



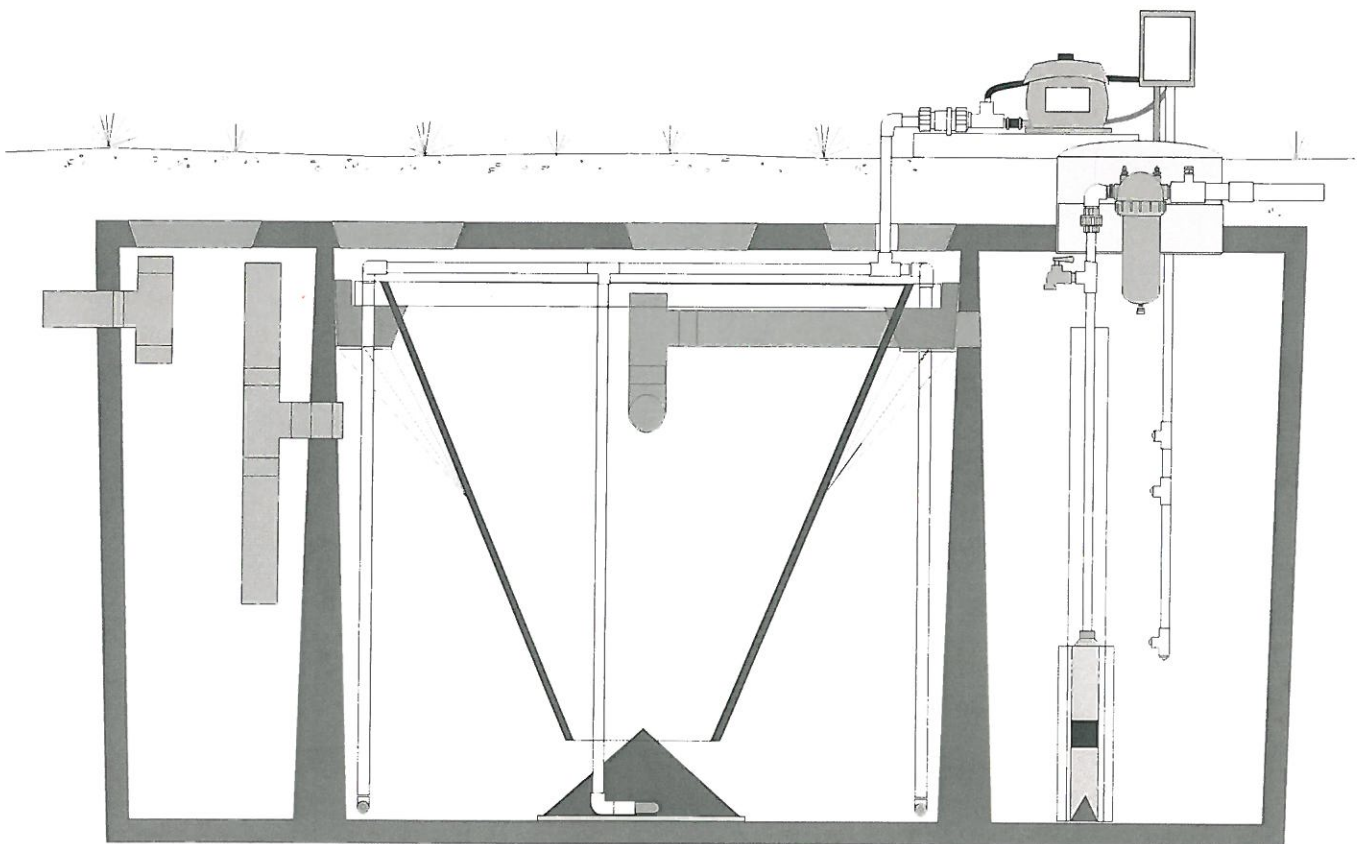
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Florida Drip Guide

This manual is expressly to convey recommendations to guide in the design and installation of the Hoot System. These recommendations are only suggestions and local regulations, have been included and if more restrictive, must be followed, regardless of our recommendations. Installers must follow the design of the Professional Engineer who has designed the system for the specific design application.



WARNING! TO PREVENT MALFUNCTION OF YOUR SEWAGE SYSTEM, DO NOT DISCHARGE THE FOLLOWING MATERIALS INTO THE SYSTEM: Plastic Materials • Cloth • Cigarette Stubs • Large quantities of acids or caustics, soaps or cleaning materials which have a high or low pH factor (Use low suds detergents) • Throw-away Diapers • Baby wipes • Paper Towels • Kleenex & some toilet tissues which do not decompose readily in water • Rubber products • Excess grease or fatty materials (Use garbage disposal sparingly) • Oily materials, motor oils, grease, kerosene, gasoline, Paints, etc. • Backwash water from water softeners • Any other materials which do not disintegrate readily in water • Gutters • Pool Filter Discharge • Hot Tubs/Jacuzzi Water • SUMP PUMP DISCHARGE

WARNING! TO FUNCTION PROPERLY, THE HOOT SYSTEM MUST BE MAINTAINED BY A QUALIFIED PROFESSIONAL AT LEAST EVERY SIX (6) MONTHS FOR THE LIFE OF THE SYSTEM. FAILURE TO MAINTAIN THE HOOT SYSTEM VOIDS THE LIMITED WARRANTY AND MAY CAUSE SERIOUS BODILY INJURY OR ILLNESS TO PEOPLE AND PETS AND MAY CAUSE SERIOUS DAMAGE TO THE HOOT SYSTEM OR OTHER PROPERTY.

DANGER! ONLY A QUALIFIED PROFESSIONAL SHOULD ATTEMPT TO REPAIR OR FIX THE HOOT SYSTEM. ATTEMPTED REPAIR BY ANYONE OTHER THAN A QUALIFIED PROFESSIONAL MAY CAUSE SERIOUS BODILY INJURY OR DEATH TO THE HOMEOWNER OR OTHER PERSONS AND MAY CAUSE SERIOUS DAMAGE TO THE HOOT SYSTEM AND OTHER PROPERTY.

DANGER! DO NOT DISCONNECT THE POWER TO THE HOOT SYSTEM. DISCONNECTION OF THE POWER FROM THE SYSTEM MAY CAUSE SERIOUS ILLNESS OR DEATH TO THE HOMEOWNER AND OTHER PERSONS AND MAY CAUSE SERIOUS DAMAGE TO THE HOOT SYSTEM AND OTHER PROPERTY.

WARNING! IN CASE OF IMMINENT FLOOD, IMMEDIATELY TURN OFF THE ELECTRICAL POWER TO THE HOOT SYSTEM AT THE INDEPENDENT BREAKER LOCATED ON THE HOUSE. FAILURE TO TURN OFF THE ELECTRICAL POWER MAY CAUSE SERIOUS INJURY OR DEATH TO THE HOMEOWNER AND OTHER PERSONS AND MAY CAUSE SERIOUS DAMAGE TO THE HOOT SYSTEM AND OTHER PROPERTY.

WARNING! IF THE UNIT FAILS TO FUNCTION PROPERLY, DO NOT USE THE BATHROOM FACILITIES UNTIL QUALIFIED PERSONNEL FIX THE PROBLEM. USE OF THE BATHROOM FACILITIES DURING A SYSTEM FAILURE MAY CAUSE SERIOUS INJURY, ILLNESS, OR DEATH TO PERSONS AND MAY CAUSE SERIOUS DAMAGE TO THE HOOT SYSTEM AND OTHER PROPERTY.

WARNING! DO NOT ALLOW CHILDREN TO PLAY ON OR AROUND THE AEROBIC TREATMENT SYSTEM, THE SPRINKLER SYSTEM, OR OTHER OVER-LAND DISCHARGE AREA. ALLOWING CHILDREN TO PLAY IN THESE AREAS MAY CAUSE SERIOUS BODILY INJURY, ILLNESS, OR DEATH TO THE CHILDREN AND OTHER PERSONS AND MAY CAUSE DAMAGE TO THE HOOT SYSTEM AND OTHER PROPERTY.

DANGER! DO NOT OPEN CONTROL PANEL WITHOUT ELECTRICITY DISCONTINUED AND LOCKED OUT ON THE SYSTEM. FAILURE TO DO SO COULD CAUSE SEVERE INJURY OR DEATH



Hoot Drip Design Guide

I. Introduction to Drip

The purpose of this design guide is to detail the equipment and design considerations necessary for the effective application of Hoot Aerobic Systems utilizing drip irrigation technology to the onsite wastewater field.

Drip Irrigation was originally developed for the agriculture industry as a technique to improve the efficiency of water delivered to plants, especially in environments where water supply is limited. The technique involves delivering only those amounts of water that plants actually use into the root zone, and relying on horizontal as well as vertical movement through the soil to disperse the water. Hoot Aerobic Systems utilizes components supplied by the Netafim Corporation, a world leader in drip applications. Their products, including pressure compensating emitters, filters, valves and other products have become industry standards.

The goal of delivering water in the shallow subsurface and in the root zone of plants enables the wastewater designer to take advantage of evapotranspiration, plant uptake for nutrient removal, and slow dispersal in the soil medium.

With High levels of Pre-Treatment, provided by the Hoot Aerobic System, and physical filtration of the effluent, failed drainfields are a thing of the past. If the system fails, the problem is in the tank, which can be pumped, not a drainfield that needs to be replaced.

Within the last few years, the EPA has recognized that on-site treatment and disposal of wastewater is a permanent alternative rather than a temporary solution for wastewater treatment and disposal when centralized collection systems are not feasible. Increasing public concern about issues related to the effective

and reliable treatment and disposal of wastewater on-site has created a climate for change beyond septic tanks and drainfields.

Hoot Aerobic Systems has responded with improved technology for wastewater treatment and regulations have become more explicit and scientifically based. These are key reasons why interest in drip disposal within the on-site industry has rapidly increased.

While the EPA and the Florida Department of Health have identified on-site disposal of wastewater as a satisfactory long-term solution, it is still necessary to prevent human contact with contaminants and pathogens in untreated wastewater. Examples of failures of this requirement are:

- Surfacing of Failing Conventional Septic Systems
- Under treated effluent entering ground water
- Contact of wastewater with surface waters in lakes or streams

As the demand increases for residential development in rural areas and in sub-optimal conditions for onsite wastewater disposal, the significance for alternative technologies increases. The use of a Hoot Aerobic System with drip disposal is the most effective strategy for a wide variety of the most demanding on-site wastewater design parameters.

In addition to simply "getting rid of" wastewater, drip disposal has a number of benefits:

- Water can be re-used for irrigation of lawns, shrubs, or trees;

The disposal area can remain intact, taking advantage of natural or modified landscape strategies;
Beneficial wastewater nutrients are available for plant uptake;

With proper design, drip irrigation can be applied in almost any climate or soil conditions.

The following design manual provides basic design guidelines for drip system design, installation, maintenance, and operation. However, because such designs are subject to state and local regulatory requirements for on-site wastewater systems, any regulatory specification must be given precedence over the recommendations included herein. If local regulations allow design parameters which exceed the following recommendations, the designer should bear in mind that **the following recommendations are based on actual design experience and analysis of a variety of failed on-site systems.**

Common causes of drip system failure include:

- Overestimation of soil absorption potential
- Underestimation of wastewater load
- Poor system layouts
- Inappropriate dosing schedules.

Recommendation: use state regulations only when they are more restrictive than this design guide, not less restrictive.

This can easily be achieved by any properly designed and maintained Hoot Aerobic System.

Effluent leaves the Hoot Treatment system and enters an adequately designed storage tank. The Storage tanks are designed to allow for both a working level and reserve capacity above the high water level alarm.

The drip system is designed to distribute the wastewater uniformly over the drip field and throughout the 24 hour day. The drip control system regulates this flow and can provide for back-flushing, zone shifting, and alarms whenever operational conditions are exceeded.

Since drip tubing requires operating pressure, this design manual is built around our 20 GPM Hoot Effluent Blaster. Pressure is also required to operate filters (automatic or manual back flush), which are necessary to remove organic and inorganic suspended solids. These suspended solids can be a significant problem for drip emitters and can even clog piping over time. Zone layout is necessary to keep pumps small and inexpensive. Yet pump capacity must allow for the achievement of scouring velocity (2 ft. per second) at the return ends of distribution lines and drip tubing during manual or automatic field flush cycles.

Drip tubing is normally installed at a minimum depth of 6", but 10" to 12" depths are recommended to minimize human contact potential, 12" is maximum burial depth according to State Code.

It appears that the warmth of the wastewater achieved by circulation in a residence and by oxidation of the organics prevents freezing in the soil, especially in temperate climates in Florida. We have many installations in Colorado and other locations with few issues except in the harshest of winters.

Most critical to a proper design is matching the soil capacity to absorb water with the demand for disposal of the design flow. In this regard, the designer must take account of water flow over, into, and through the soil; storage of water in the soil column; the loss of water to the air through evaporation; loss through uptake in the roots; and exchange to the air through the leaves of plants (evapotranspiration).

The following design guide shows in more detail how accurate information about daily wastewater flow, along with proper soil analysis and site evaluation, can lead to a properly sized complete, successful, and cost-effective drip system.

II. Wastewater Flow Determination

A drip disposal system must accommodate the amount of wastewater effluent generated. The following table outlines the Florida 64 E rules for Aerobic Plant sizing. Actual water usage data or other methods of calculating wastewater usage rates must be used by the system designer if it is determined that, for whatever reason, these quantities exceed the standard estimates. In any case, estimates used for on-site wastewater treatment designs must be approved by local regulatory authorities.

RESIDENTIAL:

Number of Bedrooms	Building Area in square feet	Minimum Required Treatment Capacity gallons per day
1 or 2	Up to 1200	400
3	1201-2250	500
4	2251-3300	600

For each additional bedroom or each additional 750 square feet of building area, or fraction thereof, treatment capacity shall be increased by 100 gallons.

COMMERCIAL:

Estimated Sewage Flow in gallons per day	Minimum Required Treatment Capacity in gallons per day
0-400	 400
401-500	 500
501-600	 600
601-700	 700
701-750	 750
751-800	 800
801-1000	 1000

Performance Based Designs allow for Professional Engineers to Design the system to actual flow numbers, which in most cases will allow for a greater number of bedrooms or square feet to be designed to a smaller sized Aerobic Plant. The Systems were tested and designed to handle their rated flow in actual numbers if domestic strength household waste is introduced to the system. The average Influent strength the system received during the performance evaluation was 200 mg/L on both CBOD 5 and TSS.

The following pages contain the State of Florida Estimated Sewage flows of waste generated from each activity. These estimates can be used in most cases, however, Hoot STRONGLY recommends that any system designed by the recommendations of the State must have a water meter installed on the line to the drip field. The property owner must be made aware of their water limits and influent strength to ensure proper treatment and disposal.

Additionally, if the Hoot System is utilized as a replacement to a failed system, a detailed investigation of the failure of the previous system(s) is a must. Infiltration through plumbing and other sources of water may cause the Hoot System to fail as well. If there is any doubt, the design should include a water meter so actual flow can be determined.

Chapter 64E-6
TABLE I
For System Design
ESTIMATED SEWAGE FLOWS (2013 Rules)

TYPE OF ESTABLISHMENT	GALLONS PER DAY
COMMERCIAL:	
Airports, bus terminals, train stations, port & dock facilities,	
Bathroom waste only	
(a) per passenger	4
(b) add per employee per 8 hour shift	15
Barber & beauty shops per service chair	75
Bowling alley bathroom waste	
only per lane	50
Country club	
(a) per resident	100
(b) add per member or patron	25
(c) add per employee per 8 hour shift	15
Doctor and Dentist offices	
(a) per practitioner	250
(b) add per employee per 8 hour shift	15
Factories, exclusive of industrial wastes	
gallons per employee per 8 hour shift	
(a) No showers provided	15
(b) Showers provided	25
Flea Market open 3 or less days per week	
(a) per non-food service vendor space	15
(b) add per food service establishment	
using single service articles only per	
100 square feet of floor space	50
(c) per limited food service establishment	25
(d) for flea markets open more than	
3 days per week, estimated flows	
shall be doubled	
Food operations	
(a) Restaurant operating 16 hours or less	
per day per seat	40
(b) Restaurant operating more than 16 hours	
per day per seat	60
(c) Restaurant using single service articles only	
and operating 16 hours or less per day	
per seat	20
(d) Restaurant using single service articles only	
and operating more than 16 hours per day	
per seat	35
(e) Bar and cocktail lounge per seat	20
add per pool table or video game	15
(f) Drive-in restaurant per car space	50
(g) Carry out only, including caterers	
1. per 100 square feet of floor space	50
2. add per employee per 8 hour shift	15
(h) Institutions per meal	5
(i) Food Outlets excluding deli's,	
bakery, or meat department	
per 100 square feet of floor space	10
1. add for deli per 100 square feet of deli	
floor space	40
2. add for bakery per 100 square feet of bakery	
floor space	40

3. add for meat department per 100 square feet of meat department floor space	75
4. add per water closet	200
Hotels & Motels	
(a) Regular per room	100
(b) Resort hotels, camps, cottages per room	200
(c) Add for establishments with self service laundry facilities per machine	750
Mobile Home Park	
(a) per single wide mobile home space, less than 4 single wide spaces connected to a shared onsite system	250
(b) per single wide mobile home space, 4 or more single wide spaces are connected to a shared onsite system	225
(c) per double wide mobile home space, less than 4 double wide mobile home spaces connected to a shared onsite system	300
(d) per double wide mobile home space, 4 or more double wide mobile home spaces connected to a shared onsite system	275
Office building	
per employee per 8 hour shift or	15
per 100 square feet of floor space, whichever is greater	15
Transient Recreational Vehicle Park	
(a) Recreational vehicle space for overnight stay, without water and sewer hookup per vehicle space	50
(b) Recreational vehicle space for overnight stay, with water and sewer hookup per vehicle space	75
Service stations per water closet	
(a) Open 16 hours per day or less	250
(b) Open more than 16 hours per day	325
Shopping centers without food or laundry per square foot of floor space	0.1
Stadiums, race tracks, ball parks per seat	4
Stores per bath room	200
Swimming and bathing facilities, public per person	10
Theaters and Auditoriums, per seat	4
Veterinary Clinic	
(a) per practitioner	250
(b) add per employee per 8 hour shift	15
(c) add per kennel, stall or cage	20
Warehouse	
(a) add per employee per 8 hour shift	15
(b) add per loading bay	100
(c) self-storage, per unit (up to 200 units)	1
add 1 gallon for each 2 units or fraction thereof, for over 200 units and shall be in addition to employees, offices or living quarters flow rates.	
INSTITUTIONAL:	
Churches per seat which includes kitchen	

wastewater flows unless meals prepared on a routine basis	3
If meals served on a regular basis add per meal prepared	5
Hospitals per bed which does not include kitchen wastewater flows	200
add per meal prepared	5
Nursing, rest homes, adult congregate living facilities per bed which does not include kitchen wastewater flows	100
add per meal prepared	5
Parks, public picnic	
(a) with toilets only per person	4
(b) with bathhouse, showers & toilets per person	10
Public institutions other than schools and hospitals per person which does not include kitchen wastewater flows	100
add per meal prepared	5
Schools per student	
(a) Day-type	10
(b) Add for showers	4
(c) Add for cafeteria	4
(d) Add for day school workers	15
(e) Boarding-type	75
Work/construction camps, semi-permanent per worker	50
RESIDENTIAL:	
Residences	
(a) Single or multiple family per dwelling unit	
1 bedroom with 750 sq. ft. or less of building area	100
2 bedrooms with 751-1200 sq. ft. of building area	200
3 bedrooms with 1201-2250 sq. ft. of building area	300
4 bedrooms with 2251-3300 sq. ft. of building area	400
for each additional bedroom or each additional 750 square feet of building area or fraction thereof in a dwelling unit, system sizing shall be increased by 60 gallons per dwelling unit.	
(b) Other per occupant	50

Chapter 64E-6

Drip System Design Requirements

Drip irrigation systems – Drip irrigation systems may, at the option of the applicant, be used in lieu of a mineral aggregate drainfield. Drip irrigation systems shall meet all requirements of this chapter except as noted below.

(a) Drip irrigation systems shall receive effluent from an approved aerobic treatment unit or a performance-based treatment system designed to meet at least secondary treatment standards for CBOD₅ and TSS, and shall meet the following requirements:

1. Drip irrigation systems shall be designed by an engineer licensed in the State of Florida.
2. The infiltrative area required shall be the same as the area required for a mineral aggregate drainfield with reductions allowed for the reduction of CBOD₅ and TSS as noted in this chapter for aerobic treatment units.
3. In an absorption bed configuration, the drainfield area shall be calculated as extending one foot beyond the sides of the outermost emitter lines. Notwithstanding the provision of paragraph 64E-6.014(5)(b), F.A.C., the individual bed size limitation of 1500 square feet does not apply to drip emitter systems.
4. In a trench containing a single emitter line, the drainfield area shall be calculated as 2 feet multiplied by the emitter spacing in feet multiplied by the number of emitters.
5. Drip effluent disposal systems shall be considered pressure distribution systems. Head loss calculations shall be provided to insure proper hydraulic pressure at the emitter. Pump selection shall be indicated in the design specifications. Pump performance curves shall be included in the permit application.
6. Recirculation rates shall be in the design specifications.
7. Check valves, petcocks, inline filters, and vacuum breaking device locations shall be shown on the design drawings.
8. Drip irrigation systems shall be time-dosed over the 24-hour period. Demand control dosing shall override timed-dosing in periods of flow where timed dosing cannot accommodate the excessive flow.
9. Emitter lines shall be designed as a continuous loop circuit with no dead-ends.
10. Emitter lines shall be drawn to scale and emitter spacing shall be indicated on the drawings.
11. Vacuum release valves shall be installed at the highpoint of the emitter lines.
12. The maximum emitter longitudinal spacing on an emitter line shall be 2 feet. The maximum spacing between adjacent emitter lines in an absorption bed configuration shall be 2 feet. The 24-inch separation from the seasonal high water table shall be measured from the emitter orifice. Setbacks shall be measured from the drip emitter lines.
13. The setback from drip emitter lines to building foundations and property lines shall be no less than two feet.
14. The definition of a filled system in Rule 64E-6.002, F.A.C., is not applicable to drip effluent disposal systems. A drip effluent disposal system is considered to be a mound system when any part of the bottom surface of any drip emitter line is located at or above the elevation of undisturbed native soil in the drainfield area. A drip effluent disposal system is considered a standard subsurface drainfield system when the entire bottom surface of every drip emitter line is installed below the elevation of undisturbed native soil in the drainfield area.
15. For mound systems there shall be a minimum 18-inch separation between the shoulder of the fill and the nearest drip emitter line. Mound system slopes shall be in accordance

with paragraph 64E-6.009(3)(f), F.A.C. , except that a minimum 2 foot separation is required between the nearest drip emitter line and a building foundation, retaining wall, or similar obstruction. Mound systems shall be stabilized in accordance with paragraph 64E-6.009(3)(f), F.A.C.

16. For standard subsurface systems, the elevation of any fill covering the drainfield shall extend no less than 18 inches away from all emitter lines before tapering down to natural grade.

17. Minimum cover on the emitter lines shall be 6 inches for all drip irrigation systems. The maximum cover for all drip irrigation systems shall be no greater than 12 inches.

18. The system shall include a petcock on the dosing pump discharge line for effluent sampling.

19. All systems shall incorporate an automatic mechanism for backwashing or flushing the drip lines and filters.

20. All onsite sewage treatment and disposal systems that include a drip effluent disposal system and aerobic treatment unit shall have a biennial operating permit, a maintenance contract with an approved aerobic treatment system maintenance entity, and shall be inspected in accordance with the requirements of this chapter.

21. Drip irrigation systems shall be designed to have a minimum operating pressure at the emitter head of 10 PSI, a maximum operating pressure at the emitter head of 45 PSI, a maximum system operating pressure of 60 PSI, and a maximum discharge rate per emitter of 1.5 gallons per hour.

22. The hydraulic surge storage requirement of Rule 64E-6.028, F.A.C., does not apply to drip irrigation systems.

23. Drip irrigation systems shall only use components approved by the Bureau of On-site Sewage Programs.

24. Unobstructed area for drip irrigation systems may be located anywhere on the establishment property that meets the setbacks for unobstructed area and can be accessed via transmission lines, supply lines and return lines installed in accordance with this chapter. The land containing only transmission lines, supply lines and return lines shall not be included in the calculation of unobstructed area.

25. Supply lines and return lines shall be considered as transmission lines for determining setbacks not specified in this section.

26. Except for slopes required to meet the stabilization requirements of paragraph 64E-6.009(3)(f), F.A.C., the area over the drip irrigation drainfield shall be vegetated with plant species specified by the design engineer. The species specified shall not include trees.

(b) Drip irrigation systems shall be monitored during required maintenance visits by visual inspection of the ground surface above the emitter lines for evidence of soil saturation at the ground surface.

III. Site Characteristics

Before doing any detailed design specification, it is necessary to evaluate specific site features. This assessment should include the following:

A. Site Boundaries: Most state rules will have regulations on how close drip lines may be placed to property lines, home foundations, and other permanent property features. Follow local rules for set backs from these boundaries.

B. Special Features: Community water distribution lines, property and utility easements, wells, treatment systems, water lines from wells etc. require set backs. Surface waters, including ponds, lakes, streams and even Intermittent water courses also require specific set backs, typically 75 feet. Be certain to Follow local regulations for set backs.

C. Future Land Use Restrictions The drip field can be installed under a permanent lawn, among trees, or other landscape features, provided set backs are followed. Any future permanent structures that will affect soil texture and water flow through the soil must be avoided over a drip field, including but not limited to the following: out buildings, parking areas, swimming pools, Florida Rooms, tennis courts, home additions, decks, etc. The designer should consult with the homeowner regarding any anticipated improvements to the property, and avoid these areas.

D. Precipitation: If the site is in an area which experiences seasonal, intense, and even short duration precipitation events which cause collection of water from surrounding areas or ponding of water on the soil surface, then special attention should be directed toward regrading the soil surface to encourage direct precipitation run off.

E. Slopes: Drip disposal encourages lateral, not just vertical movement throughout the soil. This does not restrict disposal fields to level areas, especially with the use of pressure compensating emitters and zoning. However, it will increase the amount of land needed depending on the severity of the slope. The following chart, from the State of Virginia, demonstrates that considerations of slope must include information about the soil depth. Additional considerations about slopes include

- 1) whether there is a natural or artificial barrier down slope from the proposed site that might provide opportunities for water to surface (such as hill side cuts or walls),
- 2) whether the drip tubing can be laid out on the contours of the slope, and
- 3) whether the design can incorporate air release valves, check valves, zones, and other means to equalize flow and to prevent drainbacks.

Absorption Area Increase (percent)				
Depth to Impervious (Rock, pans, etc.)	Slope of Site (percentage)			
	10 to 19	20 to 29	30 to 39	40 to 50
Drip Tubing, 24" off Impervious strata	17%	33%	50%	67%
Drip Tubing 24" or more off impervious strata	0%	17%	33%	50%

G. Prior Land Use: Research should be conducted to determine if there were any prior activities on the proposed site that would affect soil characteristics. These effects include compaction, foreign soils, buried materials, etc.

With consideration of the above issues, and any similar issues that the designer believes may affect soil absorption rates, the designer is ready to evaluate the specific soil characteristics.

IV. Soil Absorption

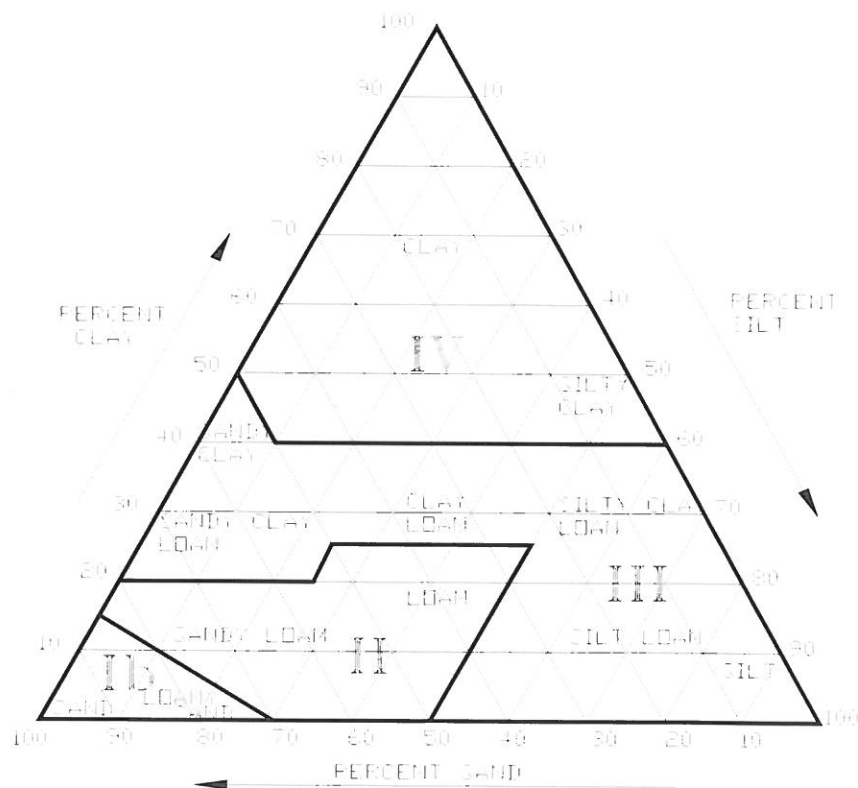
After the drip disposal area has been identified, the designer must undertake a thorough study of the specific soil characteristics of the proposed field. Particular focus must be given to Texture, Loading Rates, Native vs. Disturbed Soils, and Restrictive layers.

A. Sample Collection

An accurate representation of the overall site conditions requires a determination of the underlying soil characteristics. A minimum of 2 samples per proposed zone is necessary. The sample shall be a three dimensional soil core

sample which extends into the soil a minimum of 2 feet deeper than the proposed location for the drip tubing. The analysis of the soil core should not only be for the texture, but should include analysis for presence of ground water, seasonal high water tables, restrictive layers, etc. USDA/ NRCS Soils Maps or other locally available geological maps should be consulted to determine consistency between observed and referenced conditions. Any inconsistencies should lead the designer to undertake further investigations of the site particulars and history.

B. Soils and Site Characteristics: The following USDA Chart should serve as an outline to determine soil composition, therefore texture and suggested loading rates.



SOIL PARTICLE SIZE:

 30 ± 0.05 to 0.002 nm in diameter.

Grovel = Greater than 2.0 mm in diameter

$$f_{\text{eff}} = f_{\text{eff}(\text{res})} + \epsilon$$

For Sizing of Drainfields Other Than Mounds (2013 Revised Loading Rates)

U.S. DEPARTMENT OF AGRICULTURE SOIL TEXTURAL CLASSIFICATION	SOIL TEXTURE LIMITATION (PERCOLATION RATE)	MAXIMUM SEWAGE LOADING RATE TO TRENCH & BED ABSORPTION SURFACE IN GALLONS PER SQUARE FOOT PER DAY	
		TRENCH	BED
Sand; Coarse Sand not associated with a seasonal water table of less than 48 inches; and Loamy Coarse Sand	Slightly limited (Less than 2 min/inch)	0.80	0.60
Loamy Sand; Sandy Loam; Coarse Sandy Loam; Fine Sand	Slightly limited (2-4 min/inch)	0.80	0.60
Loam; Fine Sandy Loam; Silt Loam; Very Fine Sand; Very Fine Sandy Loam; Loamy Fine Sand; Loamy Very Fine Sand; Sandy clay loam	Moderately limited (5-10 min/inch)	0.65	0.35
Clay Loam; Silty Clay Loam; Sandy Clay; Silty Clay, Silt	Moderately limited (Greater than 15 min/inch but not exceeding 30 min/inch)	0.35	0.20
Clay; Organic Soils; Hardpan; Bedrock	Severely limited (Greater than 30 min/inch)	Unsatisfactory for standard subsurface system	
Coarse Sand with an estimated wet season high water table within 48 inches of the bottom of the proposed drainfield; Gravel or Fractured Rock or Oolitic Limestone	Severely limited (Less than 1 min/inch and a water table less than 4 feet below the drainfield)	Unsatisfactory for standard subsurface system	

For Sizing of Drainfields—Mounds

Fill Material	Maximum Sewage Loading Rate to Mound Drain Trench Bottom Surface in gallons per square foot per day	Maximum Sewage Loading Rate to Mound Absorption Bed Bottom Surface in gallons per square foot per day
Sand; Coarse Sand; Loamy Coarse Sand & Fine Sand	0.80	0.60
Sandy Loam; Coarse Sandy Loam; Loamy Sand	0.65	0.40
Fine Sandy Loam; Very Fine Sand Loamy Fine Sand; and Loamy Very Fine Sand	0.35	0.25

C. Determining Soil Texture

Accurate analysis of several samples collected across the proposed site area is critical to determining the absorptive capacity of the soil. The designer must locate the soil on the USDA Soil Chart to establish the soil classification. If the samples from the different locations of the proposed site are different, the design must be based on the most restrictive sample. The system designer should always consult with a Registered Soil Scientist, Site Evaluator or Soils Structure Laboratory for assistance in determining an accurate soil texture classification.

D. Restrictive Layers

Many soil environments are surrounded by other soils with less desirable characteristics. It should be recognized that water movement through multiple soil types will be determined by the characteristics of the most restrictive types. Therefore, whenever these restrictive types are encountered in a proposed drip field, they should provide the operative design criteria. In particular, soil absorptive capacities should be based on those of restrictive layers rather than those of the more absorptive soils. If restrictive layers are present within two feet below the drip line, then the designer should use the reduced loading rates of the restrictive layer to prevent system failure. The greater the soil depth to a restrictive layer, the better.

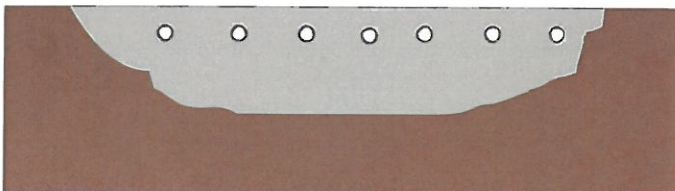
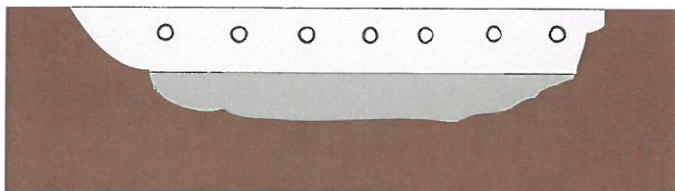
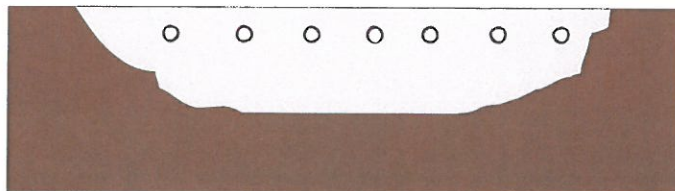
In the two to four foot range below the drip tubing, if there is a change in the soil classification of one unit or more, or if a boundary layer is present (rock, tight clays, etc.), then the disposal area must be increased to prevent failure.

E. Native vs. Disturbed Soils

Native, non-disturbed soils are always the most desirable medium for drip application. However, if the soils are very poor, or the site conditions (e.g., available space) are so limited, then the designer can consider the introduction of fill material.

If the proposed drip field employs fill material, artificially compacted soils, or mixed soils, special considerations apply. Although the fill material may have a greater soil absorptive capacity, a design should not rely on the better soil classification if the underlying poor soil is still present and utilized in the drip system design. Mixing or tilling of the soils may increase the soil absorptive capacity. However, adding Class II soils to a Class IV site does **NOT** yield a Class III absorptive capacity. A proper analysis by a soils laboratory (engineering rather than agricultural focus) is necessary to determine the new soil characteristics. Any time a drip field is constructed with added soil, the overall field should be larger than called for in the design, and the loading rate should be determined by the restrictive layers rather than by the constructed soils.

The following "soup bowl" configuration demonstrates the problem. If the bowl area is scooped out and replaced with more absorptive soils, system failures may still occur because the water will be trapped in the bowl. Conversely, if the situation is reversed, in a "mound" configuration, water will tend to escape at the



interface between the imported and native soils. With the above constraints used to define the overall characteristics of the proposed drip disposal site, the designer is now prepared to es-

V. Soil Hydraulic Loading Rate

The maximum hydraulic loading per unit area of soil is determined by the soil texture classification. Different soil textures have different porosities and therefore enable different quantities of water to pass through the soil. In drip disposal, the goal is shallow disposal, not deep percolation or surfacing. Therefore soil textures at the surface and at depth are important to enable wastewater flow both horizontally and vertically. The key to successful drip system design is to load the soil at an even rate near the surface, therefore promoting plant uptake and evapotranspiration. The recommended loading rates for each soil classification are as follows:

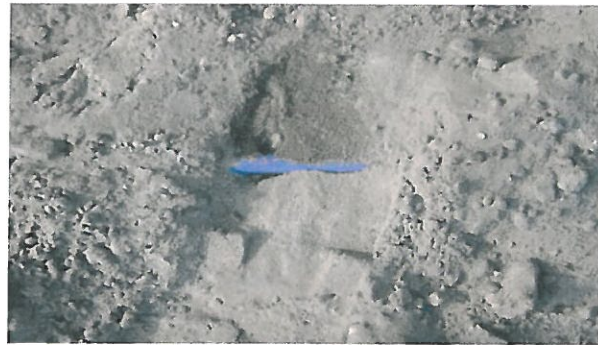
Some states have regulations specifying loading rates that are sometimes more restrictive and sometimes more generous than the above. The designer must follow regulations, but otherwise should opt for more conservative designs.

The basic rule for drip disposal area is:

$$\text{Application Area} = \text{Daily Flow} / \text{Loading Rate}$$

Variations in the recommended rates enable the designer to take account of special circumstances, such as vegetation, precipitation, wind, or other factors that can remove water from the immediate vicinity of the drip emitter. In all cases, using the higher application rate may result in a system failure. When it comes to design, the more conservative the approach, the better. Remember, the least expensive part of the overall drip system is the tubing.

Default: The designer should take into account that the proposed loading rates are for optimal soil conditions, and any of the above mentioned constraints, including but not limited to: Special Features, Precipitation, Slopes, Prior and Adjacent Land Uses, Impervious Boundaries, etc. must be considered in the design. When in doubt, always default to lower application rates.



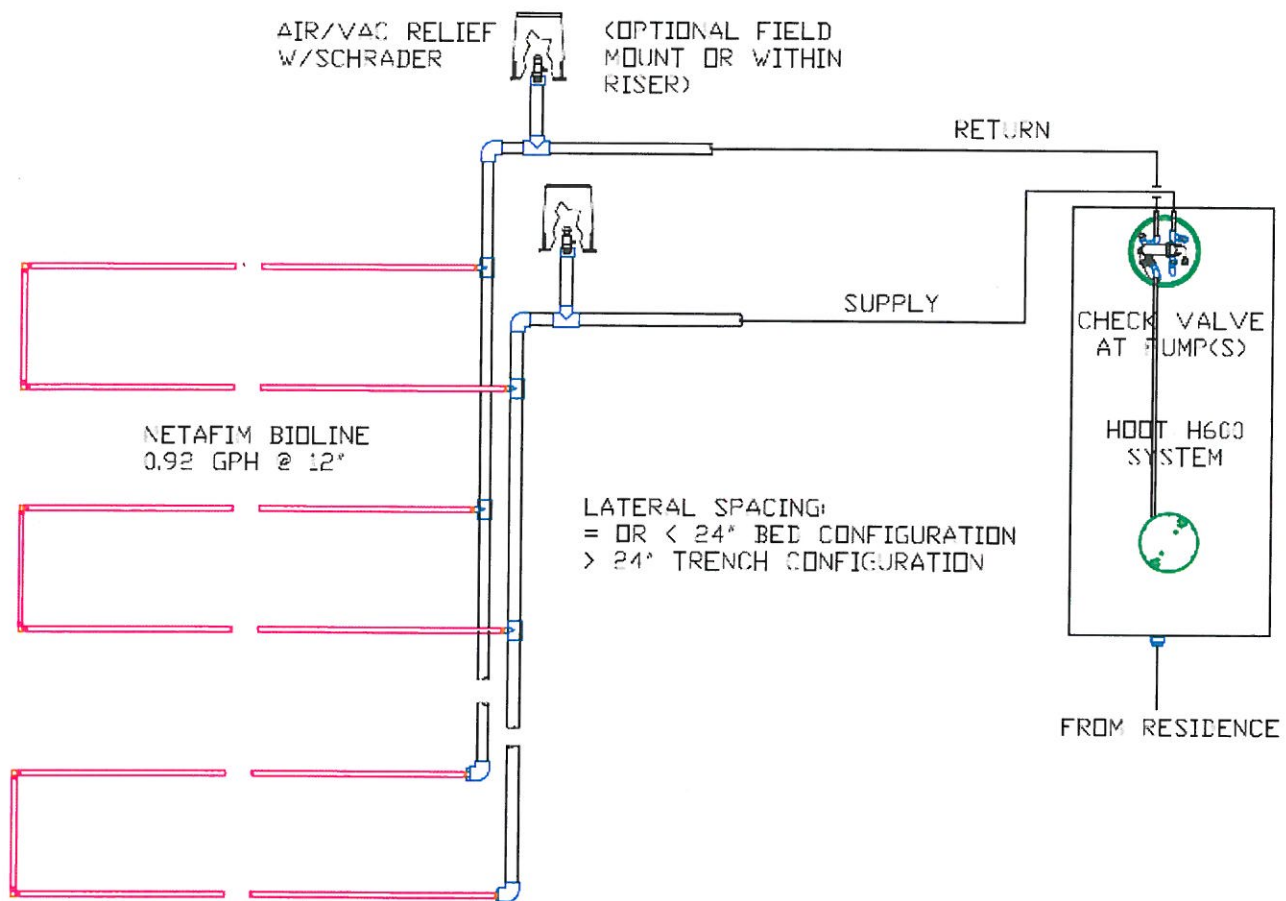
Soils Range From Class I Sandy soils



to Class IV Tight, Restrictive, Clays.

Soil Classification	Recommended Loading Rate (gal/sq. ft)	Maximum Loading Rate (gal/sq. ft)
I	0.5	.80
II	0.25	0.65
III	0.15	0.35
IV	Unsatisfactory for Florida	Unsatisfactory for Florida

VI. A. System Design



VI. B. Components

Pump: Although systems can be designed to use most any commercially available pressure pump, the Hoot Blaster 20EB is the supplied pump for these systems. Its curve is optimal for the drip systems, capable of delivering high volumes of water for creating scouring velocity, and a low enough maximum pressure, even under dead head conditions, to prevent damage to components, fittings and tubing.

Storage: An operating storage capacity in the storage tank behind the treatment unit to allow for flow equalization and emergency storage. The operating capacity should be designed to hold a minimum of 18 hours of normal flow to allow for even distribution to the drip field throughout the day. Additionally, an emergency or reserve capacity should be established which will allow for temporary excess flow, or in the case of equipment failure, time for service or repair personnel to arrive. There should be a minimum of one-half day storage above the high water alarm, but circumstances may dictate higher storage capacity.

Filtration: Every drip system must include a filter to prevent introduction of sediments and suspended organic materials into the drip tubing that might accumulate over time and cause plugging. A 100 Micron Disc Filter is typical, allowing for filtration of particles 7 times smaller than the maximum sized particle the emitter can pass.

VI. B. Components—cont.

Vacuum Relief: A critical feature in drip system design is a minimum of two vacuum relief valves per zone. Their purpose is to prevent soil particles from being sucked back into the drip emitters when the system is depressurized. They should be located at the highest point on both the distribution and return manifolds. They should be located in an irrigation or valve box, lined with a pea gravel bed of at least 6 inches.

Pressure Regulation: With the use of Pressure compensating drip emitters and appropriately sized pumps, it is not normally necessary to regulate pressure. A normal field operating pressure should not exceed 45 psi, with a recommended range of 25 –40 psi. The Netafim Bioline is designed to provide uniform drip output rates with pressures of 7 to 70 psi at the emitter.

Check Valves: Check valves are necessary to prevent backflow and to isolate zones. In multiple zone systems, each zone should have a check valve at the distribution and return manifolds.

Loops and Flex Connects: Loops and flex connects are made of flexible PVC with a Spin Lock connector. They are used to prevent kinking of Bioline tubing. Kinking can completely shut off flow through the drip tube, therefore eliminating its usefulness. Loops should be used in any circumstance where greater than a 45 degree turn must be made. Flex connects must be used between the Bioline tubing and the manifold to allow for shrink and swell and the movement and settling of the soils.

Supply line: The standard design is a 1 ¼" high pressure line made of schedule 40 PVC from the filter to the supply manifold. It should contain a minimum of 1 check valve to prevent back flow into the tank. The check valve located on top of the Hoot Blaster is sufficient if the system has only one zone. Each zone needs its own check valve in multi zone systems.

Supply Manifold: The standard design is 1 ¼" PVC piping where the supply enters and is distributed to the tubing via the flex connections. To maintain both a volume and pressure of effluent to achieve scouring velocity for field flushing, the number of connections to the manifolds must be limited. See chart on page 10 for maximum number of connections to each manifold.

Tubing: Through the tubing is where water distribution into the soil occurs. The effluent leaves the tubing at 0 psi, through pressure compensating emitters, designed to produce a flow rate of 0.9 gallons per hour (gph) The limited flow rate is designed to prevent over loading of the soil.

Return Manifold: The characteristics of the return manifold are the same as the supply, with a limited and equal number of connections. It is recommended to maintain the same diameter pipe size as the supply to limit any possible restrictions.

Flush line: This component should be made of the same diameter of pipe as the return manifold. It terminates at the front end of the treatment system (pre-treatment tank). **If disinfection is utilized on the system, the flush line must return to the pump tank or the system will be disrupted by the disinfection agents.** It shall have, at a convenient location, a manual or electric valve to enable flow only during field flushing.

VI. C. Zone Requirements

Maximum Zone Size - If flows exceed 10 G.P.M., or if there are significant topographic or other site constraints, it is recommended that multiple zones be considered in order to have sufficient system capacity for field flushing. For the longevity of the tubing, from time to time field flushing is necessary to keep the emitters and the tubing clear of sediments. For the most cost effective results, the designer should consider the use of mechanical valve such as the Hydrotek, to dose different zones.

Drip Tube Type	Maximum Tubing Length per Zone			
	with 5 Connections	with 6 Connections	with 7 Connections	with 8 Connections
.9 GPH @12"	1250 feet	1042 feet	834 feet	626 feet

Flows exceeding 10 G.P.M. per zone require specialized pumps, higher voltage, and contactors and motor starters. The Hoot controller can be used to drive an external contactor with a 120 volt input coil, however, utilizing multiple zones or drip tubing at lower rates may be an effective alternative.

If utilizing drip in limited soils, or designs that require larger drainfields, zones can be increased by using tubing of different drip rates (.9, .6 and .4) and at 12, 18 and 24" centers are available. These special order tubings can allow for up to 2,000 linear feet utilizing either at either .6 and .4 gph tubing on 18 or 24" centers. PLEASE NOTE!: This is a special order and can be made with advanced notice (expect several weeks to fulfil this type of request).

VI D. Piping Layout

The basic principle of field layout is to arrange the tubing so that drip tube laterals are roughly equal and approximately 200 feet in length. Lengths greater than 200 feet will not be able to achieve a scouring velocity on the distal end because too much water will be lost through the drip emitters. Horizontal spacing between tubes of up to 24 inches is standard practice for a trench configuration. Spacing in excess of 24" is considered a bed configuration and has lower loading rates.

A standard, recommended pipe size to optimize flow and friction loss for drip distribution systems up to 5000 gallons per day is 1 1/4 inch PVC for distribution lines, supply and return manifolds, and return lines.

VII. Operational Design Principles

In addition to describing the key system components, it is necessary to discuss fundamental operational principles. These pertain to dosing, filtration, field flushing, and control of root intrusion.

A. Dosing and Controls

The fundamental principle of drip distribution is to take full advantage of the entire application area, over the course of the entire day. Although most wastewater flows have peaks and valleys, the goals of effective distribution are to:

- Keep soil moist
- Encourage lateral (i. e., capillary) rather than gravitational flow
- Spread the effluent out over the field, and
- Utilize the entire 24 hour day.

All of these goals are accomplished through effective dosing controls. A sophisticated dosing system is especially important on tight, shrink-swell soils, since they are very sensitive to overloading.

With an effective design, the drip disposal system provides water in the root zone for plant uptake. Plant uptake increases the soil absorptive capacity through evapotranspiration.

The function and complexity of the control system will be determined both by the wastewater demand and the limitations of the soil. The control system needs to take into account:

- Unusual loading conditions
- Storage Capacity
- Emergency storage/malfunction
- Sizing limitations (as discussed above).

A simple demand system configuration will generally not be adequate; for example, a float switch with a 100 gallon tether. Time dosing of drip effluent is required by Florida State Code. The system must have adequate capacity to receive the flow and distribute it evenly over the course of the day, rather than merely distribute the effluent as it enters the pump tank.

Historically, the cause of most drip system failures is not improperly designed drip fields, but rather an inadequate soil loading schedule. Experience has shown that even a flow as little as 200 gallons, dosed intensively, can cause a system failure in the same field that could accept 500 gallons, if dosed evenly throughout the day.

Dosing to the field can occur up to 12, 24 or 36 times per day as standard choices and 6 and 18 are available by special request. When you make a selection, the pump will only run when there is water in the tank, and you do want to spread it out over as much of the day as possible. Most applications work well with 12 or 24 times per day.

Doses of between 1 and 20 minutes can be selected, however we recommend a minimum run time of at least 7 minutes, to insure proper filling and run time. In flat applications, this is not as critical, but we recommend with a typical dose of 8-12 minutes.

B. Filter Cleaning

The filter on the system is designed to capture particles larger than what can safely pass through the drip emitter. Over time, particles will build up and cause the filter to clog. There are several filtration systems and methods that can be used to clean and restore the filter to normal flow.

Passive Filter with Surface Flush: Cleaning it requires the filter cartridge to be removed, and the rings and housing to be manually flushed with water each 6 months of operation.

Automated Back Flush: This is a more sophisticated filtration system which normally has several filters and valves used in a configuration to clean one another automatically. The frequency of the back wash is controlled using a time clock or dosing counter to automatically flush the filter. Filtered water is sent through another filter backwards, therefore dislodging particles captured between the filter rings. This backwash water is then returned to the treatment system and reprocessed. These are special order applications and require additional engineering but are recommended for commercial and special applications.

Default: All systems from time to time will need cleaning. If the system has a manual or automatic timed back flush, manual cleaning of the filter cartridge and rings will still be needed occasionally. Especially as a treatment and disposal system is first started up, cleaning will be necessary to insure that construction debris is removed before it can lodge in the sensitive drip emitter elements.

Filter Cleaning: All filters from time to time require that the filter be taken apart and cleaned out. Each disk surface has grooves that capture particles as they try to pass through the filter. Therefore, it is necessary to separate the disks and clean each surface to truly clean the filter. This is accomplished by using water under pressure to wash the surfaces of each disk, not only the outside of the cartridge. For deposits that have formed on the disks and cannot be removed by mechanical means, muriatic acid should be used (in a 10:1 ratio of water to acid, following safety instructions on the acid container).

C. Field Flush

Drip tubing is designed to last the lifetime of the system. Although filtration is taking place, small particles (under 100 microns) can still enter the tubing. These particles are generally 7 times smaller, as a maximum, than the size the emitter can pass. However, over time these particles can accumulate. Therefore, occasionally it is necessary to field flush the system.

Field flushing is accomplished by opening the return line from the drip field to the pre-treatment tank. In this process, the velocity of water moving through the tubing must be at least 2 feet per second. To prevent plugging of the emitters, the Hoot Controller performs a field flush every 2 weeks, or 256 doses to the field, whichever occurs first.

C. How to Dose & Hoot Calculator

The following analysis, available in a computer file (Excel), provides the conceptual basis for sizing the drip field, setting up zones, and designing the pump control system for delivering the desired quantities of wastewater to the desired places over the desired time periods. To determine the information necessary for a simple design, you will need to answer 4 basic questions:

1. How many Gallons Per Day is the Wastewater load? (See Page 4 for residential, 5-7 for commercial)
2. What is the Soil loading Rate? (See page 12)
3. Select Drip Rate (Typical is .92 on 12" centers)
4. You can then play with the dose time to achieve an even 12 or 24 doses per day, Start with 10.

From the above basic information, you will determine:

1. Calculate Disposal Area. ($G.P.D./Loading\ Rate = Application\ Area$)
2. Can take a drainfield reduction credit (25% for ATU, 30 or 40% if going performance based)
5. it will determine the feet of tubing needed
6. Calculate Total Flow Rate of all tubing
8. Calculate total flow rate per zone GPM
9. Provide the Doses per Zone, per day.
10. Time between doses.
11. Total Daily run time
12. The maximum connections to each manifold
13. Gallons delivered per dose.

On the following page is an example of a basic design, at 600 gallons per day in a moderated limed Loam Sand in a Trench Configuration.



Drip Design Calculator

Job Name/Homeowner:	John and Jane Doe
Address:	123 Main Street
City, State, Zip:	Anytown, Any State
Permit Agency:	Big River Water District
Installer Name:	Johns Septic
Designed By:	Ken Write
Date:	7/23/2014

Gallons Per Day	600		
Soil Loading Rate (GPD, Per Sq. Ft.)	0.65		
Select drip rate	0.92		
Emitter Spacing	12		
Desired Dose Time	10		
# of Zones	1	Square feet of Application Area	692
		Drainfield Reduction Credit %	25
		Linear Feet of Tubing	346
		Number of Emitters	346
		Linear Feet of Tubing Per Zone	346
		Emitters Per Zone	346
		Drip Rate (GPH)	0.92
		Gallons Per Minute Per Zone	5.3
		Minutes Per Day Per Zone	113
		Doses per Zone	12
		Total Doses per Day	12
		Time Between Doses in Hours	2.0
		Total Run time in Minutes	113
		Maximum Connections to Manifold	7
		Gallons per dose	53

VIII. Installation of Tank & System

Tank Installation:

- Soil cover depth: a minimum of 6" inches and no greater than 30". Systems that need to be at deeper burial should be serviced through the use of a lift station.
- Prepare an excavation approximately one foot larger than the tank all around with a firm, level bottom. Be sure to check the depth of the excavation to the bottom of the inlet to ensure tank will be deep enough for your inlet to flow into the tank.
- Place Tank on a level native ground, or a compacted or gravel bed of at least 4 inches thick.
- Fill out Hoot Installation and Delivery Tracking Form. Driver should not leave tank at jobsite until this form is filled out.
- Delivery driver will place tank in hole - and confirm it is level within 1 inch from center of tank to any corner.
- Begin filling the tank with water to perform visual water tight integrity test.
- Bring in 4" Schedule 40 Pipe into the inlet end of tank through one or more openings to the Pre-Treatment Tank, and Schedule 40 - 4" line out to drainfield.
- Follow local guidance for proper backfilling of remainder of system.
- Bring required access ports to final grade.
- Provide power to hook up the blower/alarm system (20 Amp Service for Gravity, 30 for Pumped)
- Hook up blower plumbing, 1 1/4" from Blower through grommet into riser.
- Place Blower on concrete pad, Place cover over aerator.
- Power up system - it is ready to accept sewage.
- Fill in Warranty Registration and Service Policy, and give to homeowner.

Electrical Warning!

WIRING MUST HAVE 20 AMP (30 AMP FOR SYSTEMS WITH A DISPOSAL PUMP) INDEPENDENT BREAKER AND MUST MEET NATIONAL - STATE - AND LOCAL REGULATIONS. INSTALLATION AND OPERATION MUST BE IN COMPLIANCE WITH STATE WATER REGULATIONS, COUNTY AND LOCAL PLUMBING AND ELECTRICAL CODES.

An Aeration Alarm will occur if tank is not filled before startup. The system must be filled from the front into the pump tank to be left in proper operating condition.

IX. Installation of Tubing

A. Site Preparation

To reiterate, the drip field should be viewed as a wastewater disposal field and the limitations of conventional septic drain fields should apply. These limitations should include:

No future expectation of building(s), decks, or other impervious surfaces

Limited Number of trees (to avoid root intrusion problems)

No long term storage of equipment or vehicles over the site

A permanent vegetative cover.

Grasses dormant in winter must be over seeded with winter grasses when possible. (This factor is critical when designs approach the absorptive capacity of the soil and rely on evapotranspiration for water movement.)

The drip tubing should be installed 8 to 10 inches below the soil surface with an absolute minimum of 6 inches. Remarkably, even drip systems distributing high quality effluent generate enough heat to prevent freezing. Colder climates may require deeper placement to avoid freezing during period of inactivity (see discussion above).

The depth of the manifold trenches should be the same as the tubing depth in order for the vacuum release valves to work effectively.

With each of the following tubing installation methods, it is assumed that the inlet lines and feed manifold and the return lines and return manifold are trenched with a backhoe in order to provide sufficient working room to cut and fit tees and to insert the flex connectors between the manifolds and the tubing.

B. Drip Tubing Installation

There are three common ways to install the Drip tubing. They are:

1. Trenching: This method uses a commonly available chain trenching machine to cut narrow trenches for tubing installation. The advantages of this method are that these machines are widely available and easy to use. The disadvantages are that the trench may leave wall surfaces that are "slicked" and therefore not receptive to horizontal water flow. The trench must be filled with original materials and watered in from the top down. Failure to do so will lead to premature failure.



2. Pulling: Although a misnomer, pulling refers to the method of knifing, or using a vibratory plow, to insert the drip tubing. This method is increasingly common as the equipment becomes more widely available for such installations. Plowing, or the use of a foot to open a narrow trench is a variant of the pulling approach.



3. Fill: In this method, tubing is laid on the ground and fill material is placed over it. If there is any vegetative cover, it must be removed and the original soil scarified to minimize any inhomogeneity between soil types. If soils of different textures are used, the constraints discussed in the **SOILS** discussion above must apply. . *It is recommended that the fill material be the same as the original, if possible.*



EVERY EFFORT MUST BE MADE TO AVOID ANY MECHANICAL STRESS ON THE TUBING—BEFORE, DURING, AND AFTER INSTALLATION.

C. Piping Hook-up

The supply and return lines, and the supply and return manifolds are installed using standard techniques for PVC piping.

The standard recommended glue is, at a minimum, Medium bodied PVC Cement with Cleaner; however, Heavy Bodied Cement is preferred. It is not recommended to use “Rain or Shine” or “Hot” glue, as these glues are designed for emergency applications where it is not possible to maintain a dry environment. These alternative glues tend to break down faster over time and are less flexible to shrink and swell forces than the recommended glues.

To prevent introduction of PVC filings to the distribution lines, the installer should use a good quality ratcheting type PVC cutter as opposed to a saw of any type.



X. Operation and Maintenance

The designer should take special precautions to troubleshoot the system and insure that it is working properly over an initial startup period, typically the first month of operation. The Installer should manually clean the filter after the first month of operation. All Aerobic systems have a start-up period where the levels of both TSS and BOD are higher than typical. Once the system establishes itself, the performance level increases, and longer periods between servicing can be used. The filter has been designed to retain solids for a service interval of 6 months between cleaning, after the initial startup.

The State of Florida Requires a service policy for all ATU's at which time the maintenance of the drip system can be conducted. Proper operation of the pump, air release valves, indexing or solenoid valves should be conducted. The filter cartridge should be cleaned mechanically, using high pressure water or be exchanged with another cartridge that has been allowed to soak in either a 10% bleach or Muratic Acid solution.

When a drip distribution system is properly sized, laid out, and installed, it is set up to operate with little maintenance and easy monitoring. In addition to the fundamental design considerations already outlined, several other principles implemented at the installation will simplify maintenance. These are as follows:

1. Provide Schrader valves (tire gauges) on critical piping elements (pump output, supply and return manifolds, etc.) in irrigation boxes.
2. Maintain access to a short length of drip tubing for inspection. Some installers insert a short length of clear PVC pipe in critical locations to enable easy observation of flow, biofilm buildup, etc.
3. Keep a detailed plot plan, system diagram, and wiring diagram readily accessible in a freezer type Ziploc bag located within the filter box.
4. Establish a service record chart to record manual filter cleaning times and pressures at the pump, at feed and return headers, and at the backflush valve.
5. Monitor any changes in the number, activities, and water usage patterns of members of the household.

With this information framework, a system inspector can quickly and easily determine if the system is operating within specifications. If problems are identified by changes in pressure or flow, they can be located and corrected easily using information in the plans and locations of irrigation boxes.

The following page is an example of a service form that contains the basic necessary items to do a proper maintenance visit.

Hoot Systems Drip Service Form

Inspection Date: _____

System Owner: _____

Address: _____

City, St., Zip: _____

Inspected Items:	Operational	Inoperative	Not Applicable
Aerator & Aeration Plumbing	☐	☐	☐
Air Filter Cleaned.....	☐	☐	☐
Alarm Operational.....	☐	☐	☐
Riser(s) at or Above Finished Grade.....	☐	☐	☐
Pre Treatment/Clarifier inspection.....	☐	☐	☐
Effluent Pump	☐	☐	☐
Drip Filter Cleaned.....	☐	☐	☐
Vegetation over Drainfield.....	☐	☐	☐
Pressure Check on Air Release	☐	☐	☐

Supply Pressure _____ Return Pressure _____

Step Through Modes and Verify Operation

Mode 1 _____ Verify System Status (Water Levels, Photocell)

Mode 2 _____ Force on Air & Effluent Pump (if water present)

Mode 3 _____ Air Back Pressure (in WCI)

Mode 4 _____ Last 4 Alarms (if present)

Mode 5 _____ Clear Alarm Memory

Reset Controller, one long Beep at Startup? Yes: _____ (if No, clear memory, Mode 5)

Verify Green Solid Green Light when leaving: _____

Inspector Name, Signature

XI. Chlorine Use with Drip, Monroe Co. (Keys) and Variances Only

Drip irrigation is subsurface discharge and has little or no human contact potential. Just like every other subsurface discharge system (including through field lines, infiltrator panels, L.P.D.) there is no requirement for disinfection.

There are certain circumstances that may require disinfection. These would be limited to Installations in the Florida Keys may require the use of disinfection.

Even with highly pre-treated effluent, the soil is capable of degrading the organic and biological matter still present in the effluent even further. The disinfection of the effluent prior to discharge, especially with the use of chlorine, can create problems with both the soil and the drip disposal equipment.

If the effluent is disinfected prior to leaving the pump tank, all further biological activity is halted. This will eventually lead to the plugging of the soil with organic matter. Drip systems are commonly utilized on lots where no other disposal method can work. This will lead to the failure of the system because of the lingering, accumulation effect of the chlorine residual, now in the soil. An important part of the decomposition process of chlorine is exposure to sunlight. This cannot take place if the effluent is subsurface discharged.

The Bioline, pressure compensating drip tubing has a diaphragm that regulates the flow from the emitter. This diaphragm is made of EPDM Rubber. Over years of exposure to constantly chlorinated water, these diaphragms will break down, leading to the inability of the tubing to regulate the

pressure. There are no known studies that can provide information on the expected life of the emitters if exposed to chlorine. We are certain that this will lead to premature failure. The tubing has an anticipated life of 30 years when maintained, however there is no warranty on the tubing if chlorine is constantly utilized with the system.

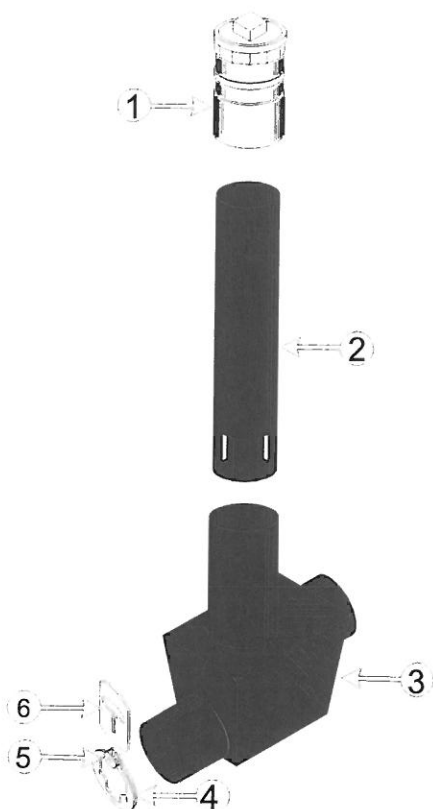
In all cases, Chlorine should not be utilized except where require by law. At the current time, this would only be in installations where fractured rock is encountered less than 1 foot below the dripper line.

Chlorine can be used (10% solution) to clean the filter(s) on the system. Chlorine can be also be used to shock the pump tank, but do not field flush the system with this effluent. The high concentration of chlorine returning to the pre-treatment tank could severely disrupt the system and ruin the treatment process.

IF ANY DRIP SYSTEM MUST UTILIZE CHLORINE FOR DISINFECTION, THEN THE FILED FLUSH/RETURN MANIFOLD LINES MUST RETURN TO THE PUMP TANK AND NOT THE PRETREATMENT TANK. THIS WILL CAUSE THE SYSTEM TO FAIL AND NEVER PROPERLY FUNCTION.

If disinfection is required, it would be advantageous for the installer to utilize alternate methods of disinfection such as Ozone or UV. Both of these methods have no residual effects, and therefore will allow for biological activity to continue in the soil. The rate of decomposition will be slowed in comparison to non disinfected effluent, and again is not recommended unless required by law.

HOOT Chlorination System



- | | |
|-------------------------------|-----------------------|
| 1. Chlorinator Cap | 4. Weir Frame |
| 2. Chlorine Tube | 5. Flow Control Plate |
| 3. Chlorine Contact Reservoir | 6. Adjustment Knob |

Chlorination System

The HOOT Chlorine Delivery System is the finest in line, small flow chlorinator available on the market. The Chlorine Tube is larger than before, and this increase in diameter does not allow the tablets to expand out and get hung up in the tube. The tube has a ribbed bottom which keeps the tablets raised up so that water can pass under them for even dissolving. The Chlorine Contact Reservoir bottom allows for storage of chlorinated water and the when new water enters, it displaces the chlorinated water the reservoir was holding. This eliminates the problem associated with open bottom chlorinators which achieve insufficient contact with the tablets. The level of the water in the reservoir is pre-set to the middle setting, however it should be checked before you leave the installation. If upon inspection the system has been going through a large amount of chlorine, or the residual exceeds 1.0, then the level in the reservoir can be lowered by turning the Adjustment Knob counter clock wise. If it is at the lowest possible setting, and still too much chlorine is being used, then raise the tablets off of the bottom of the chlorine tube by the use of the 1 ½ spacer provided in the control box. If the Chlorine residual is below 0.1, then raise the level in the reservoir by turning the Adjustment Knob clock wise. To service or change the Chlorine level sensor, pull the Adjustment Knob forward and lift the Flow Control Plate from the Weir Frame, you will now be able to reach the sensor for replacement.

Cut Sheets for Submittals

REVISIONS	DESCRIPTION	DATE

AIR/VAC RELIEF
W/SCHRADER

<OPTIONAL FIELD
MOUNT OR WITHIN
RISER>

RETURN

SUPPLY

NETAFIM BIOLINE
0.92 GPH @ 12"

LATERAL SPACING:
= OR < 24" BED CONFIGURATION
> 24" TRENCH CONFIGURATION

CHECK VALVE
AT PUMP(S)

HOOT H600
SYSTEM

FROM RESIDENCE

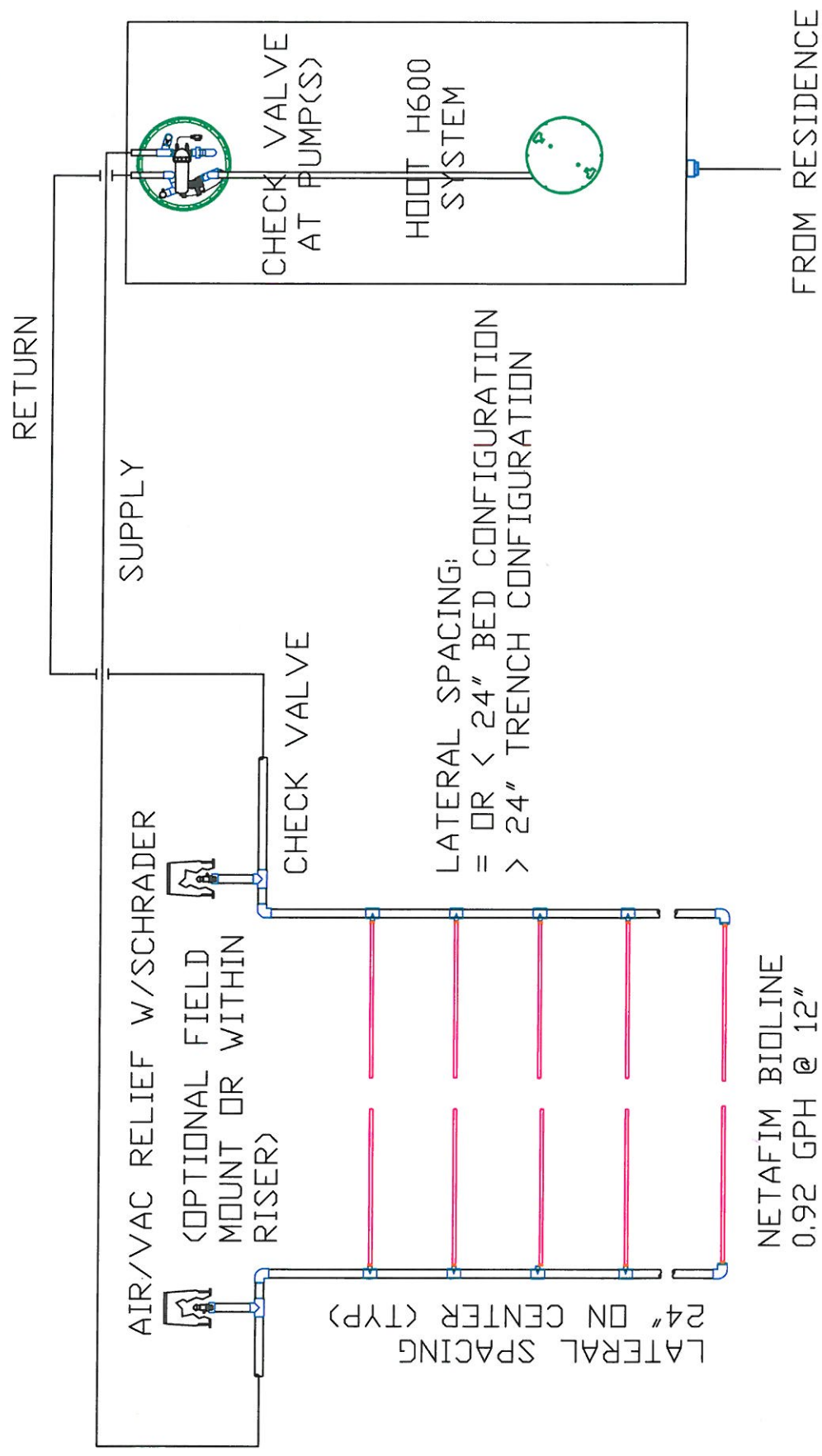


HOOT SYSTEMS, LLC
www.hootsystems.com

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DESCRIPTION: SINGLE ZONE SYSTEM				PART #
LOOPEL FIELD				
DATE:	DRAWN BY:	CHECK BY:	SCALE:	
7-26-13	SMS	RJS	NTS	Single Zone

REVISIONS	DESCRIPTION	DATE

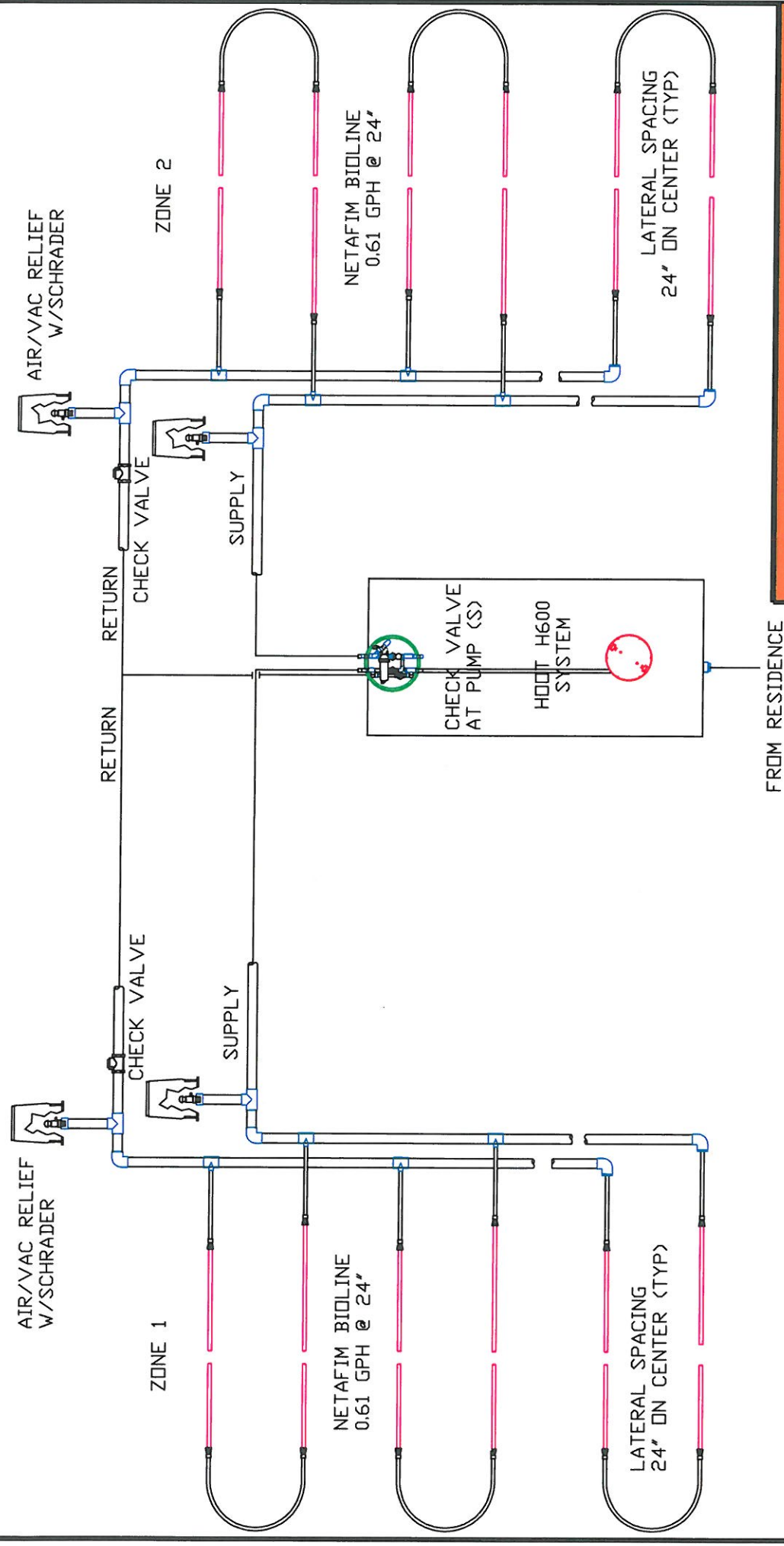


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DESCRIPTION: SINGLE ZONE SYSTEM				PART #	
MANIFOLD TO MANIFOLD				Single Zone	
DATE:	DRAWN BY:	CHECK BY:	SCALE:		
7-26-13	SMS	RJS	NTS		

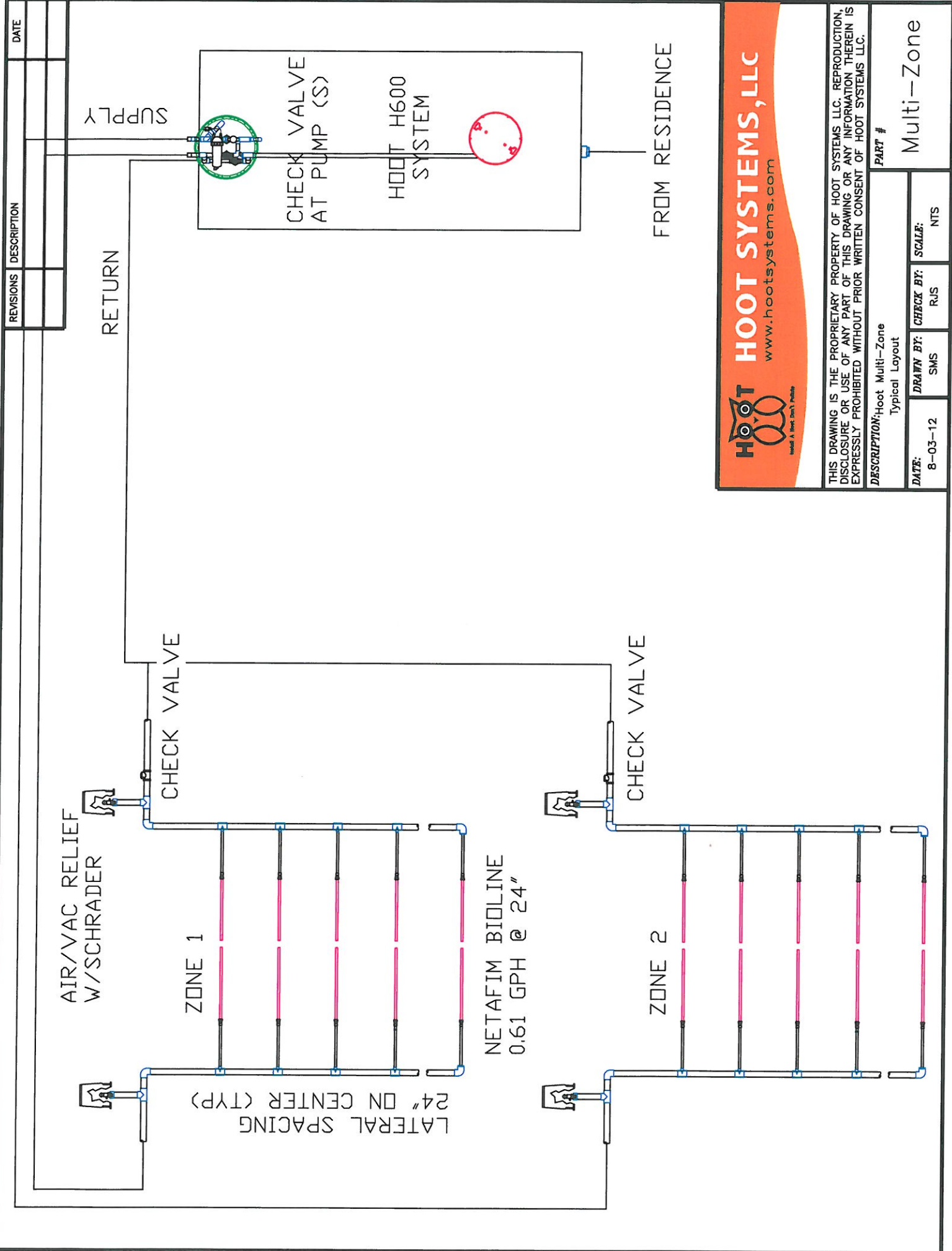
REVISIONS	DESCRIPTION	DATE



HOOT
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DESCRIPTION: Hoot Multi-Zone Typical Layout			
DATE:	DRAWN BY:	CHECK BY:	SCALE:
8-03-12	SMS	RJS	NTS
PART # Multi-Zone			





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DESCRIPTION: Hoot Multi-Zone Typical Layout

PART #

Multi-Zone

DATE: 8-03-12

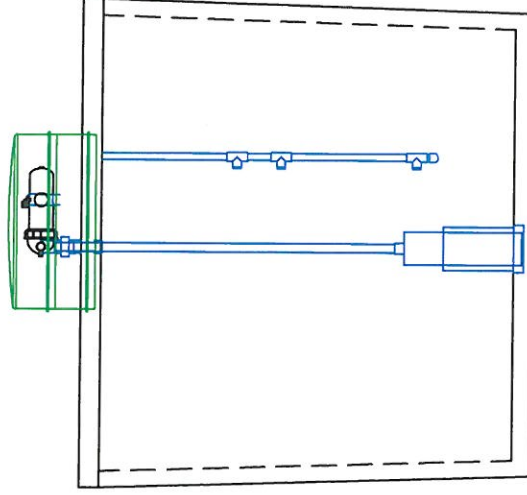
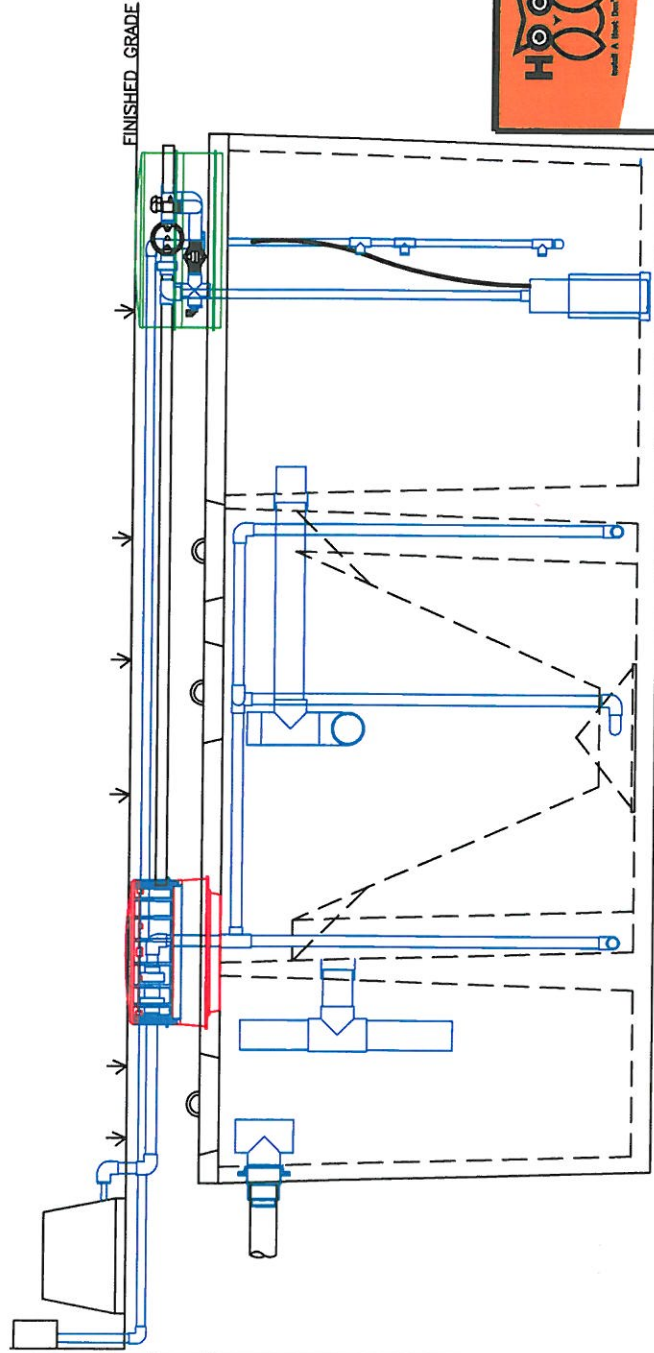
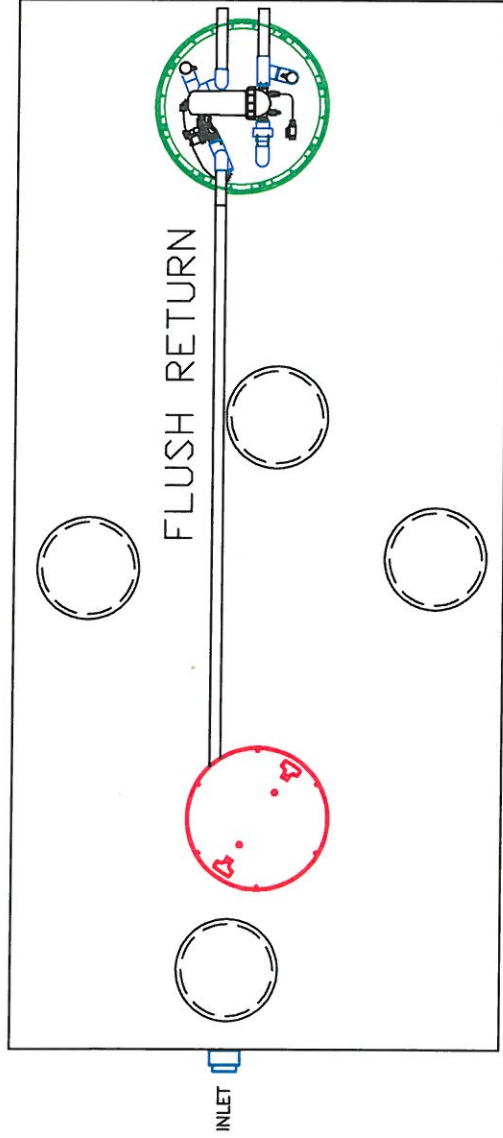
DRAWN BY: SMS

CHECK BY: RJS

SCALE: NTS

REVISIONS	DESCRIPTION	DATE

HOOT H600 SYSTEM W/SIMPLEX PUMP AND DRIP HEADWORKS



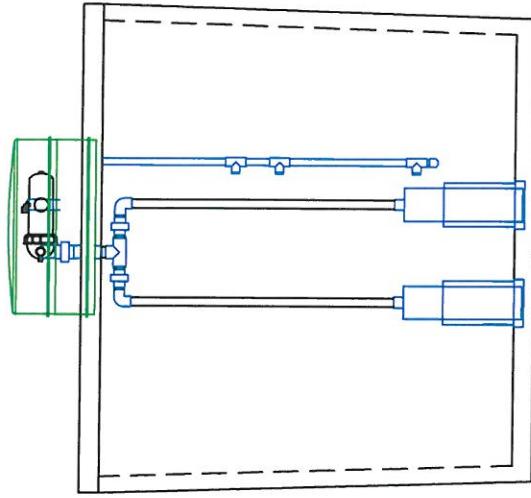
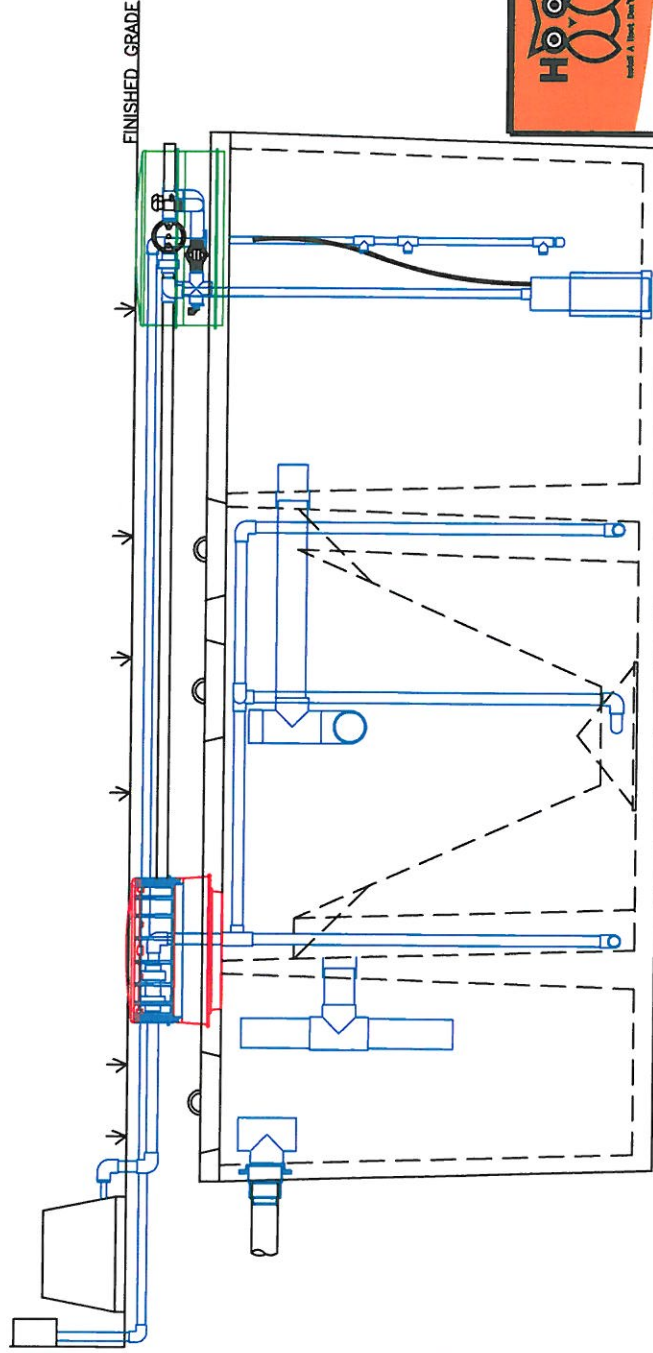
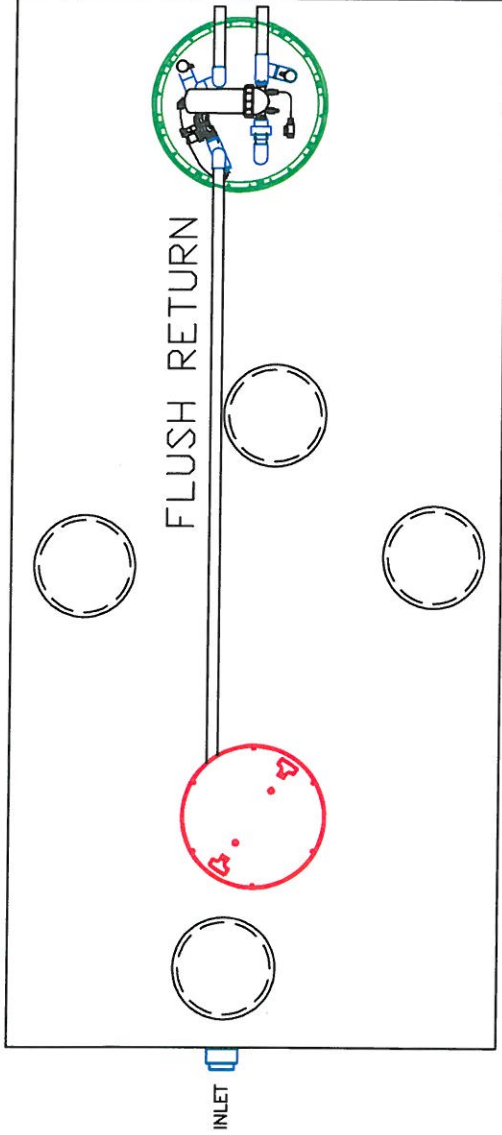
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DESCRIPTION: Hoot H-500 System w/Simplex Pump and Drip Headworks		PART #
DATE: 4-06-09	DRAWN BY: SMS	CHECK BY: RJS
		SCALE: NTS
Simplex Drip		

REVISIONS	DESCRIPTION	DATE

HOOT H600 SYSTEM W/DUPLEX PUMPS AND DRIP HEADWORKS



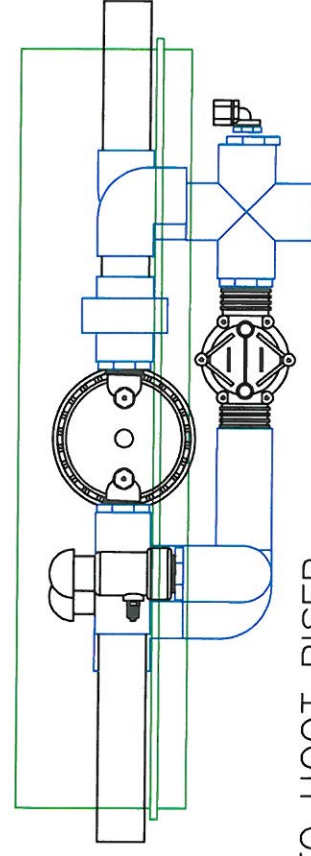
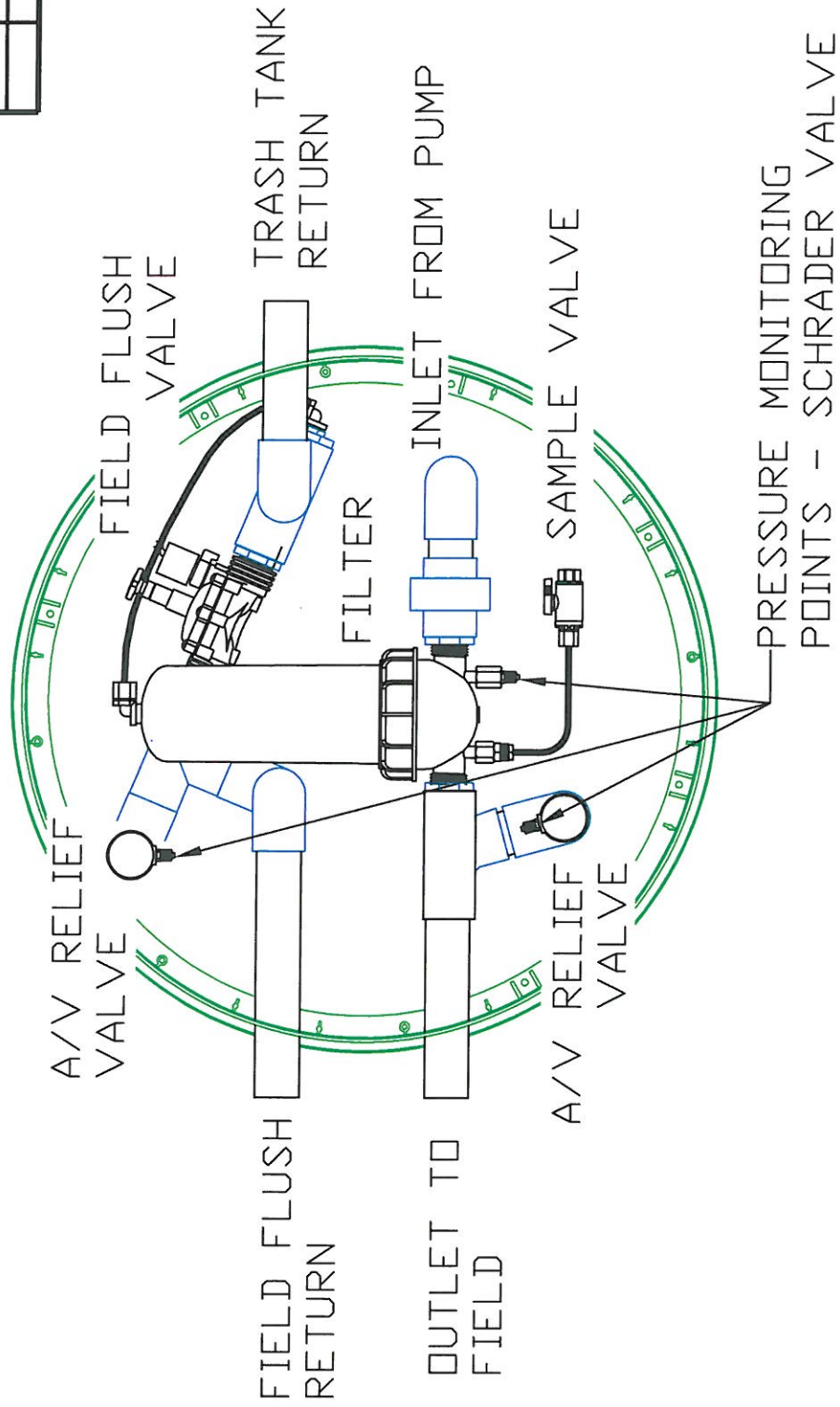


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DESCRIPTION: Hoot H-500 System w/Duplex Pumps & Drip Headworks				PART #
DATE: 4-06-09	DRAWN BY: SMS	CHECK BY: RJS	SCALE: NTS	Duplex Drip

REVISIONS	DESCRIPTION	DATE



20" AUTO HOOT RISER
CONNECTIONS DETAIL
SCALE: NTS

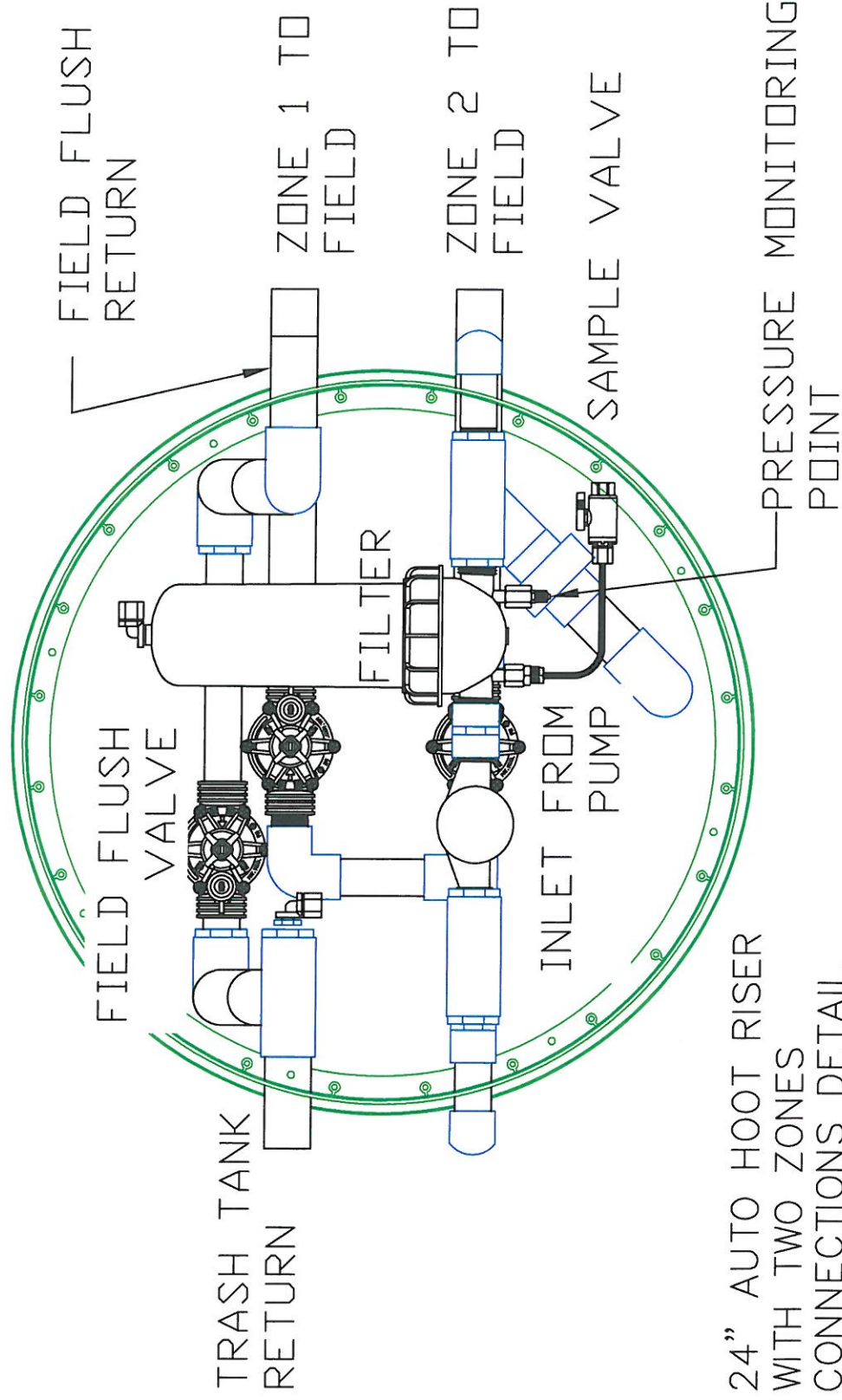
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DESCRIPTION: 20" Drip Riser Headworks w/ Auto Field Flush		PART #
DATE: 6-06-10	DRAWN BY: SMS	CHECK BY: RJS
	SCALE: NTS	
		HDR-20"

REVISIONS	DESCRIPTION	DATE



24" AUTO HOOT RISER
WITH TWO ZONES
CONNECTIONS DETAIL

1

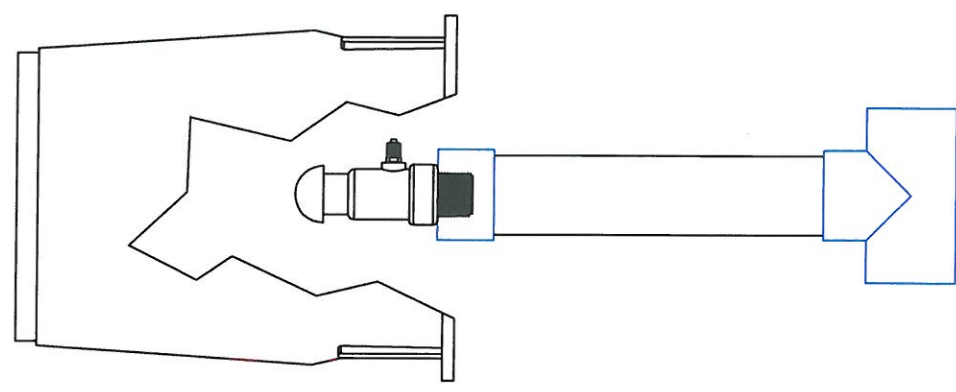
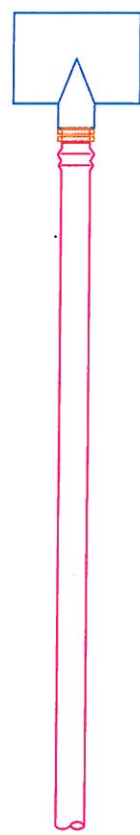
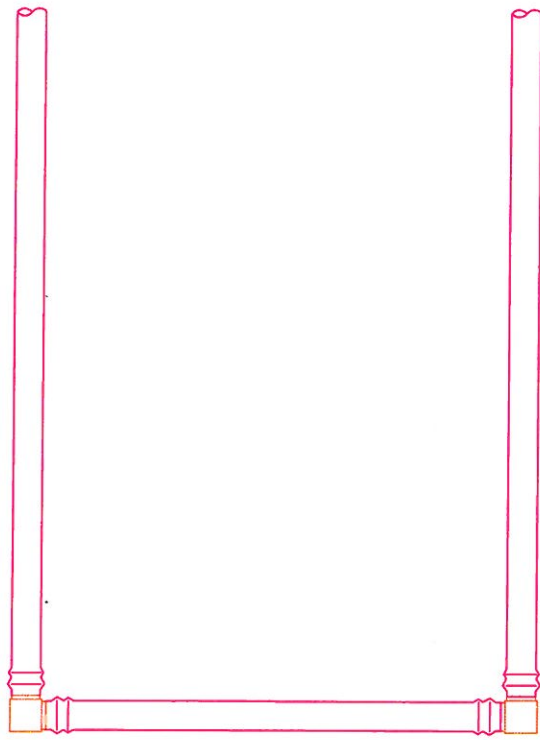
SCALE: NTS



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DESCRIPTION: HOOT DRIP RISER, 2 ZONE WITH WATER METER AND FIELD FLUSH			
DATE: 8-03-12	DRAWN BY: SMS	CHECK BY: RJS	SCALE: NTS
PART #			HDR-2Z-24"

REVISIONS	DESCRIPTION	DATE



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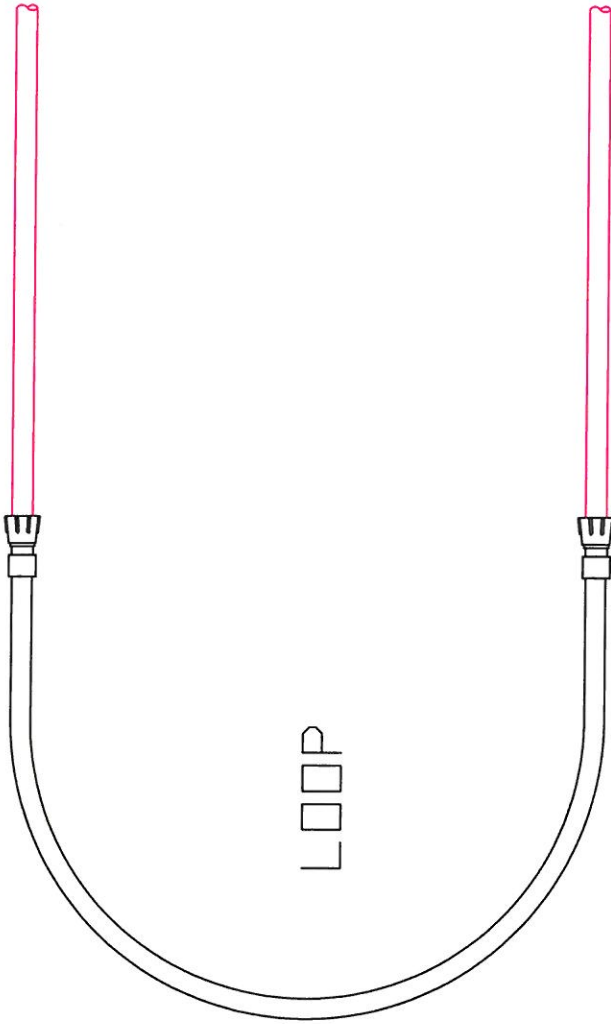
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DESCRIPTION: TEE CONNECTIONS AND LOOPED TURNS AND AIR RELEASE VALVE WITH SCHRADER

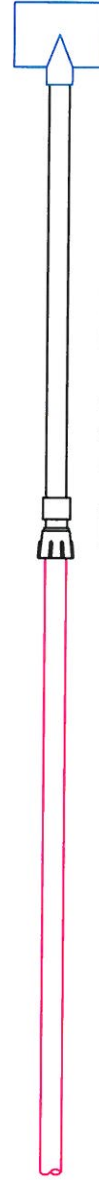
DATE: 8-23-2013	DRAWN BY: SMS	CHECK BY: RJS	SCALE: NTS
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PART #
COMPONENTS

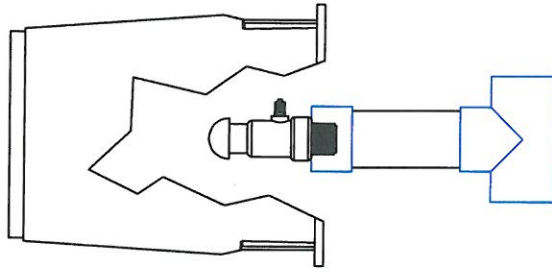
REVISIONS	DESCRIPTION	DATE



LOOP



FLEX CONNECT



AIR RELEASE
WITH COVER



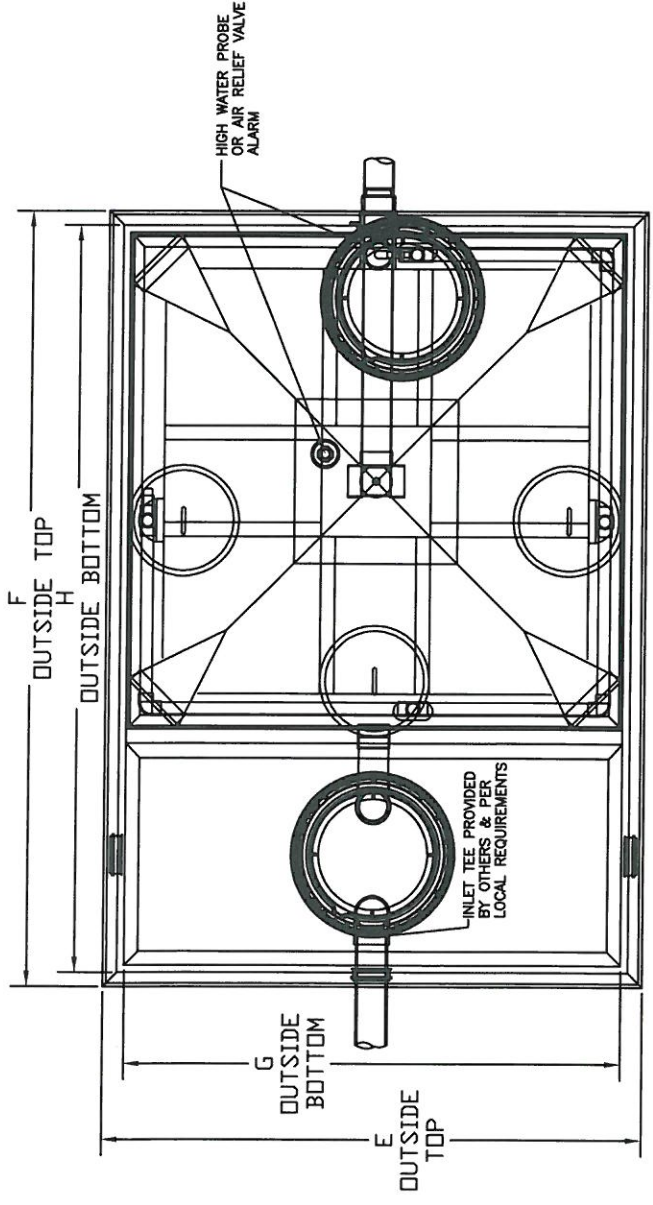
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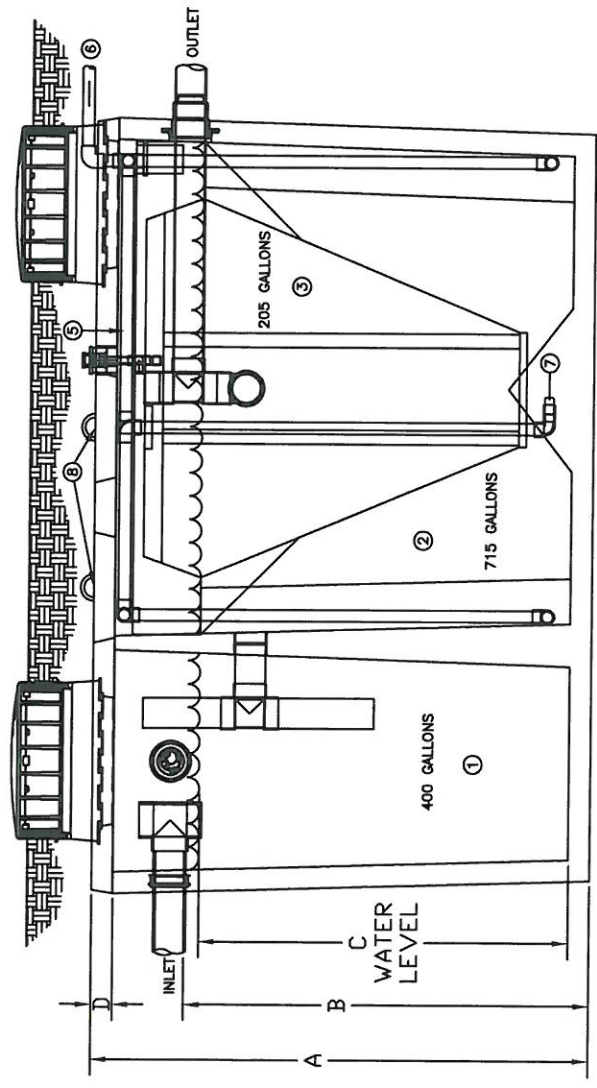
DESCRIPTION: HOOT LOOPS, FLEX CONNECTS AIR RELEASE VALVE W/COVER				PART #
DATE: 8-03-12	DRAWN BY: SMS	CHECK BY: RJS	SCALE: NTS	COMPONENTS

REVISIONS	DESCRIPTION	DATE

CRITICAL DIMENSIONS	
A	69.00"
B	57.00"
C	52.00"
D	3.00"
E	74.50"
F	106.00"
G	65.50"
H	97.00"

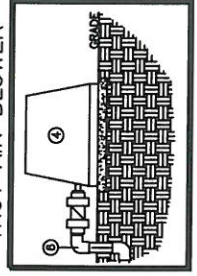


PLAN VIEW



SIDE ELEVATION

TROY AIR BLOWER



- THE H-SERIES HOOT AEROBIC TREATMENT SYSTEM
- 1) PRETREATMENT TANK- WHERE ANAEROBIC DIGESTION OCCURS AND STORAGE FOR NON-BIODEGRADABLE MATERIALS.
 - 2) AERATION CHAMBER- WHERE AIR IS INTRODUCED INTO SEWAGE FOR DIGESTION.
 - 3) CLARIFIER- A STILL CHAMBER WHERE SOLIDS SETTLE OUT AND THE CLEAR EFFLUENT RISES.
 - 4) TROY AIR LINEAR AIR BLOWER- LONG LIFE EFFICIENT LINEAR BLOWER WHICH COMPRESSED ATMOSPHERIC AIR AND UNDER PRESSURE DELIVERS IT TO THE TANK. MAY BE REMOVED / MOUNTED UP TO 50' FROM SYSTEM. MUST MAINTAIN 1/8" SLOPE TOWARDS TANK FOR DRAINAGE.
 - 5) AIR MANIFOLD- DELIVERS THE AIR FROM THE LINE TO THE STONES FOR DIFFUSION INTO THE SEWAGE.
 - 6) AERATION LINE- DELIVERS THE AIR FROM THE PUMP TO THE MANIFOLD. CHECK VALVE INCLUDED.
 - 7) AERATION STONE- AIR IS FINELY DIFFUSED FROM THE STONE INTO THE AERATION CHAMBER.
 - 8) 15" COVERS- PROVIDE ASSEMBLY PORT ACCESS INSIDE OF THE SYSTEM. (NOT REQUIRED FOR REGULAR SERVICE)



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DESCRIPTION: 600 GPD GRAVITY DISCHARGE SYSTEM
H-500 A (2- RISER POLYLOK ACCESS)

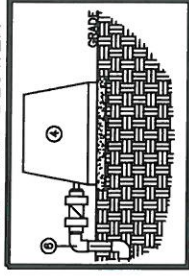
PART #
H-600A (2R)

DATE: 9-7-09
DRAWN BY: AY
CHECK BY: RS
SCALE: N.T.S.

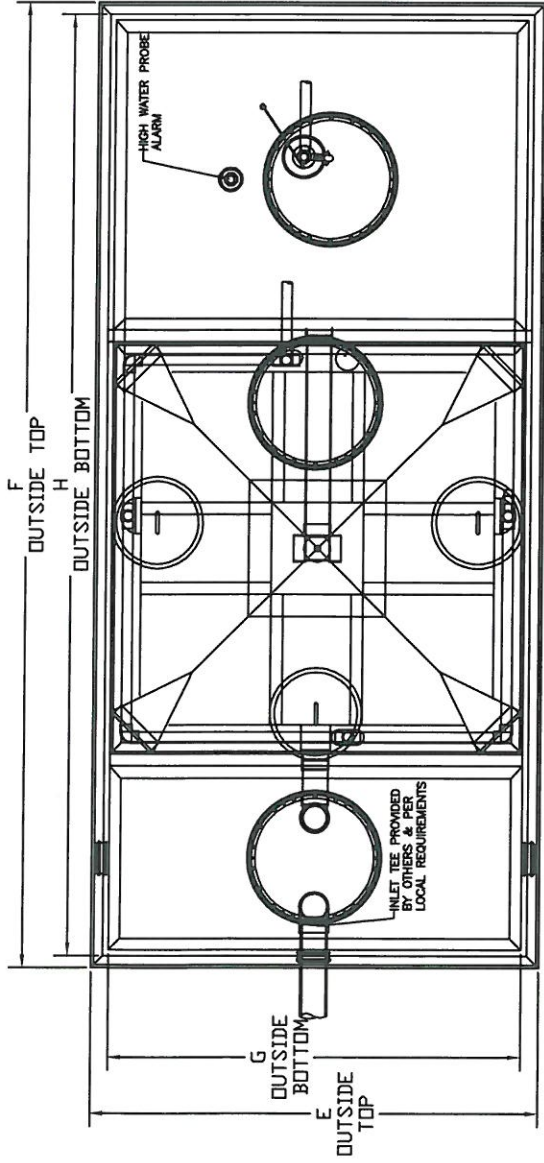
REVISIONS	DESCRIPTION	DATE

CRITICAL DIMENSIONS	
A	69.00"
B	57.00"
C	52.00"
D	3.00"
E	74.50"
F	160.00"
G	65.50"
H	151.00"
J	48.50"
K	15.00"
L	24.50"
M	12.00"

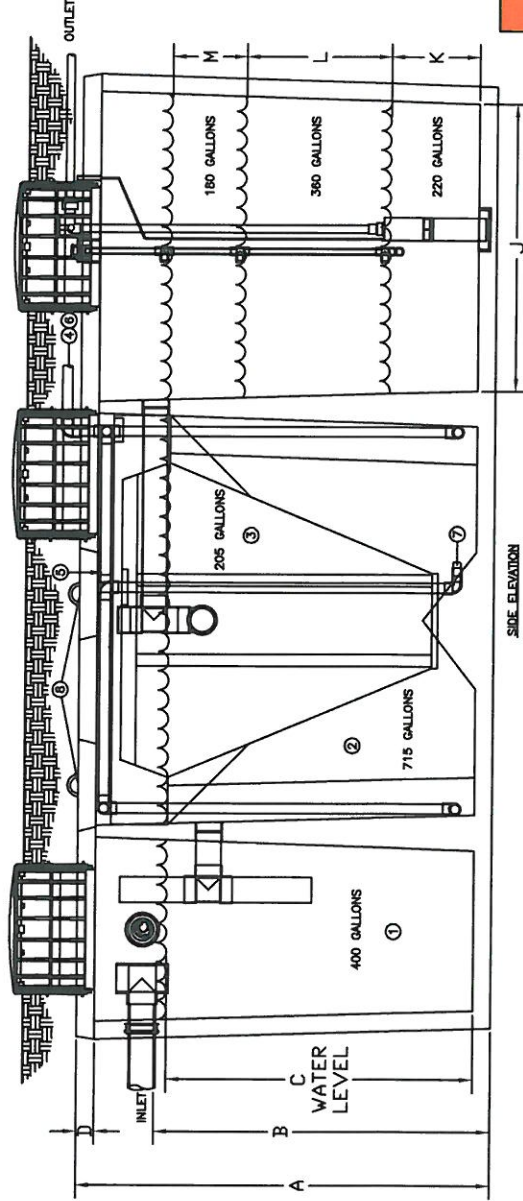
TROY AIR BLOWER



PLAN VIEW



SIDE ELEVATION



THE H-SERIES HOOT AEROBIC TREATMENT SYSTEM

- 1) PRETREATMENT TANK- WHERE ANAEROBIC DIGESTION OCCURS AND STORAGE FOR NON-BIODEGRADABLE MATERIALS.
- 2) AERATION CHAMBER- WHERE AIR IS INTRODUCED INTO SEWAGE FOR DIGESTION.
- 3) CLARIFIER- A STILL CHAMBER WHERE SOLIDS SETTLE OUT AND THE CLEAR EFFLUENT RISES.
- 4) TROY AIR LINEAR AIR BLOWER- LONG LIFE, EFFICIENT LINEAR BLOWER WHICH COMPRESSED ATMOSPHERIC AIR AND UNDER PRESSURE DELIVERS IT TO THE TANK. MAY BE REMOTELY MOUNTED UP TO 50' FROM SYSTEM. MUST MAINTAIN 1/8" SLOPE TOWARDS TANK FOR DRAINAGE.
- 5) AIR MANIFOLD- DELIVERS THE AIR FROM THE LINE TO THE STONES FOR DIFFUSION INTO THE SEWAGE.
- 6) AERATION LINE- DELIVERS THE AIR FROM THE PUMP TO THE MANIFOLD. CHECK VALVE INCLUDED.
- 7) AERATION STONE- AIR IS FINELY DIFFUSED FROM THE STONE INTO THE AERATION CHAMBER.
- 8) 15" COVERS- PROVIDE ASSEMBLY PORT ACCESS INSIDE OF THE SYSTEM. (NOT REQUIRED FOR REGULAR SERVICE)

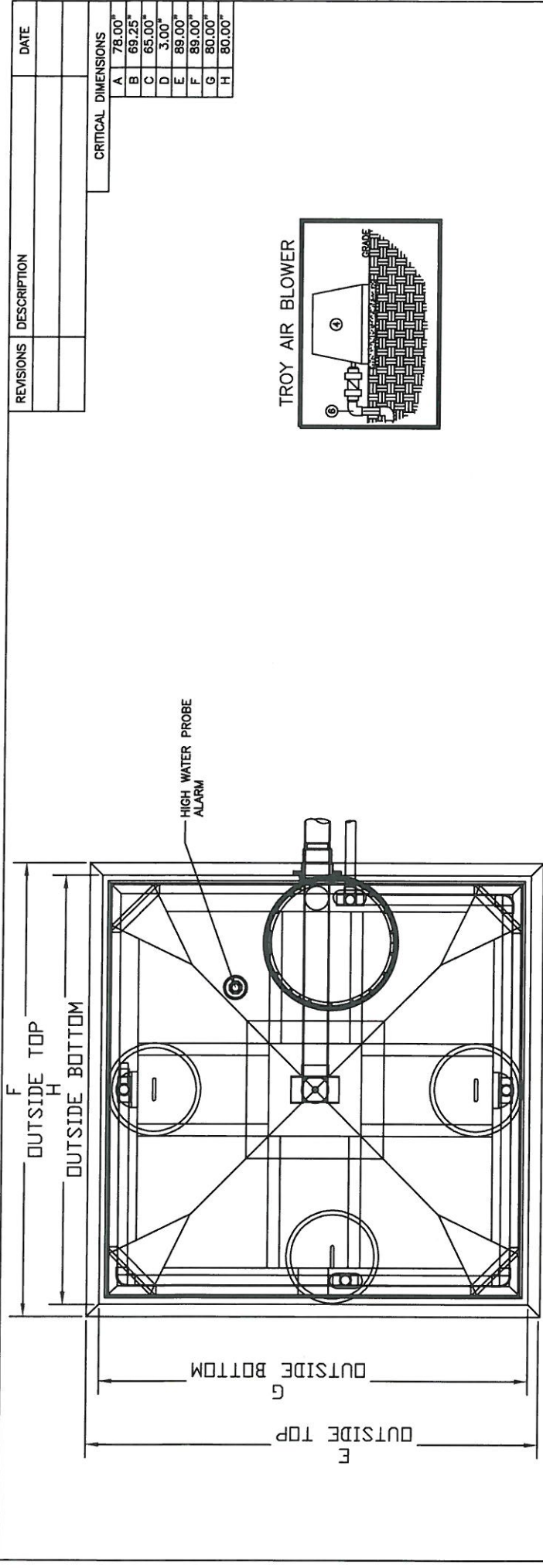


HOOT SYSTEMS, LLC

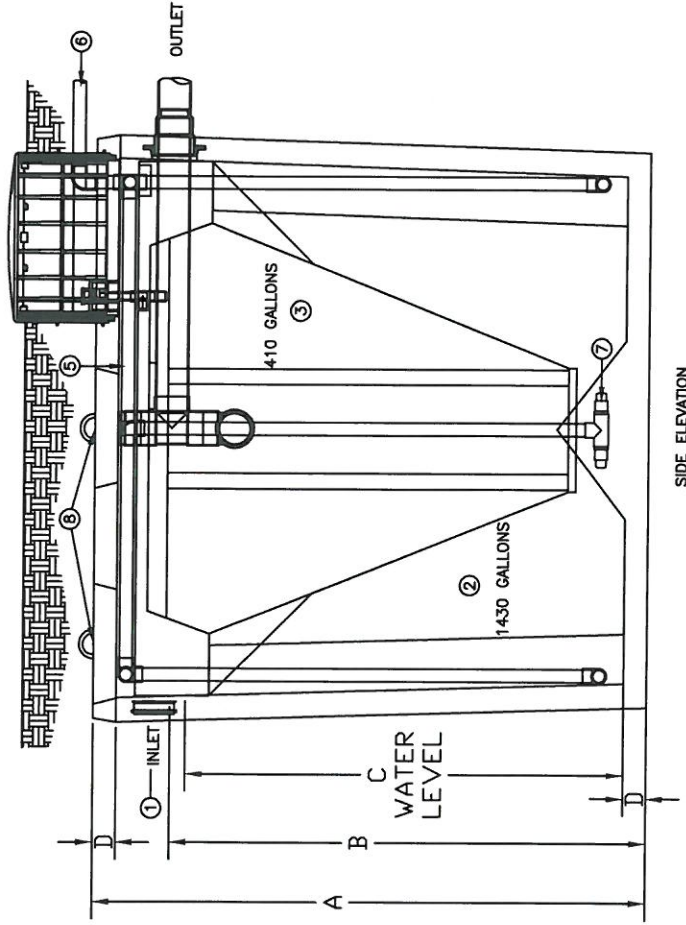
www.hootsystems.com

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DESCRIPTION: 600 GPD PUMPED DISCHARGE SYSTEM H-500/600 AN				PART #	
DATE:	DRAWN BY:	CHECK BY:	SCALE:	H-600AN	
9-7-09	AY	RS	N.T.S.		

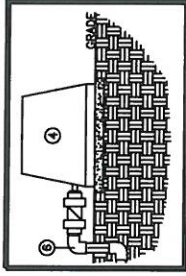


PLAN VIEW



SIDE ELEVATION

TROY AIR BLOWER



THE HOOT AEROBIC TREATMENT SYSTEM

- 1) SEPARATE PRETREATMENT TANK REQUIRED (MIN. 800 GALLONS) - WHERE ANAEROBIC DIGESTION OCCURS AND STORAGE FOR NON-Biodegradable MATERIALS.
- 2) AERATION CHAMBER - WHERE AIR IS INTRODUCED INTO SEWAGE FOR DIGESTION.
- 3) CLARIFIER - A STILL CHAMBER WHERE SOLIDS SETTLE OUT AND THE CLEAR EFFLUENT RISES.
- 4) TROY AIR LINEAR AIR BLOWER - LONG LIFE, EFFICIENT LINEAR BLOWER WHICH COMPRESSES ATMOSPHERIC AIR AND UNDER PRESSURE DELIVERS IT TO THE TANK. MAY BE REMOTELY MOUNTED UP TO 50' FROM SYSTEM. MUST MAINTAIN 1/8" SLOPE TOWARDS TANK FOR DRAINAGE TO TANK.
- 5) AIR MANIFOLD - DELIVERS THE AIR FROM THE LINE TO THE STONES FOR DIFFUSION INTO THE SEWAGE.
- 6) AERATION LINE - DELIVERS THE AIR FROM THE PUMP TO THE MANIFOLD. CHECK VALVE INCLUDED.
- 7) AERATION STONE - AIR IS FINELY DIFFUSED FROM THE STONE INTO THE AERATION CHAMBER.
- 8) 15" COVERS - PROVIDE ACCESS TO EACH COMPONENT OF THE SYSTEM FOR SERVICE ARE BROUGHT TO GRADE IE. REQUIRED PER LOCAL CODE.



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PART #

DESCRIPTION: 1000 GPD GRAVITY DISCHARGE SYSTEM
H-1000-A w/ POLYLOK ACCESS

DATE: 9-7-09
DRAWN BY: AY
CHECK BY: RS
SCALE: N.T.S.

H-1000-A

REVISIONS

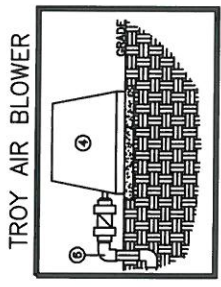
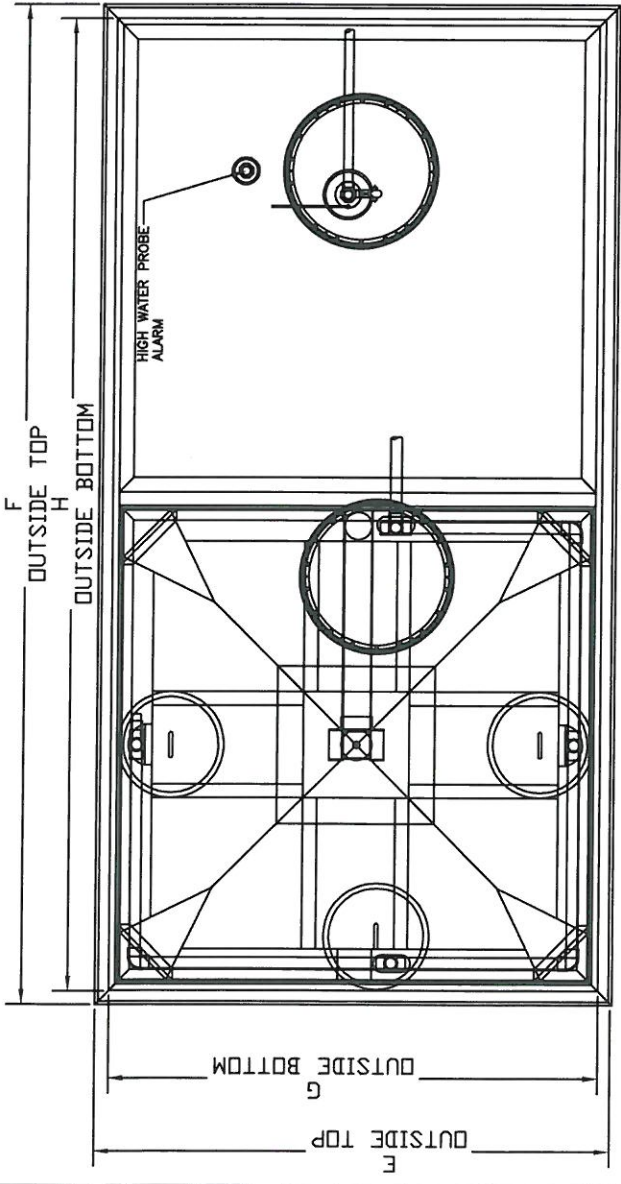
DESCRIPTION

DATE

CRITICAL DIMENSIONS

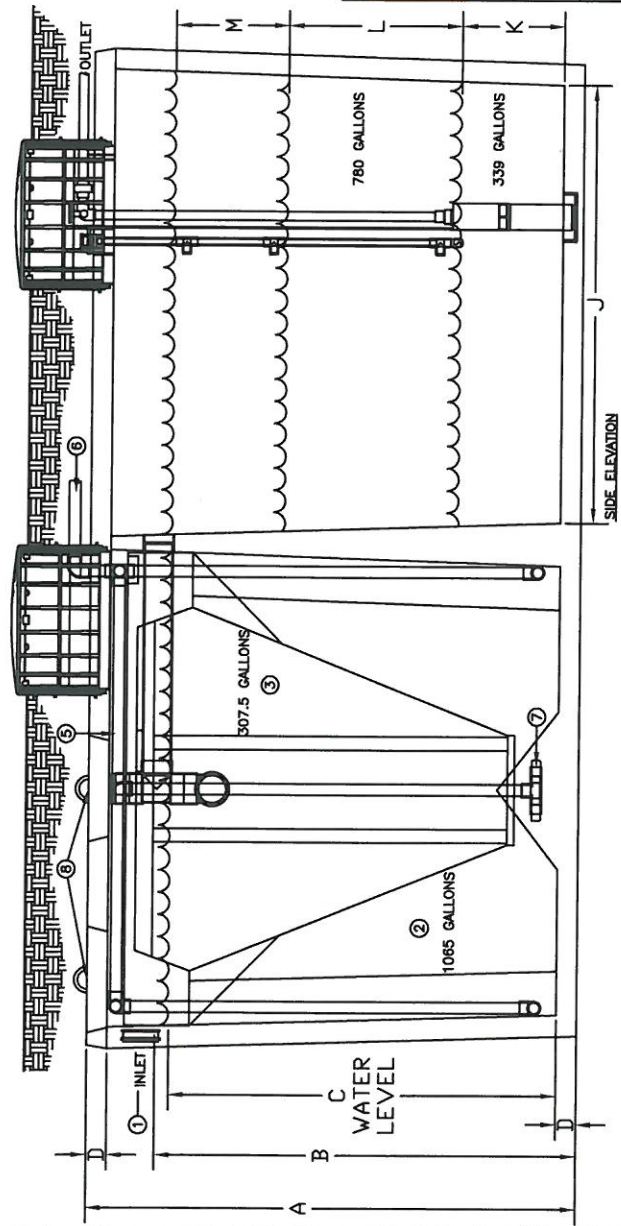
A	78.00"
B	69.25"
C	65.00"
D	3.00"
E	89.00"
F	89.00"
G	80.00"
H	80.00"

REVISIONS	DESCRIPTION	DATE



CRITICAL DIMENSIONS	
A	76.00"
B	69.25"
C	65.00"
D	3.00"
E	89.00"
F	157.00"
G	80.00"
H	148.00"
J	89.50"
K	15.00"
L	32.00"
M	14.00"

PLAN VIEW



THE HOOT AEROBIC TREATMENT SYSTEM

- 1) SEPARATE PRETREATMENT TANK REQUIRED (MIN. 800 GALLONS) WHERE ANAEROBIC DIGESTION OCCURS AND STORAGE FOR NON-Biodegradable MATERIALS.
- 2) AERATION CHAMBER- WHERE AIR IS INTRODUCED INTO SEWAGE FOR DIGESTION.
- 3) CLARIFIER- A STILL CHAMBER WHERE SOLIDS SETTLE OUT AND THE CLEAR EFFLUENT RISES.
- 4) TROY AIR LINEAR AIR BLOWER- LONG LIFE, EFFICIENT LINEAR BLOWER WHICH COMPRESSES ATMOSPHERIC AIR AND UNDER PRESSURE DELIVERS IT TO THE TANK. MAY BE BELT MOUNTED UP TO 50' FROM SYSTEM. MUST MAINTAIN 1/8" SLOPE TOWARDS TANK FOR DRAINAGE TO TANK.
- 5) AIR MANIFOLD- DELIVERS THE AIR FROM THE LINE TO THE STONES FOR DIFFUSION INTO THE SEWAGE.
- 6) AERATION LINE- DELIVERS THE AIR FROM THE PUMP TO THE MANIFOLD. CHECK VALVE INCLUDED.
- 7) AERATION STONE- AIR IS FINELY DIFFUSED FROM THE STONE INTO THE AERATION CHAMBER.
- 8) 18" COVERS- PROVIDE ACCESS TO EACH COMPONENT OF THE SYSTEM FOR SERVICE. ARE BROUGHT TO GRADE IE. REQUIRED PER LOCAL CODE.



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DESCRIPTION: 1,000 GPD PUMPED DISCHARGE SYSTEM		PART #	
HOOT H-1000AN W/1469 GAL PUMP TANK		H-1000-AN	
DATE:	DRAWN BY:	CHECK BY:	SCALE:
3-1-2010	AY	RS	N.T.S.

For Additional Information, Please Contact:



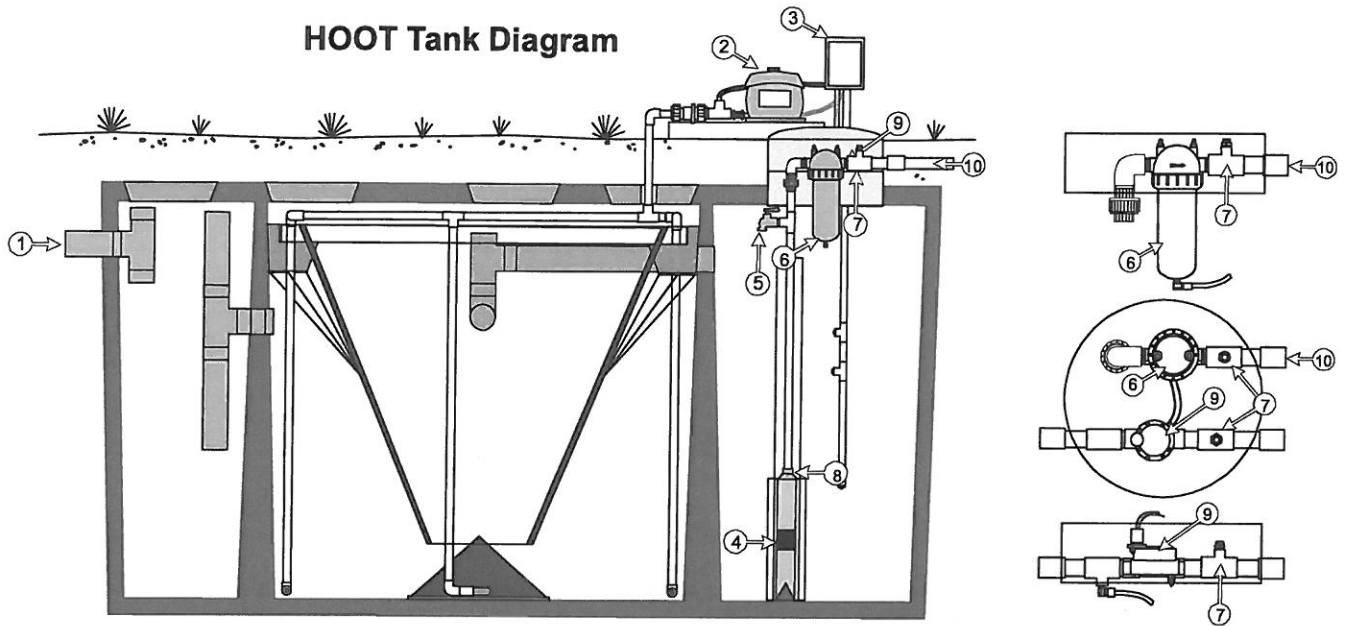
Hoot Systems, LLC

2885 Highway 14 East Lake Charles, LA 70607
(337) 474-2804 phone (337) 477-7904 fax

www.hootsystems.com

Revision 7/2014

HOOT Tank Diagram



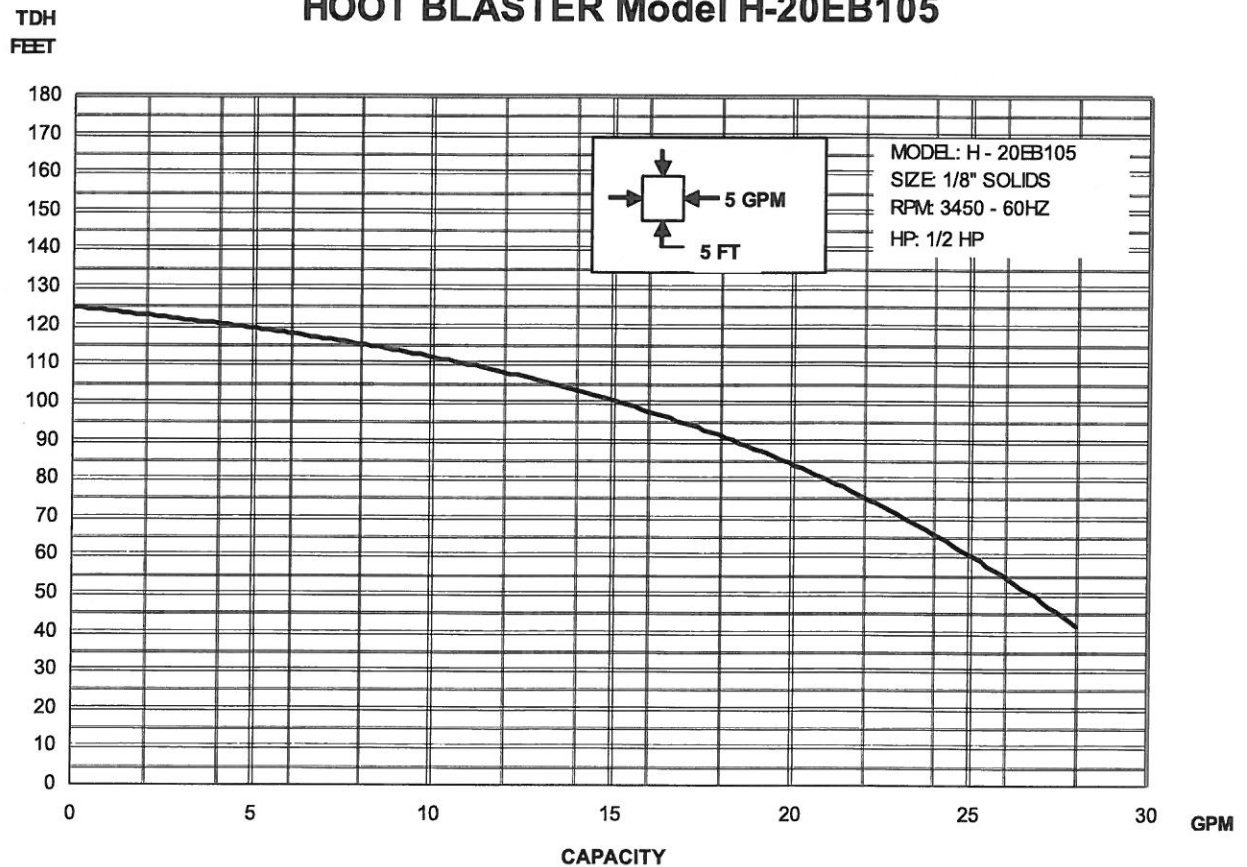
Key

- 1. 4" Inlet
- 2. Troy Air Blower
- 3. Hoot Dosing Control Panel

- 4. Hoot Blaster 20EB105
- 5. Sampling Port
- 6. 100 Micron Filter

- 7. Air Release Valves
- 8. Check Valve
- 9. Field Flush Solenoid Valve
- 10. 1 1/4" Pump Outlet

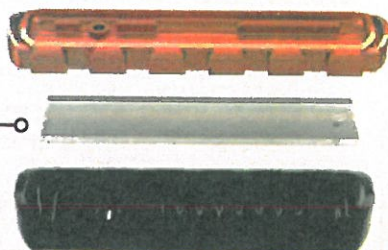
HOOT BLASTER Model H-20EB105



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.



PRODUCT ADVANTAGES

- Pressure compensation - all drippers deliver equal flow, even on sloped or rolling terrain.
- Unique flow path - Turbonet technology provides more control of water and a high resistance to clogging.
- Continuous self-flushing dripper design - flushes debris, as it is detected - throughout operation, not just at the beginning or end of a cycle. Ensures uninterrupted dripper operation.
- Single hole dripper outlet from tubing:
 - Better protection against root intrusion
 - Allows the dripline to be used in subsurface applications without need for chemical protection
- Drippers capture water flow from the center of the tubing - ensures that only the cleanest flow enters the dripper.
- Built-in physical root barrier - drippers are protected from root intrusion without the need for chemical protection.
- Three dripper flow rates - provides the broadest range of flow rates available. Allows the designer to match the dripline to any soil or slope condition.
- Bioline tubing is completely wrapped in purple - easily identifying it for non-potable use, regardless of how the tubing is installed.
- Cupron copper oxide is impregnated at specific concentrations, our patent-pending process, ensuring it remains effective throughout the life of the product.
- Bioline can be installed on-surface, under cover or subsurface.
- No special storage requirements - does not degrade if stored outdoors.

APPLICATIONS

- Typically installed following a treatment process
- Can be used with domestic septic tank effluent with proper design, filtration and operation
- Reuse applications including municipally treated effluent designated for irrigation and other disinfected and non-disinfected water sources.

SPECIFICATIONS

- Dripper flow rates: 0.4, 0.6 or 0.9 GPH
- Dripper spacings: 12", 18" or 24" dripper spacings and blank tubing
- Pressure compensation range: 7 to 58 psi
- Maximum recommended system pressure: 58 psi
- Tubing diameter: 0.66" OD, 0.56" ID
- Tubing color: Purple color indicates non-potable
- Coil lengths: 500' or 1,000' (Blank tubing in 250')
- Recommended filtration: 120 mesh
- Bending radius: 7"
- UV resistant
- Tubing material: Linear low-density polyethylene

Additional spacing and pipe sizes available by special order. Please contact Netafim USA Customer Service for details.

BIOLINE DRIPLINE

MAXIMUM LENGTH OF A SINGLE LATERAL WITH 3.0 fps FLUSH VELOCITY

ADDITIONAL FLOW OF 2.3 GPM REQUIRED PER LATERAL TO ACHIEVE 3 fps

DRIPPER SPACING		12"			18"			24"		
INLET PRESSURE	DRIPPER FLOW RATE (GPH)	0.4 GPH	0.6 GPH	0.9 GPH	0.4 GPH	0.6 GPH	0.9 GPH	0.4 GPH	0.6 GPH	0.9 GPH
	15	102	94	84	136	127	113	161	151	137
	25	151	136	118	203	184	161	245	223	197
	35	193	171	146	260	232	200	315	283	245
	40	211	186	158	286	254	218	347	311	267
	45	228	200	169	310	274	233	377	335	287
Flow per 100' (GPM / GPH)		0.67/40	1.02/61	1.53/92	0.44/26.67	0.66/41	1.02/61	0.34/20	0.51/31	0.77/46

Lateral lengths are based on flows allowing for a 3 fps flushing/scouring velocity

MAXIMUM LENGTH OF A SINGLE LATERAL WITH 2.5 fps FLUSH VELOCITY

ADDITIONAL FLOW OF 2.0 GPM REQUIRED PER LATERAL TO ACHIEVE 2.5 fps

DRIPPER SPACING		12"			18"			24"		
INLET PRESSURE	DRIPPER FLOW RATE (GPH)	0.4 GPH	0.6 GPH	0.9 GPH	0.4 GPH	0.6 GPH	0.9 GPH	0.4 GPH	0.6 GPH	0.9 GPH
	15	128	115	100	172	155	136	205	187	165
	25	183	161	137	248	220	188	301	268	231
	35	228	198	166	310	272	229	379	333	283
	40	248	214	178	338	295	247	413	362	305
	45	266	229	190	364	316	263	447	389	327
Flow per 100' (GPM / GPH)		0.67/40	1.02/61	1.53/92	0.44/26.67	0.66/41	1.02/61	0.34/20	0.51/31	0.77/46

Lateral lengths are based on flows allowing for a 2.5 fps flushing/scouring velocity

MAXIMUM LENGTH OF A SINGLE LATERAL WITH 2.0 fps FLUSH VELOCITY

ADDITIONAL FLOW OF 1.6 GPM REQUIRED PER LATERAL TO ACHIEVE 2.0 fps

DRIPPER SPACING		12"			18"			24"		
INLET PRESSURE	DRIPPER FLOW RATE (GPH)	0.4 GPH	0.6 GPH	0.9 GPH	0.4 GPH	0.6 GPH	0.9 GPH	0.4 GPH	0.6 GPH	0.9 GPH
	15	161	141	119	217	191	164	263	233	201
	25	221	190	157	302	261	218	369	321	270
	35	269	229	187	370	316	260	455	391	324
	40	290	246	200	399	340	278	493	421	347
	45	310	261	212	427	362	296	527	449	369
Flow per 100' (GPM / GPH)		0.67/40	1.02/61	1.53/92	0.44/26.67	0.66/41	1.02/61	0.34/20	0.51/31	0.77/46

Lateral lengths are based on flows allowing for a 2 fps flushing/scouring velocity

MAXIMUM LENGTH OF A SINGLE LATERAL WITH 1.5 fps FLUSH VELOCITY

ADDITIONAL FLOW OF 1.2 GPM REQUIRED PER LATERAL TO ACHIEVE 1.5 fps

DRIPPER SPACING		12"			18"			24"		
INLET PRESSURE	DRIPPER FLOW RATE (GPH)	0.4 GPH	0.6 GPH	0.9 GPH	0.4 GPH	0.6 GPH	0.9 GPH	0.4 GPH	0.6 GPH	0.9 GPH
	15	201	171	140	275	235	194	337	289	241
	25	266	222	179	366	308	251	453	383	313
	35	316	262	210	437	365	295	543	455	369
	40	337	280	223	469	391	313	583	487	393
	45	358	296	235	497	413	331	619	517	415
Flow per 100' (GPM / GPH)		0.67/40	1.02/61	1.53/92	0.44/26.67	0.66/41	1.02/61	0.34/20	0.51/31	0.77/46

Lateral lengths are based on flows allowing for a 1.5 fps flushing/scouring velocity

MAXIMUM LENGTH OF A SINGLE LATERAL WITH 1.0 fps FLUSH VELOCITY

ADDITIONAL FLOW OF 0.8 GPM REQUIRED PER LATERAL TO ACHIEVE 1.0 fps

DRIPPER SPACING		12"			18"			24"		
INLET PRESSURE	DRIPPER FLOW RATE (GPH)	0.4 GPH	0.6 GPH	0.9 GPH	0.4 GPH	0.6 GPH	0.9 GPH	0.4 GPH	0.6 GPH	0.9 GPH
	15	248	205	163	344	285	228	427	355	285
	25	315	258	203	440	361	286	549	453	359
	35	367	298	234	513	419	331	643	527	417
	40	389	316	248	545	445	350	683	559	441
	45	409	332	260	574	468	367	721	589	463
Flow per 100' (GPM / GPH)		0.67/40	1.02/61	1.53/92	0.44/26.67	0.66/41	1.02/61	0.34/20	0.51/31	0.77/46

Lateral lengths are based on flows allowing for a 1 fps flushing/scouring velocity

MAXIMUM LENGTH OF A SINGLE LATERAL WITH 0.5 fps FLUSH VELOCITY

ADDITIONAL FLOW OF 0.4 GPM REQUIRED PER LATERAL TO ACHIEVE 0.5 fps

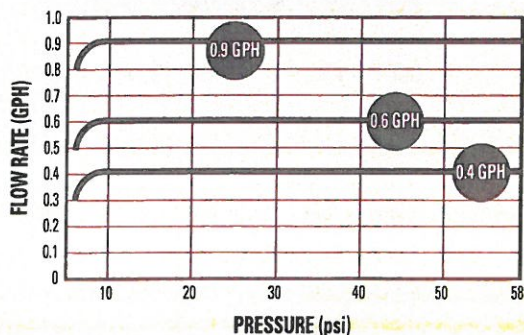
DRIPPER SPACING		12"			18"			24"		
INLET PRESSURE	DRIPPER FLOW RATE (GPH)	0.4 GPH	0.6 GPH	0.9 GPH	0.4 GPH	0.6 GPH	0.9 GPH	0.4 GPH	0.6 GPH	0.9 GPH
	15	301	242	188	422	341	265	531	429	335
	25	369	296	228	520	418	323	655	527	409
	35	421	337	260	595	476	368	749	603	467
	40	443	354	273	626	501	387	790	635	491
	45	464	371	285	656	524	404	829	665	513
Flow per 100' (GPM / GPH)		0.67/40	1.02/61	1.53/92	0.44/26.67	0.66/41	1.02/61	0.34/20	0.51/31	0.77/46

Lateral lengths are based on flows allowing for a 0.5 fps flushing/scouring velocity

Netafim recommends flushing velocities capable of breaking free any accumulated bioslimes and debris in the piping network.

- Notes:
1. Refer to local regulations for information on flushing velocities that may be written into codes.
 2. Netafim does not endorse a specific flushing velocity.
 3. Flushing velocities should be determined based on regulations, quality of effluent, and type of flushing control.
 4. Using a flushing velocity less than 1 fps does not provide turbulent flow as defined by Reynolds Number.
 5. Higher flushing velocities provide more aggressive flushing.

DRIPPER FLOW RATE VS. PRESSURE



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.

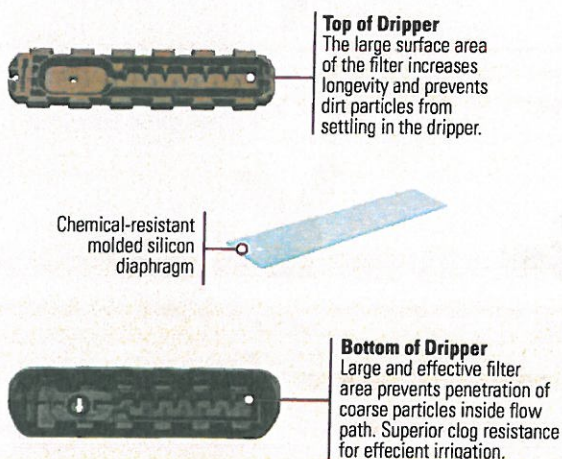
FLOW PER 100 FEET

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

Netafim sets the bar for innovation in drip irrigation with copper. Cupron® copper oxide-based technology allows for maximum performance. The integration of copper oxide in the internal emitter, and the unique patented emitter design with physical root barrier provides two levels of protection, giving your system the protection it needs to fight against root intrusion.

- Cupron copper oxide provides one of two layers of defense against root intrusion, a physical root barrier inside the dripper provides the other.
- Cupron copper oxide technology will not wash out, wear off or leach out; remaining effective throughout the life of the product.
- Cupron copper oxide is approved for use by the EPA ensuring peace of mind.

EXPLODED VIEW OF BIOLINE DRIPPER



BIOLINE DRIPPER OPERATION

Bioline drippers are pressure compensating - delivering the water uniformly into the soil for further treatment or for reuse by the landscape. These unique drippers allow the tubing to be installed on flat topography or steep slopes.

Bioline drippers are protected against microbial activity. Copper oxide impregnated XR drippers – Copper, a natural antimicrobial material, is used to help prevent microbial activity.

Netafim drippers are continuously self-cleaning during operation, not just at the beginning and end of a cycle. The result is dependable, clog-free operation, year after year.

SPECIFYING INFORMATION

SAMPLE MODEL NUMBER

08WRAM.6-24 V

A Bioline Dripline = **08WRAM**

1 **DRIPPER FLOW RATE**
0.4 GPH = .4
0.6 GPH = .6
0.9 GPH = 1

2 **DRIPPER SPACING**
12" = 12
18" = 18
24" = 24

3 **COIL LENGTH**
500' = V500
1,000' = V

BLANK Tubing Model Number: 250' = 08WRAM-250

ORDERING INFORMATION

FLOW RATE	DRIPPER SPACING	COIL LENGTH	MODEL NUMBER
0.4 GPH	12"	1,000' 500'	08WRAM.4-12V 08WRAM.4-12V500
0.4 GPH	18"	1,000' 500'	08WRAM.4-18V 08WRAM.4-18V500
0.4 GPH	24"	1,000' 500'	08WRAM.4-24V 08WRAM.4-24V500
0.6 GPH	12"	1,000' 500'	08WRAM.6-12V 08WRAM.6-12V500
0.6 GPH	18"	1,000' 500'	08WRAM.6-18V 08WRAM.6-18V500
0.6 GPH	24"	1,000' 500'	08WRAM.6-24V 08WRAM.6-24V500
0.9 GPH	12"	1,000' 500'	08WRAM1-12V 08WRAM1-12V500
0.9 GPH	18"	1,000' 500'	08WRAM1-18V 08WRAM1-18V500
0.9 GPH	24"	1,000' 500'	08WRAM1-24V 08WRAM1-24V500
Blank Tubing 17mm		250'	08WRAM-250

BIOLINE FITTINGS

FITTING APPLICATIONS

- Fits Bioline Dripline

FITTING SPECIFICATIONS

- Barbed fittings for a secure fit
- Easy installation without glue or tools
- Allows for easy on-site inspection of proper fitting installation



TLCoup
Insert Coupling



TLEll
Insert Elbow



TLTEE
Insert Tee



TLCROS
Insert Cross



TL050MA
1/2" Male Adapter



TL075MA
3/4" Male Adapter



TL075FTEE
Combination Tee
Ins x Ins x 3/4" FPT



TL2W075MA
2-Way Insert
3/4" MPT x Insert



TLIAPE-B
Insert Adapter for 1" or
Larger PE (Requires 11mm
or 7/16" drill or punch)



TLIAPVC-B
Insert Adapter with Grommet
1 1/2" or larger PVC Pipe



TDBIT16.5
Drill Bit for TLIAPVC
Fitting (16.5mm or 21/32")



TLFIG8
Figure 8 Line End



TLS6
6" Soil Staple

FITTING DEFINITIONS

FPT = Female Pipe Thread

MPT = Male Pipe Thread

Ins x Ins = Insert by Insert



TLSOV
Shut-Off Valve
Ins x Ins



TLCV
Inline Check Valve

- Flow Range: 0.9 to 4.4 GPM
- Opening Pressure: 10.2 psi
- Closing Pressure: 5.8 psi
(13.4 Feet Column of Water)

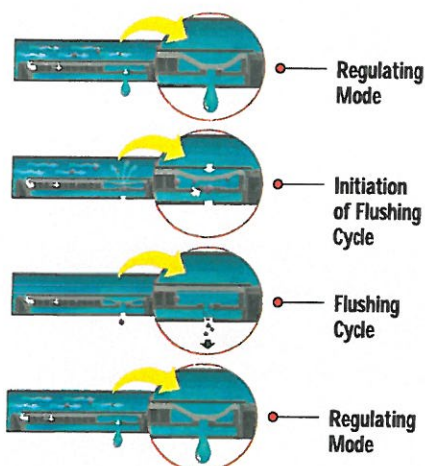


NETAFIM USA
5470 E. Home Ave.
Fresno, CA 93727
CS 888 638 2346
www.netafimusa.com

NETAFIM

BioLine Dripperline

Pressure Compensating Dripperline for Wastewater



BioLine's Self-Cleaning, Pressure Compensating Dripper is a fully self-contained unit molded to the interior wall of the dripper tubing.

As shown at left, BioLine is continuously self-cleaning during operation, not just at the beginning and end of a cycle. The result is dependable, clog free operation, year after year.

Product Advantages

The Proven Performer

- Tens of millions of feet used in wastewater today.
- BioLine is permitted in every state allowing drip disposal.
- Backed by the largest, most quality-driven manufacturer of drip products in the U.S.
- Preferred choice of major wastewater designers and regulators.
- Proven track record of success for many years of hard use in wastewater applications.

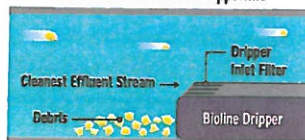
Quality Manufacturing with Specifications Designed to Meet Your Needs

- Pressure compensating drippers assure the tightest application uniformity - even on sloped or rolling terrain.
- Excellent uniformity with runs of 400 ft. or more reduce installation costs.
- Highest quality-control standards in the industry: Cv of 0.25 (coefficient of manufacturer's variation).
- A selection of flows and spacings to satisfy the designer's demand for almost any application rate.

Long-Term Reliability

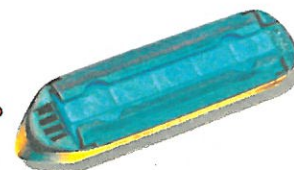
- Protection against plugging:
 - Dripper inlet raised 0.27" above wall of tubing to prevent sediment from entering dripper.
 - Drippers impregnated with Vinyzene to prevent buildup of microbial slime.
 - Unique self-flushing mechanism passes small particles before they can build up.

Cross Section of BioLine Dripperline



Root Safe

- A physical barrier on each BioLine dripper helps prevent root intrusion.
- Protection never wears out - never depletes - releases nothing to the environment.
- Working reliably for up to 15 years in subsurface wastewater installations.
- Additional security of chemical root inhibition with Techfilter - supplies Trifluralin to the entire system, effectively inhibiting root growth to the dripper outlets.



Applications

- For domestic strength wastewater disposal.
- Installed following a treatment process.
- Can be successfully used on straight septic effluent with proper design, filtration and operation.
- Suitable for reuse applications using municipally treated effluent designated for irrigation water.

Specifications

Wall thickness (mil): 45*

Nominal flow rates (GPH): .4, .6, .9*

Common spacings: 12", 18", 24"*

Recommended filtration: 120 mesh

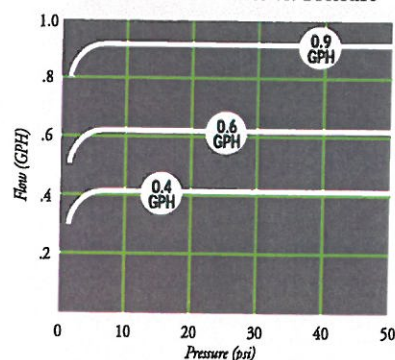
Inside diameter: .570*

Color: Purple tubing indicates non-potable source.

*Additional flows, spacings, and pipe sizes available by request. Please contact Netafim USA Customer Service for details.



BIOLINE Flow Rate vs. Pressure



NETAFIM
USA
PRECISION IRRIGATION™

5470 E. Home Ave. • Fresno, CA 93727
(888) 638-2346 • FAX (800) 695-4753
www.netafimusa.com

BioLine Technical Information

DRIPPER FLOW PATH DIMENSIONS

Dripper	Length	Depth	Width
0.4 GPH	.75"	.037"	0.040"
0.6 GPH	.75"	.045"	0.044"
0.9 GPH	.75"	.047"	0.060"

DRIPPER HYDRAULIC PERFORMANCE

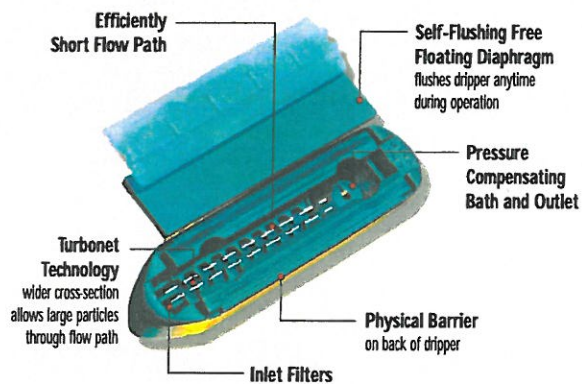
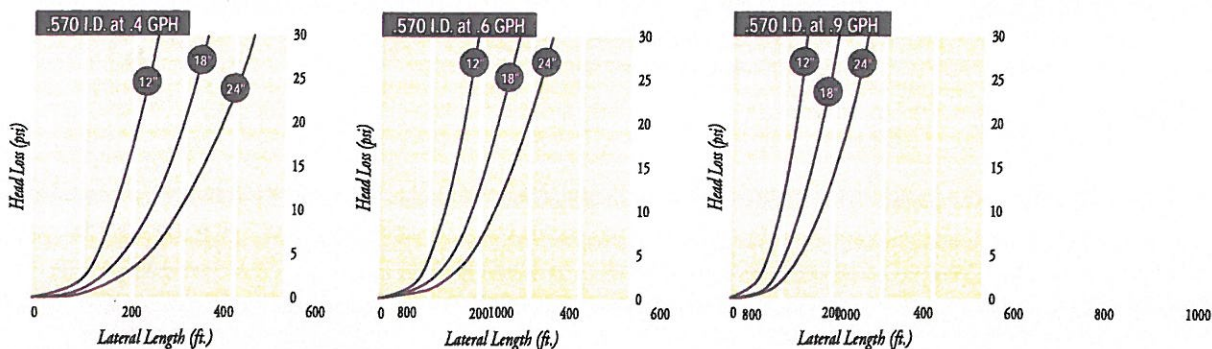
Dripper	Kd	Exponent (x)	Constant (K)
0.4 GPH	.9	0	.42
0.6 GPH	.9	0	.61
0.9 GPH	.9	0	.92

UNIFORMITY

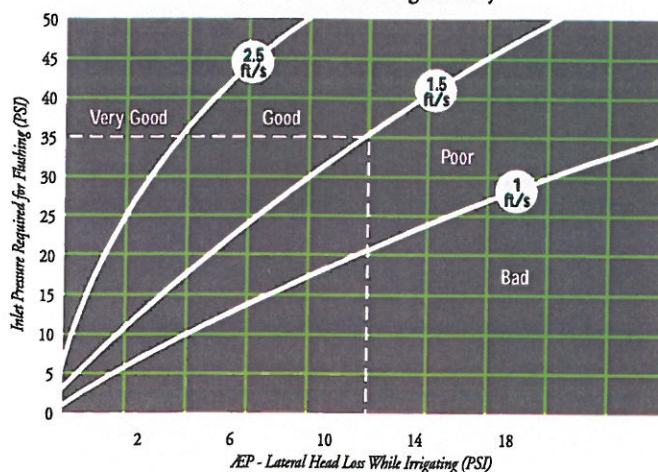
Dripper	Cv
0.4 GPH	0.25
0.6 GPH	0.25
0.9 GPH	0.25

OPERATING RECOMMENDATIONS

Dripper	Minimum Pressure	Maximum Pressure	Minimum Filtration
0.4 GPH	10 psi	60 psi	120
0.6 GPH	10 psi	60 psi	120
0.9 GPH	10 psi	60 psi	120



BIOLINE Flushing Velocity



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 www.netafimusa.com



DEPARTMENT OF HEALTH

STATE HEALTH OFFICE

SEPTIC TANK DESIGNATED APPROVAL NUMBERS

SEPTIC TANK MANUFACTURERS

run date: 6/16/2014

Searching for: ATU

George W. Shepard & Son, Inc.

PO Box 202

Naples FL 34106

ACTIVE

Collier

TANK NUMBER	CATEGORY	WALL THICKNESS	LIQUID DEPTH	TOP EXTERIOR WIDTH	TOP EXTERIOR LENGTH	EFFECTIVE GALLONS	TOTAL GALLONS (Pump Tanks)	USE	APPROVAL DATE	FAMILY
11-149-H10G-C3	C3	2.50	65.00	89	89	1880	2,100	ATU	2/26/2014	1
REMARKS: Houses the Hoot 1000 gpd gravity ATU system (H-1000 A), requires settling tank										
11-149-H10G-C4	C4	2.50	65.00	89	89	1880	2,100	ATU	2/26/2014	1
REMARKS: Houses the Hoot 1000 gpd gravity ATU system (H-1000 A), requires settling tank; 5000 psi concrete										
11-149-H10P-C4	C4	2.50	65.00	89	157	3309		ATU	4/3/2012	1
REMARKS: Houses the Hoot 1000 gpd dosed ATU system (H-1000 AND), requires settling tank; 5000 psi concrete										
11-149-H10P-C3	C3	2.50	65.00	89	157	3309		ATU	10/25/2011	1
REMARKS: Houses the Hoot 1000 gpd dosed ATU system (H-1000 AND), requires settling tank										
11-149-H6G-C4	C4	2.50	52.00	74.5	106	1320		ATU	7/12/2012	8
REMARKS: Houses either the Hoot 500 or 600 gpd gravity flow ATU (H-500A; H-600A); 5000 psi concrete										
11-149-H6G-C3	C3	2.50	52.00	74.5	106	1320		ATU	10/24/2011	3
REMARKS: Houses either the Hoot 500 or 600 gpd gravity flow ATU (H-500A; H-600A)										
11-149-H6P-C4	C4	2.50	52.00	74.5	160	2080		ATU	7/12/2012	8
REMARKS: Houses either the Hoot 500 or 600 gpd dosed ATU (H-500 AND, H-600 AND). Needs recirculation for increased nitrogen reduction; 5000 psi concrete										
11-149-H6P-C3	C3	2.50	52.00	74.5	160	2080		ATU	10/25/2011	2
REMARKS: Houses either the Hoot 500 or 600 gpd dosed ATU (H-500 AND, H-600 AND). Needs recirculation for increased nitrogen reduction										

Jeb Bush
Governor



John O. Agwunobi, M.D.
Secretary

INTEROFFICE MEMORANDUM

INFORMATION
HSES 02-001

DATE: January 28, 2002

TO: County Health Department Directors/Administrators
ATTN: Environmental Health and Engineering Directors

THROUGH: Sharon L. Heber, Dr. P.H., Director
Division of Environmental Health 

FROM: 
Gerald Briggs, Chief
Bureau of Onsite Sewage Programs

SUBJECT: ANSI/NSF Standard 40, Class I, Aerobic Treatment Units (new listings)

INFORMATION ONLY

Baylor University has certified the following aerobic treatment units (ATUs) as meeting all of the requirements of ANSI/NSF Standard 40 - Residential Wastewater Treatment Systems for Class classification. Please add them to the listing of ATUs acceptable for use in the State of Florida.

LISTED SYSTEM: Hoot Aerobic Systems
MANUFACTURER: Murphy Cormier, General Contractor, Inc.
2885 Highway 14 East
Lake Charles, LA 70607
(337) 474-2804
www.hootsystems.com

MOST RECENT LISTING DATE 10/11/2001 (Re-certification complete as of this date)

APPROVED MODELS AND MATERIALS DESIGNATIONS:
Model Number Rated Capacity-Gallons/Day Classification
H-500 A/AD/AN/AH/AW/AS/AT/AND/ASD/ATD, CP 500 Class I
H-750 AN/AH/AND, CP 750 Class I
H-1000 AD/AN/AW/AND, CP 1000 Class I
LA-Hoot 500 & 500TP 500 Class I
LA-Hoot 1000 & 1000TP 1000 Class I

Attached, you will find completion reports and/or engineering drawings for these units.

Please direct any questions to Brad Croft at (850) 245-4070 or SC 205-4070.

GB/bc
Attachments

**STATE OF FLORIDA
DEPARTMENT OF HEALTH
APPLICATION FOR ONSITE SEWAGE TREATMENT AND DISPOSAL SYSTEM OPERATING PERMIT**

Authority: Chapter 381, F.S. & Chapter 64E-6, F.A.C.
New: _____ Amended: _____ Renewal: _____
Aerobic: _____ Commercial: _____ Industrial/Manufacturing: _____

Application/Permit Number _____

GENERAL INFORMATION

Property Owner: _____
Work Telephone: _____ Home phone: _____
Address of Owner: _____ City: _____ State: _____ Zip: _____
Owner's Agent: _____
Agent's Address: _____ City: _____ State: _____ Zip: _____
Agent's Phone: _____ Property Street Address: _____
City: _____ State: _____ Zip: _____
Section: _____ Township: _____ Range: _____ Parcel: _____ Lot: _____ Block: _____ Subdivision: _____ Unit: _____

EXISTING SYSTEM INFORMATION

Please complete those items shown below which are applicable to the existing permitted onsite sewage disposal system serving the above referenced property: Onsite Sewage Treatment and Disposal System Construction Permit Number (if known): _____
Septic Tank(s)/Aerobic Unit _____ gallons Grease Trap(s) _____ gallons Dosing Tank _____ gallons
Drainfield size is _____ square feet installed in a: standard subsurface _____ filled _____ mound system _____
The drainfield layout is in trenches _____ absorption bed _____ other _____ (describe) Drip Irrigation Disposal System
Onsite Well? Yes _____ No _____ System Setback to Wells _____ ft. Lot Size _____ Square Feet
Estimated sewage flow into system _____ Gallons/Day Based on _____
Number of businesses or dwellings (circle one) which are being served by this onsite sewage disposal system _____
Additional Comments: _____

COMMERCIAL/INDUSTRIAL/MANUFACTURING FACILITY

Please attach a business survey form for each business which is or will be served by the onsite sewage disposal system. Briefly describe the type of activities that will be supported by the onsite sewage system serving this property. _____

What is the zoning designation for the property? _____ Give a description of the zoning and examples of approved businesses in this type of zoning: _____

AEROBIC TREATMENT UNIT

Date of aerobic system installation approval: _____/_____/_____ Is the aerobic treatment unit still under the manufacturer's initial two year warranty? Yes X No _____ Aerobic Unit Manufacturer: Hoot Aerobic Systems
Type of Aerobic Unit: Hoot GPD Class I: X Class II: _____ Above 1500 Gallon Capacity: No
Construction/Installation Permit Number: _____ Are multiple aerobic units used on the site: Yes _____ No _____
Is there an active service agreement on the aerobic treatment unit? Yes X No _____ Please Attach a Copy of the Agreement
If yes, when does the service agreement expire? _____/_____/_____
Who is the authorized service company providing maintenance to your unit?
Company Name _____ Phone Number _____
Address _____ City _____ State _____ Zip _____

I hereby certify that the above information is accurate and a reflection of the actual conditions existing on the above referenced property. I understand that any change of occupancy or tenancy at the above location will require me to file an amendment to this operating permit.

Applicant's signature: _____ Date _____/_____/_____
Application Status: _____
Disapproved: _____ Date _____/_____/_____ Reason: _____

By: _____ Title: _____ CHD
Approved: _____ Date _____/_____/_____
By: _____ Title: _____ CHD

PERFORMANCE STANDARDS DESIGN REVIEW CHECKLIST

Application

1. Cover letter from engineer requesting the approval of a performance based system. _____
2. Initial site evaluation with estimated seasonal high water table, soil LTAR _____
3. County Department of Health/Engineer concurrence on estimated seasonal high water table, soil LTAR. _____

Design

1. Plans signed, dated, and sealed by an engineer registered in the State of Florida. _____
2. "Certification of Design" statement signed by the Engineer _____
3. Design adherence to setback requirements. _____
If not, specify non-conformance setbacks. _____
4. Design adherence to separation from the seasonal high water table _____
5. Information required:

! System design criteria:

! Performance level: STS(), ASTS(), AWTS()

ASTS with enhanced nutrient removal (Keys)()

- ! CBOD = 2.4 mg/l
- ! TSS = 1.8 mg/l
- ! TN = 9.7 mg/l
- ! TP = N/A mg/l
- ! f coliform = N/A fc colonies/100 ml

! System design calculations. _____

! System design plans and drawings. _____

! Monitoring requirements:

! pollutant(s) to be monitored. _____

! pollutant sampling frequency. _____

! monitoring ports provided. _____

! monitoring locations identified. _____

6. Drainfield:

! Drainfield infiltrative surfaces identification. _____

! Drainfield infiltrative surface calculations. _____

! Drainfield Infiltrative surface reductions adherence to performance expectations. _____

! Design adherence to "effective storage volume" requirements. _____

! Design adherence to "total storage volume" requirements. _____

! Design adherence to unobstructed area requirements. _____

7. Modeling programs:

! Model program inputs documented in tabular form. _____

! Model program outputs included In the engineering submission _____

8. System failure effluent collection contingency plan, if applicable. _____

9. Installation Instructions. _____

Inspection

1. Operational manual. _____

2. Operational maintenance manual/instructions _____

Operational maintenance frequency. _____

3. Signed maintenance agreement between owner and maintenance entity _____

4. Property owner has executed and recorded (in the public records at the county courthouse), a written notice that informs all subsequent property owners of the use of the performance based treatment system and the requirement for the system to be maintained. _____

5. "Certification of Installation" statement signed by the engineer, or an agent of the engineer. _____

6. Verification of system installation per design plans and specifications. _____

DRIP EFFLUENT DISPOSAL SYSTEMS

DESIGN CRITERIA

April 11, 2001

Drip effluent disposal systems shall be permitted as an alternative drainfield option for use in Performance-Based Treatment Systems in the State of Florida. The following criteria apply.

Florida registered professional engineers shall design all drip effluent disposal systems and the design shall include and consider the following:

1. Drip effluent disposal systems shall be considered performance-based treatment systems.
2. Effluent for drip effluent disposal systems shall be pretreated to reduce both the 5-day Carbonaceous Biochemical Oxygen Demand (CBOD₅) and the Total Suspended Solids (TSS) to each be less than 30 mg/l.
3. The infiltrative area required shall be the same as the area required for a mineral aggregate drainfield with reductions allowed for the reduction of CBOD₅ and TSS as noted in Florida Administrative Code, Chapter 64E-6, Part IV, Performance-Based Treatment Systems.
4. In a bed configuration, the drainfield area shall be calculated as extending one foot beyond the sides of the outermost emitter lines.
5. In a trench containing a single distribution line, the drainfield area shall be calculated as 2 feet X the emitter spacing in feet X the number of emitters.
6. Drip effluent disposal systems shall be considered pressure distribution systems.
7. Head loss calculations shall be provided to insure proper hydraulic pressure at the emitter.
8. Pump selection shall be indicated in the design specifications. Pump performance curves shall be provided.
9. Recirculation rates shall be indicated on the drawings.
10. Check valves, petcocks, inline filters, and vacuum breaking device locations shall be indicated on the drawings.
11. Drip effluent disposal systems shall be time-dosed over the 24-hour period. Demand control dosing shall override timed-dosing in periods of flow where timed dosing cannot handle the excessive flow.
12. All drip emitter systems shall be designed as continuous loop circuits with no dead-end emitter lines. All systems need to incorporate a mechanism for backwashing or flushing.
13. Drip effluent disposal systems shall meet the following operating parameters:
 - Minimum operating pressure at the emitter head shall be 10 psi.
 - Maximum operating pressure at the emitter head shall be 45 psi.
 - Maximum system operating pressure shall be 60 psi.
 - Maximum discharge rate per emitter shall be 1.5 gallons per hour.
14. Drip emitter lines shall be drawn to scale and drip emitter spacing shall be indicated on the drawings.
15. The maximum emitter longitudinal spacing on a distribution line shall be 2 feet. The maximum distribution line spacing in a bed configuration shall be 2 feet.

16. The 24-inch separation from the seasonal high water table shall be measured from the emitter orifice.
17. Setbacks shall be measured from the drip emitter lines.
18. There is no drainfield sidewall in a drip effluent disposal system. The definition of a filled system in s. 64E-6.002(24), Florida Administrative Code, is not applicable to drip effluent disposal systems. A drip effluent disposal system is considered to be a mound system when any part of the bottom surface of any drip emitter line is located at or above the elevation of undisturbed native soil in the drainfield area. A drip effluent disposal system is considered a standard subsurface drainfield system when the entire bottom surface of every drip emitter line is installed below the elevation of undisturbed native soil in the drainfield area.
19. For mound systems there shall be a minimum separation of 18 inches between the shoulder of the fill and the nearest drip emitter line. Mound system slopes shall be in accordance with s. 64E-6.009(3)(f), Florida Administrative Code. Mound systems shall be stabilized in accordance with s. 64E-6.009(3)(f), Florida Administrative Code.
20. For standard subsurface systems, the elevation of any fill covering the drainfield shall extend no less than 18 inches away from all emitter lines before tapering down to natural grade.
21. Minimum cover on the distribution lines shall be 6 inches for standard subsurface systems and 9 inches for mound systems. The maximum cover for all systems shall be no greater than 12 inches.
22. The system shall include a petcock on the dosing pump discharge line for effluent sampling in lieu of the installation of monitoring ports required in s. 64E-6.029(2), Florida Administrative Code.
23. All onsite sewage treatment and disposal systems that include a drip effluent disposal system shall have an annual operating permit, maintenance contract with an approved performance-based system maintenance entity and shall be inspected in accordance with s. 64E-6.027(5), Florida Administrative Code.
24. Manufacturers of drip effluent disposal system distribution lines, emitters, and components shall apply for and obtain approval for specific model numbers or part numbers prior to inclusion of the components on any site specific permit application.
25. Manufacturer's of drip effluent disposal system components shall provide design and installation manuals for engineering and construction guidance. Design manuals shall include tables that detail flow rates vs. pressure and pressure loss per length(s) of distribution pipe.

Answers for Drip Effluent Disposal Systems Design Criteria for the State of Florida

Dated April 11, 2001

1. OK
2. 2.4 CBOD 1.8 TSS
3. OK
4. OK
5. OK
6. OK
7. Pressure Loss in 100' of 1 1/4" Tubing is 0.39 Lbs.
Pressure loss across filter is 7 PSI including filter flush return line
Flow Rate while the system is running is _____ GPM.
To Achieve 2.0 ft/s scouring velocity, _____ GPM is needed
Pump is capable of producing _____ GPM at _____' of Head
Pressure to field will be adjusted to achieve a maximum of 30 PSI on the
supply manifold by opening the by-pass petcock located in the pump tank.
8. Hoot Blaster H-2OEB 105, pump curve in enclosed.
9. _____ GPM, filter flush return line, _____ GPM during field flush, _____ GPM in pump tank.
10. Check Valves, Petcocks, filter and air relief valves are located inside pump chamber, or in filter box.
11. OK
12. OK
13. Minimum will be 25 PSI
Maximum will be 30 PSI
Maximum will be 45 PSI
Maximum will be 0.92 GPH per emitter.
14. OK
15. OK
16. OK
17. OK
18. OK
19. OK
20. OK
21. 6" Cover over emitters.
22. OK
23. OK
24. Completed with Paul Booher.
25. Drip manual given to Installer and Engineer.