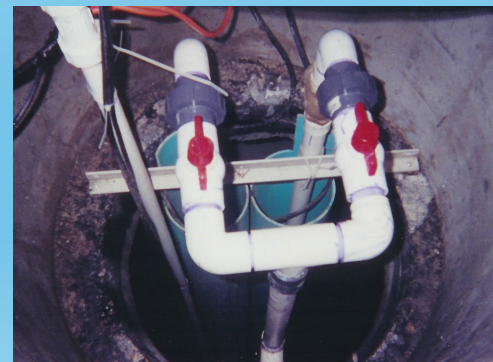
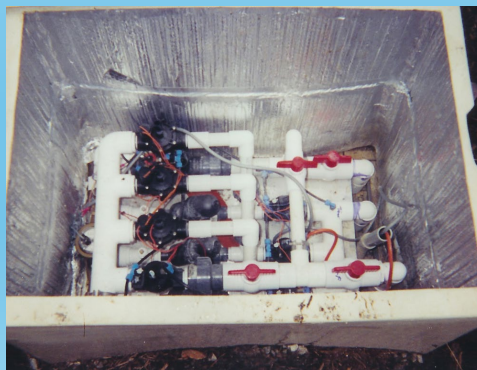


MODEL DP2 PERC RITE DRIP CONTROL W/
HMI & LONG TERM DATA LOGGING

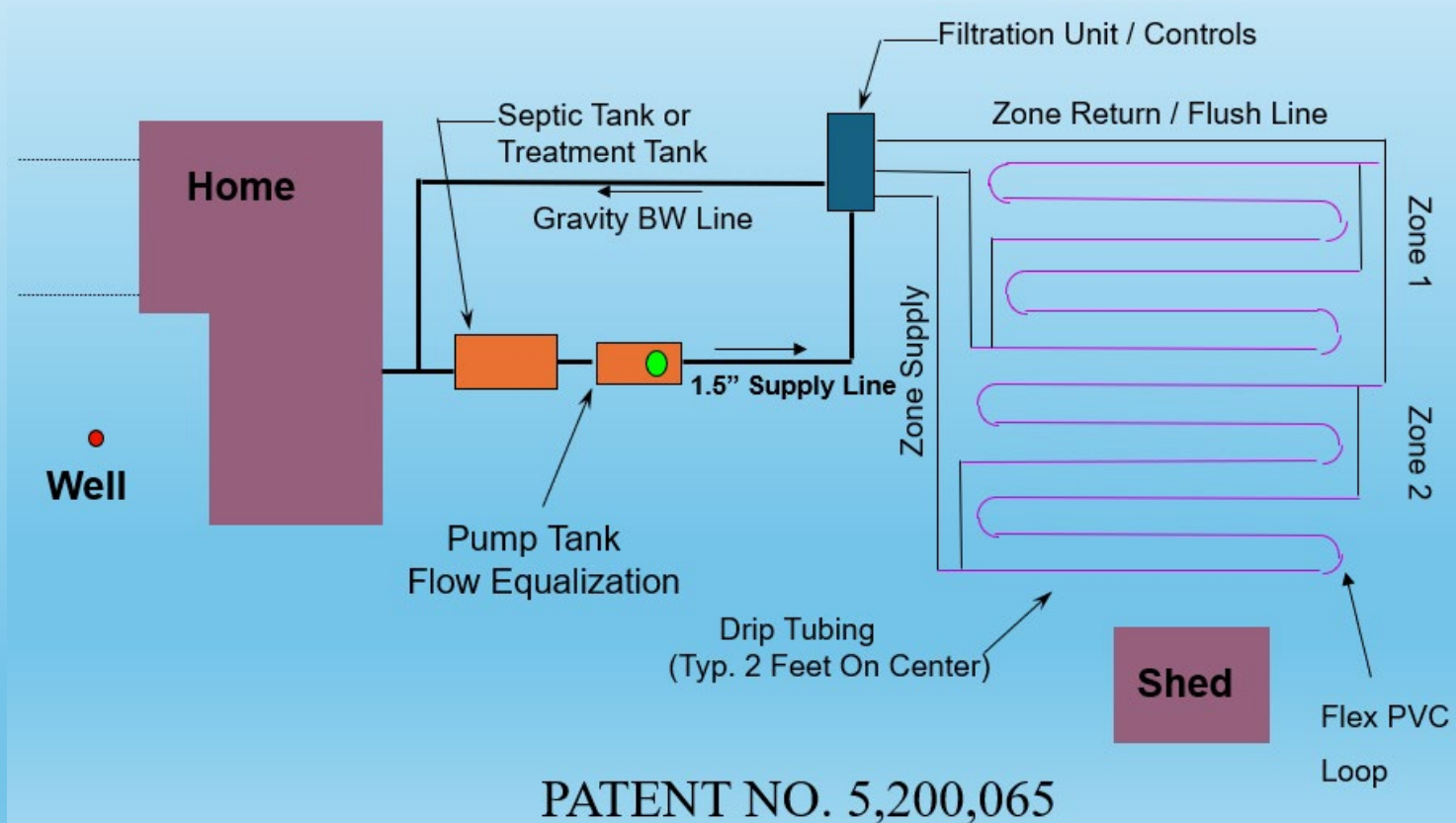




Fallingwater



Drip Zone & System Terminology



RUN – One pull of tubing across contour.

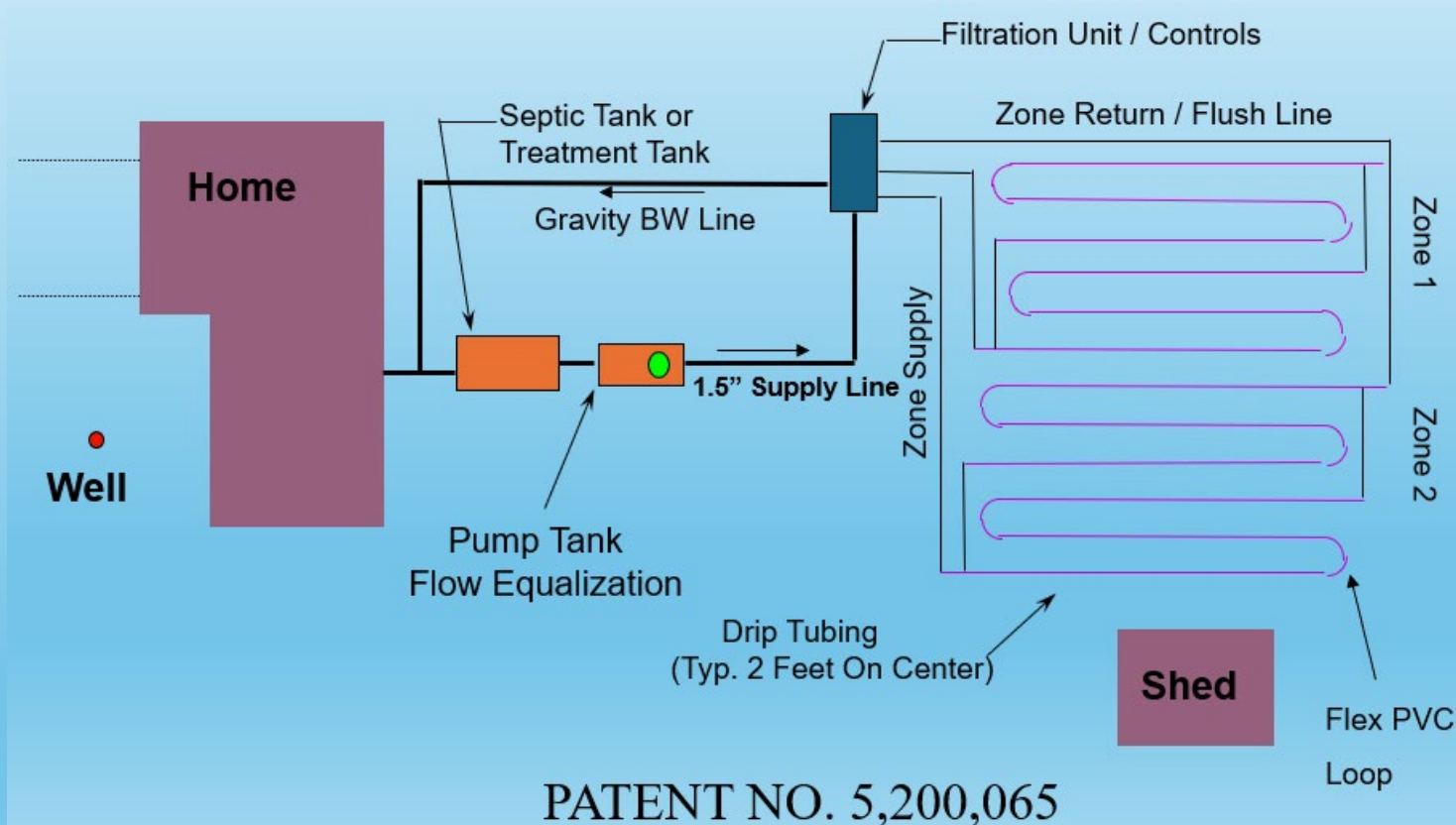
LATERAL – One or a series of runs with a supply and a return connection.

ZONE – A group of laterals dosed at the same time.

What to look for in a design review?

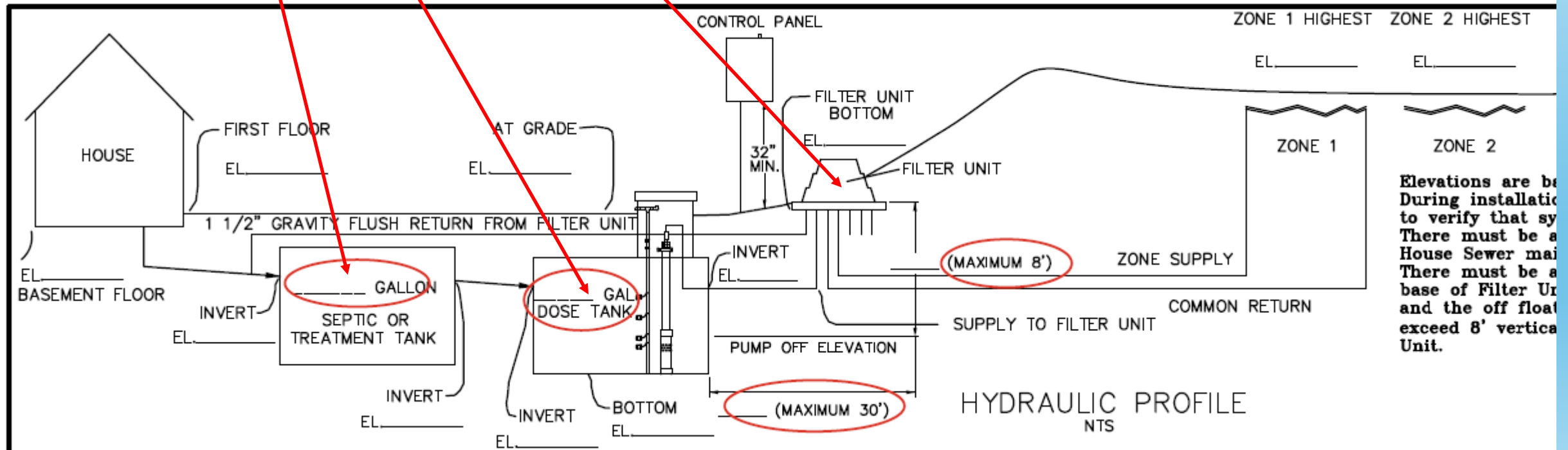
EQUIPMENT:

- 2-4 drip zones
- Max 1200 l.f. per zone
- Total GPM for any zone is 15 gpm or less
- ASD15 filter unit with control panel
- ½ HP PUTURB15 pump from American (115v or 230v)
- Appropriately sized Septic Tank & Pump Tanks





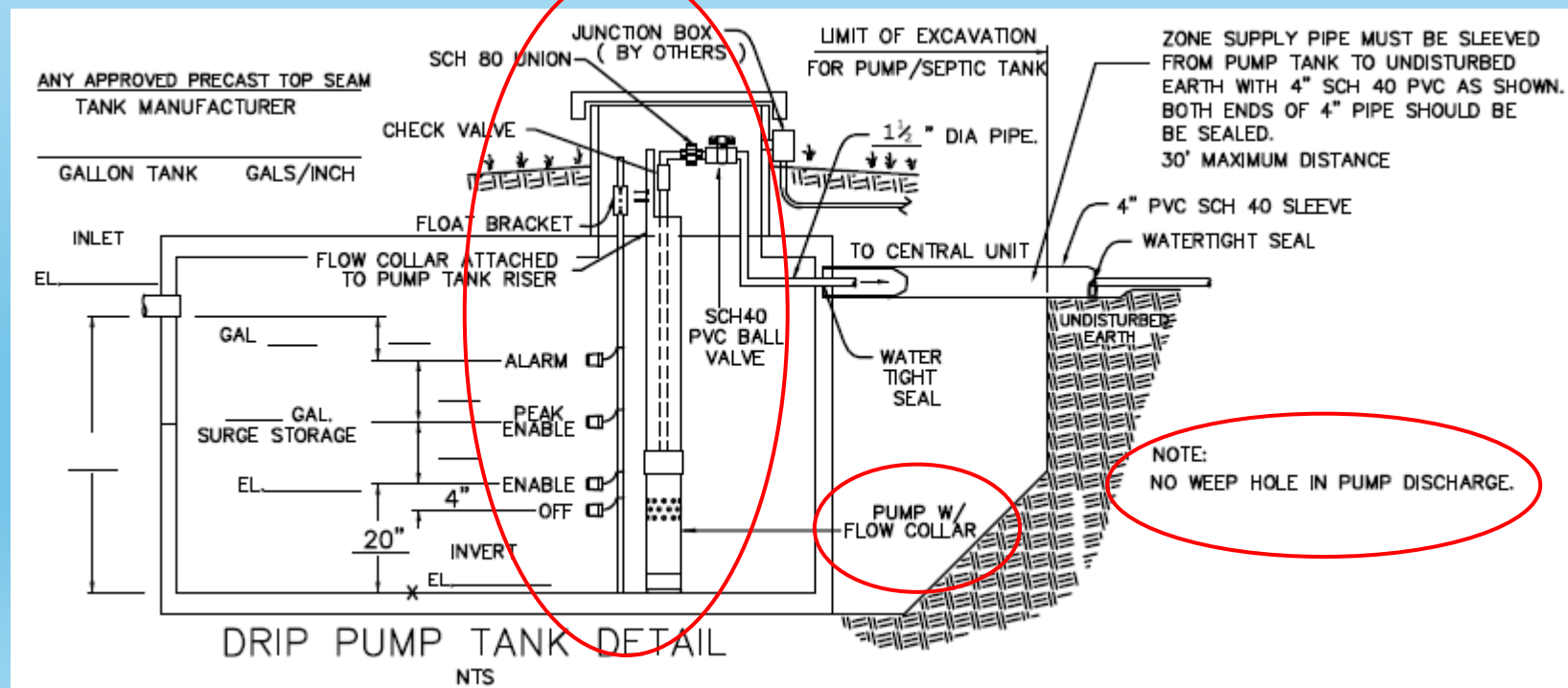
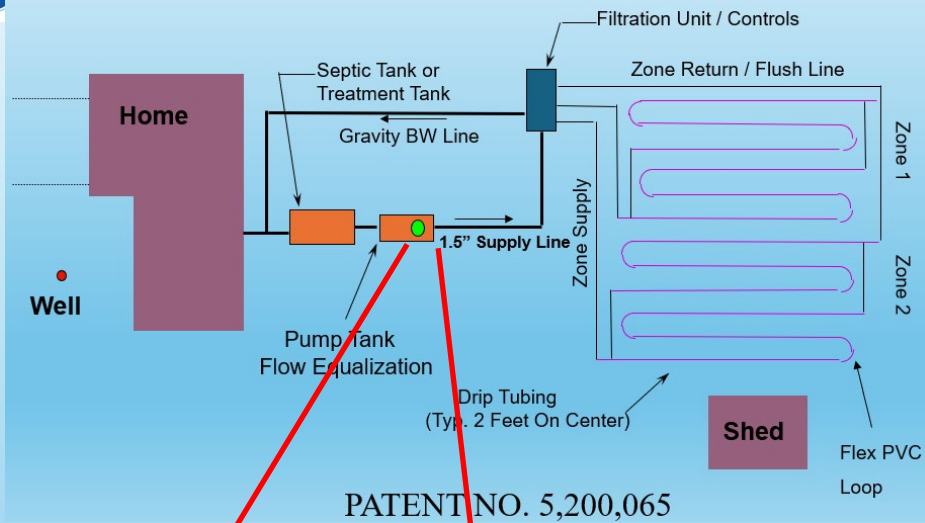
- Appropriately sized Septic Tank & Pump Tanks
- Max 30 ft run from pump to ASD15 hyd unit
- Max 8 ft lift from “Off” level float to ASD15 hyd unit



What to look for in a design review?

EQUIPMENT:

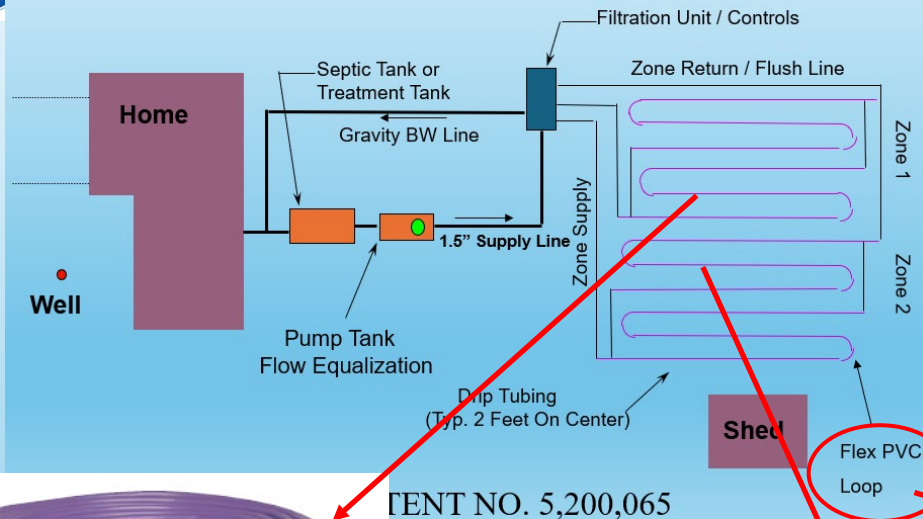
- ½ HP PUTURB15 pump from American (115v or 230v)
- Cool Guide 15
- Cool Guide **Extension by the installer**
- Four floats in correct order
- NO WEEP HOPE in pump discharge



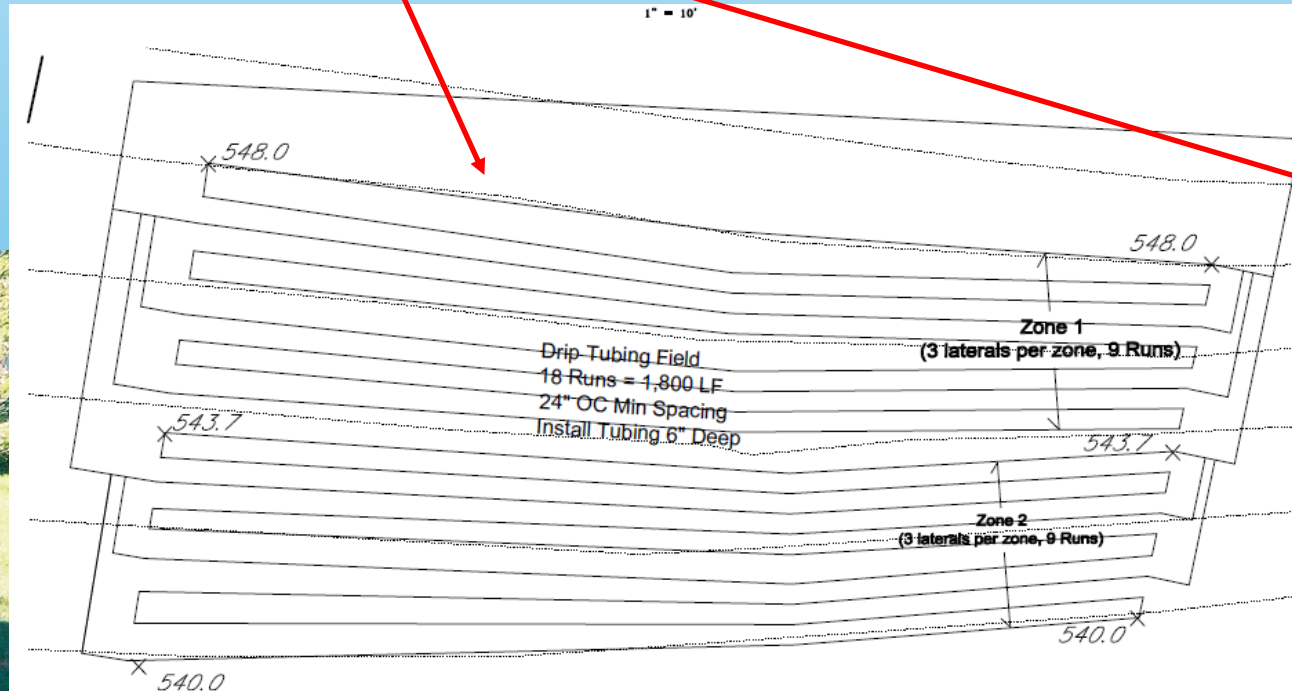
What to look for in a design review?

EQUIPMENT & INSTALL SPECS:

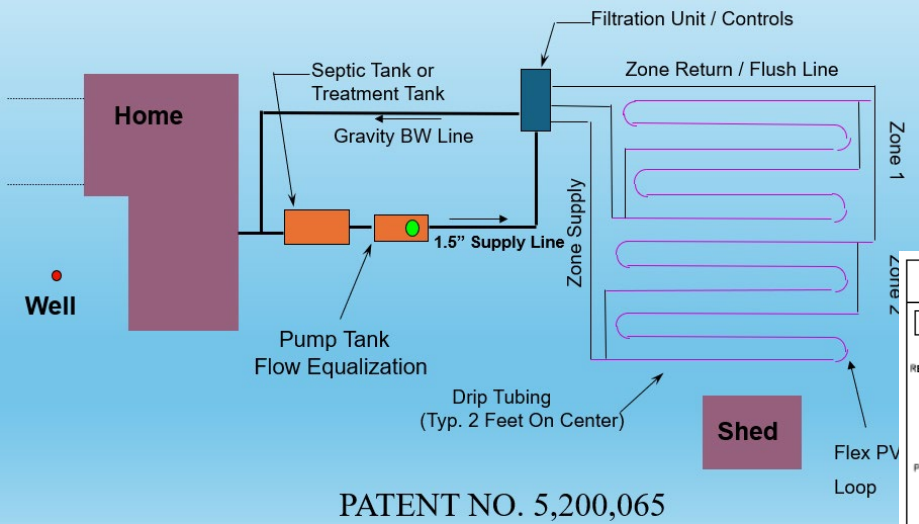
- Drip tubing designed & installed along contour!!!
- Correct drip tubing: Netafim PC, purple, 0.6 gph, 24" o.c.
- Loops made with flex PVC, not drip tubing!
- Loops elevated to drain !!!!
- Air release valves at high points on manifolds
- Top Feed Manifolds



PATENT NO. 5,200,065

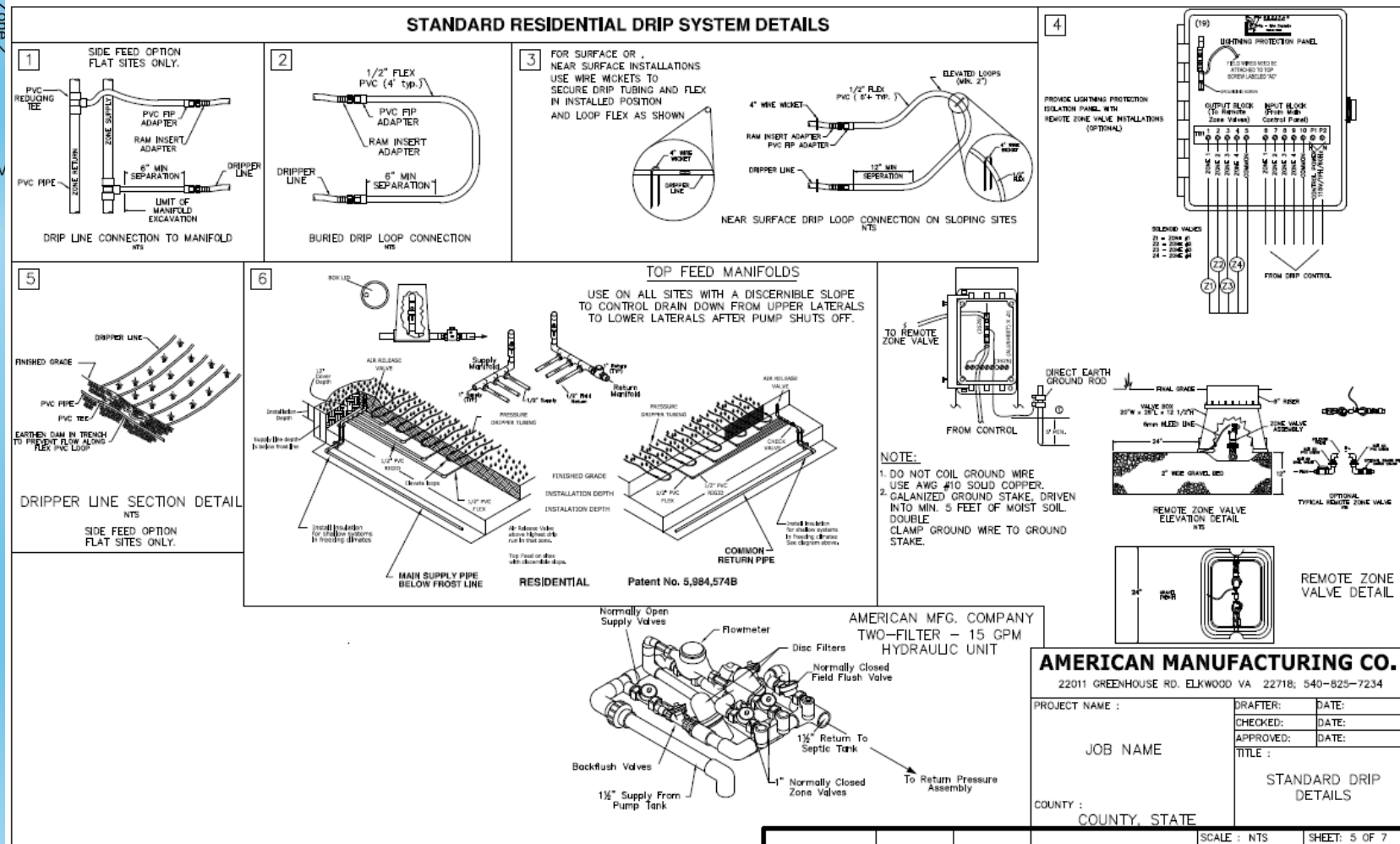


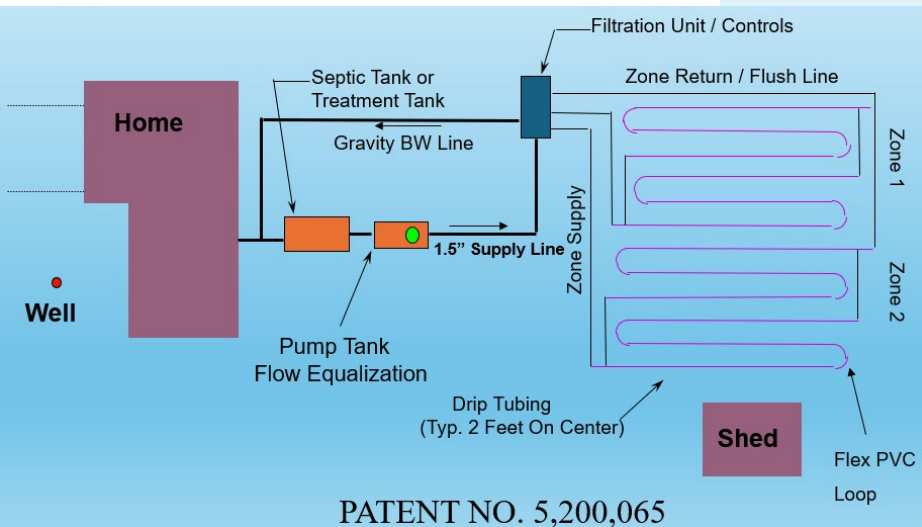
What to look for in a design review?



General Drip Design Details:

- Manifolds
- Loop Detail
- Pump Curve & Spec
- Hydraulic Filter Unit Info
- Control Panel Info





Drip Design Calculations:

- # of Zones
- Zone Size (l.f.)
- Dose GPM
- Flush & Total GPM
- Pump Size, Voltage, Phase
- Pump Run Time
- Pump Rest Time
- Gallons per Cycle per Zone

**IMPORTANT INFO NEEDED FOR
STARTUP!!**

What to look for in a design review?



Perc-Rite® DESIGN CALCULATION SHEET

This calculation sheet is set up for a two-zone system. If you are designing a single zone system, disregard items 19-26. If more zones are needed, continue calculating head losses for each zone, then size the pump for the highest head loss. Contact American for design support if pumping downhill or if over pressurizing is indicated.

To Simplify the design process use the American "Perc-Rite® Calc-Tool" for standard designs.

1. Site Name: _____ Date _____
2. _____ GALLONS PER DAY _____ BEDROOMS
3. _____ GPD/S.F. SOIL LOADING RATE REQUIRED
4. _____ FT. X _____ FT. AREA FOR DISPOSAL LAYOUT a) _____ FT²
5. _____ GPD/FT² SOIL LOADING RATE PROVIDED (#2/#4a)
6. _____ ZONES
7. _____ TOTAL DRIPPER LINE PROVIDED
8. _____ SEPTIC TANK SIZE
9. _____ DOSING TANK SIZE
10. _____ GALLONS PER INCH DOSING TANK
11. ZONE ONE
12. _____ TOTAL ABSORPTION AREA
13. _____ LINEAR FEET DRIPPER LINE
14. _____ LONGEST LATERAL LENGTH
15. _____ DOSING FLOW RATE
16. _____ NUMBER OF RETURN FIELD FLUSH CONNECTIONS
17. _____ FIELD FLUSH FLOW RATE
18. _____ TOTAL FLOW REQUIRED
19. ZONE TWO
20. _____ TOTAL ABSORPTION AREA
21. _____ LINEAR FEET DRIPPER LINE
22. _____ LONGEST LATERAL LENGTH
23. _____ DOSING FLOW RATE
24. _____ NUMBER OF RETURN FIELD FLUSH CONNECTIONS
25. _____ FIELD FLUSH FLOW RATE
26. _____ TOTAL FLOW REQUIRED
27. _____ MAXIMUM DESIGN FLUSHING FLOW
28. _____ FEET HEAD LOSS HYDRAULIC UNIT (BASED ON # 27)
29. HYDRAULIC UNIT SUPPLY LINE SIZE (1-1/2" TYPICAL)
30. _____ INCHES PIPE
31. _____ LENGTH SUPPLY PIPE
32. _____ FT. STATIC LIFT (HYDRAULIC UNIT ELEVATION - OFF FLOAT ELEVATION)
33. _____ TOTAL FEET HEAD LOSS LINE (DYN. HEAD LOSS + #32)
34. FORCE MAIN SUPPLY LINE PIPE SIZE & LENGTH _____ FT.
35. _____ ZONE ONE SIZE, _____ ZONE ONE LENGTH _____ FEET HEAD LOSS
36. _____ ZONE TWO SIZE, _____ ZONE TWO LENGTH _____ FEET HEAD LOSS
37. RETURN FLUSH LINE SIZE & LENGTH _____
38. _____ ZONE ONE SIZE, _____ ZONE ONE LENGTH _____ FEET HEAD LOSS
39. _____ ZONE TWO SIZE, _____ ZONE TWO LENGTH _____ FEET HEAD LOSS
40. _____ FEET HEAD LOSS TOTAL STATIC (VERTICAL LIFT)
41. TOTAL PRESSURE LOSS (ADD ITEMS; 28,33,35-36, 38-39,40 +FLUSHING)
42. _____ ZONE ONE HEAD LOSS, INCLUDES _____ FEET FLUSHING
43. _____ ZONE TWO HEAD LOSS, INCLUDES _____ FEET FLUSHING
44. PUMP SIZING
45. _____ MAXIMUM PRESSURE LOSS TOTAL (HIGHEST FEET 61-64)
46. _____ DISC FILTER BACKFLUSH (#32 + 115' @15 GPM)
47. _____ GPM @ _____ FEET (LARGER OF 45 & 46)
48. PUMP MODEL _____
49. _____ GPM @ _____ FEET _____ VOLTS _____ PHASE _____ HP
50. TIME DOSING PER ZONE
51. Two Zone Standard Enable (180 min rest)
52. Two Zone Peak Enable (108 min rest)
53. ZONE ONE _____ GPM _____ MIN/DOSE _____ AVE. CYCLES _____ PEAK
54. CYCLES _____ GAL/DOSE
55. ZONE TWO _____ GPM _____ MIN/DOSE _____ AVE. CYCLES _____ PEAK
56. CYCLES _____ GAL/DOSE
57. _____ PEAK CYCLES _____ GAL/DOSE
57. _____ INCHES DRAWDOWN FLOAT SWITCH SETTING (MIN. 4")

What to look for in a design review?

COLD WEATHER INSTALLATION NOTES

Minimum construction techniques for all American "Perc-Rite" Drip systems in cold weather climates

"Top feed" manifolds should be used on all sites with a discernible slope to allow for proper drainage of the manifolds and the 3/4" and 1/2" lateral connectors into the drip tubing. The main supply and return lines shall be installed below the frost line and shall feed the shallow "top feed" manifolds with a single vertical section of insulated sch 40 PVC pipe. Insulation shall be minimum 1/2" thick foam insulation (or equivalent). On flat sites where "top feed" manifold will not drain therefore recommend the use of side feed manifolds. 12" cover is recommended between highest point of 1/2" black flexible PVC pipe (non loop connections) and final grade. On drip tubing installations less than 12" cover is recommended between highest point of 1/2" black flexible PVC pipe (non loop connections) and final grade. Please see note on loop connections below. Ensure to cold weather. If vegetation cannot be established, then trenches and tubing to be covered with a thick layer (minimum 6") of mulch, vegetative turf is established. Amount of cover may need to be adjusted to account for settling, either blue board, bagged Styrofoam peanuts or equivalent. If fiberglass insulation is used it must be sealed to prevent it from becoming saturated. Live boxes is encouraged to reduce the volume of groundwater that may collect in valve box. Certain sites may require positive drains to daylight. / drain into the drip tubing after the pump shuts off. It is contractors responsibility to ensure these loops stay elevated during and after the loops are installed. If restrictions then adequate soil must be added over the top of the trenches so that the effective depth remains below the frost line after settling. If then trenches are to be covered with an additional layer (minimum 6") of mulch, straw/hay, etc, until such turf cover is established, using the hydraulic unit shall allow vertically down 90 degrees to a depth below the frost line prior to extending away from the unit horizontally. bagged Styrofoam peanuts or equivalent. If fiberglass insulation is used it must be sealed to prevent it from becoming saturated.

highest drip line in that particular zone.

COLD WEATHER INSTALLATION NOTES

Minimum construction techniques for all

"Top feed" manifolds should be used on all

GENERAL REQUIREMENTS:

The preservation of the original structure of the soil in the absorption area is essential to maintaining the percolative capacity of the soil. No activity other than the construction of the system is permitted within the absorption area. On sites where a majority of the vegetation needs to be removed, care must be taken to minimize the impact on the soil's natural permeability. There shall be no cutting, filling, or storage of material on or within 20' of the absorption area. Site clearing and preparation shall be performed by the installation contractor for the wastewater dispersal system. The absorption system is not to be constructed during periods of wet weather when the soil is sufficiently wet at the depth of installation to exceed its plastic limit. The plastic limit is exceeded when the soil can be rolled between the palms of the hands to produce threads 1/8 inch in diameter without breaking and crumbling.

After installation of the absorption system, and before clearing installation is not to be performed for 60 days, seed the area liberally with native grasses. The standard Department Of Transportation specification is acceptable consisting of perennial rye and fescue. At all times protect the installation

in soil moisture conditions. Track machines are preferred to those with rubber tires and should only be used around edges of installation. Soil moisture conditions need to be confirmed prior to beginning

ground surface. Stumps may be ground to two inches below the installation depth and the hole backfilled with sandy material to 6" above installation depth and the remainder with natural soil. When the area is to 6" above installation depth and the remainder with natural soil. Digging and pushing over trees may be more detrimental to the soil's infiltrative characteristics. Track machines are preferred to moisture conditions need to be confirmed prior to beginning clearing and system installation by the soil scientist of record.

installation depth, backfill the hole with sandy material to 6" above installation depth and the remainder with natural soil. Stumps may be ground to two inches below the installation depth and the hole backfilled with sandy material to 6" above installation depth and the remainder with natural soil. Digging and pushing over trees may be more detrimental to the soil's infiltrative characteristics than "pulling" and are not recommended. Track machines are preferred to those with rubber tires and are to be confirmed prior to beginning clearing and system installation by the soil scientist of record.

manner. It is desirable to water test an installed zone while the supply and return manifold header ditches are exposed to better inspect for leaks. In order to facilitate site and equipment protection and to monitor the water to both flush and leak test each zone or subzone prior to backfill. The flushing volume shall be five times the volume of the piping network being flushed. The flushing velocity shall be the volume of the pipe. The leak test shall continue until steady state flow is achieved and the flow rate is within 6% of the design flow rate or as approved by the manufacturer or engineer. After the system is sealed and protected from dirt and debris from entering prior to final connection.

General Construction Notes American Manufacturing "Perc-Rite®" Drip

General Construction Notes

American Manufacturing "Perc-Rite®" Drip

AMERICAN MANUFACTURING CO.

22011 GREENHOUSE RD. ELKWOOD VA 22718; 540-825-7234

PROJECT NAME :	DRAFTER:	DATE:
	CHECKED:	DATE:
JOB NAME	APPROVED:	DATE:
	TITLE :	GENERAL CONSTRUCTION, COLD WEATHER INSTALLATION & SITE CLEARING NOTES
COUNTY :		
COUNTY, STATE		

SCALE : NTS SHEET: 7 OF 7



What to look for in a design review?

Design Review Letter OR Authorized Designer Letter:

- Signed by American Mfg
- References correct address
- Correct System
- Note: All MicroMounds need a letter!



December 19, 2024

Paul Smith
JC Design, LLC
1111 Main Street
Johnstown, Pennsylvania 18888

**RE: 89 Westwood Boulevard
Westfield Township
Montgomery County, Pennsylvania
American Mfg. Co. "Perc-Rite®" MicroMound Drip Dispersal System Design**

Dear Paul,

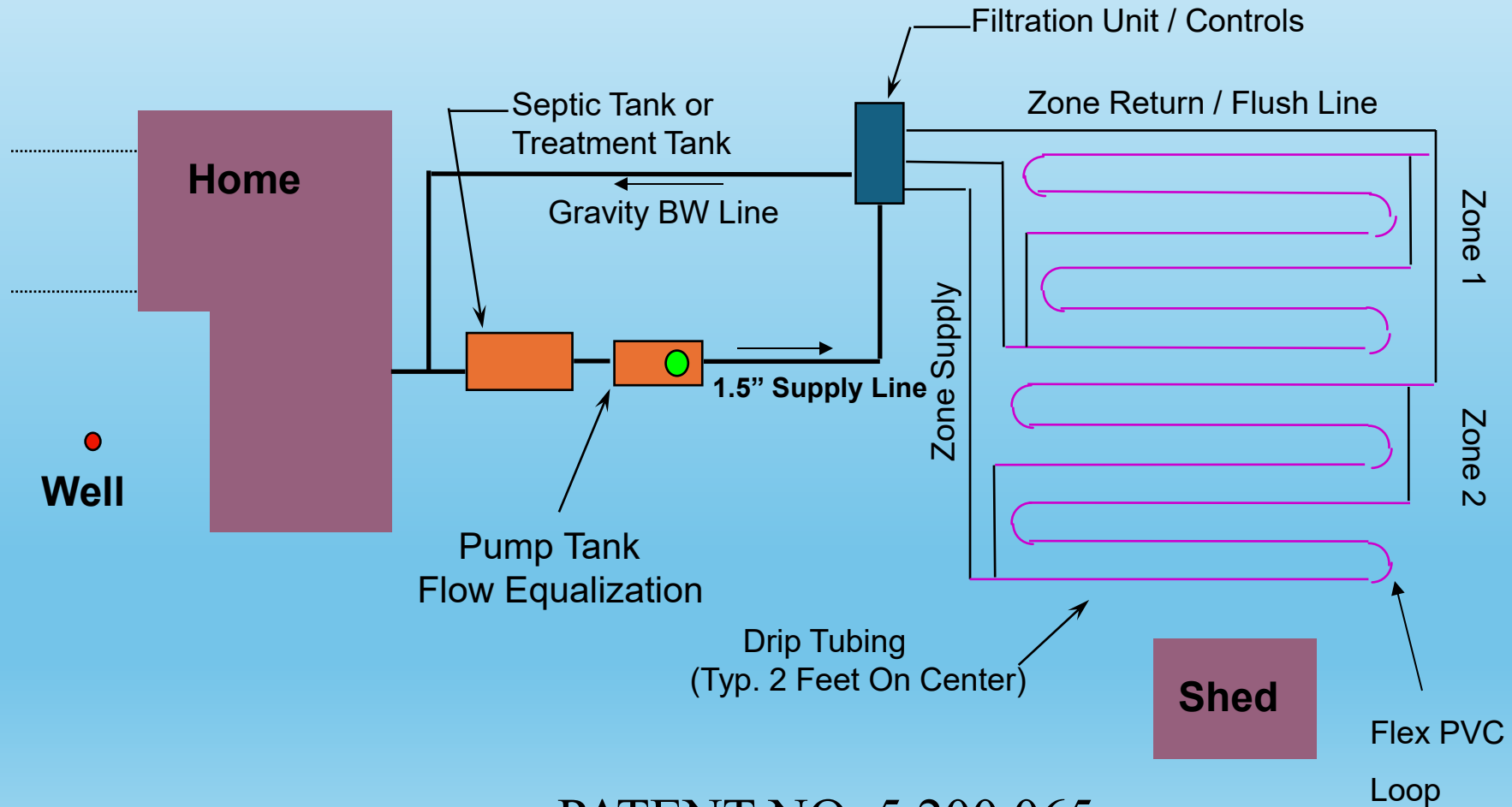
Upon our review of your proposed **American Manufacturing Co. "Perc-Rite®" MicroMound Drip Dispersal System** Model ASD152-SAB124 for 89 Westwood Boulevard in Westfield Township, Montgomery County, Pennsylvania, I hereby certify that the system has been designed in compliance with the manufacturer's recommendations.

Sincerely,

Bryan J. Allen

Bryan J. Allen, P.E.
American Manufacturing Co., Inc.

Drip Dispersal Schematic



PATENT NO. 5,200,065

NEW DESIGN REQUIREMENTS

Parameters needed for design:

Design Flow: **150 gpd/bedroom**

Loading Rate: gpd/l.f.

Determine how much drip tubing is required
Max 0.34 gpd/l.f.

HLLR: Horizontal Linear Loading Rate. **Max is 4.6**

The gallons per foot along the topographic contour.

Min horizontal length required is the average daily flow (50% of design) divided by 4.6.

RATES PROVIDED BY PAPSS

recommendation of the soil scientist.

- (8) The maximum horizontal linear load (the gallons per foot along the topographic contour) is 4.6 gallons per day as calculated on the average daily flow of the onlot system. The average daily flow is 50% of the maximum design flow as listed in 73.17 (relating to sewage flows).
- (9) The horizontal linear load equals the average daily gallons per day divided by the length of the system.
- (10) The minimum horizontal length required is the average daily flow divided by 4.6.
- (11) The sewage enforcement officer may require the site plan for the drip distribution

Commonwealth of Pennsylvania
Department of Environmental Protection (DEP)
Bureau of Point and Non-Point Source Management
Harrisburg, PA

Issued to: American Manufacturing Co, Inc.
PO Box 97
Elkwood, VA 22718-0097
Phone: 800-345-3132
www.americanonsite.com

Technology: American PERC-RITE® (PERC-RITE primary effluent)

Classification Type: Alternate technology (Listing #A2010-0005-0002)

Classification Date: January 4, 2010, March 1, 2012

DEP Alternate Classification Listing
American PERC-RITE primary effluent
Classification Date: March 1, 2012

Page 8 of 8

Table 1

Texture	Structure						Structureless	
	Platy			Prismatic/Blocky/Granular			Single Grain	Massive
	Strong	Moderate	Weak	Strong	Moderate	Weak		
Gravelly Coarse Sand	NOT APPLICABLE (N/A)							N/A
Coarse Sand							.34	
Sand							.34 - .25	
Fine Sand								
Very Fine Sand								
Loamy Coarse Sand							.34	
Loamy Sand								
Loamy Fine Sand							.34 - .25	
Loamy Very Fine Sand								
Coarse Sandy Loam	≤25			.34 - .25		.34 - .25	N/A	≤25
Sandy Loam								
Fine Sandy Loam					.34 - .25	≤25		
Very Fine Sandy Loam					.34	.34 - .25		
Loam								
Silt Loam							N/A	
Sandy Clay Loam					.34 - .25	≤25		
Clay Loam								
Silty Clay Loam								
Sandy Clay								
Silty Clay					.25 - ≤15			
Clay								

Notes:

- All values in gallons per day per linear foot of tubing

Loading rate chart is on last page of listing.

LOADING RATE

Max Loading Rate: 0.34 gpd/l.f.

Drip tubing is typically spaced 2.0 ft o.c.

0.34 gpd/l.f. /2 ft o.c. = 0.17 gpd/sq ft

0.17 gpd /sq ft is roughly equal to 2 in/ac/wk
 which is the old spray irrigation loading rate

DEP Alternate Classification Listing
 American PERC-RITE primary effluent
 Classification Date: March 1, 2012

Page 8 of 8

Table 1

Texture	Structure							Single Grain	Massive
	Shape						Structureless		
	Platy			Prismatic/Blocky/Granular					
	Strong	Moderate	Weak	Strong	Moderate	Weak			
Gravelly Coarse Sand	NOT APPLICABLE (N/A)							N/A	
Coarse Sand							.34		
Sand							.34 -.25		
Fine Sand									
Very Fine Sand									
Loamy Coarse Sand							.34		
Loamy Sand									
Loamy Fine Sand									
Loamy Very Fine Sand							.34 -.25		
Coarse Sandy Loam			.34 -.25	.34		.34 -.25	N/A	≤.25	
Sandy Loam			≤.25	.34 -.25		≤.25			
Fine Sandy Loam				.34		.34-.25			
Very Fine Sandy Loam				.34 -.25		≤.25			
Loam				.34 -.25		≤.25	N/A		
Silt Loam				.25 - ≤.15					
Sandy Clay Loam									
Clay Loam									
Silty Clay Loam							N/A		
Sandy Clay									
Silty Clay									
Clay									

Notes:

- All values in gallons per day per linear foot of tubing

PA DESIGN EXAMPLE

Assumptions:

5 bedroom home= **600 gpd**

Less than 25% slope

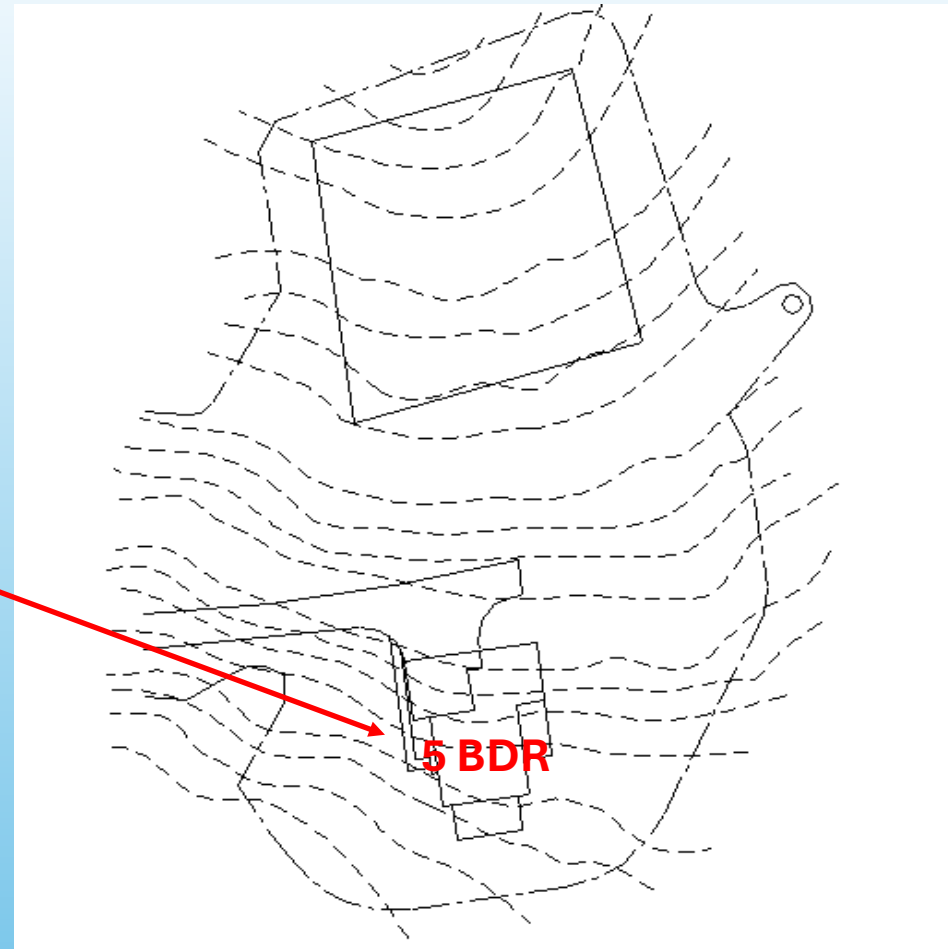
Depth to restriction greater than 24" so we can use PRIMARY EFFLUENT Listing

Soil Scientist's Report calls for:

Loading Rate: **0.34 gpd/l.f.**

HLLR: **4.6**

Installation Depth: **6"**



- Installation Zone:
- (5) The slope in each drip distribution zone must be between 0 and 25%.
 - (6) The minimum depth to limiting zone from the mineral soil surface must be greater than or equal to 24 inches. A minimum vertical isolation distance of 18 inches must be maintained between the depth of installation of the drip distribution tubing and the shallowest indication of any limiting zone. The maximum tubing installation depth is 12 inches.

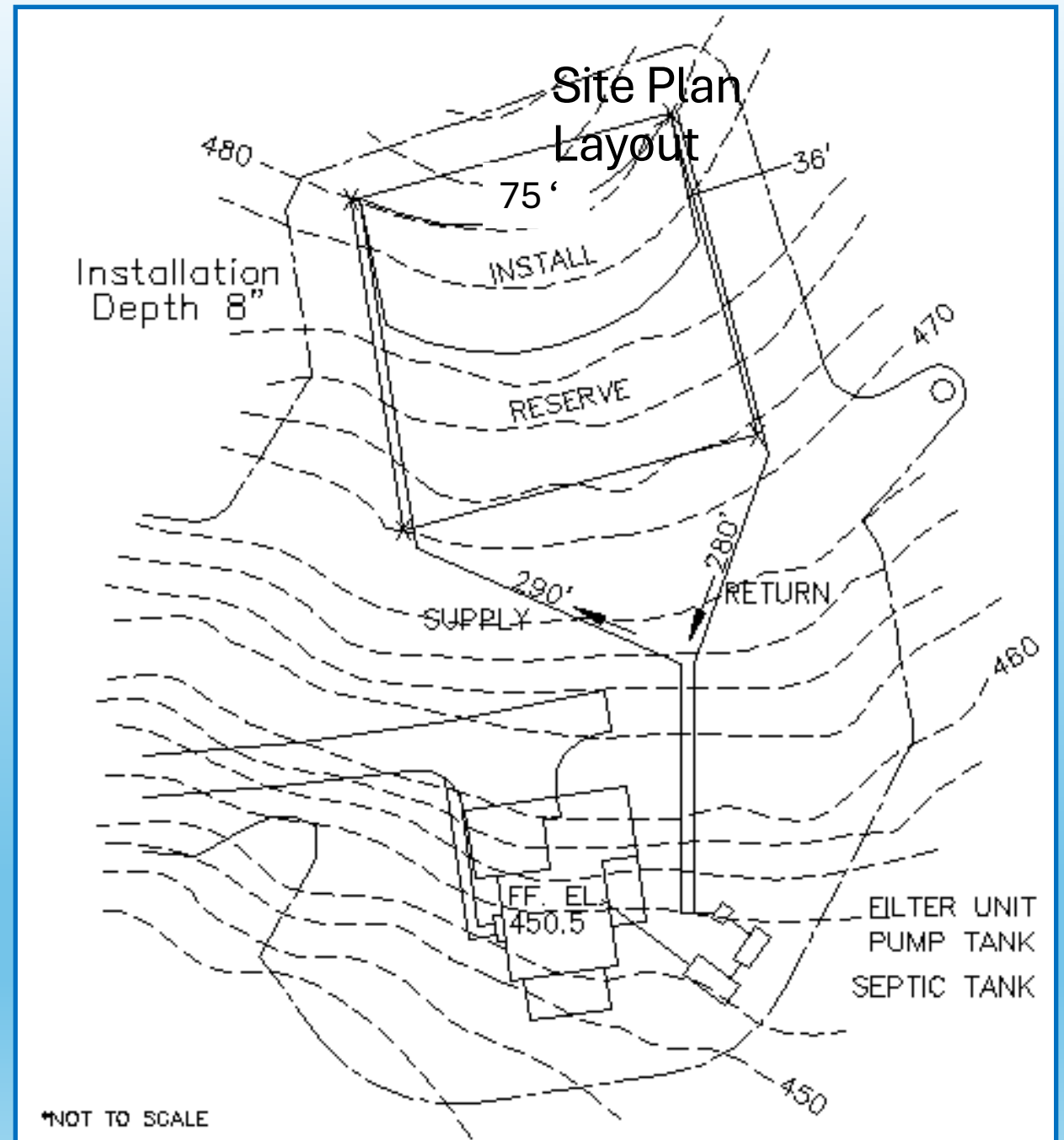
PA DESIGN EXAMPLE

- **Drip Tubing Required:** 600 gpd / 0.34 gpd/l.f.
= 1765 l.f.
- **HLLR Required:** 50% of daily flow / 4.6
- 300 gpd/4.6 = 65 ft. Site has 75 ft (>65 so OK)
- **Drip Tubing Spacing:** 2.0' on center

Example Site has:

- 75 ft along contour
 - 1765 l.f. required / 75 ft runs = 23.5 runs
- Round up to 24 runs (@75 ft = 1800 l.f.)

Zone Detail: See ZD Table for Options



Perc-Rite® Residential Drip Dispersal

Engineering Specifications

CalcTool

Standard Zone Detail Table

Lift & Distance Table
Instructions

Perc-Rite® Commercial Drip Dispersal

Wastewater System Controls

Commercial Sand Filters

Disinfection Systems
Chlorination & UV

Pump Systems

Engineering Tables & Charts

Drawings, AutoCAD & PDF

Standard Zone Detail Table

ASD15 Perc-Rite® Zone Detail Table: Septic or Secondary

15 GPM Automatic Drip Systems: 24" Emitter Spacing

RUN LGTH #RUN	50' ZD LF	75' ZD LF	100' ZD LF	125' ZD LF	150' ZD LF	200' ZD LF	225' ZD LF	250' ZD LF	300' ZD LF
2						Z121 400	Z121 450	Z121 500	Z121 600
3					Z131 450	Z131 600	Z131 675	Z131 750	Z131 900
4			Z122 400 Z141 400	Z122 500 Z141 500	Z122 600 Z141 600	Z141 800 Z221 800	Z141 900 Z221 900	Z141 1000 Z221 1000	Z141 1200 Z221 1200
5			Z151 500	Z151 625	Z151 750	Z151 1000	Z151 1125		
6		Z123 450 Z132 450	Z123 600 Z132 600	Z132 750	Z132 900 Z231 900	Z231 1200	Z231 1350	Z231 1500	Z231 1800 Z321 1800
7									
8	Z124 400 Z142 400	Z124 600 Z142 600	Z142 800 Z222 800 Z241 800	Z142 1000 Z222 1000 Z241 1000	Z142 1200 Z222 1200 Z241 1200	Z241 1600	Z241 1800	Z241 2000	Z241 2400
9	Z133 450	Z133 675	Z133 900			Z331 1800	Z331 2025	Z331 2250	Z331 2700
10	Z125 500 Z152 500	Z152 750	Z251 1000	Z251 1250	Z251 1500	Z251 2000	Z251 2250		
11									
12	Z126 600 Z134 600 Z143 600	Z134 900 Z143 900 Z223 900 Z232 900	Z143 1200 Z223 1200 Z232 1200	Z232 1500	Z232 1800 Z322 1800	Z341 2400 Z431 2400	Z341 2700 Z431 2700	Z341 3000 Z431 3000	Z341 3600 Z431 3600
13									

PRODUCTS

DESIGN

INSTALLATION & OPERATIONS

RESOURCES

ABOUT

CONTACT

From the Zone Detail table. Go to the cell at the intersection of the # of runs and run length.

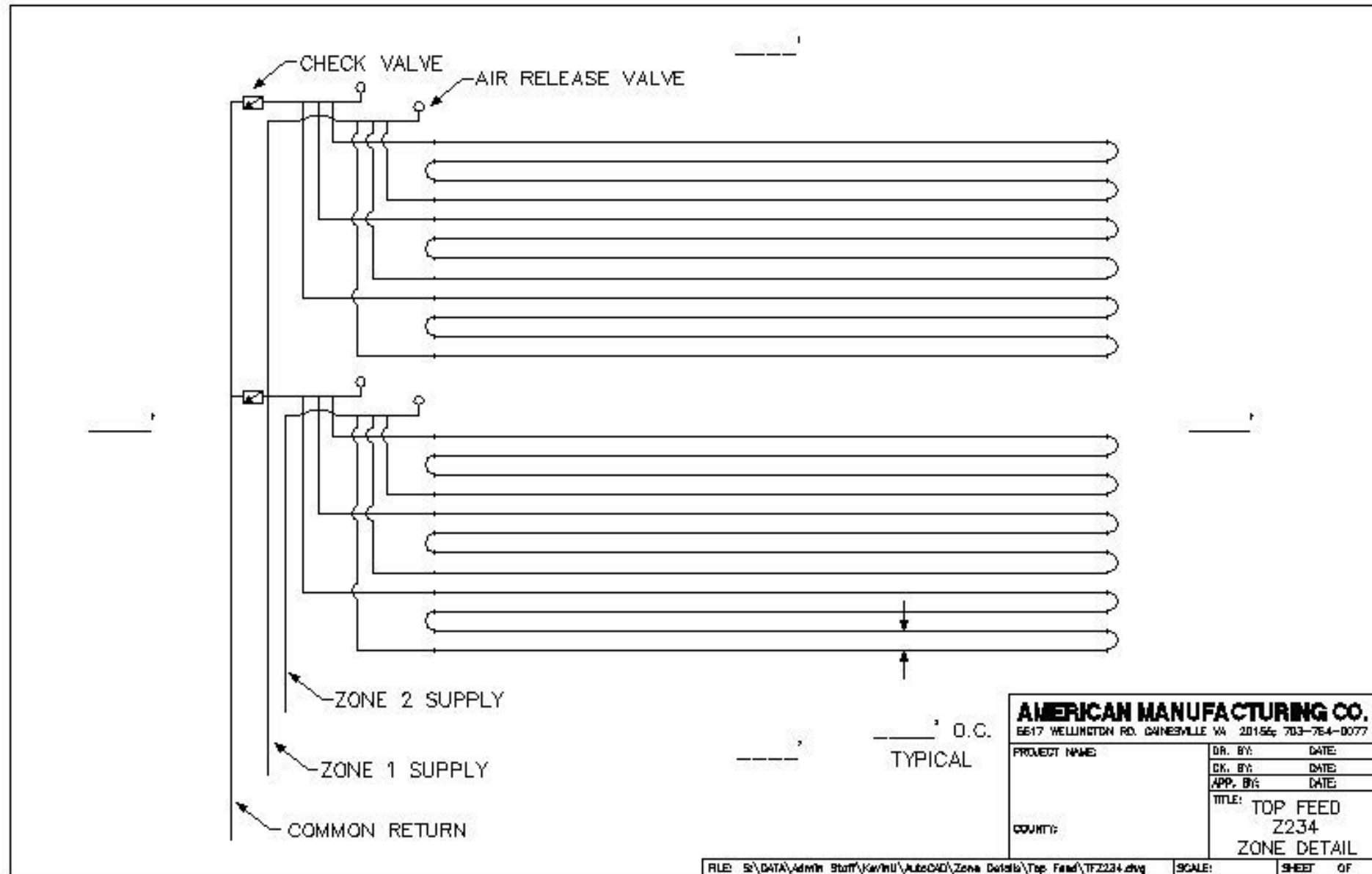
In this case 24 runs and 75 ft length gives us two options.

Z234 OR
Z324

	Z225 1000 Z252 1000									
21			Z371 2100							
22										
23										
24	Z146 1200 Z226 1200 Z234 1200 Z243 1200	Z234 1800 Z324 1800	Z243 2400 Z342 2400 Z423 2400	Z342 3000 Z432 3000	Z342 3600 Z432 3600					
25										
26										
27		Z333 2025	Z333 2700							
28	Z272 1400		Z471 2800							
29										
30	Z235 1500 Z253 1500	Z253 2250 Z352 2250	Z352 3000							



AMERICAN
Manufacturing Company, Inc.



So what does a Zone Z234 mean for the design?

ZONE DETAIL NUMBERING SYSTEM

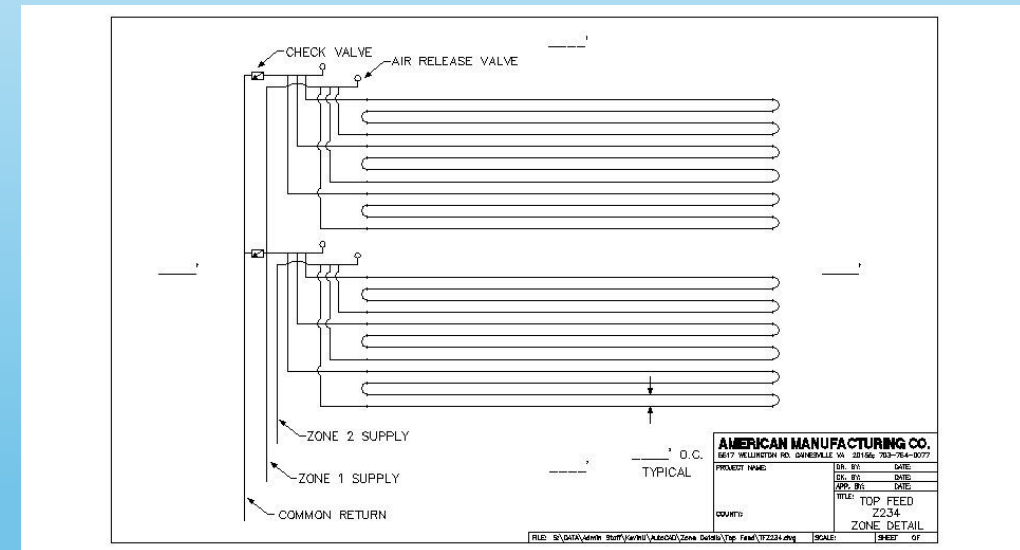
- Each zone is designated by a “Z” indicating it is a Zone Detail Designation followed by three groups of numbers, the first is the number of zones, the second is the number of laterals per zone, the third is the runs per lateral.

- _____
- Z = Zone # Zones # Laterals # Runs/Lat

EXAMPLE 1

- Z 2 3 4
- Z = Zone # Zones # Laterals # Runs/Lat

- This example shows a three zone detail with three lateral per zone and three runs per lateral.



Add the zone length and width. Add pipe sizes.

Zone Configuration

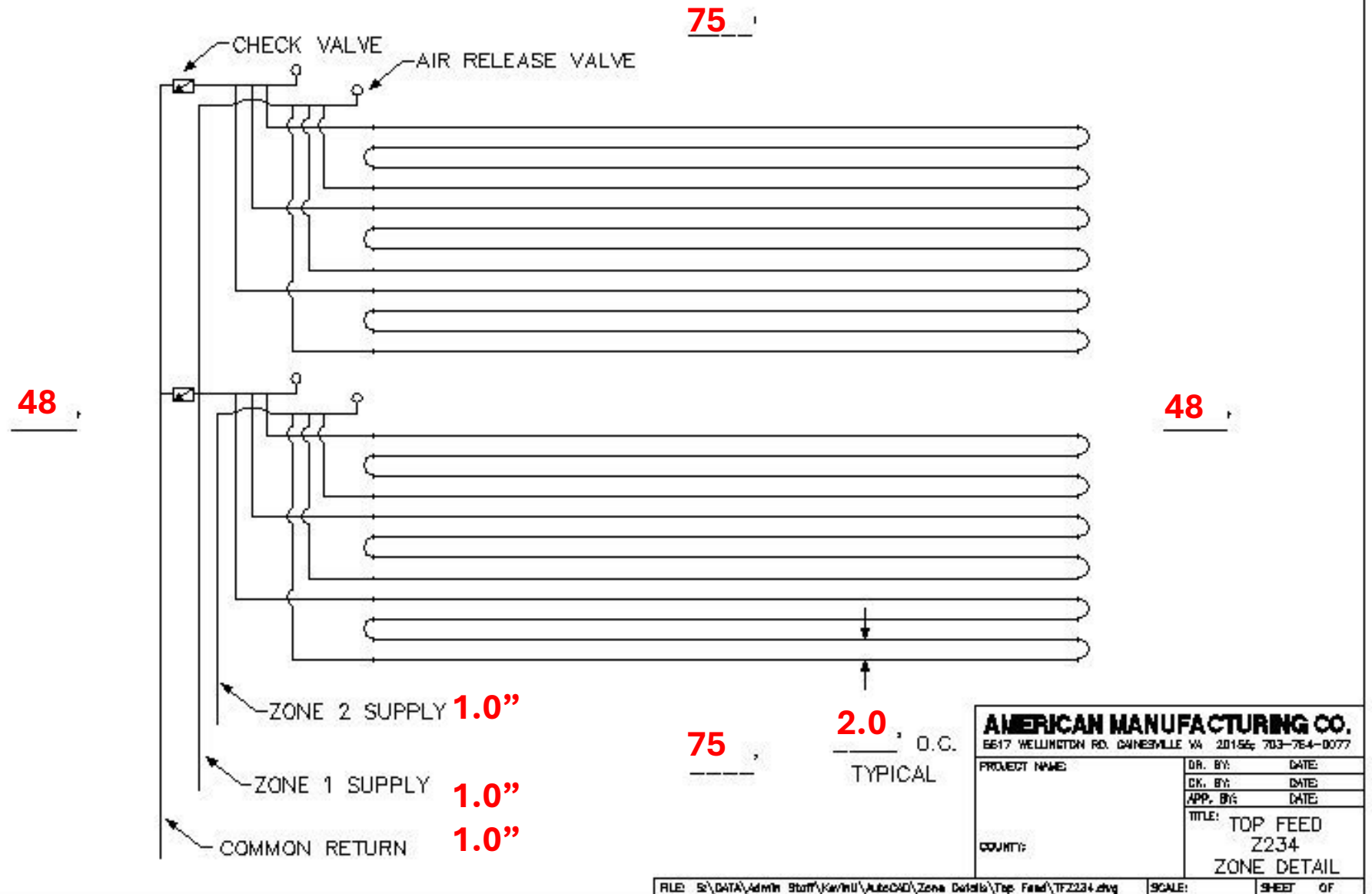
Options:

- Z234

- 2 zones
- 3 laterals per zone
- 4 runs per lateral
- Supply & Return in same trench

- EACH ZONE
- 900 l.f.
- Three 300 ft laterals
- 12 runs at 75 ft each

24 runs at 2 ft o.c.
Header: 48 ft



If you are doing a design OR reviewing a design, you might see a calculation sheet similar to this.

Calculations Include:

- Dose Rates
- Flush Rates
- Force Main Sizes
- Lift and Distances
- Pump Run Times
- Pump Rest Times
- Pump Sizing

Perc-Rite® DESIGN CALCULATION SHEET

This calculation sheet is set up for a two-zone system. If you are designing a single zone system, disregard items 19-26. If more zones are needed, continue calculating head losses for each zone, then size the pump for the highest head loss. Contact American for design support if pumping downhill or if over pressurizing is indicated.

To Simplify the design process use the American "Perc-Rite® Calc-Tool" for standard designs.

1. Site Name: _____ Date _____
2. _____ GALLONS PER DAY _____ BEDROOMS
3. _____ GPD/S.F. SOIL LOADING RATE REQUIRED
4. _____ FT. X _____ FT. AREA FOR DISPOSAL LAYOUT a) _____ FT²
5. _____ GPD/FT² SOIL LOADING RATE PROVIDED (#2/#4a)
6. _____ ZONES
7. _____ TOTAL DRIPPER LINE PROVIDED
8. _____ SEPTIC TANK SIZE
9. _____ DOSING TANK SIZE
10. _____ GALLONS PER INCH DOSING TANK
11. ZONE ONE
12. _____ TOTAL ABSORPTION AREA
13. _____ LINEAR FEET DRIPPER LINE
14. _____ LONGEST LATERAL LENGTH
15. _____ DOSING FLOW RATE
16. _____ NUMBER OF RETURN FIELD FLUSH CONNECTIONS
17. _____ FIELD FLUSH FLOW RATE
18. _____ TOTAL FLOW REQUIRED
19. ZONE TWO
20. _____ TOTAL ABSORPTION AREA
21. _____ LINEAR FEET DRIPPER LINE
22. _____ LONGEST LATERAL LENGTH
23. _____ DOSING FLOW RATE
24. _____ NUMBER OF RETURN FIELD FLUSH CONNECTIONS
25. _____ FIELD FLUSH FLOW RATE
26. _____ TOTAL FLOW REQUIRED
27. _____ MAXIMUM DESIGN FLUSHING FLOW
28. _____ FEET HEAD LOSS HYDRAULIC UNIT (BASED ON # 27)
29. HYDRAULIC UNIT SUPPLY LINE SIZE (1-1/2" TYPICAL)
30. _____ INCHES PIPE
31. _____ LENGTH SUPPLY PIPE
32. _____ FT. STATIC LIFT (HYDRAULIC UNIT ELEVATION - OFF FLOAT ELEVATION)
33. _____ TOTAL FEET HEAD LOSS LINE (DYN. HEAD LOSS + #32)
34. FORCE MAIN SUPPLY LINE PIPE SIZE & LENGTH _____ FT.
35. _____ ZONE ONE SIZE, _____ ZONE ONE LENGTH _____ FEET HEAD LOSS
36. _____ ZONE TWO SIZE, _____ ZONE TWO LENGTH _____ FEET HEAD LOSS
37. RETURN FLUSH LINE SIZE & LENGTH _____
38. _____ ZONE ONE SIZE, _____ ZONE ONE LENGTH _____ FEET HEAD LOSS
39. _____ ZONE TWO SIZE, _____ ZONE TWO LENGTH _____ FEET HEAD LOSS
40. _____ FEET HEAD LOSS TOTAL STATIC (VERTICAL LIFT)
41. TOTAL PRESSURE LOSS (ADD ITEMS; 28,33,35-36, 38-39,40 +FLUSHING)
42. _____ ZONE ONE HEAD LOSS, INCLUDES _____ FEET FLUSHING
43. _____ ZONE TWO HEAD LOSS, INCLUDES _____ FEET FLUSHING
44. PUMP SIZING
45. _____ MAXIMUM PRESSURE LOSS TOTAL (HIGHEST FEET 61-64)
46. _____ DISC FILTER BACKFLUSH (#32 + 115' @15 GPM)
47. _____ GPM @ _____ FEET (LARGER OF 45 & 46)
48. PUMP MODEL _____
49. _____ GPM @ _____ FEET _____ VOLTS _____ PHASE _____ HP
50. TIME DOSING PER ZONE
51. Two Zone Standard Enable (180 min rest)
52. Two Zone Peak Enable (108 min rest)
53. ZONE ONE _____ GPM _____ MIN/DOSE _____ AVE. CYCLES _____ PEAK
54. CYCLES _____ GAL/DOSE
55. ZONE TWO _____ GPM _____ MIN/DOSE _____ AVE. CYCLES _____ PEAK
56. CYCLES _____ GAL/DOSE
57. _____ PEAK CYCLES _____ GAL/DOSE
57. _____ INCHES DRAWDOWN FLOAT SWITCH SETTING (MIN. 4")

Three Hydraulic Conditions

Backwashing Disc Filters *(Most limiting condition)*

Each filter is backwashed individually at the beginning of each dose cycle.

Requires 115' of head at 15 gallons per minute.

Lift from dose chamber enable float to hydraulic unit to be as minimal as possible (< 8'). Pump supply run from dose chamber to hydraulic unit to be as minimal as possible (<30').

Routine Zone Dosing *(Least limiting condition)*

Gallon per minute flow of zone tubing for pump run time calculation. Default at four times per day per zone (average). Typically no hydraulic design in standard system.

Zone Tubing Flushing Flow *(System TDH Calc)*

Zone dose flow plus 1.6 GPM per lateral condition. Zones are forward flushed at an adequate velocity once every 25 dose runs. Value is used for hydraulic calculations. Size supply (and return) for 2 feet per second velocity based on this flow.

To Determine GPM Dose Rate in a zone you need:

1. Linear Feet of Drip Tubing in the Zone
2. Emitter Rate: Gallons Per Hour
3. Emitter Spacing Inside the Drip Tubing

BIOLINE Flow per 100 Feet

Dripper Spacing	0.4 GPH Dropper		0.6 GPH Dropper		0.9 GPH Dropper	
	GPH	GPM	GPH	GPM	GPH	GPM
12"	40.0	0.67	61.0	1.02	92.0	1.53
18"	26.7	0.44	41.0	0.68	61.0	1.02
24"	20.0	0.34	31.0	0.51	46.0	0.77

BIOLINE DOSING CHART Maximum Length (feet) of a Single Lateral

Dripper Spacing		12"			18"			24"		
Dripper Flow Rate (GPH)		0.4	0.6	0.9	0.4	0.6	0.9	0.4	0.6	0.9
Inlet Pressure (psi)	15	292	233	175	410	322	247	510	405	308
	25	397	312	238	558	438	335	660	550	423
	35	486	365	279	656	514	394	760	649	497
	45	520	407	311	732	574	439	880	725	555

Lateral lengths are calculated for operation while dosing, and allow for the pressure at the end of the dripperline to be 7 psi or greater. These data do not take scouring velocity into account.

Dose Flow Rate =

(l.f. / 2.0' o.c) X (0.6 gph / 60 min per hr)

Field Flush Flow Rate =

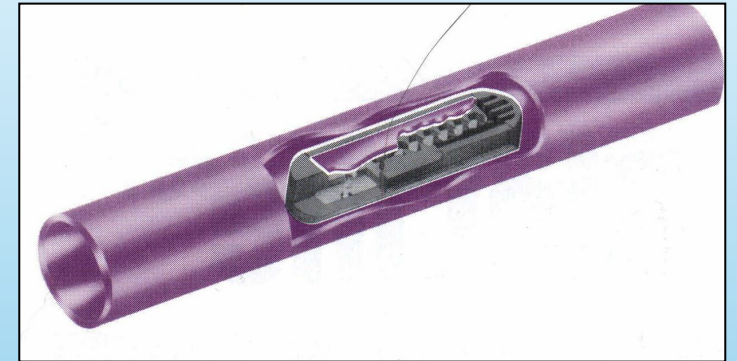
- 0.57" dia Tubing**
- Minimum scouring velocity 2.0'/sec
at distal ends of laterals**
- For 0.57" dia tubing scouring velocity
= 1.6 gpm flow**

CALCULATE ZONE DOSE RATE

**Example: 900 l.f./zone, 0.6 gph emitters,
24" o.c. (2') emitter spacing**

**900 l.f. X 0.6gph
 2' o.c. 60 min/hr**

= 4.5 gallons per minute (GPM)



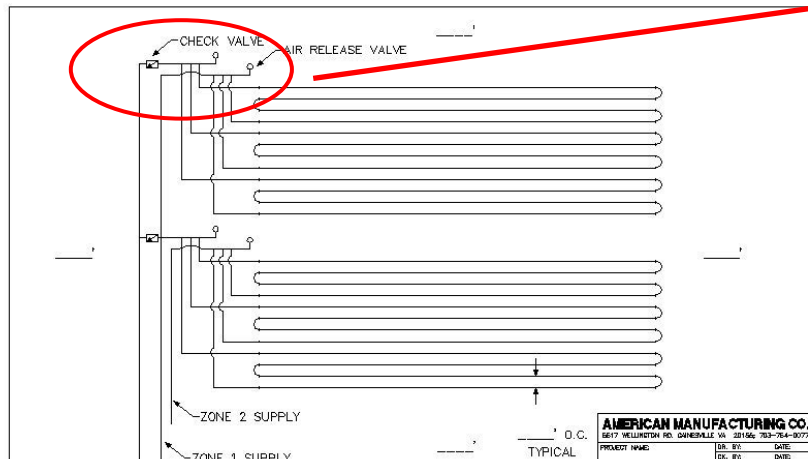
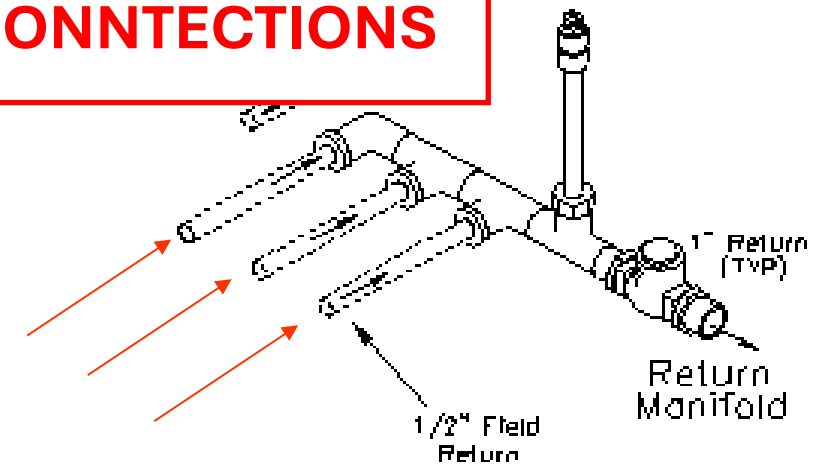
BIOLINE Flow per 100 Feet

Dripper Spacing	0.4 GPH Dripper		0.6 GPH Dripper		0.9 GPH Dripper	
	GPH	GPM	GPH	GPM	GPH	GPM
12"	40.0	0.67	61.0	1.02	92.0	1.53
18"	26.7	0.44	41.0	0.68	61.0	1.02
24"	20.0	0.34	31.0	0.51	46.0	0.77

**To Determine GPM Forward
Field Flush Rate for a zone
you need:**

- 1. GPM Dose Rate (already
calculated)**
- 2. Number of lateral connections
to the return line in the zone.**

**ZONE Z234 WILL
HAVE THREE
LATERALS
RETURN
CONNECTIONS**



Zone Forward Flush / Scour Velocity

- 2.0 ft / sec velocity is the engineering standard
- Achieve at distal end of tubing (i.e. the end of each lateral)
- ***1.6 gpm per lateral connection = velocity of 2.0 ft/sec in ½" dia. tubing.***
- Frequency: Min twice per month. Varies with effluent quality.



CALCULATE ZONE FORWARD FLUSH / SCOUR RATE

Our Design Example:
900 l.f. = 4.5 gpm Dose Rate
3 laterals at 300 ft

1.6 gpm x 3 laterals = 4.8 gpm

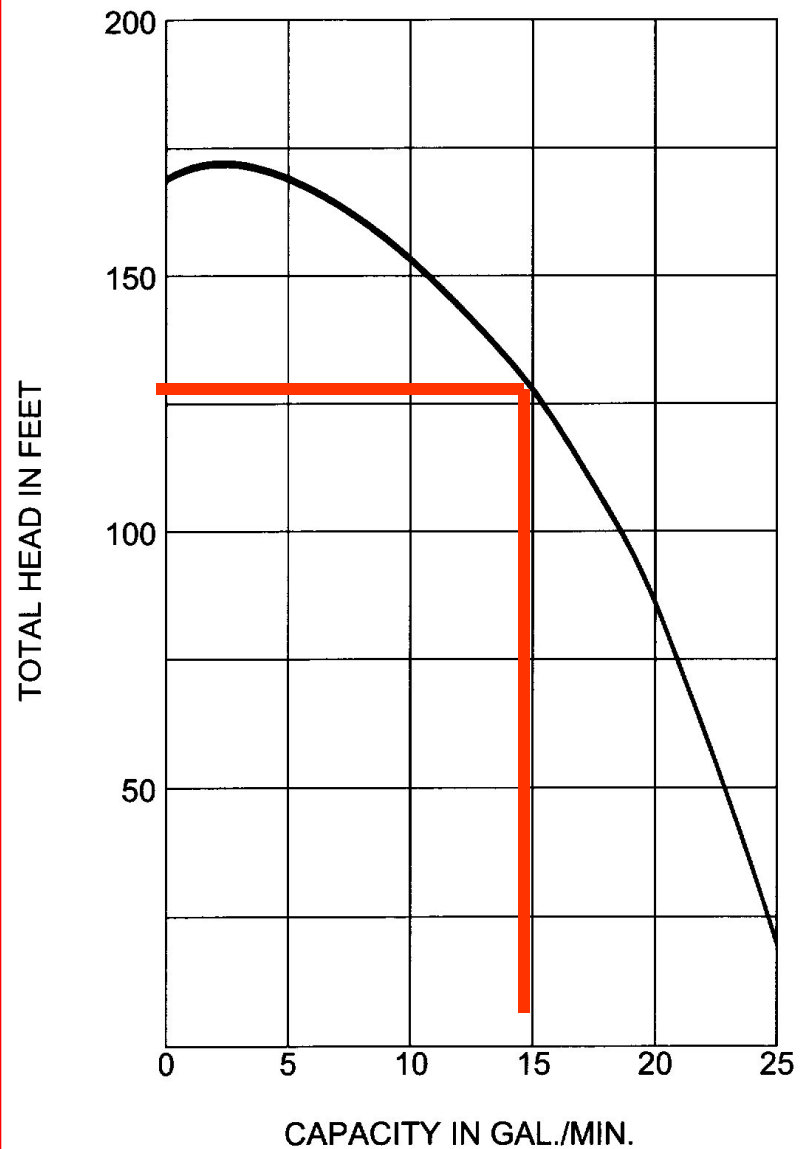
Total Forward Flow = 9.3 gpm (4.5 + 4.8)

OPERATING POINTS

- **Dose Flow 2 – 4 times per day**
- **Forward Field Flush every 25 cycles or 14 days**
– Flush at the *Total Flow gpm*
- **Disc Filter* Backflush before each dose.**
 - * Disc Filters: for Effluent Applications



Turbine15 Pump Curve



4.0" dia.

115v/230v

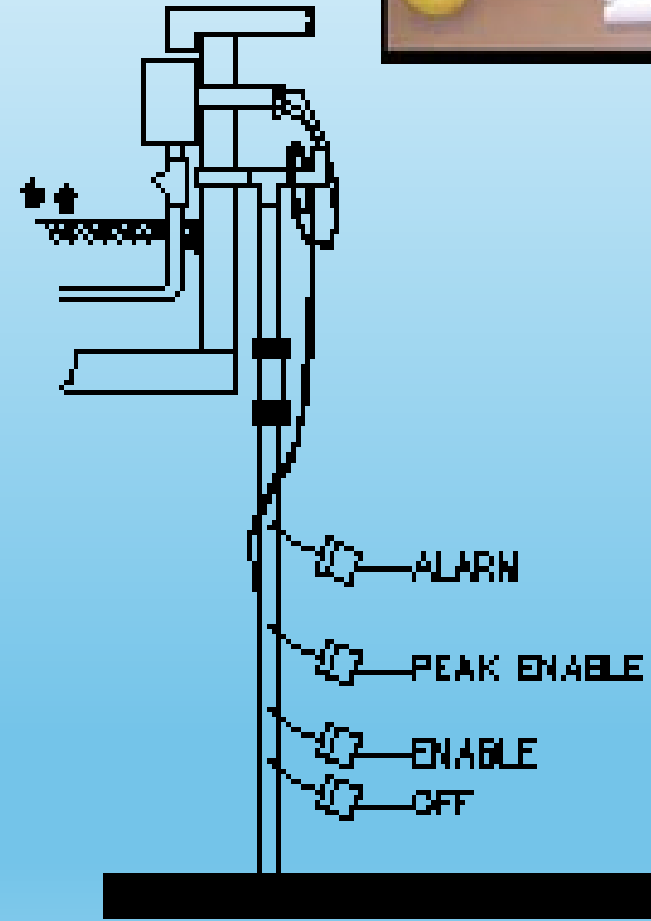
Typ. ½ HP

High Head

**Effluent
Pump**

Float Switches

- Time dosing (No Demand Dose!)
- 4 float operation
- Standard mode 60% of design flow
- Peak mode 100% of design flow



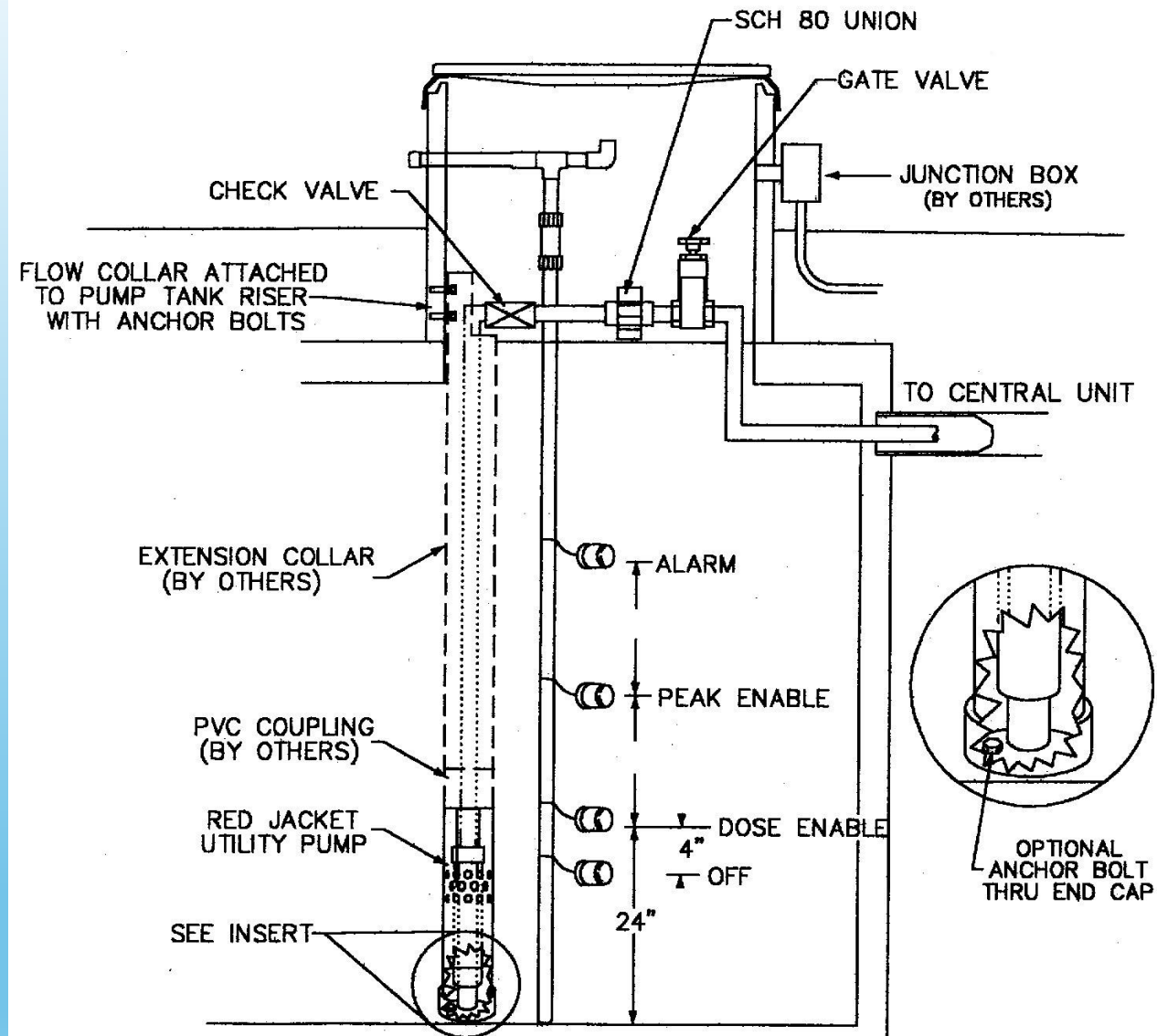
Typical Pump Tank:

50 - 75% working volume between the Timer Enable and High Alarm switch

25% storage above the High Alarm

Volume is Never less than that of a standard septic tank.

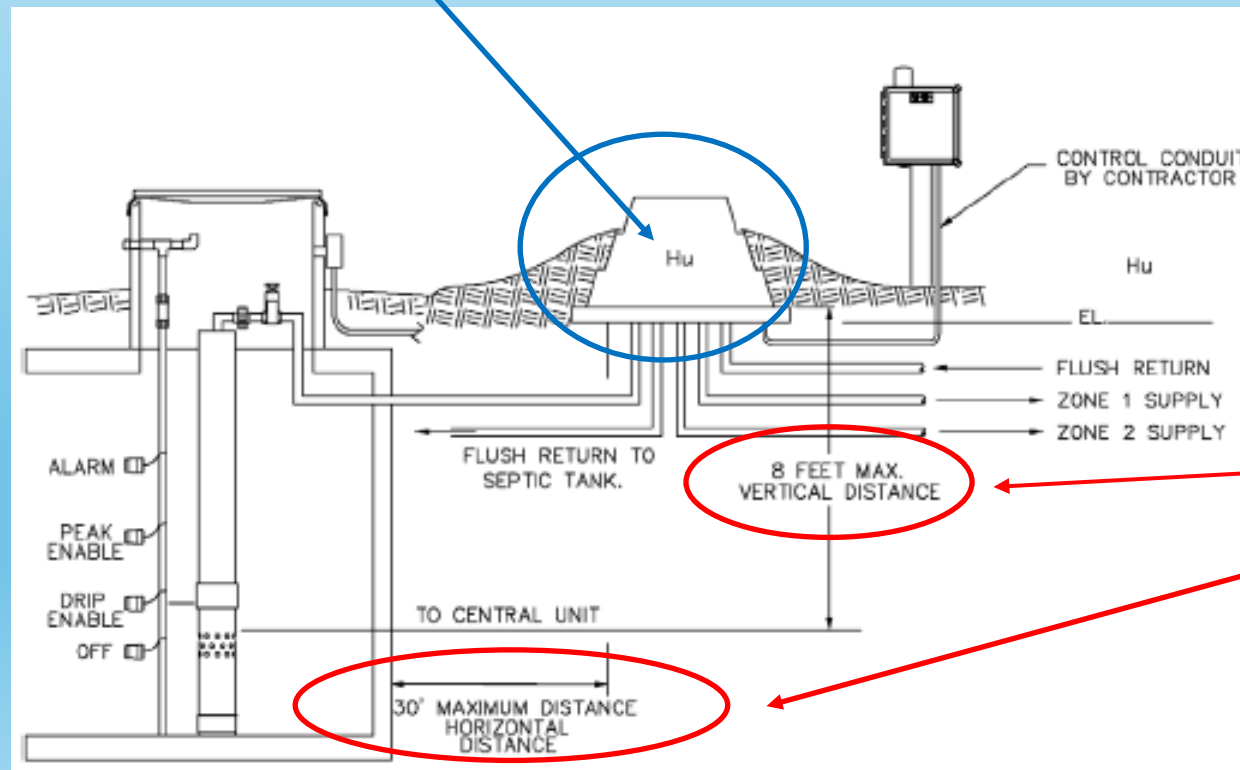
Watertight access risers to grade.



Pump Chamber Sizing

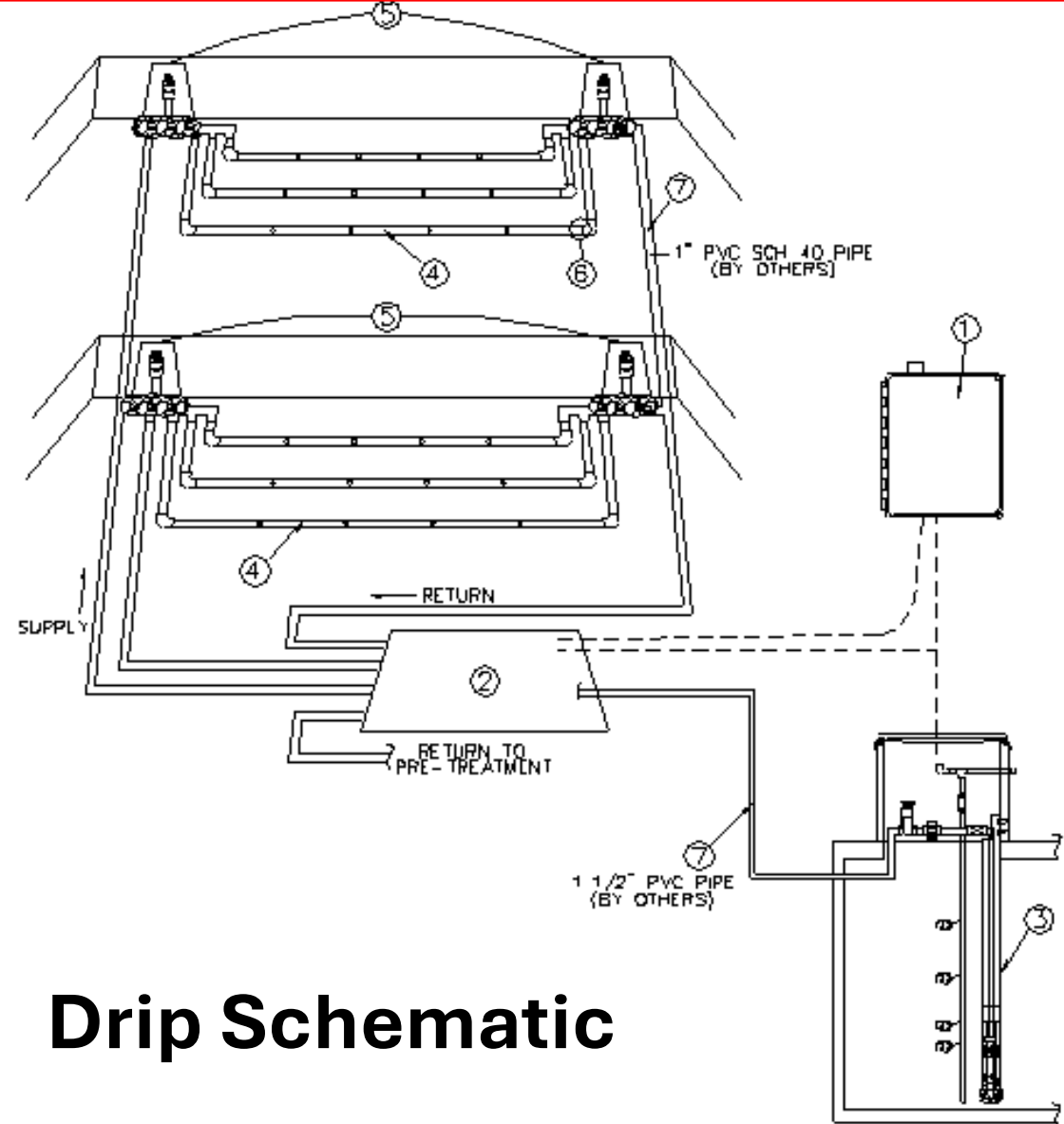
HEADLOSS CALCULATIONS

1. Pump to Hyd. Unit (TDH) Max 30' horizontal & 8-9' vertical
2. HL through Hyd. Unit (includes filters, flowmeter, sol. Valves, PVC fittings, etc.)



Perc Rite® Drip Calculations

3. Friction loss in Zone Supply Lines
4. Friction Loss in Zone Return Lines
5. Static Lift from Hyd unit to Drip Field
6. HL through longest lateral of drip tubing (Chart 3A)
7. Total HL = Summation of these values





P.O. Box 549, Manassas, VA 20108-0549

www.americanonsite.com

Standard friction loss table.

Gal/ min	1/2" vel	1/2" hLoss	3/4" vel	3/4" hLoss	1" vel	1" hLoss	1-1/4" vel	1-1/4" hLoss	1-1/2" vel	1-1/2" hLoss	2" vel	2" hLoss	2-1/2" vel	2-1/2" hLoss	3" vel	3" hLoss	4" vel	4" hLoss
2	2.11	3.24	1.20	0.87	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4	4.22	11.68	2.41	3.15	1.49	1.03	0.86	0.29	-	-	-	-	-	-	-	-	-	-
6	6.34	24.75	3.61	6.68	2.23	2.17	1.29	0.61	0.95	0.30	-	-	-	-	-	-	-	-
8	8.45	42.17	4.81	11.39	2.97	3.70	1.72	1.03	1.26	0.50	0.76	0.16	-	-	-	-	-	-
10	10.56	63.75	6.02	17.22	3.71	5.60	2.15	1.56	1.58	0.76	0.96	0.24	-	-	-	-	-	-
12	12.67	89.35	7.22	24.13	4.46	7.84	2.57	2.19	1.89	1.07	1.15	0.33	0.80	0.15	-	-	-	-
15	-	-	9.03	36.48	5.57	11.86	3.22	3.31	2.36	1.61	1.43	0.50	1.01	0.22	-	-	-	-
18	-	-	10.83	51.13	6.68	16.62	3.86	4.64	2.84	2.26	1.72	0.71	1.21	0.31	0.78	0.11	-	-
20	-	-	12.03	62.15	7.43	20.20	4.29	5.64	3.15	2.75	1.91	0.86	1.34	0.38	0.87	0.14	-	-
25	-	-	-	-	9.28	30.54	5.36	8.52	3.94	4.16	2.39	1.30	1.68	0.57	1.09	0.21	-	-
30	-	-	-	-	11.14	42.80	6.44	11.94	4.73	5.83	2.87	1.82	2.01	0.80	1.30	0.29	0.76	0.08
35	-	-	-	-	12.99	56.95	7.51	15.89	5.52	7.75	3.35	2.42	2.35	1.06	1.52	0.39	0.88	0.11
40	-	-	-	-	14.85	72.92	8.58	20.34	6.30	9.93	3.82	3.10	2.68	1.36	1.74	0.49	1.01	0.14
45	-	-	-	-	-	-	9.65	25.30	7.09	12.35	4.30	3.86	3.02	1.69	1.95	0.61	1.13	0.17
50	-	-	-	-	-	-	10.73	30.76	7.88	15.01	4.78	4.69	3.35	2.05	2.17	0.75	1.26	0.21
55	-	-	-	-	-	-	11.80	36.69	8.67	17.90	5.26	5.60	3.69	2.45	2.39	0.89	1.39	0.25
60	-	-	-	-	-	-	12.87	43.11	9.46	21.03	5.74	6.57	4.02	2.87	2.60	1.05	1.51	0.30
65	-	-	-	-	-	-	-	-	10.24	24.40	6.22	7.62	4.36	3.33	2.82	1.21	1.64	0.34
70	-	-	-	-	-	-	-	-	11.03	27.98	6.69	8.75	4.69	3.82	3.04	1.39	1.76	0.39
75	-	-	-	-	-	-	-	-	11.82	31.80	7.17	9.94	5.03	4.35	3.26	1.58	1.89	0.45
80	-	-	-	-	-	-	-	-	12.61	35.84	7.65	11.20	5.36	4.90	3.47	1.78	2.02	0.50
85	-	-	-	-	-	-	-	-	-	-	8.13	12.53	5.70	5.48	3.69	1.99	2.14	0.56
90	-	-	-	-	-	-	-	-	-	-	8.61	13.93	6.03	6.09	3.91	2.22	2.27	0.63
95	-	-	-	-	-	-	-	-	-	-	9.08	15.40	6.37	6.73	4.12	2.45	2.39	0.69
100	-	-	-	-	-	-	-	-	-	-	9.56	16.93	6.70	7.40	4.34	2.69	2.52	0.76
110	-	-	-	-	-	-	-	-	-	-	10.52	20.20	7.37	8.83	4.77	3.21	2.77	0.91
120																		

Predetermined Mfg.'s Pressure Loss Tables

- Drip Tubing
- Filter Units

AMERICAN MANUFACTURING CO. "Perc-Rite" Drip Systems

DRIPPER LINE PRESSURE CHART 3A FIELD FLUSHING		
LENGTH LINEAR FEET	HEAD LOSS PSI.	HEAD LOSS FT.
50	7	16
60	7	16
70	7	16
80	7	16
90	7	16
100	7	16
110	7	16
120	7	16
130	7	16
140	7	16
150	7	16
160	7	16
170	7	16
180	7	16
190	7.4	17
200	8	18
210	8.6	20
220	9.2	21
230	9.9	23
240	10.5	24
250	11.2	26
260	12	28
270	12.7	29
280	13.5	31
290	14.3	33
300	15.2	35
310	16	37
320	16.9	39
330	17.9	41
340	18.9	44
350	19.9	46
360	20.9	48
370	22	51
380	23.1	53
390	24.2	56
400	25.4	59

CENTRAL HYDRAULIC UNIT CHART 2A FLOW vs HEAD LOSS		
FLOW IN GPM	TOTAL LOSS IN TDH 25 gpm UNIT (ft)	TOTAL LOSS IN TDH 15 gpm UNIT (ft)
5	2	4
6	2	4
7	3	5
8	4	6
9	5	7
10	6	8
11	7	9
12	7	11
13	8	12
14	9	13
15	10	16
16	12	19
17	14	22
18	16	24
19	18	27
20	20	28
21	21	
22	22	
23	23	
24	24	
25	25	

Total Head in Feet

S:\DATA\Kevin\AutoCAD\Kevin2e.dwg

15 gpm Hyd. Unit – Typical Single Family Home
 Max. 4 zones, 4800 l.f.

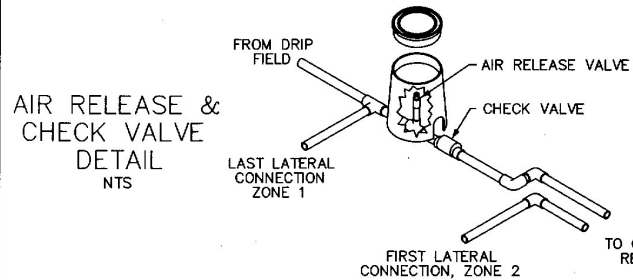
Netafim 0.5", PC emitters
 24 inch emitter spacing

TYPICAL DESIGN

- **Site Plan (scaled, 2.0' contours)**
- **Zone Detail**
- **Hydraulic Profile**
- **Dose Tank w/ Pump & Float Settings**
- **Typical manifold & pipe drawings.**
- **Construction Notes**
- **Calc Sheet (long or short form)**

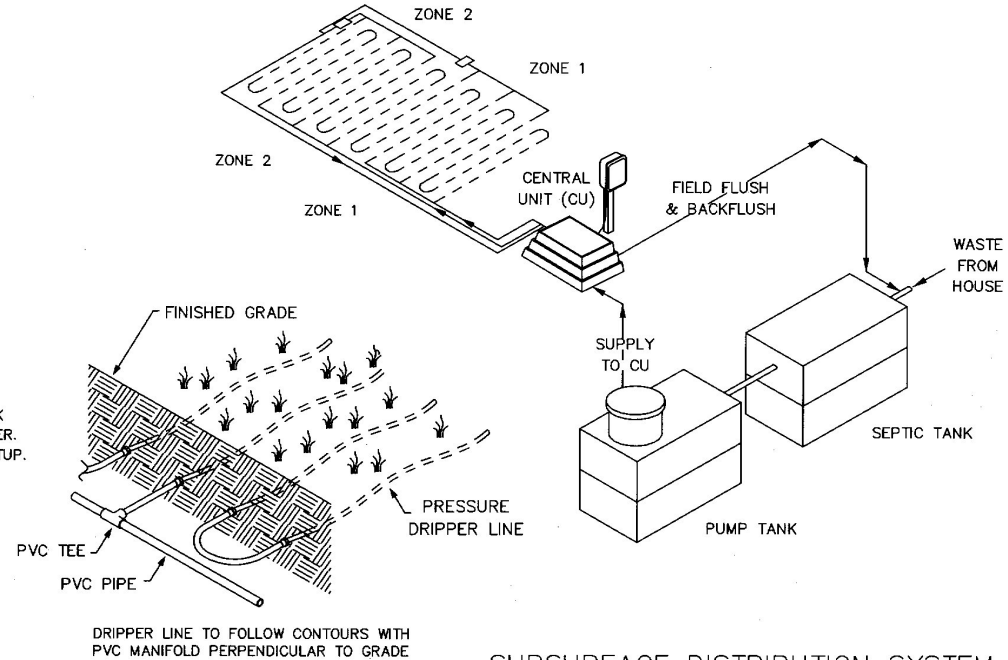
DISPOSAL

1. ALL INSTALLATION AND CONSTRUCTION TECHNIQUES SHALL CONFORM TO COUNTY CODES AND STATE BOARD OF HEALTH "SEWAGE HANDLING AND DISPOSAL REGULATIONS" PERTAINING TO ON SITE SEWAGE SYSTEMS AND THE PERMIT FOR THIS SITE.
2. THE INSTALLATION OF THIS SYSTEM SHALL BE IN ACCORDANCE WITH SPECIFICATIONS AND PROCEDURES AS SUPPLIED BY THE MANUFACTURER OF THE EQUIPMENT.
3. ALL PVC PIPE AND FITTINGS SHALL BE PVC SCH 40 TYPE 1 RATED FOR PRESSURE APPLICATIONS. ALL GLUED JOINTS SHALL BE CLEANED AND PRIMED WITH PURPLE (DYED) PVC PRIMER PRIOR TO BEING GLUED.
4. ALL CUTTING OF PVC PIPE, FLEXIBLE PVC AND DRIPPER TUBING SHALL BE ACCOMPLISHED WITH PIPE CUTTERS APPROVED BY MANUFACTURER. NO SAWING OF PVC, FLEXIBLE PVC OR DRIPPER TUBING ALLOWED.
5. ALL PVC PIPE, FLEXIBLE PVC AND DRIPPER TUBING IN THE WORK AREA SHALL HAVE THE ENDS COVERED WITH DUCT TAPE TO PREVENT CONSTRUCTION DEBRIS FROM ENTERING THE PIPE. PRIOR TO GLUING ALL JOINTS SHALL BE INSPECTED FOR AND CLEARED OF ANY CONSTRUCTION DEBRIS.
6. NO WET WEATHER INSTALLATION IS PERMITTED.
7. NO ACTIVITY ON DRAINFIELD AREA OTHER THAN MINIMUM REQUIRED TO INSTALL SYSTEM. DO NOT PARK EQUIPMENT, DRIVE LARGE EQUIPMENT OVER, OR STORE MATERIALS ON DRAINFIELD SITE.
8. HORIZONTAL SPACING BETWEEN DRIPPER LINES AND THE INSTALLATION DEPTH SHALL BE AS SPECIFIED.
9. THE BUILDING SEWER SHALL BE 4" SCH40 PVC WITH A MINIMUM SLOPE OF 1/4" PER FOOT. THERE SHALL BE NO BENDS GREATER THAN 45 DEGREES. CLEANOUTS SHOULD BE PROVIDED EVERY 25 FEET. FOR CONSTRUCTION TECHNIQUES REFER TO THE "SEWAGE HANDLING AND DISPOSAL REGULATIONS".
10. IF EXISTING SEPTIC TANKS ARE TO BE USED, THEY SHALL BE PUMPED OUT BY A COMMERCIAL SEPTIC TANK CLEANER. AFTER THE TANK IS EMPTIED IT SHALL BE RINSED, PUMPED AND REFILLED WITH CLEAN WATER. DEBRIS IN SEPTIC TANK MUST BE KEPT TO A MINIMUM AS IT COULD CLOG THE DISK FILTERS DURING STARTUP. IF UTILIZED SEPTIC TANKS MUST BE WATERTIGHT.
11. IF TREES ARE TO BE REMOVED FROM SITE, CUT STUMPS FLUSH WITH GROUND. REMOVE BY HAND.
12. GRAVEL BASE UNDER CENTRAL CONTROL UNIT IS TO BE DRAINED VIA 2" PVC PIPE, SCREENED AT INLET AND OUTLET, DISCHARGE TO BE AT GRADE DOWN SLOPE (TO ENSURE DRAINAGE OF SURFACE WATER FROM UNIT).
13. THE CONTRACTOR SHALL BE CERTIFIED TO INSTALL THIS TYPE OF SYSTEM BY THE MANUFACTURER AND SHALL HOLD A PRE CONSTRUCTION MEETING WITH THE INDIVIDUALS RESPONSIBLE FOR SOIL EVALUATION, PERMITTING AND INSPECTIONS PRIOR TO SITE WORK BEGINNING TO INSURE PROTECTION OF THE SITE CONDITIONS AND TO ENSURE THE SYSTEM IS INSTALLED ACCORDING TO DESIGN.
14. IF SITE CONDITIONS ARE DETERMINED TO REQUIRE THE INSTALLATION OF THE SYSTEM TO DEVIATE FROM THESE PLANS, ALL SITE WORK SHALL STOP IMMEDIATELY AND THE DESIGNER SHALL BE NOTIFIED. ANY ONGOING WORK SHALL BE AT THE SOLE RESPONSIBILITY OF THE CONTRACTOR.
15. DRAINFIELD SUPPLY AND RETURN LINES TO BE INSTALLED AT ADEQUATE DEPTH TO PREVENT FREEZING.
16. EFFLUENT STRENGTH IS EXPECTED TO BE LESS THAN 300 mg/L BOD5 AND 200 mg/L TSS.
17. THIS DESIGN COMPLIES WITH THE "SEWAGE HANDLING AND DISPOSAL REGULATIONS".
18. OPERATION AND MAINTENANCE MANUAL TO BE PROVIDED AT JOB COMPLETION.



NOTE:

1. THE AIR RELEASE VALVE SHALL BE PLACED AT THE HIGHEST POINT ON THE RETURN LINE OF EACH ZONE.
2. EACH ZONE TO HAVE THE SAME VALVE BOX SETUP AND THEREAFTER CONNECTED.



SUBSURFACE DISTRIBUTION SYSTEM

SCOPE: DOMESTIC SEWAGE WILL FLOW BY GRAVITY THROUGH THE SEPTIC TANK THEN INTO A FINAL DOSING TANK. THE CENTRAL UNIT WILL DISPOSE OF THE EFFLUENT BY ALTERNATELY DOSING MULTIPLE ZONES IN THE SOIL ABSORPTION AREA.

THE CENTRAL UNIT COMPRISES BOTH THE CONTROL AND THE HYDRAULIC UNITS.

AMERICAN MANUFACTURING CO.

5517 WELLINGTON RD. GAINESVILLE VA 20155; 703-754-0077

PROJECT NAME:

COUNTY:

DR. BY: DATE:

CK. BY: DATE:

APP. BY: DATE:

TITLE:

Cover Sheet

FILE:

SCALE:

SHEET OF

REV.

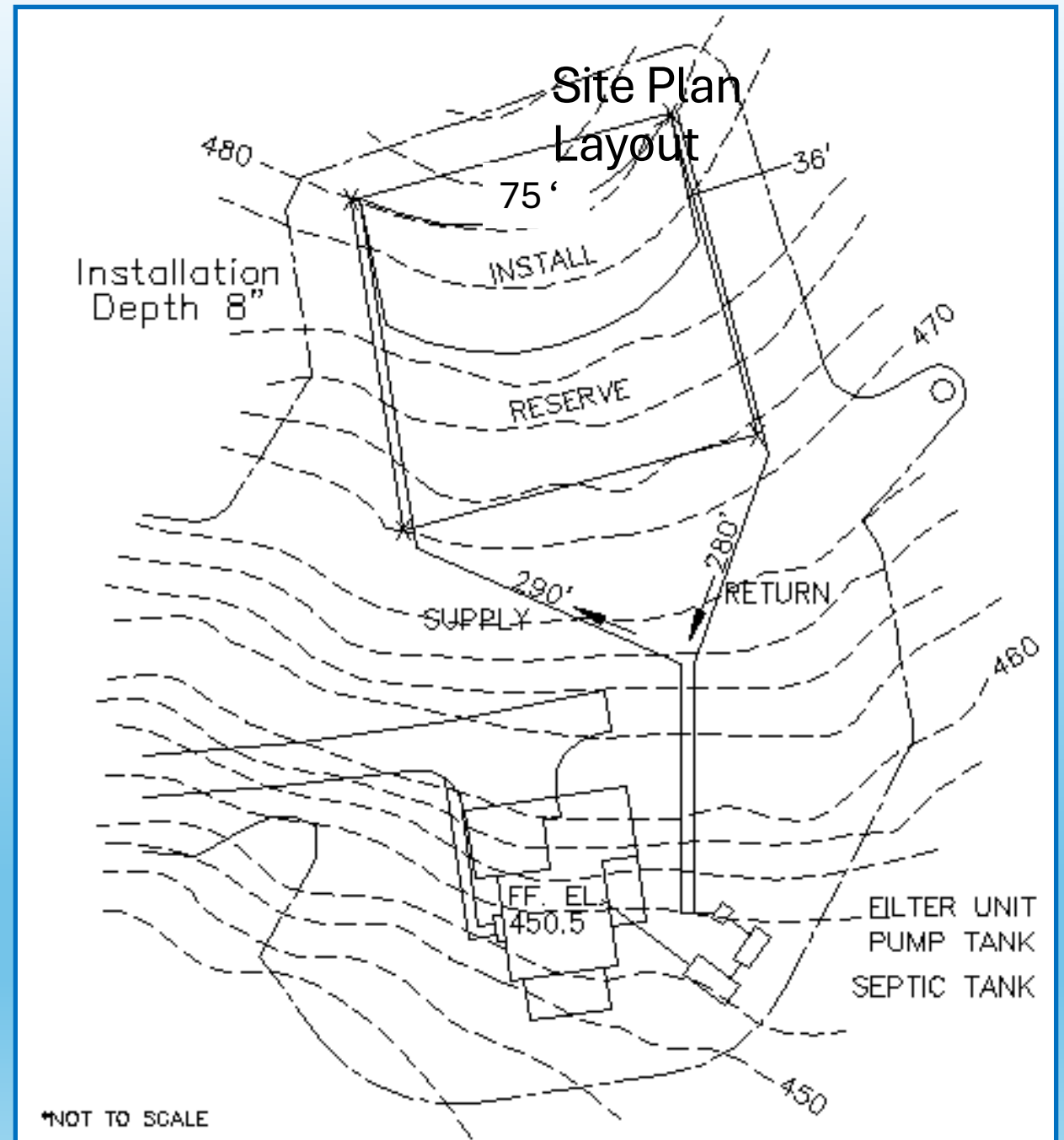
PA DESIGN EXAMPLE

- **Drip Tubing Required:** 600 gpd / 0.34 gpd/l.f.
= 1765 l.f.
- **HLLR Required:** 50% of daily flow / 4.6
- 300 gpd/4.6 = 65 ft. Site has 75 ft (>65 so OK)
- **Drip Tubing Spacing:** 2.0' on center

Example Site has:

- 75 ft along contour
 - 1765 l.f. required / 75 ft runs = 23.5 runs
- Round up to 24 runs (@75 ft = 1800 l.f.)

Zone Detail: See ZD Table for Options



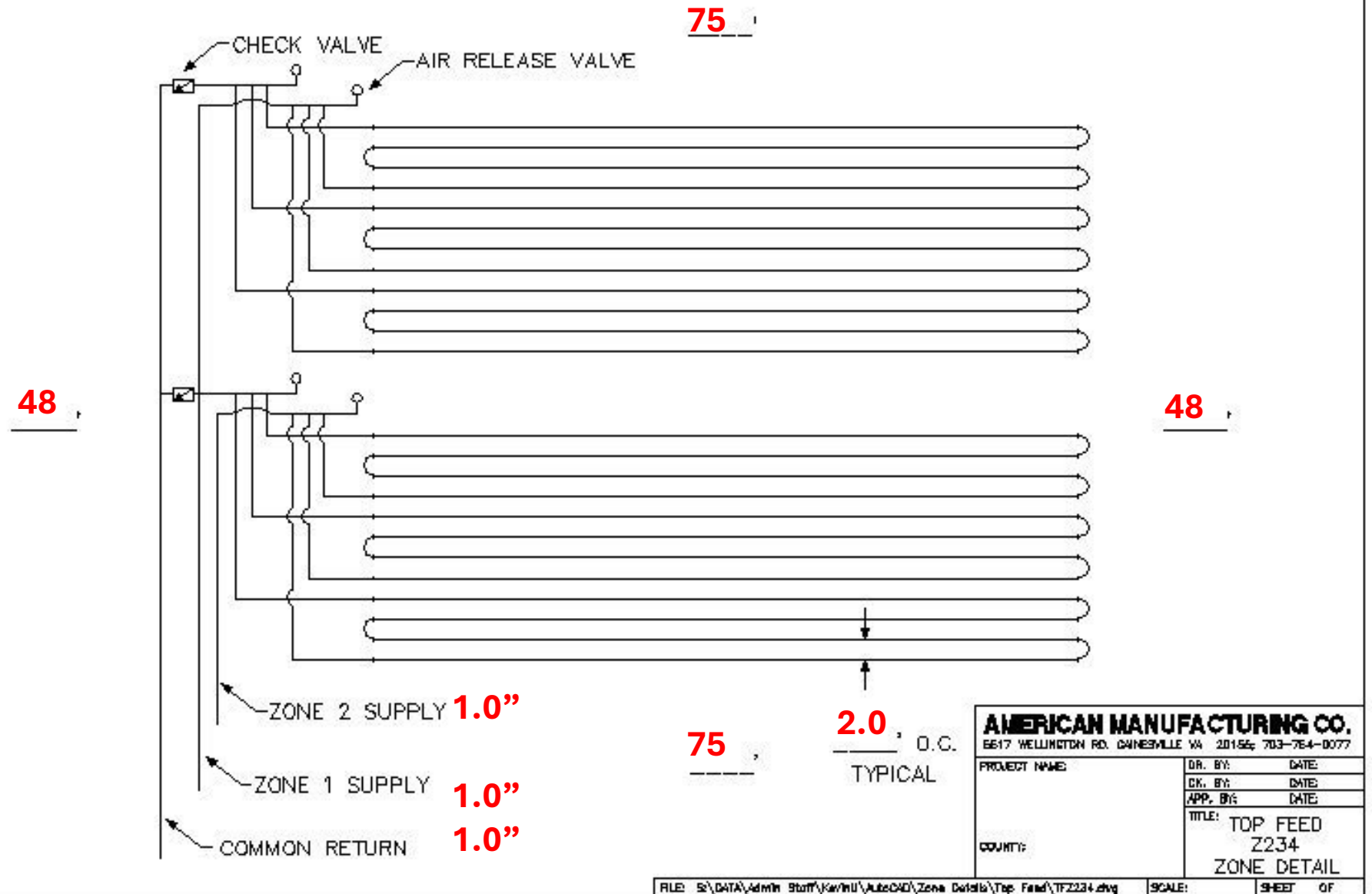
Zone Configuration

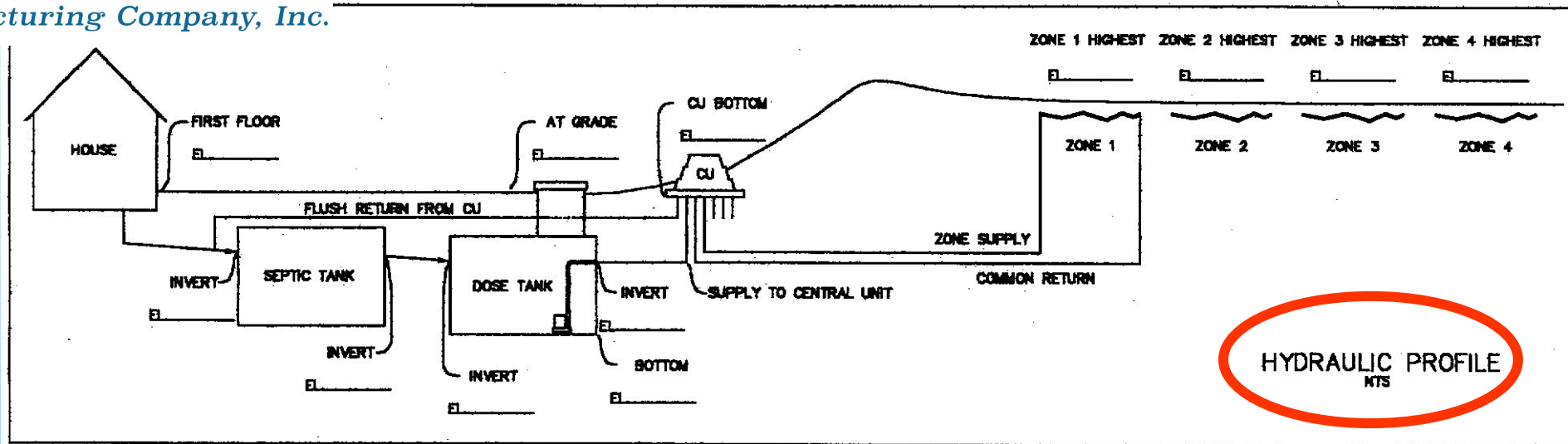
Options:

- Z234

- 2 zones
- 3 laterals per zone
- 4 runs per lateral
- Supply & Return in same trench
- EACH ZONE
- 900 l.f.
- Three 300 ft laterals
- 12 runs at 75 ft each

24 runs at 2 ft o.c.
Header: 48 ft

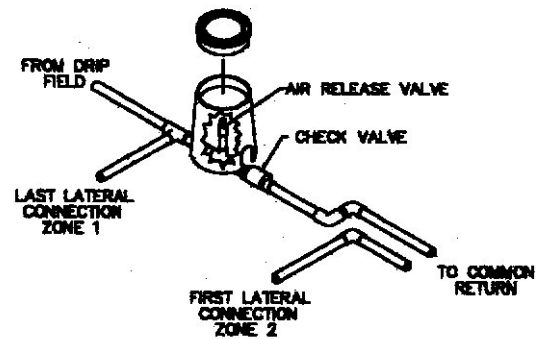




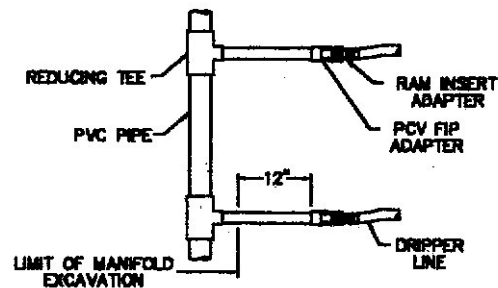
NOTE:

1. THE AIR RELEASE VALVE SHALL BE PLACED AT THE HIGHEST POINT ON THE RETURN LINE OF EACH ZONE.

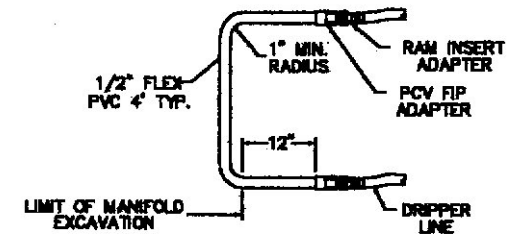
2. EACH ZONE TO HAVE THE SAME VALVE BOX SETUP AND THEREAFTER CONNECTED.



AIR RELEASE & CHECK VALVE DETAIL



TYPICAL MANIFOLD CONNECTION
NTS



TYPICAL DRIP LOOP CONNECTION
NTS

AMERICAN MANUFACTURING CO.

5517 WELLINGTON RD. GAINESVILLE VA 20185; 703-754-0077

PROJECT NAME: DR. BY: DATE:

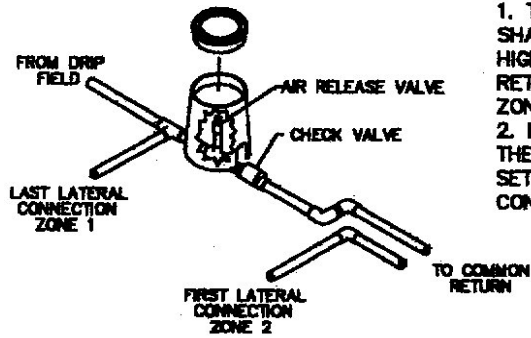
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APP. BY: DATE:

TITLE:

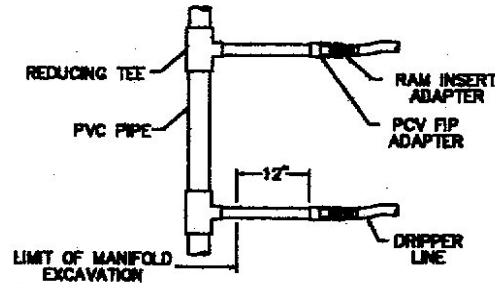
COUNTY: HYDRAULIC PROFILE & TYP. DRIP DETAILS

REV. FILE: SCALE: SHEET OF

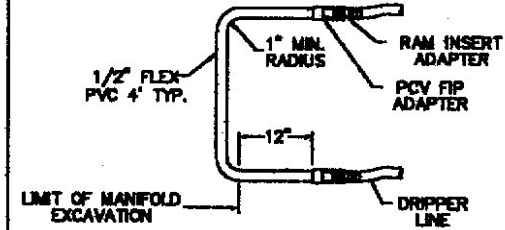


AIR RELEASE & CHECK VALVE DETAIL

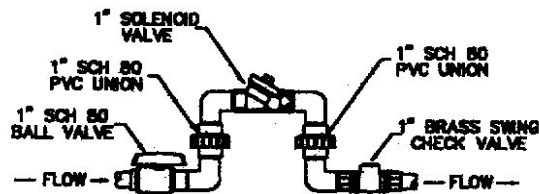
NOTE:
1. THE AIR RELEASE VALVE SHALL BE PLACED AT THE HIGHEST POINT ON THE RETURN LINE OF EACH ZONE.
2. EACH ZONE TO HAVE THE SAME VALVE BOX SETUP AND THEREAFTER CONNECTED.



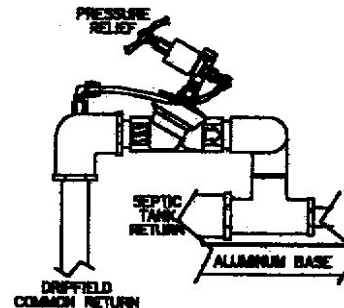
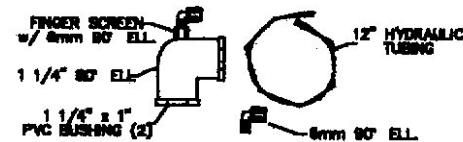
TYPICAL MANIFOLD CONNECTION
NTS



TYPICAL DRIP LOOP CONNECTION
NTS



OPTIONAL
TYPICAL REMOTE ZONE VALVE
NTS



OPTIONAL
RETURN PRESSURE ASSEMBLY
NTS

NOTE:
In the event the drip zones are over 10 feet in vertical elevation above the hydraulic unit, install a "return pressure assembly". The assembly is to be used to prevent the return line from draining after or during a dose. Remove the zone return connection and reinstall a short 1" nipple in the return valve. Install assembly as shown to the left. The hydraulic tubing providing pressure for the rest of the unit must be plugged and the new tubing from the assembly connected to the pressure side of the solenoid.

AMERICAN MANUFACTURING CO.

5517 WELLINGTON RD. GAINESVILLE VA 20155; 703-754-0077

PROJECT NAME:

DR. BY: DATE:

CHK. BY: DATE:

APP. BY: DATE:

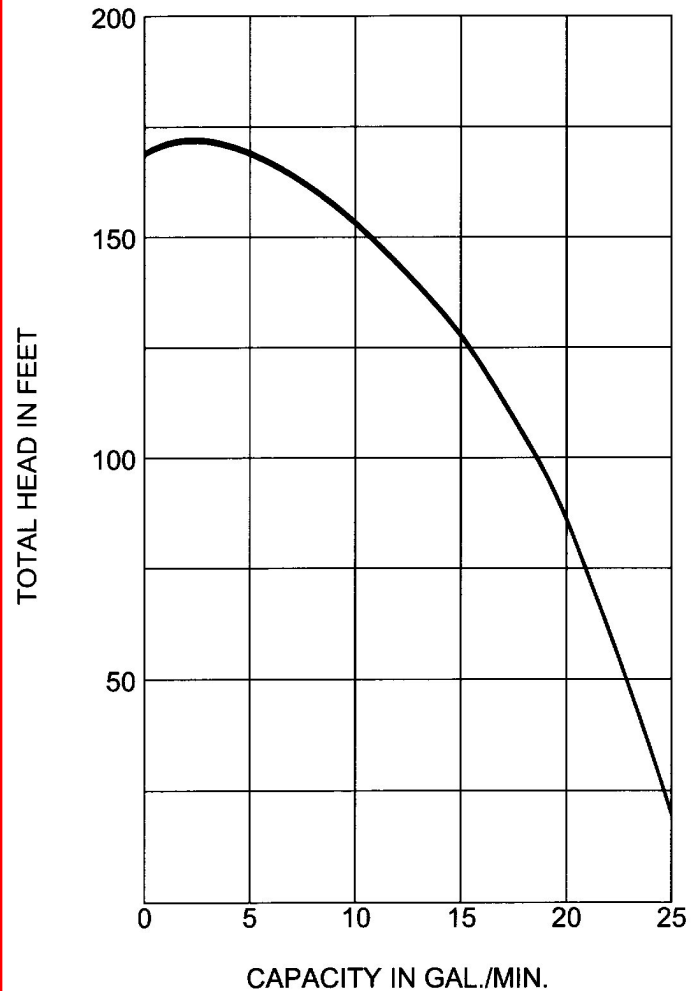
TITLE:

COUNTY:

DRIP DETAIL
SCHEMATICS

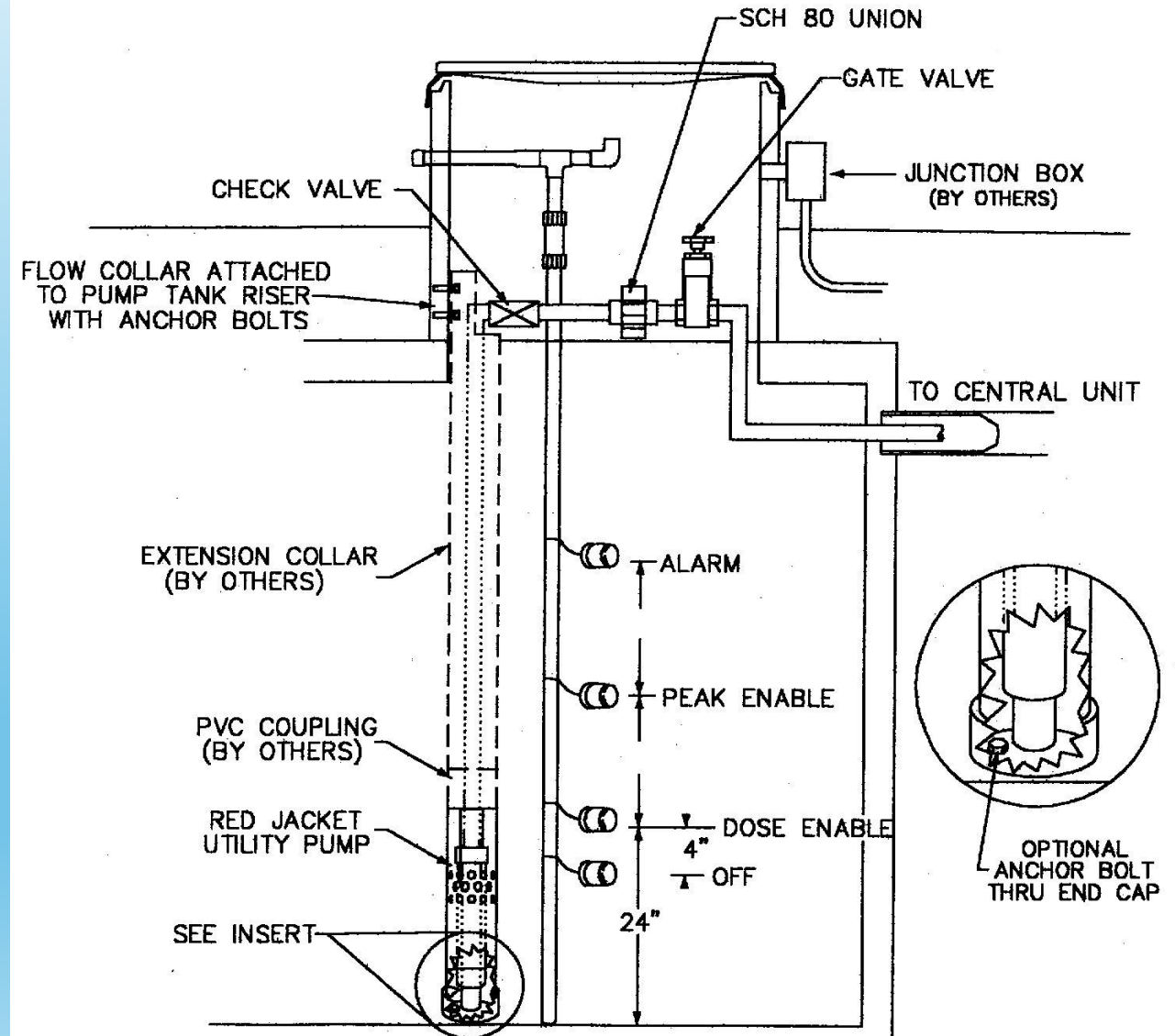
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Turbine15 Pump Curve

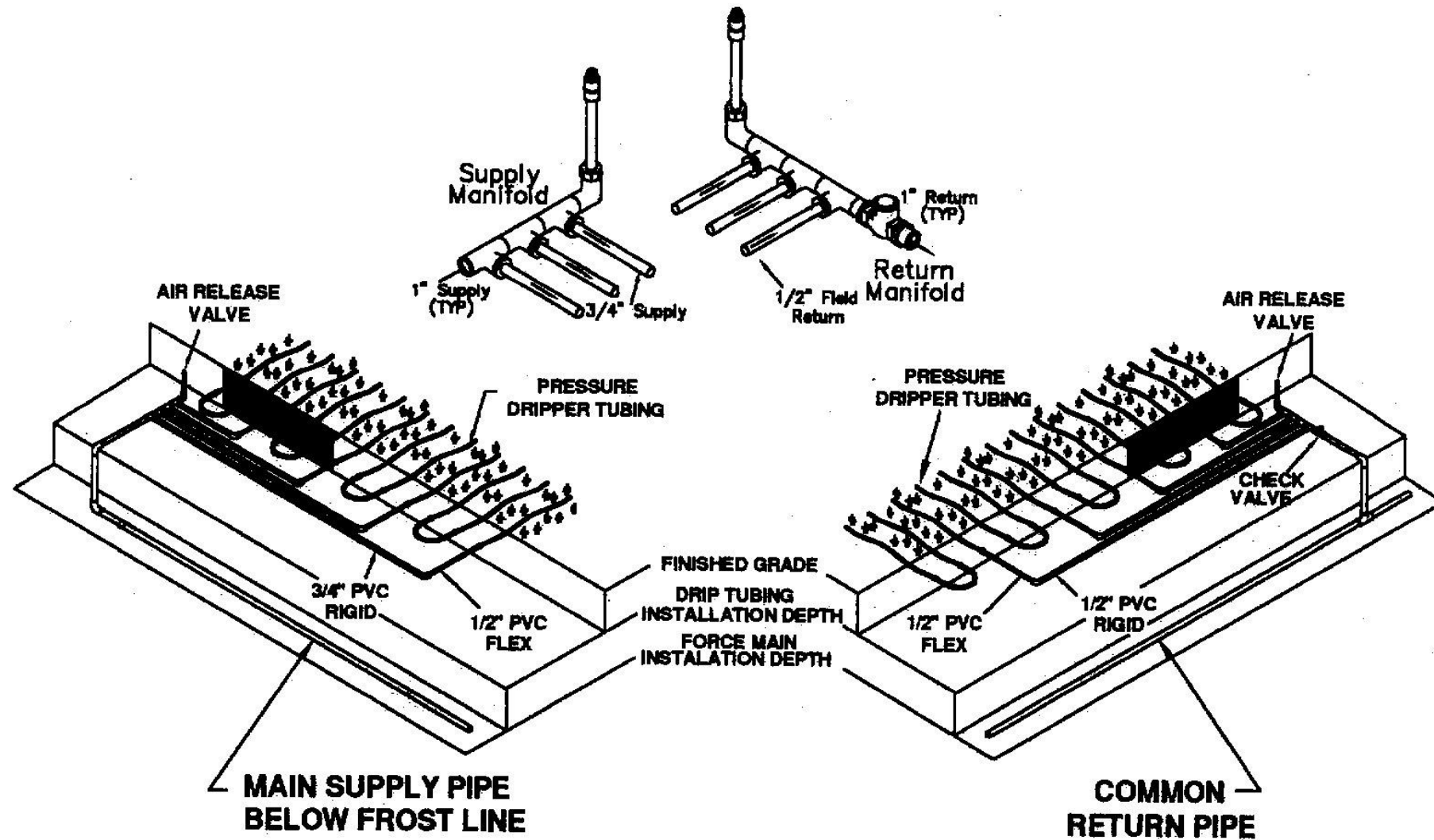


DOSING CHAMBER DETAIL FOR 15 GPM AMERICAN LAMINAR FLOW COLLAR (LFC15)

NTS



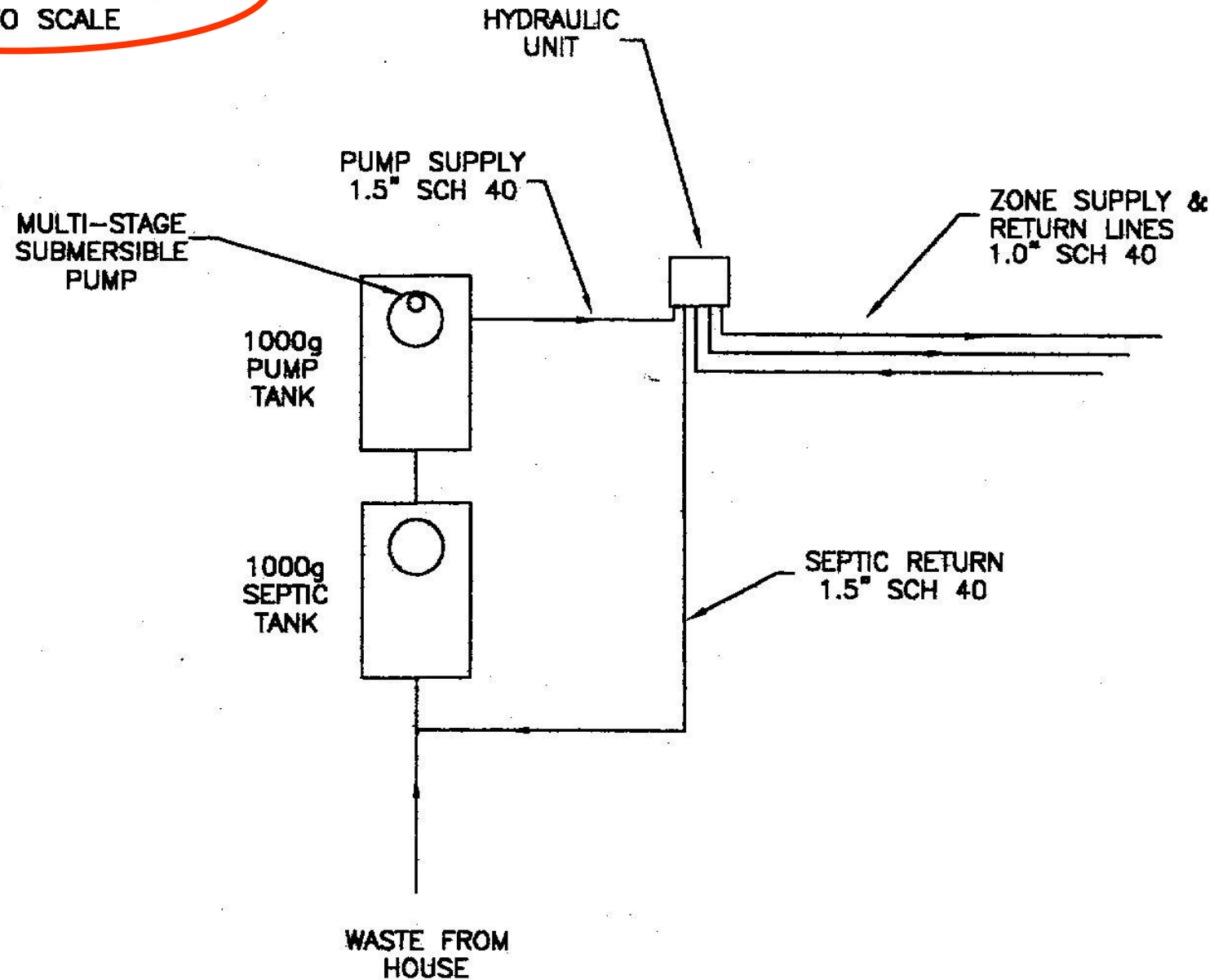
STANDARD RESIDENTIAL DRIP SYSTEM DETAILS



RESIDENTIAL
Patent No. 5,984,574

TREATMENT SCHEMATIC
NOT TO SCALE

(Tre



Perc-Rite® DESIGN CALCULATION SHEET

This calculation sheet is set up for a two-zone system. If you are designing a single zone system, disregard items 19-26. If more zones are needed, continue calculating head losses for each zone, then size the pump for the highest head loss. Contact American for design support if pumping downhill or if over pressurizing is indicated.

To Simplify the design process use the American "Perc-Rite® Calc-Tool" for standard designs.

1. Site Name: _____ Date _____
2. _____ GALLONS PER DAY _____ BEDROOMS
3. _____ GPD/S.F. SOIL LOADING RATE REQUIRED
4. _____ FT. X _____ FT. AREA FOR DISPOSAL LAYOUT a) _____ FT²
5. _____ GPD/FT² SOIL LOADING RATE PROVIDED (#2/#4a)
6. _____ ZONES
7. _____ TOTAL DRIPPER LINE PROVIDED
8. _____ SEPTIC TANK SIZE
9. _____ DOSING TANK SIZE
10. _____ GALLONS PER INCH DOSING TANK
11. ZONE ONE
12. _____ TOTAL ABSORPTION AREA
13. _____ LINEAR FEET DRIPPER LINE
14. _____ LONGEST LATERAL LENGTH
15. _____ DOSING FLOW RATE
16. _____ NUMBER OF RETURN FIELD FLUSH CONNECTIONS
17. _____ FIELD FLUSH FLOW RATE
18. _____ TOTAL FLOW REQUIRED
19. ZONE TWO
20. _____ TOTAL ABSORPTION AREA
21. _____ LINEAR FEET DRIPPER LINE
22. _____ LONGEST LATERAL LENGTH
23. _____ DOSING FLOW RATE
24. _____ NUMBER OF RETURN FIELD FLUSH CONNECTIONS
25. _____ FIELD FLUSH FLOW RATE
26. _____ TOTAL FLOW REQUIRED

27. _____ MAXIMUM DESIGN FLUSHING FLOW
28. _____ FEET HEAD LOSS HYDRAULIC UNIT (BASED ON # 27)
29. HYDRAULIC UNIT SUPPLY LINE SIZE (1-1/2" TYPICAL)
30. _____ INCHES PIPE
31. _____ LENGTH SUPPLY PIPE
32. _____ FT. STATIC LIFT (HYDRAULIC UNIT ELEVATION - OFF FLOAT ELEVATION)
33. _____ TOTAL FEET HEAD LOSS LINE (DYN. HEAD LOSS + #32)
34. FORCE MAIN SUPPLY LINE PIPE SIZE & LENGTH _____ FT.
35. _____ ZONE ONE SIZE, _____ ZONE ONE LENGTH _____ FEET HEAD LOSS
36. _____ ZONE TWO SIZE, _____ ZONE TWO LENGTH _____ FEET HEAD LOSS
37. RETURN FLUSH LINE SIZE & LENGTH _____
38. _____ ZONE ONE SIZE, _____ ZONE ONE LENGTH _____ FEET HEAD LOSS
39. _____ ZONE TWO SIZE, _____ ZONE TWO LENGTH _____ FEET HEAD LOSS
40. _____ FEET HEAD LOSS TOTAL STATIC (VERTICAL LIFT)
41. TOTAL PRESSURE LOSS (ADD ITEMS; 28,33,35-36, 38-39,40 +FLUSHING)
42. _____ ZONE ONE HEAD LOSS, INCLUDES _____ FEET FLUSHING
43. _____ ZONE TWO HEAD LOSS, INCLUDES _____ FEET FLUSHING
44. PUMP SIZING
45. _____ MAXIMUM PRESSURE LOSS TOTAL (HIGHEST FEET 61-64)
46. _____ DISC FILTER BACKFLUSH (#32 + 115' @15 GPM)
47. _____ GPM @ _____ FEET (LARGER OF 45 & 46)
48. PUMP MODEL _____
49. _____ GPM @ _____ FEET _____ VOLTS _____ PHASE _____ HP
50. TIME DOSING PER ZONE
51. Two Zone Standard Enable (180 min rest)
52. Two Zone Peak Enable (108 min rest)
53. ZONE ONE _____ GPM _____ MIN/DOSE _____ AVE. CYCLES _____ PEAK
54. CYCLES _____ GAL/DOSE
55. ZONE TWO _____ GPM _____ MIN/DOSE _____ AVE. CYCLES _____ PEAK
56. CYCLES _____ GAL/DOSE
56. _____ PEAK CYCLES _____ GAL/DOSE
57. _____ INCHES DRAWDOWN FLOAT SWITCH SETTING (MIN. 4")

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