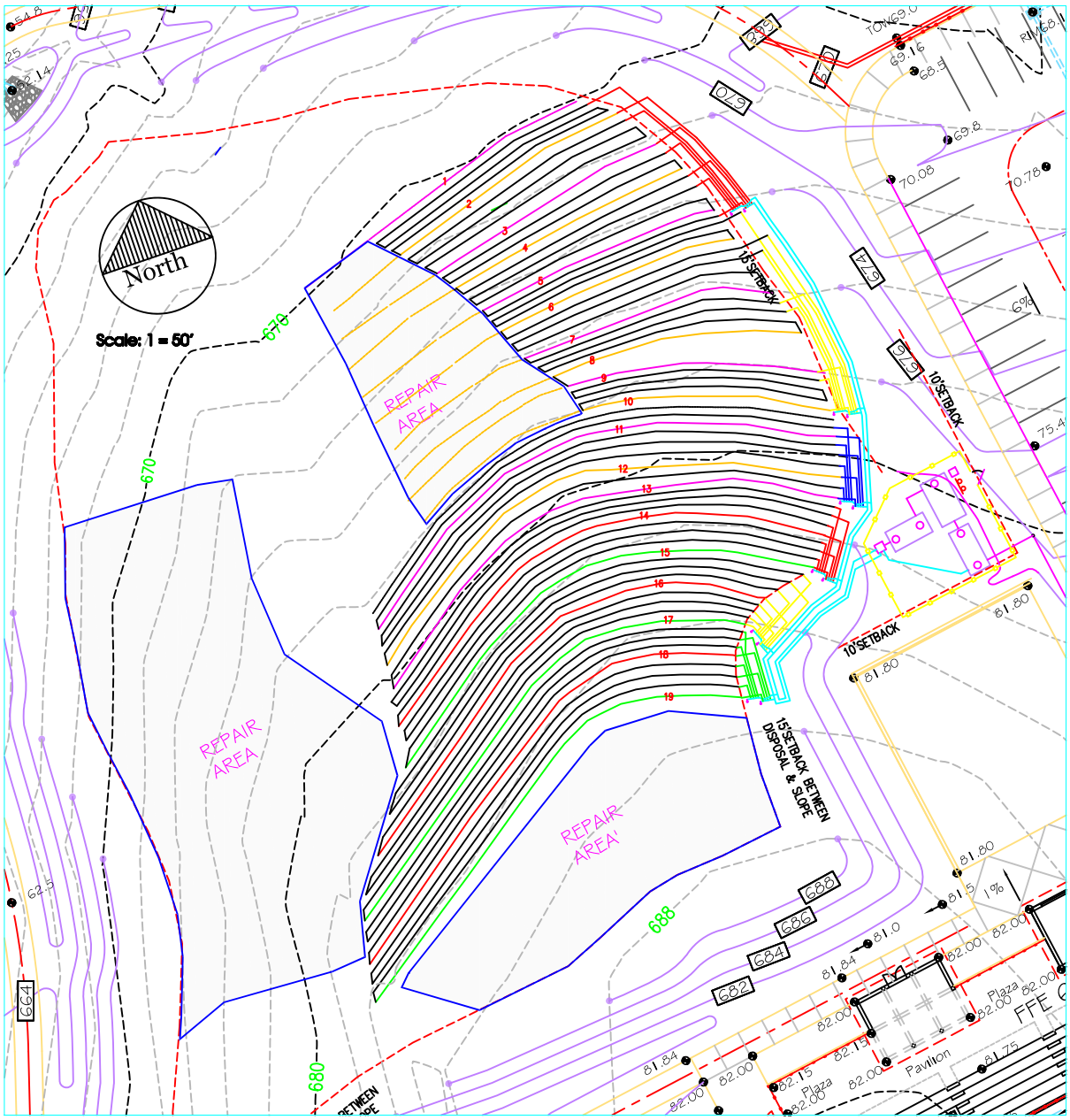
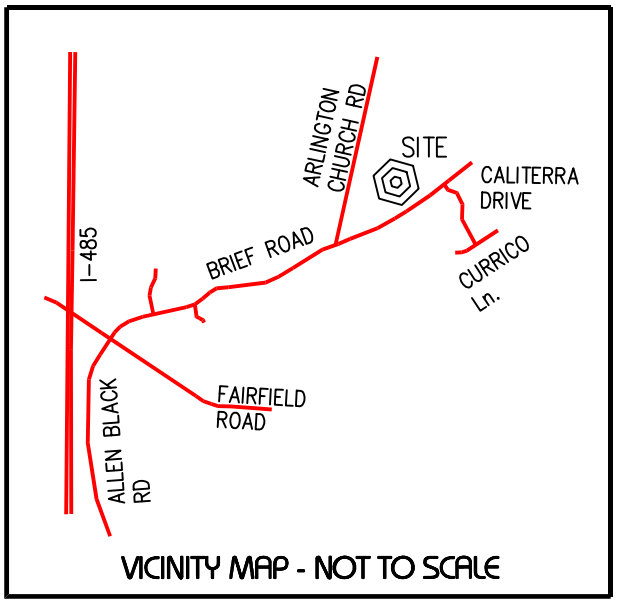




PROJECT:

WASTEWATER FACILITY for:
MINT HILL ATHLETIC PARK

Location:
9801 Brief Road
Charlotte, NC 28227
Mecklenburg County

Submittal for Permit
Date: 5-11-17

LASH ENGINEERING
Consulting Civil Engineer/Planner
1104 Cindy Carr Drive
Matthews, N.C. 28105
Phone: 704/847-3031
email: mike@lashengineering.com

Lash Engineering, Inc.
Civil/Consulting/Wastewater/Planning
1104 Cindy Carr Drive
Matthews, NC 28105
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mikel@LashEngineering.com

Lash Engineering, Inc.

Wastewater Facility for the Mint Hill Athletic Park
Onsite Wastewater Treatment and Disposal System

Table of Contents

1. Cover Sheet
2. Table of Contents
3. NC.DENR Onsite Subsurface Checklist
4. Engineer's Project Summary
5. Survey of Site
6. Mountain Soils, Inc. – Soil Scientist Report
7. In-Field Drip Layout Status
8. Bio-Microbics State Controlled Demonstration Approval
9. Bio-Microbics Design Approval Letter
10. American Onsite Authorized Designer Letters
11. American Onsite Design Approval Letter
12. American Drip Tubing State Approval (Aerobic) IWWS-93-1R6B
13. American Perc-Rite CalcTool for drip tubing
14. Anti-Floatation Calculations
15. Available Storage Calculations
16. Auxiliary Power Calculations
17. Precast Septic Tank Cut Sheet
18. Precast Pump Tank Cut Sheet
19. Goulds Blaster 25 gpm Cutsheet
20. Bio-Microbics Fast Brochure
21. FAST - Installation Manual
22. FAST – Service Manual
23. FAST – Owners Manual
24. FAST – Do's & Don'ts
25. Engineering Plans, dated 5-11-2017

Also: 2 Sets of Plans and 2 submittal folders are included in this submittal.

Mint Hill Athletic Park Wastewater Facility
5-11-2017

NCDENR On-Site Water Protection Section – Engineering Review
Small (< 3,000 gpd) Subsurface Wastewater System
Plans and Specifications Transmittal Checklist

The following transmittal checklist must be filled out and included with every submittal under 3,000 gallons per day that is sent to the On-Site Water Protection Section for Engineering Review

DONE	NA		
		I.	**Applicant and General Information**
☑	☐	1.	Property owner's name, mailing address and daytime phone number
☑	☐	2.	All consultants' contact information (address, license number, phone, FAX, and e-mail address)
☑	☐	3.	Designated use of the property, facility type and proposed design daily flow Sheet 3 of 6
☑	☐	4.	Basis for the design flow if other than a single-family residence, including plumbing plans, specifications/cut sheets for all water using fixtures and any other additional information as required to support the proposed design daily flow Sheet 3 of 6
☐	☑	5.	Any plumbing or collection system appurtenances (grinder pumps, etc) that may affect the operation and performance of the system
☑	☐	6.	Written documentation from the system manufacturer on company letterhead specifying that the named designer is currently authorized for systems that require authorized designers
☑	☐	7.	Locator map for the property
☑	☐	8.	Application has been submitted to local health department
		II.	**Soil/Site Evaluation**
			Note that when the concurrence of the OSWP Regional Soils Scientist (RSS) is being sought, a complete copy of the soil and site evaluation report shall be sent by the LHD to the RSS for review prior to submittal to the OSWP Central Office.
☑	☐	1.	Written documentation (letter) from the local health department or the Regional Soil Scientist concurring with the following
☑	☐		a. Proposed LTAR 0.15
☑	☐		b. Trench depth USING DRIP TUBING (12")
☐	☑		c. Reductions in vertical or horizontal setbacks (if applicable)
☐	☑		d. Increase in LTAR (if applicable)
☑	☐		e. Hydraulic assessment, if required, and associated data and analysis
☑	☐	2.	Written documentation (letter) from the local health department that all the information specified in the "Soil and Site Evaluation" Section of "Requirements for Submittals of Soil Reports and Pretreatment and/or Dispersal System Designs" has been included in the submittal SEE REPORT IN SUBMITTAL PACKAGE
☑	☐	3.	Written documentation (letter) from the local health department that the local health department has field verified the layout of the proposed drainfield, including that the drainfield lines are on contour SEE REPORT IN SUBMITTAL PACKAGE
☑	☐	4.	Copy of the soils report and all supporting documentation that the local health department or Regional Soil Scientist reviewed
		III.	**Pretreatment Components**
☑	☐		Site plan detailing the proposed system at a scale no smaller than 1 inch = 20 feet, a North Arrow, and the following information Sheet 2 of 6
☑	☐	1.	Tanks Sheet 2 of 6
☑	☐		a. Plan and profile drawings
☑	☐		b. Tank dimensions, location and relevant elevations (e.g. inlet and outlet inverts, ground surface elevations and other elevations as need to show that the system design works as proposed)
☑	☐		c. Other pertinent elevations in recirculation and pump tanks (i.e. float activation levels)

DONE	NA	
☑	☐	d. Identification number of state approved tanks
☑	☐	e. Access riser, manhole, effluent filter and discharge pipe details
☑	☐	f. Provisions for anti-floatation including calculations and drawings
		2. Advanced Pretreatment Components
☑	☐	a. Plan and profile drawings Sheet 3 of 6
☑	☐	b. Drawings showing all treatment units and appurtenances, piping (size and type), disinfection unit, blowers if needed, location of control panels, height of control panels, etc Sheet 3 of 6 on cross-section
☑	☐	c. Details on all appurtenances supplied with the advanced pretreatment unit (pump curves, cut sheets, control panels, valves, etc)
☑	☐	d. Documentation from the manufacturer supporting the proposed design and use of the advanced pretreatment system, if needed
☑	☐	e. Reference the specific accepted, innovative, controlled demonstration or experimental approval Sheet 3 of 6 See Wastewater System Notes
		3. Pump Systems
☑	☐	a. Calculations for system total dynamic health including friction loss, elevation head, pressure head, etc Sheet 3 of 6
☑	☐	b. Cut sheet for pump with pump curve Sheet 5 of 6
☑	☐	c. Description of float sequencing, control panel function under normal and other than normal conditions, and appropriate settings Sheet 5 of 6
☑	☐	d. Control panel must meet requirement of 15A NCAC 18A .1952(c)(6) and (7) and most recent version of the I&E approval, as applicable Sheet 5 of 6
☑	☐	e. Emergency storage capacity calculations and provision for auto-dialer and stand-by power, where applicable See Reports for Aux. Power & Storage
☑	☐	f. For pressure dispersal, dosing and flushing conditions for pumping and filter backwash requirements, as applicable Sheet 3 of 6
☑	☐	g. Single or multiple control panels, who will be providing the panel(s) and what each panel will be controlling Bio-Microbics Panel Sheet 3: American Panel Sheet 5
☑	☐	4. Location and identification of all gravity and pressure lines, including calculations, size and type of piping from building to tanks, among tanks and pretreatment units, and from tanks to nitrification field Sheet 3 of 6
☑	☐	5. Testing and start-up procedures Included in submittal documents. Controlled Demonstration Approval

IV. Nitrification Fields

Detailed site plan at a scale no smaller than 1 inch = 30 feet with the following information

☑	☐	a. Location, layout, and design of the initial and repair areas Sheet 5 of 6
☑	☐	b. Field contour lines must be shown on the plans or a minimum of two-foot intervals or spot elevations shall be provided if there is less than two-foot elevation variation across the site Sheet 5 of 6

Following information must be included in the submittal

☑	☐	1. Trench and lateral distribution system plan and cross sectional details (e.g. trench width and length, trench depth, hole spacing, pipe size and type)
☐	☑	2. Specific trench media to be used, including model number, if applicable Sheet 5 of 6 "Note: MidRange Installation"
☑	☐	3. Manifolds, supply lines, return lines, cleanouts, interconnection details and appurtenances
☑	☐	4. Flow distribution device design and construction details Sheet 5 of 6
☐	☑	5. Drainage system locations, discharge points and design details
☐	☑	6. Fill modifications referencing both depth and location to established horizontal and vertical benchmarks
☑	☐	7. Reference the specific accepted, innovative, controlled demonstration or experimental approval Sheet 6 of 6 for Drip Tubing

DONE	NA	

V. Site Preparation, Installation, and Other Items

☑	☐	1. Proposed installation procedures, including site preparation, method of trench/tubing installation, provisions and procedures for blanking, where applicable Sheet 6 of 6

☑	☐	2.	An operation and maintenance plan for the proposed system, and proposed maintenance of pretreatment and drainage, if applicable
☐	☑	3.	Details of cleanouts, aerial crossings, road crossings, water line crossings, storm sewer crossings, etc, as needed
☑	☐	4.	Written documentation from the local health department that all necessary legal documents, including easements, association documents, Tri-Party Agreements, etc, have been submitted
☑	☐	5.	Flow reduction information as needed for projects other than single or multiple family home systems
☐	☑	6.	Additional information based on the soil and site evaluation
☐	☑	7.	Fill installation procedures, including selection and incorporation of fill material
☑	☐	8.	Methods for removal of vegetation, including trees
☑	☐	9.	Slope stabilization plan and maintenance provisions for slopes greater than 30 percent
☑	☐	10.	Final landscaping and vegetation establishment provisions for the nitrification field area, including maintenance of vegetation or landscaping over system
☐	☑	11.	Identification of any well(s) to be abandoned, including a statement that well abandonment shall be per the Division of Water Quality in the Department of Environment and Natural Resources or local health department regulations, as applicable
☐	☑	12.	Identification of old roads, buildings, etc, to be removed and removal procedures
☐	☑	13.	Locations of any debris to be buried on site shall be specified
☐	☑	14.	Any other site specific installation procedures recommended by the consultant

Included in submittal: Innovative Waste-water Approval

SEE ENGINEER LETTER IN SUBMITTAL

Sheet 3 of 6

Sheet 6 of 6

Sht.6

Also See Wirth Erosion Control Plans

Concurring Signature, the applicant has, to the best of his/her abilities and belief, provided complete and factual representations of the information requested above:

_____ _____

Applicant or Applicant's Agent Date

Health Department's Concurrence that Application has been submitted, requested information appears complete and State review is requested:

Jacob Presley, Mecklenburg County Health Dept. (980) 721-2060 has requested the State to review this submittal.

_____ _____

Local Health Department Environmental Health Specialist Date

* **Note to all interested persons.** This transmittal check list and necessary accompanying information shall be submitted by the LHD to the On-Site Water Protection Section, Division of Environmental Health, 1642 Mail Service Center, Raleigh, NC-27699-1642 (Fax: 919-715-3227).

Lash Engineering, Inc.
Civil/Consulting/Wastewater/Planning
1104 Cindy Carr Drive
Matthews, NC 28105
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mikel@LashEngineering.com

Lash Engineering, Inc.

Wastewater Facility for Mint Hill Athletic Complex

9801 Brief Road (across from existing Park)
Charlotte, NC. 28227
SEPTIC, PRE-TREATMENT & DRIP SYSTEM DESCRIPTION

This project consists of an athletic complex of soccer and baseball fields with a common restroom, no showers, or kitchen. The State has previously approved the allocation of wastewater according to 10 gpd per parking space. The total number of spaces is: 288 requiring a system capable of treatin and disposing of 2,880 gpd. Because of the nature of the complex being predominately used on weekends, a Flow Equalization system is proposed. This lowers the design daily flow to 2,141 gpd. The treatment process is based on the higher number of 2,880 gpd while the disposal utilizes the Flow Equalization process to lower the daily load to 2,141 gpd. The wastewater flows into a Standard Precast Septic Tank, sized according to the proposed flow calculations and in accordance with State and local codes. The septic tank (sized at 4,000 gal.) is a dual compartment unit, sized for 2/3 of the volume on the inlet side, and 1/3 of the volume on the outlet side with the required effluent filter.

The septic tank serves two purposes: First, as a settlement chamber to allow the solids to fall out of the wastewater. Second, the septic tank initiates the breakdown of the effluent by providing a suitable environment for anaerobic decomposition. An effluent filter is also installed in the septic tank to assist in removing the larger solids. The effluent filter is screen-type and sized with 1/8-inch openings. The effluent filter is required to be removed and cleaned a minimum of once every 2 years; more frequent cleaning may be required as determined by the routine system inspection and maintenance. The septic tank should be pumped clean at routine intervals; typically every 4 to 5 years, according to the amount of sludge/scum accumulation. The cleaning is required to remove the solid matter that accumulates at the bottom of the tank as a result of household byproducts such as: paper products, greases, food waste, etc.

The effluent exits the septic tank through the effluent filter then it is routed through a pipe by gravity flow to the Bio-Microbics, Fast 4.5 system. This treatment system is capable of handling 4,500 gpd so the 2,141 gpd required easily falls within its treatment parameters. The Fast system consists of a remote, above-ground blower introduces air (oxygen) into the treatment module to facilitate a robust circulation of wastewater through the media's channeled flow path. Bacteria in the aeration zone become "fixed" or attached to the stationary media. This is where the abundant, diverse, self-

regulating population of microbes consistently metabolize the incoming waste. A clear, odorless, treated effluent to a minimum of TS I treatment levels is gravity discharged into the Pump Tank. The Fast Treatment system utilizes a Bio-Microbics Control Panel that has been designed to work for this unit. It is a standard panel within a NEMA 4 enclosure setup for the floats, pumps and internal monitoring of the system. A programmable micro-logic controller (PLC) activates the recirculation and discharge pumps through a program that self-adjusts these operations based on actual wastewater flow into the processor (as monitored by the PLC). The processor constantly evaluates the water usage and meters out the effluent discharge to the soil absorption system in equal doses over a 24-hour period (a dosing schedule can be customized to the project specification). The Bio-Microbics Fast 4.5 is a State approved unit. The State Certification for the tank has been included with this submittal.

Once the effluent has been processed, the discharge pump (more like an aerator or blower) will run as directed by the PLC for the exact time to discharge the treated effluent to the Pump Tank. The pump tank represents the start of the sub-surface drip irrigation system. The pump tank contains two (duplex) high-head, turbine-style effluent pumps to provide adequate (Total dynamic Head) TDH.

The duplex pump tank contains four floats for 2 pumps. The pumps typically alternate but one will automatically be used if the other pump fails. The Control Panel would send out an alarm for notification. The first float, located approximately 18" above the tank bottom, is a redundant "off" float. The second float, located 22-1/2" above the tank bottom, is the "on "float and signals the PLC to discharge the effluent to the drip field. The third float, located 28" above the tank bottom, is the peak enable float. This float, when activated, signals the PLC that the system is experiencing higher-than-normal usage and cuts the system dosing rest time in half until the system effluent levels return to normal. The fourth float, located 30" above the tank bottom, is a high level float which will trigger the PLC to sound both the audible and visual alarms. The alarms indicate that the system is having some type of problem (such as pump failure, extremely high water usage, etc.) and means that the system needs to be checked.

The effluent is pumped out of the pump tank through a 1-1/2" schedule 40 PVC pipe to the headworks unit, which should be located adjacent to the pump tank. The headworks unit is installed just below grade and should be at a high point in the landscape, and is covered by a large insulated valve or meter box provided as part of the system. The top of the valve box should be installed about 3" above finished grade, and the installer should provide a minimum of 6" of gravel below the headworks unit. The headworks unit consists of a base panel, disc filters (one per zone), zone solenoid valves, thermostatically controlled heater unit, flow meter, supply line connection point (one for each zone), a return line connection point, and a discharge pipe which gets connected back to the incoming side of the septic tank. The supply piping to each drip irrigation zone is for 1" Schedule 40 PVC, as is the zone return line. The piping connection for the septic return line is used for backwashing the filters, and is designed for 1-1/2" PVC schedule 40 piping. The headworks unit is connected to the control panel using a 1" PVC electrical conduit, and requires one wire per zone for the solenoid valves, two wires for the heater, two wires for the zone master (if more than one zone is involved), and one wire for the zone return valve (A common neutral is provided for those devices requiring only one wire). Final electrical connections to the panel and to the headworks unit shall be made by a factory authorized representative.

Each zone shall be supplied with a 1" Schedule 40 PVC connection from the headworks unit to the zone manifold, located at the start of each zone, and at the highest elevation point in each zone (typically, each of the 6 zones has about 1200ft. of drip tubing). The elevation point is critical so that the furnished air-release valves at each manifold (one per supply and one per return) can release all air in the system and allow for proper drainage back into the drip lines and dispersal for freeze protection. The supply manifold consists of the 11/2" connection from the headworks unit, the air-release valve, and one 1/2" PVC fitting for each lateral located in that zone. The return manifold will also have the same configuration, but will also be provided with a check valve to insure water does not flow "backwards" through the drip tubing, again, to help protect against freezing. Each air release valve will be covered with a 6" round valve box provided with the system for service access during system inspections.

Site Specific Information

The design flow as reflected on the Treatment Plan (Sheet WW-3) is 2,141 gallons per day. Based on an in-field analysis performed by the Avery County Environmental Health Department and Karen Wallace, the design LTAR is 0.15, which results in a required area of 14,270 square feet for the drip field (which equates to 7,135 linear feet of drip tubing). These test pits were field located and are shown on the Site Plan (Sheet WW-2). Based on the site's topography, available space, required setbacks, and system performance, the system is designed with 6 zones, consisting of 4 laterals per Zone and 2 runs per lateral. Each run is approximately 150'. Total drip tubing length as shown on the plans is 7,200 feet. There should be no blanking for trees required. The drip tubing is provided with integral emitters spaced every two feet, which will operate at pressures between 6 and 60 psi. Each emitter can release up to 0.6 gallons of effluent per hour at a maximum. Each line shall be connected to the proper supply or return line as shown on the drip field detail plan using solid flex line and drip hose fittings provided with the system. The drip field shall be installed under the guidance and supervision of a factory-trained installer or a certified and documented representative. Each flex hose connection shall be slightly elevated above the drip hose elevation to insure no water is left in the flex hose.

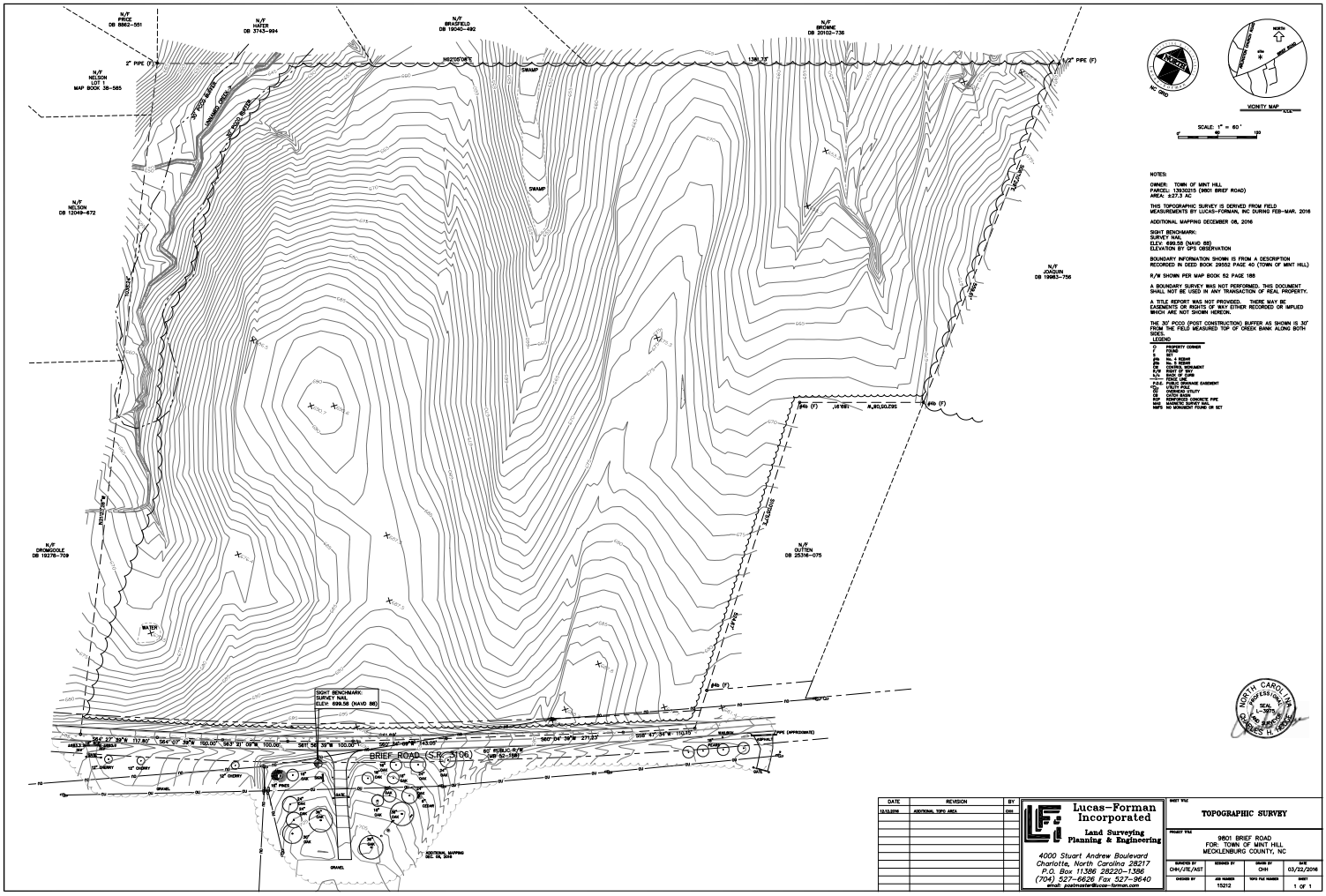
There are 2 (two) sites predetermined and shown on the site plan for possible water wells. It is probable that only well will be needed for the restroom facility. Each well has been shown with the required 100' setback.

The entire system has been designed by our firm along with Bio-Microbics (pre-treatment supplier), American Manufacturing (supplier of the drip irrigation field), and their factory certified designers, in conjunction with the information provided by the soil scientist with the gathered information during the site survey. All major system components have been reviewed and approved for this application by the State of North Carolina, and several systems of this type have already been installed and certified in North Carolina. The system shall be installed by certified contractors, and the entire system shall be certified as complete by Lash Engineering, Inc. The Bio-Microbics Fast 4.5 unit must be installed by a State Licensed Grade IV Installer, and under the State's approval requirements, must be inspected twice a year (or as dictated by the State Permit). The inspector must be a minimum of State Grade I sub-surface operator. The unit is capable of TS1 treatment levels however, there is 18" or greater soil depth so a NSF 40 treatment level can be utilized. Therefore, the unit will be tested within 180 days following the installation completion, and shall be tested for BOD and TSS only. The requirements for Nitrogen and Pathogens are not required with the NSF 40 treatment

levels. Test results will be a matter of public record, and a copy of the inspection report shall be forwarded to the local environmental health office. The operator/inspector shall visit the site every six months (or as dictated by the State Permit), and shall check the system for such items as proper panel performance, media status, pump operation, alarm conditions, high-level alarm condition, and document any fault conditions that have occurred and what was done to correct the problem. The effluent filter needs to be removed, inspected, and cleaned as required, with all removed particles being washed back into the septic tank. The drip system must be visually inspected twice a year to; check for leaks, make sure the control panel and the alarms are working, run the system through a manual cycle, and verify valves and filters are working properly. The drip field should be checked thoroughly for leaks or ponding, which could indicate a broken drip line. An Owner maintenance Inspection Checklist has been included in this submittal and is to be supplied to the Owner for assistance in this process.

Lash Engineering, Inc., in conjunction with the BioMicrobics Representative, will provide a final certification packet including a letter stating that the system was installed properly and that all connections and programming have been checked. A final "As-Built" drawing showing any minor changes made due to site-specific conditions will also be included if there are major deviations from thee approved and permitted plans.

Please contact Lash Engineering, Inc. if you have any questions or concerns at 704-847-3031.



SCALE: 1" = 60'

0' 60' 120'

NOTES:

OWNER: TOWN OF MINT HILL
PARCEL: 13532315 (9801 BRIEF ROAD)
AREA: ±27.3 AC

THIS TOPOGRAPHIC SURVEY IS DERIVED FROM FIELD MEASUREMENTS BY LUCAS-FORMAN, INC DURING FEB-MAR. 2016

ADDITIONAL MAPPING DECEMBER 08, 2016

SIGHT BENCHMARK:
SURVEY NAIL
ELEV. 699.56 (NAVD 88)
ELEVATION BY GPS OBSERVATION

BOUNDARY INFORMATION SHOWN IS FROM A DESCRIPTION RECORDED IN DEED BOOK 29552 PAGE 40 (TOWN OF MINT HILL)

R/W SHOWN PER MAP BOOK 52 PAGE 188

A BOUNDARY SURVEY WAS NOT PERFORMED. THIS DOCUMENT SHALL NOT BE USED IN ANY TRANSACTION OF REAL PROPERTY.

A TITLE REPORT WAS NOT PROVIDED. THERE MAY BE EASEMENTS OR RIGHTS OF WAY EITHER RECORDED OR IMPLIED WHICH ARE NOT SHOWN HEREON.

THE 30' POND (POST CONSTRUCTION) BUFFER AS SHOWN IS 30' FROM THE FIELD MEASURED TOP OF CREEK BANK ALONG BOTH SIDES.

LEGEND

○	PROPERTY CORNER
F	FOUND
S	SET
#4b	No. 4 REBAR
#5b	No. 5 REBAR
P.O.B.	POINT OF BEGINNING
R/W	RIGHT OF WAY
F/C	FACE OF CURB
C/L	CENTER LINE
P.U.E.	PUBLIC UTILITY EASEMENT
⊙	UTILITY POLE
⊙	FIRE HYDRANT
⊡	CATCH BASIN
RCP	REINFORCED CONCRETE PIPE
CMP	CORRUGATED METAL PIPE
NMFS	NO MONUMENT FOUND OR SET

DATE	REVISION	BY
12.12.2016	ADDITIONAL TOPO AREA	CHH

Lucas-Forman Incorporated
Land Surveying
Planning & Engineering
4000 Stuart Andrew Boulevard
Charlotte, North Carolina 28217
P.O. Box 11386 28220-1386
(704) 527-4626 Fax 527-9640
email: jlukinsurvey@lucas-forman.com

SHEET TITLE: TOPOGRAPHIC SURVEY

PROJECT TITLE:
9801 BRIEF ROAD
FOR: TOWN OF MINT HILL
MECKLENBURG COUNTY, NC

SURVEYED BY	DESIGNED BY	DRAWN BY	DATE
CHH/JTE/JAST		CHH	03/22/2016
CHECKED BY	JOB NUMBER	TOPO FILE NUMBER	SHEET
	15212		1 OF 1

MOUNTAIN SOILS, INCORPORATED

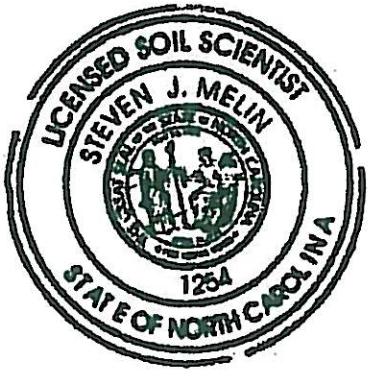
71 LEDFORD DRIVE FRANKLIN, NC 28734
EMAIL: MOUNTAINSOILS@FRONTIER.COM WEBSITE: WWW.MOUNTAINSOILS.COM
OFFICE/FAX: (828) 524-5962 CELL: (828) 371-2894

ON-SITE SOIL AND SITE EVALUATION

Mint Hill Athletic Park
PIN# 139-302-15
Mecklenburg County, North Carolina

Prepared For:
Wirth and Associates
1230 West Morehead Street, Suite 212
Charlotte, NC 28208
704-375-1588

Prepared by:
Steven J. Melin, LSS



Steven J. Melin #1254

Steven J. Melin, LSS, #1254

January 29, 2017

MOUNTAIN SOILS, INCORPORATED

71 LEDFORD DRIVE FRANKLIN, NC 28734
EMAIL: MOUNTAINSOILS@FRONTIER.COM WEBSITE: WWW.MOUNTAINSOILS.COM
OFFICE/FAX: (828) 524-5962 CELL: (828) 551-9903

INTRODUCTION

Mountain Soils, Inc. (MSI) conducted a detailed onsite wastewater feasibility study for permitting of an onsite wastewater system at the Mint Hill Athletic Park in Mecklenburg County, North Carolina. The soil/site evaluation was performed evaluating pits, under moist soil conditions. In this evaluation, MSI utilized an AutoCAD basemap layout of the proposed athletic park (from Wirth and Associates, Inc.), GPS (capable of sub-meter accuracy), Mecklenburg County GIS data, and aerial photography to determine locations of pits, contours, landscape features, proposed infrastructure, and other noteworthy features (please note that all locations are approximate). The property was evaluated in accordance with North Carolina statutes for waste disposal ("Laws and Rules for Sewage Treatment and Disposal Systems", (amended June 2011...the most recent regulations for onsite wastewater)) as part of the planning process to evaluate areas of soil with potential for subsurface wastewater disposal.

In order to determine the potential of a site to accommodate onsite wastewater systems, a thorough analysis and understanding about the characteristics of the site, especially the soil, are necessary to determine how the system will perform. The soil functions as a biological, chemical and physical treatment medium for the wastewater, as well as a porous medium to disperse the wastewater in the receiving environment as it percolates to the groundwater. Therefore, a careful and thorough site evaluation with emphasis on soil characteristics is necessary to assess the capacity of the site to hydraulically accept wastewater.

PRIMARY INVESTIGATOR'S CREDENTIALS

James Tipton:	N.C. Licensed Soil Scientist (Certification # 1335) N.C. Registered Sanitarian (Certification #1551) N.C. Licensed Installer (Certification # 4392 - Level IV) N.C. Licensed Subsurface Operator (Certification # 995647)
Education:	B.S. Environmental Health, Western Carolina University; Cullowhee, NC (May, 1990)
Steven J. Melin:	N.C. Licensed Soil Scientist (Certification # 1254)
Education:	M.S. Natural Resource Administration, North Carolina State University; Raleigh, NC (May, 2005) B.S. Watershed Management, Soil Science Minor, University of Wisconsin at Stevens Point, Stevens Point, WI (May, 2000)

METHODOLOGY

The site was investigated in December (2016) and in January (2017) by making observations of the landscape (slope, drainage patterns, past use, etc.) as well as soil properties (depth, texture, structure, seasonal wetness, restrictive horizons, etc.) with excavated pits to a depth $\geq$ 48 inches when possible. Soil color was determined with a Munsell Soil Color Chart. These pits were excavated in specific landscape positions on the parcel and the property was extensively probed to determine depths to rock. Each pit was GPS'ed and labeled in the field.

MOUNTAIN SOILS, INCORPORATED

71 LEDFORD DRIVE FRANKLIN, NC 28734
EMAIL: MOUNTAINSOILS@FRONTIER.COM WEBSITE: WWW.MOUNTAINSOILS.COM
OFFICE/FAX: (828) 524-5962 CELL: (828) 551-9903

Additionally, eleven (11) saturated hydraulic conductivity tests were performed at six (6) locations. A description of each pit / boring is attached as well as the Ksat results.

The site was investigated for an athletic park that is proposed to have 3 soccer fields and a baseball diamond. The facilities are proposed to have a concession stand (no food preparation) and bathrooms (public). Please note that athletic parks (in NC) are typically sized at one of the following:

-10 gallons / parking space
-250 gallons / plumbing fixture (bathroom – typically defined as a toilet or urinal)
-5 gallons per seat (stadium)

Since a total of 299 parking spaces are proposed, this number was decided (and agreed upon by State and County regulators) to be used (i.e. 2,990 gallons per day).

SITE FEATURES

At the time of the evaluations, the site was a regenerating with loblolly pine. The site was thick with vegetation, however an approximate acre was underbrushed that was outside potential ballfields, road, parking, and stormwater infrastructure. The majority of the area evaluated contained gentle slopes (~8-15%). A powerline (determined to be abandoned) was located that bisected the property. No other structures or wells were identified on the site during the investigation.

SOIL CHARACTERISTICS

Fourteen (14) pits and 4+ auger borings were excavated/advanced on the property and their locations were recorded using a global positioning system (GPS). Pit/auger descriptions were evaluated to depths ≥48 inches when possible. The pit evaluations were done on two separate days with Mecklenburg County Environmental Health (Jacob Pressley, LSS). Please note that a description of each soil profile (MSI's) is attached. Mecklenburg County also described the soils separately.

The soils evaluated in the auger borings were determined to derive from fine-grained metavolcanic rocks of the Carolina Slate Belt. The soils typically contained a disturbed / previously eroded and plowed surface horizon (0-6") that transitioned to a clay horizon. Typically the soils contained moderate depths to a restrictive features including redoximorphic features (e.g. seasonal high water table), platy structure, slickensides, and paralithic contact (e.g. Cr horizon). These restrictions are generally encountered around 30-inches or sometimes shallower. Some deeper profiles/pits (to restriction) were described in a few isolated areas. Please note that the soils encountered differed than mapped by the NRCS Soils Map for Mecklenburg County.

Please note, the shallower depths does not mean that on-site septic systems cannot be utilized in these areas. The use of higher technology systems (e.g. engineered systems), will be able to augment the shallow soil depths. Recommended LTARs for the use of an aerobic drip irrigation drainfield is 0.15 gallons/ft^2/day.

MOUNTAIN SOILS, INCORPORATED

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Eleven (11) saturated hydraulic conductivity tests were performed at six (6) locations. The restrictive K_{SAT} measurements averaged **2.88 GPD/FT²** for drip irrigation depths of 12-14" (Appendix – Ksat Results). Using a 10% factor, the LTAR would be 0.29 gpd/ft² for the drainfield area. While such a rates is supported by the K_{SAT} results, a more conservative LTAR of 0.15 gpd/ft² is recommended, which is approximately 5.2% of the measured K_{SAT} rate. This rate is well within the assimilating capacity of the soil (please note that TS-I pretreatment is recommended).

All the observations, measurements, and analyses indicate a 0.15 GPD/FT² LTAR is appropriate for the proposed drainfield at a 12-14" drip depth for a subsurface aerobic (TS-I) drip irrigation system. Additionally, the proposed drainfield was outlined in the field and GPS'ed by MSI personnel (See Attached Figures).

The septic tank, pump tank, and pretreatment tank sizes must be based off of Innovative Wastewater System Approvals. Additionally Engineered Plans will be required.

PROPOSED ON-SITE WASTEWATER SYSTEM (2,990 GPD)

The following recommendations are proposed (in conjunction with Mecklenburg County Environmental Health) for the Mint Hill Athletic Park in Mecklenburg County, NC. The proposed system design/layout is for a 2,990 gallon per day onsite wastewater system. Saturated hydraulic conductivity tests were performed to support the loading rate.

Application Type:	IP/AC (2,990 GPD)					
Number of Bedrooms:	Proposed Septic System	**GPD**	**Soil Group**	**Soil Texture**	**Drip LTAR**	**Linear Feet Required Calculation (in Square and Linear Feet)**
Initial Septic System:	Aerobic Drip Irrigation (not a saprolite system)	2,990	IV	Clay / Clay Loam	0.15	2,990 gpd / 0.15 gpd/ft² = 19,933 ft² or 9,967 linear feet of drip tubing 2-foot off center (See calculations below)
Repair Septic System:	Aerobic Drip Irrigation (not a saprolite system)	2,990	IV	Clay / Clay Loam	0.15	2,990 gpd / 0.15 gpd/ft² = 19,933 ft² or 9,967 linear feet of drip tubing 2-foot off center (See calculations below)
Easement Required:	NO					

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CONCLUSIONS / FINAL RECOMMENDATIONS

With a 0.15 gallons/ft^2/day loading rate, the initial system will require a minimum 19,333 ft^2 footprint. An area that is greater than 22,000 square feet is outlined on the attached map. A repair area that is greater than 25,000 square feet is also outlined (attached map). Please note that the drainfield needs to be installed on contour (12-14" depth).

The use of flow equalization may be able to reduce the size of the proposed drainfield. Please note that due to the unknown timeline of the facility, this is not being proposed at the time. If flow equalization is used, the size of the drainfield is decreased, however additional storage tanks will be required to in order to equally disperse effluent over the duration of a given time (to reduce surges in flow).

The findings presented herein represent MSI's professional opinion based on our site and soils evaluation and knowledge of the current laws and regulations governing on-site wastewater systems in North Carolina (Section .1900 of the North Carolina Administrative Code). Septic Permits must be issued by the Mecklenburg County Health Department, however privatization rules (in effect since July 1st, 2016), enables Soil Scientists partnered with Engineers (PE) to bypass the Health Department.

We appreciate the opportunity to provide with you with our services. If you have any questions please feel free to contact our office.

Sincerely,

Steven J. Melin, LSS
Project Manager - Mountain Soils, Inc.

Our goal at MSI is to provide our clients with recommendations on the most optimum septic system layouts consistent with development and site conditions.

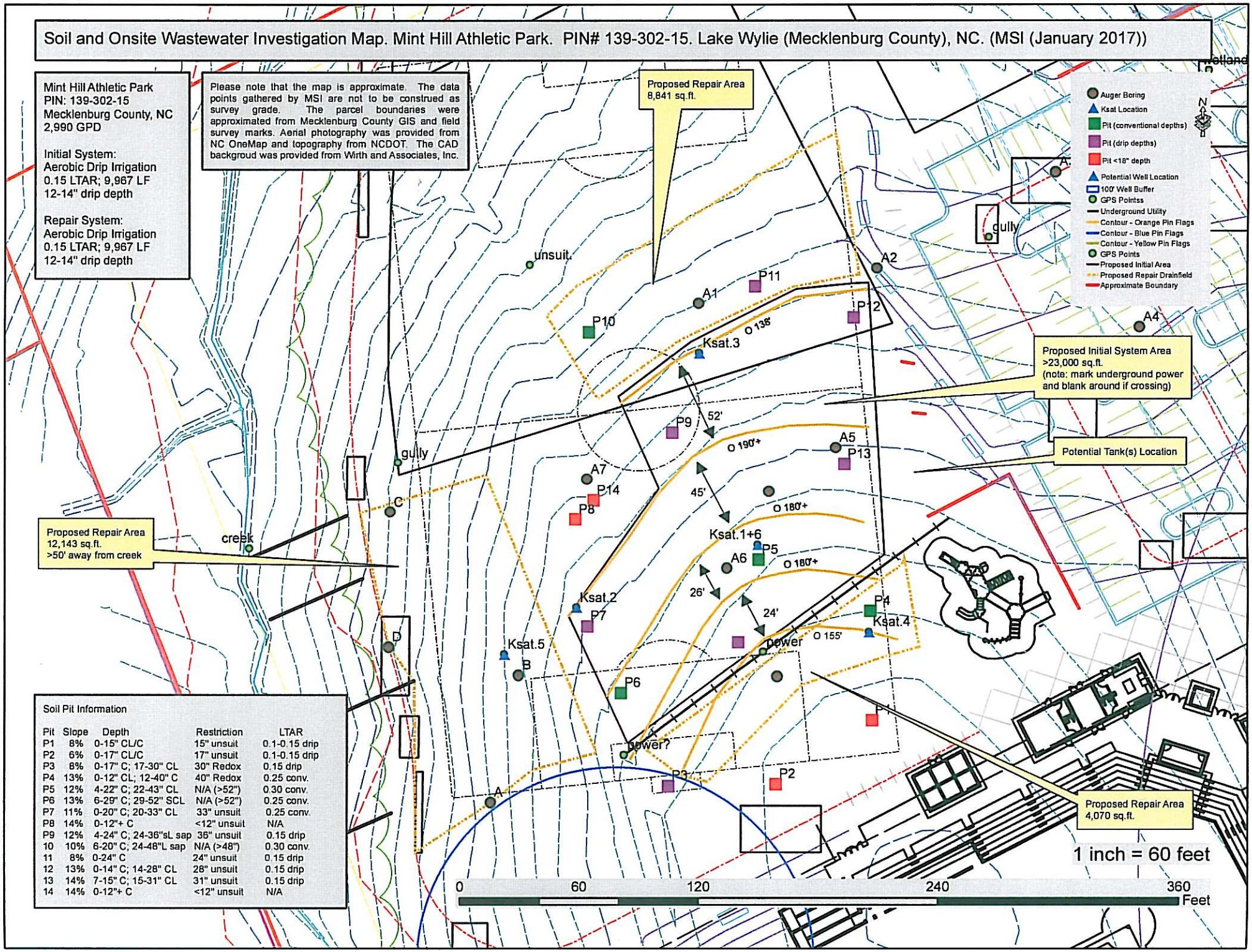
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Appendix

-Maps-
-Soil Descriptions-
-Ksat Data-

Soil and Onsite Wastewater Investigation Map. Mint Hill Athletic Park. PIN# 139-302-15. Lake Wylie (Mecklenburg County), NC. (MSI (January 2017))



Soil Pit Information

Pit	Slope	Depth	Restriction	LTAR
P1	8%	0-15" CL/C	15" unsuit	0.1-0.15 drip
P2	6%	0-17" CL/C	17" unsuit	0.1-0.15 drip
P3	8%	0-17" C; 17-30" CL	30" Redox	0.15 drip
P4	13%	0-12" CL; 12-40" C	40" Redox	0.25 conv.
P5	12%	4-22" C; 22-43" CL	N/A (>52")	0.30 conv.
P6	13%	6-29" C; 29-52" SCL	N/A (>52")	0.25 conv.
P7	11%	0-20" C; 20-33" CL	33" unsuit	0.25 conv.
P8	14%	0-12"+ C	<12" unsuit	N/A
P9	12%	4-24" C; 24-36"sL sap	36" unsuit	0.15 drip
10	10%	6-20" C; 24-48"L sap	N/A (>48")	0.30 conv.
11	8%	0-24" C	24" unsuit	0.15 drip
12	13%	0-14" C; 14-28" CL	28" unsuit	0.15 drip
13	14%	7-15" C; 15-31" CL	31" unsuit	0.15 drip
14	14%	0-12"+ C	<12" unsuit	N/A

THIS IS THE FIRST LAYOUT THAT WAS LATER REVISED.

SOIL/SITE EVALUATION

(Continuation Sheet)

Sheet ___ of ___

DEPARTMENT OF ENVIRONMENT
AND NATURAL RESOURCES
DIVISION OF ENVIRONMENTAL HEALTH

Mint Hill Athletic Park

PROPERTY ID #: ___
DATE OF EVALUATION: 12-9 & 12-22-16
COUNTY: Mecklenburg

PROFILE #	.1940 LANDSCAPE POSITION/ SLOPE %	HORIZON	DEPTH (IN.)	SOIL MORPHOLOGY (.1941) STRUCTURE/ TEXTURE	SOIL MORPHOLOGY (.1941) CONSISTENCE/ MINERALOGY	OTHER PROFILE FACTORS .1942 SOIL WETNESS/ COLOR	.1943 SOIL DEPTH	.1956 SAPRO CLASS	.1944 RESTR HORIZ	PROFILE CLASS & LTAR
1	SL 8%	Bt	0-15	1m Abk / CL C	Fi (sl pl)	5YR 4/6 +MCS	15" / >48"		15" Rock	0.1-0.15 drip
		C/Cr	15-48	Rk cont/all.>	platy Rock	MCS				
2	SL 6%	Bt	0-18	1mAbL / aCL	Firm	7.5YR 4/6 MCS	17" / >36"		17" Rock	0.1-0.15 drip
		Cr	18-36"	Rk cont.all.>						
				tho in pit 12-22-16						
3	SL 8%	Bt	0-17	2m sbk / C	Fi	10R 4/6 spm 5YR 4/4 +MCS pm	30" / >30"		30" unsuit structure	IV 0.3 0.15 drip
		Bt1	17-30	1m sbk / CL	Fi (sl R)					
		C/Cr	30-45"	Rk cont.all.>	Saprolite					
5	Lo 2%	BA	0-4	1m sbk scL	Fi	5YR 3/3 2.5YR 4/6 5YR 4/6 +pm pm	43" / >52	L	-	IV 0.25 0.3
		Bt	4-22	1to 2m Abk / C	Fi (sl pl)					
		Bt1	22-43	2m sbk / CL	Fi					
		C	43-52	sg Ma / L	Fi					
6	Lo 13%	AB	0-6	1m gr / scL	Fi	5YR 3/4 2.5YR 5/4 +MCS +more MCS pr	43" / >52	scL	-	IV 0.25 0.3
		Bt	6-29	2m Abk / C	Fi (sl pl)					
		Bt1	29-43	1m Abk / scL	Fi (sl pl)					
		C	43-52	sg Ma / scL	Fi					

COMMENTS: pit 54 was closed (not described by MSI)

1 & 3 See Mecklenburg County's description. Notes indicate 0.3 LTAR with depths around 40"

SOIL/SITE EVALUATION

(Continuation Sheet)

Sheet ___ of ___

DEPARTMENT OF ENVIRONMENT
AND NATURAL RESOURCES
DIVISION OF ENVIRONMENTAL HEALTH

Mint Hill
Athletic Park

PROPERTY ID #: ___
DATE OF EVALUATION: 12-22-11
COUNTY: Mec

PROFILE #	.1940 LANDSCAPE POSITION/ SLOPE %	HORIZON DEPTH (IN.)	SOIL MORPHOLOGY (.1941) .1941 STRUCTURE/ TEXTURE	SOIL MORPHOLOGY (.1941) .1941 CONSISTENCE/ MINERALOGY	OTHER PROFILE FACTORS .1942 SOIL WETNESS/ COLOR	OTHER PROFILE FACTORS .1943 SOIL DEPTH	OTHER PROFILE FACTORS .1956 SAPRO CLASS	OTHER PROFILE FACTORS .1944 RESTR HORIZ	PROFILE CLASS & LTAR
7	Lm ss BT / Bt / 11-1 C/r	0-20	Lm sa /c	Fi	2.5 Yr 4/6	33"		33"	IV
		20-33	Lm sabk /cl scl	Fr	5Yr 4/6 +pm				0.3
		33-45	Unsat	Sapl platy					0.25
				Rotten					Drip
				Rb cobbles					
8	Bt Lm ss Cr 14+	0-12	Lm sbk /c	Fi to massive	Mcs	12" / 36		0-12" Restr	N/A
		12-36	Cr → Ox. F.	b					Avoid Area
				sl. cem	ensidous/ Rock				
			H2O in	auger boring hole					
9	Bt1 Lm ss/ Cu ss Bt2 12+ L1 2C	0-4	MASK / SCL	Fr	2.5Yr 4/6	24" / 36"	C.sL	36" Unsat Sapro	IV
		4-24	Lm sabk / Cl-x	Fi (3% Pl)	2.5Yr 4/6 pm				.3
		24-36	Bt/M / SL	Fi					0.15 Drip
		36-44	Gm4 VFi	Unsortable					
10	Lm ss 10% Bt1 Bt2 Bt3 C	0-6	MASK / SCL	FR	5Yr 3/4	24" / 48"	L	-	IV
		6-20	LASK / C	Fi (3% Pl)	2.5 Yr 5/4 " +pm				.3
		20-24	LASK / CL	Fi					
		24-40	Gm4 / L	FR/Fi	pm				
11	Lm ss 8% Bt	0-24	LASK / Cl-x	Fi (3% Pl)	10R 4/4	24"		24" Unsat Sapro	IV
			Unsortable sap.						0.3
									(0.1-0.15 Drip)

COMMENTS: ___

Pit 10

#10

Pit 11

#11

SOIL/SITE EVALUATION

(Continuation Sheet)

Sheet ___ of ___

DEPARTMENT OF ENVIRONMENT
AND NATURAL RESOURCES
DIVISION OF ENVIRONMENTAL HEALTH

Mint Hill

PROPERTY ID #:
DATE OF EVALUATION: 12-22-16
COUNTY: Mecl

PROFILE #	.1940 LANDSCAPE POSITION/ SLOPE %	HORIZON DEPTH (IN.)	SOIL MORPHOLOGY (.1941) .1941 STRUCTURE/ TEXTURE	SOIL MORPHOLOGY (.1941) .1941 CONSISTENCE/ MINERALOGY	OTHER PROFILE FACTORS .1942 SOIL WETNESS/ COLOR	OTHER PROFILE FACTORS .1943 SOIL DEPTH	OTHER PROFILE FACTORS .1956 SAPRO CLASS	OTHER PROFILE FACTORS .1944 RESTR HORIZ	PROFILE CLASS & LTAR
12	LNSJ Bt 13% BC C/Cr	0-14	2msbk / C	Fi (st po)	10R 4/6 5YR 5/6	28"		28"	IV 0.25-0.3 0.15 drip
		14-28	1MASK / CL	Fi (st po)					
		28-45+	Unif Sap						
13	LNSJ Bt1 Bt2 14% BC C	0-7	1ASK / SCL	Fi Sticky	5YR 3/3 2.5YR 4/6 2.5YR 5/6 Fpn pr	31" / >48	clay loam "U"		IV 0.3 0.15 drip
		7-15	2/ASK/C	Fi					
		15-31	1ASK/CL	Fi Plast					
		31-48	Omg/CL	Fi (ss sp)					
14			N/A →	>10" w class	/ strong				

COMMENTS:

8" 12" drip lost

SOIL/SITE EVALUATION

(Continuation Sheet)

Sheet ___ of ___

DEPARTMENT OF ENVIRONMENT
AND NATURAL RESOURCES
DIVISION OF ENVIRONMENTAL HEALTH

Mt Holly Athletic Park - Additional Pit

PROPERTY ID #: ____
DATE OF EVALUATION: 1-20-17
COUNTY: Mecklenburg

PROFILE #	.1940 LANDSCAPE POSITION/ SLOPE %		HORIZON DEPTH (IN.)	SOIL MORPHOLOGY (.1941) STRUCTURE/ TEXTURE	SOIL MORPHOLOGY (.1941) CONSISTENCE/ MINERALOGY	OTHER PROFILE FACTORS .1942 SOIL WETNESS/ COLOR	.1943 SOIL DEPTH	.1956 SAPRO CLASS	.1944 RESTR HORIZ	PROFILE CLASS & LTAR
A	Ls 14+	AB	0-8	1mgr /sL	Fr	7.5YR 4/4				
		Bt	8-16	2msbk /sc	FR(st Pl)	5YR 4/6				IV
		Bt	16-28	1m Abk /c	Fi (st Pl)	2.5YR 4/6 +pn	>36		28"	
		Bct	28+36+	Abk to massive /scL	FR	mcs			R=2n	0.25
B	Ls 17+	Bt	0-4	1msbk /scL	Fr	5YR 7/3				
		Bt	4-14	1m Abk /c	Fi (st Pl)	5YR 4/6				IV
		BCt	14-35	1m Abk /cL	FR	5YR 5/4 +mcs	>30			0.25
C	Ls 16+	Bt	0-14	2m Abk /c	Fi (st Pl)	10R 5/4				
		BE	14-27	2msbk /cL	Fr	5YR 5/6 +pn	27"			IV
		C	27-36	massive /L	Fr 0.4+	pn	>36	L		0.3
D	Ls 11+	Bt	0-7	1msbk cL	Fr	5YR 4/4				
		Bt	7-14	2m Asbk /c	Fi (st Pl)	2.5YR 4/6	28"			IV
		BC	14-28	1m Abk /scL	Fr	5YR 5/6 +pn	>36	~~SL~~ L		0.25
		C	25+36+	Mas /L	Fr	pn				

COMMENTS: ____

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Mint Hill Athletic Park 1/29/2017
Mecklenburg County, NC (PIN# 139-302-15)
2,990 GPD

Septic System Calculation Worksheet

Initial System: Aerobic Drip Irrigation

Recommended Drip Tubing Depth: 12-14"

Gal / Day	Trench Width (Inches)	Trench Equivalency (Feet)	Soil Depth on 0% Slope
2990			24

Slope	Pit / Auger#	Soil Depth (in.)	Total Suitable Pit Depth/ Sap. Depth (in.)	Soil Needed (slope adjusted) (in.)	[1] Total Depth of Saprolite Required (2:1 ratio) factoring Soil Depth (in.)	Fill Material Required (in.)	Morphological Based Field LTAR
8%	P3	30	30	24.0	N/A	0	0.15 drip
12%	P4	40	40	24.0	N/A	0	0.3 conv
13%	P5	43	52	24.0	N/A	0	0.3 conv
13%	P6	43	52	24.0	N/A	0	0.25 conv
11%	P7	33	33	24.0	N/A	0	0.15 drip
12%	P9	24	36	24.0	N/A	0	0.15 drip
10%	P10	24	48	24.0	N/A	0	0.3 conv
8%	P11	24	24	24.0	N/A	0	0.15 drip
13%	P12	28	28	24.0	N/A	0	0.15 drip
14%	P13	31	31	24.0	N/A	0	0.15 drip
					Drip LTAR Utilized		**0.15**
					Linear Feet Required		**9967**

Repair System: Aerobic Drip Irrigation

Recommended Drip Tubing Depth: 12-14"

Gal / Day	Trench Width (Inches)	Trench Equivalency (Feet)	Soil Depth on 0% Slope
2990			24

Slope	Pit / Auger#	Soil Depth (in.)	Total Suitable Pit Depth/ Sap. Depth (in.)	Soil Needed (slope adjusted) (in.)	[1] Total Depth of Saprolite Required (2:1 ratio) factoring Soil Depth (in.)	Fill Material Required (in.)	Morphological Based Field LTAR
8%	P3	30	30	24.0	N/A	0	0.15 drip
12%	P4	40	40	24.0	N/A	0	0.3 conv
13%	P5	43	52	24.0	N/A	0	0.3 conv
13%	P6	43	52	24.0	N/A	0	0.25 conv

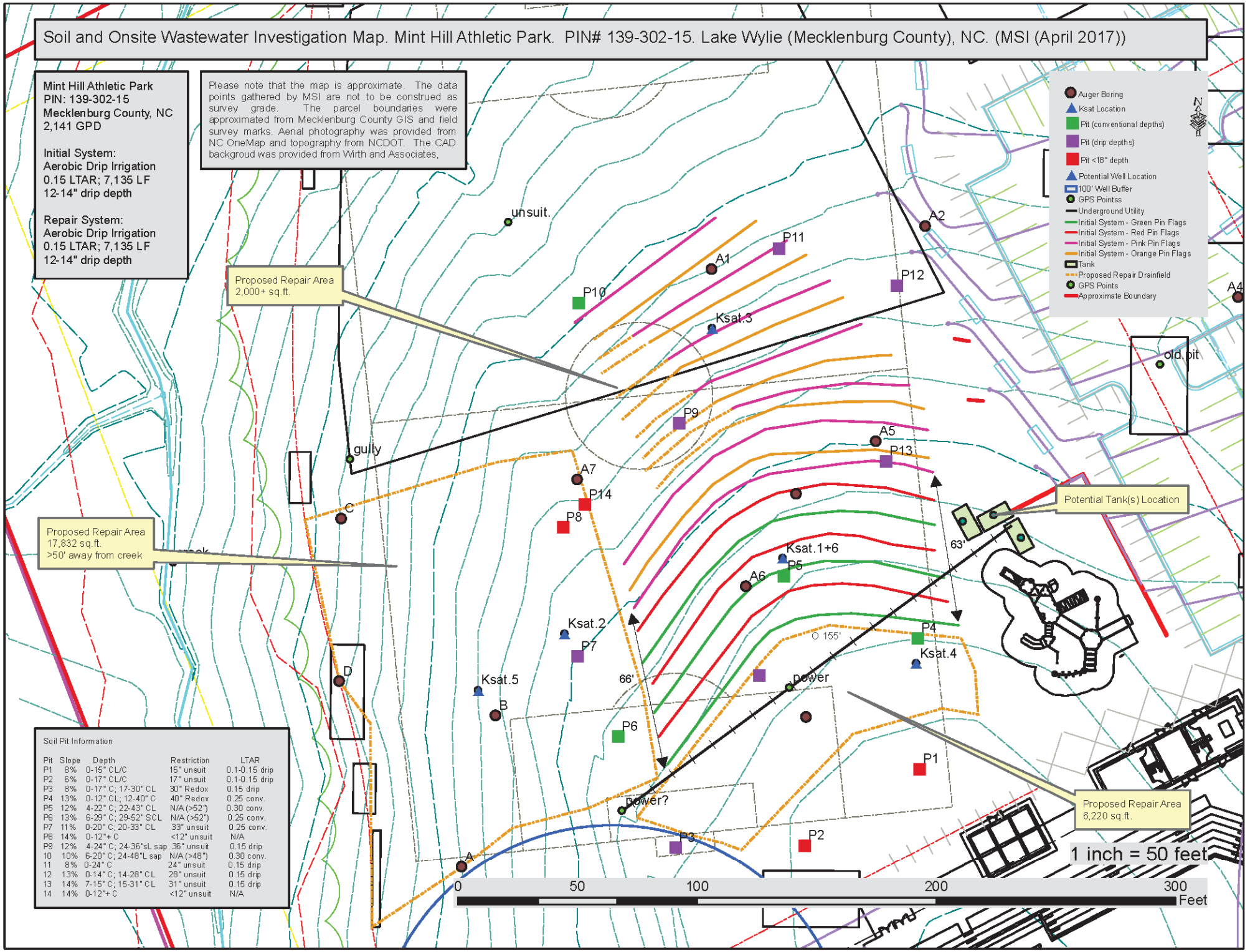
11%	P7	33	33	24.0	N/A	0	0.15 drip
12%	P9	24	36	24.0	N/A	0	0.15 drip
10%	P10	24	48	24.0	N/A	0	0.3 conv
8%	P11	24	24	24.0	N/A	0	0.15 drip
13%	P12	28	28	24.0	N/A	0	0.15 drip
14%	P13	31	31	24.0	N/A	0	0.15 drip
14%	A	28	28	24.0	N/A	1	0.25 conv
17%	B	30	30	24.0	N/A	2	0.25 conv
16%	C	27	36	24.0	N/A	3	0.3 conv
11%	D	28	36	24.0	N/A	4	0.25 conv
					LTAR Utilized		**0.15**
					Linear Feet Required		**9967**

[1] **[(soil depth needed-soil depth) x 2] + Soil depth = sap. Depth needed.**
Above equation only to be used if the difference in soil depth needed and actual soil depth present = 12" or less

Summary of Hydraulic Conductivity (Ksat) Measurments at the Mint Hill Athletic Park - 2,990 GPD System; Mint Hill (Mecklenburg Co.), NC

				Results			
Location	**Horizon**	**Textue**	**Depth**	**in/hr**	**gal/ft^2/day**	**4% Ksat gal/ft^2/day**	**10% Ksat gal/ft^2/day**
#1	Bt	C	1.0 - 8.0"	0.104	1.56	0.06	0.16
#1	Bt/BC	CL	12.5 - 19.5"	0.214	3.20	0.13	0.32
#2	Bt	C	5.5 - 12.5"	0.366	5.48	0.22	0.55
#2	Bt/BC	CL	19.0 - 26.0"	0.299	4.47	0.18	0.45
#3	Bt	CL	1.5 - 8.0"	0.108	1.62	0.06	0.16
#3	Bt/BC	CL	16.0 -23.0"	0.165	2.47	0.10	0.25
#4	Bt	C	5.0 - 12.0"	0.133	1.99	0.08	0.20
#4	Bt/BC	C	19.0 - 26.5"	0.150	2.24	0.09	0.22
#5	Bt	SC	6.5 - 14.0"	0.193	2.89	0.12	0.29
#5	Bt/BC	C	19.0 - 26.5"	0.237	3.55	0.14	0.35
#6	Bt	C / CL	7.0 - 14.0"	0.151	2.26	0.09	0.23
Average Restrictive Ksat Values				**0.165**	**2.46**	**0.10**	**0.25**
Average Restrictive Ksat Values (w/o 8" test depths)				**0.193**	**2.88**	**0.12**	**0.29**

Soil and Onsite Wastewater Investigation Map. Mint Hill Athletic Park. PIN# 139-302-15. Lake Wylie (Mecklenburg County), NC. (MSI (April 2017))



Soil Pit Information

Pit	Slope	Depth	Restriction	LTAR
P1	8%	0-15" CL/C	15" unsuit	0.1-0.15 drip
P2	6%	0-17" CL/C	17" unsuit	0.1-0.15 drip
P3	8%	0-17" C; 17-30" CL	30" Redox	0.15 drip
P4	13%	0-12" CL; 12-40" C	40" Redox	0.25 conv.
P5	12%	4-22" C; 22-43" CL	N/A (>52")	0.30 conv.
P6	13%	6-29" C; 29-52" SCL	N/A (>52")	0.25 conv.
P7	11%	0-20" C; 20-33" CL	33" unsuit	0.25 conv.
P8	14%	0-12"+ C	<12" unsuit	N/A
P9	12%	4-24" C; 24-36"sL sap	36" unsuit	0.15 drip
10	10%	6-20" C; 24-48"L sap	N/A (>48")	0.30 conv.
11	8%	0-24" C	24" unsuit	0.15 drip
12	13%	0-14" C; 14-28" CL	28" unsuit	0.15 drip
13	14%	7-15" C; 15-31" CL	31" unsuit	0.15 drip
14	14%	0-12"+ C	<12" unsuit	N/A

THIS IS THE LAYOUT THAT WAS USED AND FLAGGED IN FIELD

Lash Engineering, Inc.
Civil/Consulting/Wastewater/Planning
1104 Cindy Carr Drive
Matthews, NC 28105
Phone: 704-847-3031
mikel@LashEngineering.com

Lash Engineering, Inc.

Wastewater Facility for Mint Hill Athletic Complex

DRIP SYSTEM STATUS WITH COUNTY

This project has currently been reviewed twice in the field by the Mecklenburg Health Department (Jacob Presley). The drain field has been approved for use but the repair area is still being reviewed. The Drain field has been laid out on contour by the Soil Scientist (Steve Melin with Mountain Soils, Inc.) and that information has been transfered onto these plans. The Repair Area is setup to be cleared this week May 8-12 with a visit next week by the Health Department and Steve Melin to review pits and the repair areas used on the plans. The Repair Area will be finalized after that joint meeting and a revised report from Steve Melin is made available for submittal. This plan revision will be sent to Jacob Presley and to the State for approval.

Please contact Lash Engineering, Inc. if you have any questions or concerns at 704-847-3031.

NORTH CAROLINA DEPARTMENT
OF ENVIRONMENT AND NATURAL RESOURCES
DIVISION OF ENVIRONMENTAL HEALTH
ON-SITE WATER PROTECTION SECTION

CONTROLLED DEMONSTRATION
WASTEWATER SYSTEM APPROVAL

CONTROLLED DEMONSTRATION NO: CDWS-2002-1-R2

ISSUED TO: James Bell
Bio-Microbics, Inc.
8450 Cole Pkwy.
Shawnee, KS. 66227
800-753-FAST (3278); Fax: 913-422-0808
www.biomicrobics.com

FOR: Bio-Microbics, Inc. FAST® wastewater treatment systems
MicroFast Models 0.5, 0.75, 0.9, 1.5 and 3.0
High Strength Fast Models 1.0, 1.5, 3.0, 4.5, 9.0

APPROVAL DATE: February 24, 2009

In accordance with General Statute 130A-343 and 15A NCAC 18A .1969 a proposal by Bio-Microbics, Inc., for approval of subsurface wastewater systems utilizing the MicroFAST and High Strength FAST systems has been reviewed, and these systems have been found to meet the standards of a controlled demonstration system when all of the following conditions are met:

A. GENERAL

1. Scope of this Controlled Demonstration Approval:

   a. Use, design and construction requirements for the specified models of MicroFAST to meet TS-I or TS-II effluent and High Strength FAST pretreatment systems to meet NSF-40 or better effluent quality standards pursuant to Rule 15A NCAC 18A .1970.
   b. Special operation, maintenance and monitoring of these Bio-Microbics FAST pretreatment systems and associated subsurface systems to ensure the treatment performance standards shall continue to be met.
   c. Proposal for evaluation of this Controlled Demonstration system.

2. This Controlled Demonstration approval is applicable to wastewater systems utilizing MicroFAST and High Strength FAST pretreatment systems that have a design flow not exceeding 3,000 gallons per day.
3. The MicroFAST systems are approved to treat domestic wastewater. High Strength FAST systems are approved to treat wastewater from food service facilities or other commercial establishment generating similar high strength wastewater.

4. Influent waste strength to the Bio-Microbics, Inc. MicroFAST treatment system shall not exceed domestic septic tank quality effluent standards pursuant to Rule 15A NCAC 18A.1970(b). In addition the following requirements shall be met:

    - The permit applicant shall verify that the system influent has sufficient alkalinity to allow for the proper amount of nitrification removal when nitrogen performance standards for TS-I or TS-II must be met.
    - The blower must remain on at all times unless otherwise recommended by Bio-Microbics, Inc.
    - The influent to the MicroFAST treatment system shall not have a pH or toxins that significantly inhibit microbial growth. (Please see the company's Owner's Manual for a list of prohibited products.)

5. Design flow and influent BOD and TSS limits must be established on case-by-case basis for projects using High Strength FAST systems, depending upon the facility served and desired effluent limitations. A North Carolina Professional Engineer shall design the system and Bio-Microbics shall certify the design of each project using a High Strength FAST system. A set of support design calculations shall be provided for each system.

6. This controlled demonstration is initially limited to 50 systems with design flows of up to 3,000 gallons per day.

7. FAST pretreatment systems may be used for applications that have a design daily flow exceeding 3,000 gallons per day if designed by a P.E. licensed to practice in NC and approved by the State on a case-by-case basis. Design shall be in accordance with the Large Systems State Review/Approval Process (Rule 15A NCAC 18A .1938).

B. ADVANCED TREATMENT PERFORMANCE STANDARDS (TS-I AND TS-II)

MicroFAST and High Strength FAST have been approved for NSF-40, TS-I and TS-II. Refer to Rule .1970(a) Table VII – Effluent Quality Standards for Advanced Pretreatment Systems for treatment performance levels.

C. SITING CRITERIA

Approved Controlled Demonstration systems may be installed on sites that are suitable for a conventional wastewater system and that have a repair area of sufficient size to allow for the installation of a conventional, modified, or alternative wastewater system, an approved Innovative wastewater system, or an accepted wastewater system if the Controlled Demonstration wastewater system fails to perform properly. Other sites may be used for the initial installation of a Controlled Demonstration system that meet the criteria for a modified, alternative, approved innovative or accepted wastewater system, when the Manufacturer agrees to provide such a system if the Controlled Demonstration system were to fail to perform properly.

Approved Controlled Demonstration systems may not be installed as a repair to an existing malfunctioning system on sites that do not have any additional area for repair. Exceptions to the repair area requirement are as set forth in Rule .1969(f)(3) and (4).

The MicroFAST pretreatment systems and associated drainfields shall be sited and sized in accordance with Rule .1970 for a TS-I or TS-II system.

D. DESIGN CRITERIA

1. A MicroFAST system designed for flows of up to 1,500 gpd shall utilize models of Residential Wastewater Treatment Systems (RWTS's) that have been preapproved by the State in addition to meeting the requirements listed below. For MicroFAST systems designed for flows greater than 1,500 gpd, and for High Strength Fast units, a state-approved septic tank shall be used sized in accordance with .1952(b).

2. Tables 1 and 2 provide the minimum unit sizing required for the FAST or High Strength FAST unit based on design flow and full time or seasonal use.

Table 1 – Sizing for Full Time Residential Installations

System Model	Design Flow Limit	Settling Zone Size (gallons)	Treatment Zone Size (gallons)	Total Tank Size (gallons)
MicroFAST 0.5	500 gpd	500	750	1250
MicroFAST 0.75	750 gpd	500	1000	1500
MicroFAST 0.9	900 gpd	725	1250	1975
MicroFAST 1.5	1500 gpd	1075	1875	2950
MicroFAST 3.0*	3000 gpd	2145	3750	5895
High Strength FAST 1.0*	Design flow and influent BOD and TSS limits must be established on a case-by-case basis, depending upon the facility served and the desired effluent limitations. A North Carolina Professional Engineer shall design and Bio-Microbics shall certify the design of each project. A set of support design calculations shall be provided for each system. * See Number 6 in Design Criteria			
High Strength FAST 1.5*				
High Strength FAST 3.0*				
High Strength FAST 4.5*				
High Strength FAST 9.0*				

Table 2 – Sizing for Seasonal Use Residential Installations

System Model	Design Flow Limit	Settling Zone Size (gallons)	Treatment Zone Size (gallons)	Total Tank Size (gallons)
MicroFAST 0.75	500 gpd	500	1000	1500
MicroFAST 0.9	750 gpd	725	1250	1975
MicroFAST 1.5	9000 gpd	1075	1875	2950
MicroFAST 3.0*	1500 gpd	2145	3750	5895
MicroFAST 4.5*	3000 gpd	See Note 1	4220	See Note 1
High Strength FAST 1.0*	Design flow and influent BOD and TSS limits must be established on a case-by-case basis, depending upon the facility served and the desired effluent limitations. A North Carolina Professional Engineer shall design and Bio-Microbics shall certify the design of each project. A set of support design calculations shall be provided for each system. Note 1: The MicroFAST 4.5 is installed in a separate tank from the Settling Zone tank. The size of the Settling Zone tank should be in accordance with State and Local rules. * See Number 6 in Design Criteria			
High Strength FAST 1.5*				
High Strength FAST 3.0*				
High Strength FAST 4.5*				
High Strength FAST 9.0*				

3. Grease traps or grease interceptors in accordance with .1955(k) shall also be used prior to High Strength Fast units.

4. The FAST systems gravity discharge to the dispersal component (pump tank, gravity drain field, etc.).

5. MicroFAST systems designed for flows of domestic wastewater, up to1,500 gallons per day, shall be designed by a Bio-Microbics certified designer or a North Carolina Professional Engineer.

6. MicroFAST systems designed for flows over 1,500 and less than 3,000 gallons per day and all High Strength Fast units shall be designed on a case-by-case basis by a North Carolina Professional Engineer. A design certification shall be provided from the manufacturer (Bio-Microbics) verifying acceptance of the engineer's design criteria, plans and component specifications. The company shall provide this certification in writing to the applicant for submittal with the site application.

7. For any project utilizing a FAST system that is suspended from the lid of a tank, the tank design must be specifically approved by the State of North Carolina. This applies to each tank manufacturer, and each model FAST system to be used.

8. For any Bio-Microbics FAST pretreatment system to be installed under traffic areas, a North Carolina professional engineer, in consultation with Bio-Microbics corporate staff, shall design the containment vessels and access openings. The State shall review and approve these plans and specifications.

9. A vent for the FAST unit must be provided at the treatment unit.

10. All Bio-Microbics FAST wastewater pretreatment systems installed on Group I (sandy) soils must use a blower inlet filter that prevents sand grains from entering the blower. This shall be supplied by Bio-Microbics, or an alternate product used that is approved by Bio-Microbics.

11. A State approved septic tank sized at a minimum of twenty-five percent of the capacity required in .1952 (b) shall be provided after the FAST unit. A State-approved effluent filter sized for the daily design flow shall be placed in this septic tank.

12. An ultraviolet (UV) disinfection unit "The Disinfector" or other UV system approved by the State shall be provided after the effluent filter whenever TS-II standards are required to be met.

13. An example of the pretreatment layout is provided in Attachment A.

E. INSTALLATION AND TESTING PROCEDURES

1. A preconstruction conference shall be required and shall be attended by the system designer, Bio-Microbics or its designated manufacturer's representative, Bio-Microbics certified installer, and local health department (LHD), prior to beginning construction of the FAST Treatment System and associated ground absorption system.

2. The FAST System shall be located in compliance with the horizontal setback requirements of Rule .1950(a), and shall be located to prevent surface/subsurface water inflow/infiltration. The drainfield horizontal setbacks are in accordance with Rule .1970 for a TS-I or TS-II system.

3. All Bio-Microbics FAST systems shall be installed according to directions provided in the Bio-Microbics "Installation Manual". Tankage and instructions found on Bio-Microbics CAD drawings of each system shall be used. Additionally, all Bio-Microbics FAST systems and components used with, but not manufactured by Bio-Microbics, shall be installed in accordance with all applicable regulations

4. All individuals/companies installing Bio-Microbics FAST systems shall be in possession of all necessary permits and licenses before starting any portion of an installation.

5. Watertightness of the tanks and any dosing tanks shall be demonstrated by a 24-hour leakage test conducted at the installation site or by an approved vacuum testing method. A water level change of 1/2 inch or more over 24 hours, or visual observation of leakage shall be cause for failure of the watertightness test. Initial water level shall be to 2 inches above the riser/adapter seam.

6. A Bio-Microbics, Inc. certified system operator shall startup the FAST unit for each installation and shall provide an acceptance letter to the LHD and to Bio-Microbics, Inc. or their representative prior to issuance of the operation permit.

7. Specified site preparation steps and construction specifications for the ground absorption system shall be strictly adhered to, including specified depth of trenches in relation to site limiting conditions.

8. Each Bio-Microbics control panel shall have a label as shown in Attachment B.

9. Prior to Operation Permit issuance, the final Health Department construction inspection shall include at least the following:

   - check positive airflow out of the vent by placing a bag on the vent and observing it filling
   - assure the blower is no more than 100 feet from the FAST system
   - observe the water tightness testing
   - test the blower and UV system alarms
   - inspect the blower outlet pipe to ensure that the first twelve inches is galvanized steel pipe
   - assure all vents are installed
   - observe hydraulics of the overall system
   - confirm control panel set for continuous blower operation
   - record all time clock settings

F. OPERATION, MAINTENANCE AND TESTING

1. System classification, management and inspection shall be in accordance with Rules .1961 and .1970.

2. All Bio-Microbics FAST pretreatment systems require an operation and maintenance agreement between the system owner and Bio-Microbics, Inc, or its authorized representative, as per Rule .1970. The system shall be inspected by a certified Subsurface Operator who is also a certified Grade II biological wastewater treatment plant operator. The certified operator shall be either an employee of Bio-Microbics, Inc, or authorized in writing by Bio-Microbics, Inc to operate and maintain the system.

3. FAST pretreatment systems shall be classified at a minimum as a Type V(a) system according to Table V(a) of Rule .1961(b).

4. High Strength FAST units shall have a minimum frequency inspection of monthly.

5. All FAST pretreatment systems shall be operated and maintained according to the latest version of Bio-Microbics, Inc, O&M manual.

6. At each FAST pretreatment system inspection the Operator in Responsible Charge (ORC) shall, at a minimum, observe, monitor, and record the following:

   a. Check FAST system blower for proper operation; note any unusual sounds or physical appearance.
   b. Clean out steel inlet air filter attached to the blower and service as needed. The steel inlet air filter shall be replaced every two years.
   c. Check alarm to make sure it works and is undamaged. The alarming function can be checked by turning the blower breaker switch off. The alarm will sound after a 10-second delay.
   d. Make a visual inspection looking down the inspection port to the FAST reaction chamber to confirm that the water at the surface of the unit is churning vigorously. At the same time

check the water level to confirm that there is approximately 2 in. over the media with the blower turned off. Also check the wastewater level in the other tanks.

e. Visually inspect the clarity of effluent coming from the FAST system. It should appear to be clear and free of fine suspended solids.
f. During each inspection, check sludge levels in the initial settling tank and post treatment settling tank (effluent filter tank). The initial settling tank shall be pumped out at 1/3 of liquid depth. The post treatment settling tank shall be pumped out at 6 inches of sludge depth. When either settling tank is pumped out, also pump out any sludge that has accumulated under the FAST system.
g. The effluent filter should only be inspected when the post-treatment settling tank is pumped out. Perform all other routine inspections and service as outlined in the Bio-Microbics Service Manual.
h. Check wastewater levels in the tanks.
i. Check watertightness of tanks, risers and pipe connections at tanks.
j. Observe operation of pumps, floats, valves, electrical controls and alarms.
k. Verify pumping frequency from pump impulse counters and elapsed run time meters.
l. Record the pump cycle and run time meters and any water meter readings.

7. At least once per year the ORC shall, at a minimum, measure and report to the health department:

   a. sludge and scum levels in the pre and post settling tanks,
   b. drainfield pump delivery rate (drawdown test), and
   c. drainfield dosing volume and measure or calculate average pump run time.

8. The ORC shall also conduct other additional observations, measurements, monitoring, and maintenance activities as specified in the Operation Permit and as recommended by the manufacturer.

9. Sampling and Testing

   a. All sampling shall be done in accordance with Rule .1970(n).
   b. All systems shall be tested for effluent $CBOD_5$, TSS, NH_4-N, and fecal coliform bacteria. Influent shall be tested for BOD_5 and TKN. TS-II system effluent shall be additionally tested for TN.
   c. Influent samples shall be taken at the outlet end of the septic tank prior to the FAST unit. The sample should be taken from 12 inches below the bottom of the effluent filter/tee.
   d. Effluent samples shall be taken from an approved sampling port immediately following the FAST pretreatment unit or FAST UV system (for TS-II). The testing protocol shall follow the Bio-Microbics Testing Protocol for FAST Wastewater Treatment Systems (see Attachment C). Sampling ports may include pump tank free fall of effluent.
   e. Each system shall incorporate a system for effluent flow monitoring into its design. A separate dialer panel from the standard Bio-Microbics panel will record and 7-day and 30-day flow readings on a web based database that the operator will be able to access. The separate dialer panel can be used for pressure manifold and LPP systems. Where effluent flows are by gravity, the method of flow measurement will be done on a case-by-case basis with approval by the State.

10. Notification and Performance of Maintenance and Repairs

    a. The ORC shall alert Bio-Microbics and the system owner in a timely fashion of needed maintenance or repair activities including, but not limited to, landscaping, tank sealing, tank pumping, pipe or control system repairs, and adjustment of any other system component.
    b. The septic tank will be pumped as needed upon recommendation of the ORC and in accordance with the Bio-Microbics Treatment System Operation and Maintenance Manual. However, at a minimum, the septic tank will be pumped whenever the solids level exceeds 25% of the tank's total liquid working capacity or the scum layer is more than 4 inches thick.
    c. The ORC shall notify the system owner, Bio-Microbics, Inc, and the local health department whenever the pump delivery rate efficient or average pump run times are not within 25% of initial measurements conducted prior to system start-up. System troubleshooting and needed maintenance shall be provided to maintain the pump delivery rate and average pump run time within 25% of initial measurements conducted during system startup.

11. Reporting

    a. The ORC shall provide a completed written report to Bio-Microbics, Inc, the system owner, and the local health department within 30 days after each required visit. At a minimum this report shall specify:
        (1) the date and time of inspection,
        (2) system operating conditions observed according to F.5 above,
        (3) system operating conditions measured according to F.6 and F.7 above,
        (4) results from any laboratory analysis of any effluent samples,
        (5) maintenance activities performed since the last inspection report,
        (6) an assessment of overall system performance,
        (7) a list of any improvements or maintenance needed, and
        (8) a determination of whether the system is malfunctioning, and the specific nature of the malfunction.

    b. Proposal for Evaluation and Reporting
        (1) The manufacturer shall maintain a contract for evaluation of the performance of the controlled demonstration wastewater system with an independent third party laboratory, consultant, or other entity that has expertise in the evaluation of wastewater system and that is approved by the Department. The third party shall review the site-specific sampling and flow-monitoring protocol, collect and analyze the ORC inspection reports, sampling and monitoring data, and prepare Semi-Annual Reports summarizing all data for all the sites. These reports are due by January 31 and July 31 of each year, and shall include all data gathered through December 31 and June 30 of the previous six-month period, respectively. These reports shall provide information to the Department based upon the monitoring data and observations made from the Controlled Demonstration systems installed pursuant to this Approval. This should include an assessment of system performance in relation to the established treatment performance standards; an assessment of physical and chemical properties of the materials used to construct the system, in terms of strength, durability, and chemical resistance to loads and conditions experienced; recommended areas of applicability for the system; and any conditions and limitations related to the use of the system.
        (2) Upon completion of the research and testing protocol, and prior to completing any application

by Bio-Microbics, Inc, to the State for reclassification of the FAST Pretreatment System as an Innovative System, and within a maximum of five years of the effective date of the first Controlled Demonstration System Operation Permit (CDSOP) issued pursuant to this approval, the approved third party shall prepare a Final Report to the State that includes the results from all of the systems installed during the Controlled Demonstration, including sampling results, flow-monitoring information, ORC reports, etc., and provide recommendations on future use of the system. The Final Report shall be in electronic format and may be published on the On-Site Water Protection Section's website without confidentiality. The contents of the interim and final reports shall not be altered from the original document without approval from Bio-Microbics, Inc.

(3) A minimum of 50 data points is required, including data from a minimum of 15 sites, with a minimum of two data sets per site collected over at least a 12-month period.
(4) For coastal resort communities, the two samples shall take place between June 1 and September 8 of each year. The samples must be taken at least six weeks apart.
(5) Other seasonal homes shall be sampled during the times of greatest use.
(6) A copy of the sample results will be provided from the laboratory directly to the On-Site Water Protection Section.
(7) The State of North Carolina and Bio-Microbics, Inc, agree that any systems that are out of compliance due to owner intervention, i.e. excessive flows, chemical disposal, or high strength waste, etc., shall not be considered in the Controlled Demonstration approval and any test results from those systems shall not be held against Bio-Microbics, Inc.

12. Effluent Quality, System and Site Compliance. Compliance of each site and the system shall be in accordance with requirements set forth in Rule .1970. Consideration shall be given for the system to be reclassified as an approved Innovative system when the requirements of Rule .1969(g)(2) for "Fast Track" approval and system compliance requirements of Rule .1970(o)(2) have been met.

G. RESPONSIBILITIES AND PERMITTING PROCEDURES

1. Prior to the installation of a FAST Treatment System at a site, the lot owner or lot owner's agent shall notify the local health department of their proposed use of such a system. The local health department shall issue an Improvement Permit or Authorization to Construct or amend a previously issued Improvement Permit or Authorization to Construct allowing for the use of up to 50 of the proposed Controlled Demonstration Systems upon a finding that all provisions of this Approval and all other applicable rules shall be met. Use of the proposed Controlled Demonstration System and any conditions shall be described in the Improvement Permit and Authorization to Construct or amended Improvement Permit and Authorization to Construct, as well as described on the Operation Permit to be issued upon the acceptable completion of the system installation. **Notification of the issuance of all permits/Authorizations by the local health department pursuant to this Controlled Demonstration Approval shall be submitted to the On-Site Water Protection Section.**

2. Prior to the issuance of the Improvement Permit, the site shall be evaluated by a Licensed Soil Scientist and a written, sealed report provided to the local health department, as required pursuant to Rule .1970. The local health department may request the assistance of their Regional Soil Specialist in evaluating this report prior to Improvement Permit issuance.

3. When a special site evaluation is required pursuant to Rule .1970(p)(1), the report shall contain the information as specified in Rule .1970(p)(2).

4. Design responsibility: Prior to the issuance of an Authorization to Construct for a Bio-Microbics FAST Treatment System, a submission prepared by a Bio-Microbics certified designer or North Carolina Professional Engineer, and a Licensed Soil Scientist, as applicable, shall be submitted for review and approval by the local health department. Approval shall be contingent upon the following:

   a. Site-specific design for the pretreatment system including the FAST unit with approved tankage, final septic tank with effluent filter, UV "The Disinfector" system or other State approved UV system, and sampling point.
   b. Site-specific soils report is provided as applicable.
   c. The drainfield dosing tank and drainfield layout may be completed by either the local health department or the Certified Designer/Professional Engineer.
   d. All design submittals shall be accompanied by a letter from Bio-Microbics or its representative.

5. It is recommended that local authorized environmental health practitioners attend a design training session offered by the manufacturer or its approved representative prior to permitting the system. Also, at the request of the local health department, a Section Engineer will review the design.

6. The Bio-Microbics authorized installer must certify in writing that the system was installed in accordance with the approved design prior to Operation Permit issuance. A professional engineer must certify in writing that a system required to be designed by an engineer was installed in accordance with the approved plans and specifications prior to Operation Permit issuance. For sites required to be evaluated by a Licensed Soil Scientist or Professional Geologist (see Section I.2, above), the health department may specify as a condition on the Improvement Permit and Authorization to Construct that a Licensed Soil Scientist or Professional Geologist oversee critical phases of the drainfield installation and certify in writing that the installation was in accordance with their specified site/installation requirements prior to the Operation Permit issuance.

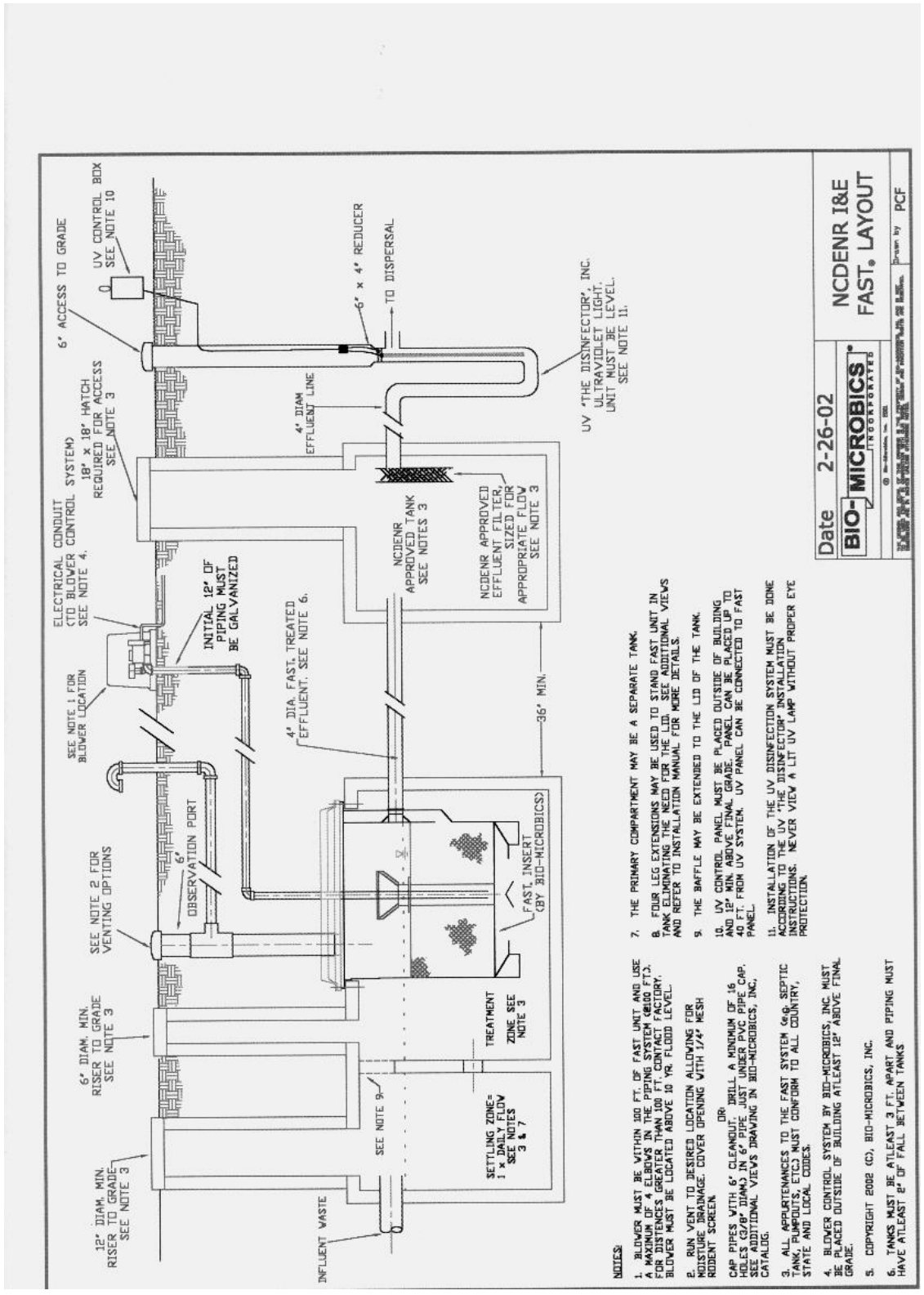
7. The operator shall be present during initial system commissioning. The ORC must be certified both as a Subsurface Operator and a Grade II Biological Wastewater Treatment Operator and an authorized by Bio-Microbics as an approved Treatment System Operator.

H. REPAIR OF SYSTEMS

The provisions of 15A NCAC 18A .1961 (c) shall govern the use of the Bio-Microbics Pretreatment System for repairs to existing malfunctioning wastewater systems.

Approved By: _____ Date: _____

Attachment A.



Attachment B

Label is 4.75” long by 1.5” tall.

NON-TYPICAL SEPTIC SYSTEM
FAST
CONTROLLED DEMONSTRATION.
GRADE II WW OPERATOR REQUIRED.

BIO MICROBICS
BETTER WATER. BETTER WORLD.
8450 Cole Parkway ▪ Shawnee, KS 66227 ▪ Phone: 913-422-0707 ▪ Fax: 913-422-0808
E-mail: onsite@biomicrobics.com ▪ www.biomicrobics.com ▪ 800-753-FAST (3278)

May 8, 2017

Michael Lash, PE.
Lash Engineering
1104 Cindy Carr Drive
Matthews, N.C. 28105

Re: Mint Hill Athletic Facility Wastewater Treatment

Dear Michael,

We have received your inquiry and plans regarding the commercial project for Mint Hill Athletic Facility. The design flow given to us is 2,880 GPD. The influent characteristics used as basis for the design were assumed to be the following concentrations:

- BOD = 300 mg/L
- TSS = 300 mg/L

We believe the MicroFAST® 4.5 should achieve NSF- 40 effluent Quality Standard 25/30 mg/L CBOD/TSS respectively. This system should perform to the effluent requirements, provided the influent is as stated above, the systems are installed, operated, and maintained properly. This also assumes there are no issues with temperature or toxicity. If the influent parameters exceed those stated above, additional equipment may be required.

Please contact me if you have any questions.

Regards,

Lucas Staus
Manager of Sales
Bio-Microbics, Inc.

cc: File Lash Engineering Correspondence, 2017

American Manufacturing Company, Inc.

P.O. Box 97, 22011 Greenhouse Road, Elkwood, VA 22718
Phone: 800-345-3132 Fax: 540-825-1785

May 4, 2011

Michael Lash, P.E.
Lash Engineering, Inc.
1104 Cindy Carr Drive
Matthews, North Carolina, 28105

Re: Authorized American "Perc-Rite®" Drip System Designer

Dear Michael,

This letter is to verify your individual status as an ***Authorized American Manufacturing Company "Perc-Rite®" Drip Dispersal System Designer***. Designs of American Mfg. "Perc-Rite®" Drip Systems are still to be reviewed and approved by American Mfg. prior to regulatory submission.

Sincerely,

Bryan J. Allen

Bryan J. Allen
American Manufacturing Company, Inc.

S:Staff\bryan\data\wordpro\north carolina\auth designer.lwp

American Manufacturing Company, Inc.
P.O. Box 97, Elkwood VA 22718
1-800-345-3132

April 4, 2017

Mike Lash
Lash Engineering
1104 Cindy Carr Drive
Matthews NC 28105

RE: Design Review
Mint Hill Athletic Complex
9801 Brief Road
Charlotte NC 28227

Dear Mr. Lash,

Upon review of your system design for the American Manufacturing "Perc-Rite®" Drip Dispersal system serving the above property, we find that the system has been designed in compliance with the manufacturer's recommendations.

Review included Lash Engineering's "Engineers Project Summary" (4 pages), and the "Wastewater Engineer Plans" (dated 3/27/17, 6 pages). Additionally, in your submission are hydraulic calculations, (dated 3/16/17, 6 pages), provided by Bryan Allen, P.E., American Manufacturing prepared in consultation with you.

American Manufacturing only certifies this "Perc-Rite®" drip system the ability to function as intended based upon the provided design submittal. No site visit has been conducted. American makes no certification to the design's applicability to LTAR, soil suitability, construction method, local approvals, codes, or other regulations governing its design.

If you have any questions or require any further information please feel fee to get in touch.

Sincerely,

Tom W. Ashton REHS, LPSS
Senior Designer

Cc: Bryan Allen, P.E. American Manufacturing



AMERICAN MANUFACTURING
Company, Inc.
www.americanonsite.com

NORTH CAROLINA DEPARTMENT
OF ENVIRONMENT AND NATURAL RESOURCES
DIVISION OF ENVIRONMENTAL HEALTH
ON-SITE WATER PROTECTION SECTION

INNOVATIVE WASTEWATER SYSTEM APPROVAL

INNOVATIVE WASTEWATER SYSTEM NO: IWWS-93-1-R6B

ISSUED TO: Robert B. Mayer, P.E.
American Manufacturing Company, Inc.
PO Box 97
Elkwood VA 22718
(800) 345-3132; Fax: 540-825-1785
Website: www.americanonsite.com

FOR: American Perc-Rite® Subsurface Drip System, Aerobic

APPROVAL DATE: October 22, 1993
February 9, 1996
March 7, 2001
October 18, 2002
November 1, 2005
June 29, 2006
February 4, 2010

In accordance with 15A NCAC 18A .1969, an application by Robert B. Mayer, P.E., American Manufacturing Company, Inc. of Elkwood, VA, for modification to the approval of their subsurface wastewater drip system has been reviewed, and the system has been found to meet the standards of an innovative system when the following conditions for use, monitoring and operation are met:

I. General

A. System Description

1. Collection system — Conventional gravity, pressure sewer fed by grinder pumps or individual septic tank effluent pumping units.
2. Pretreatment — Approved Residential Wastewater Treatment System (RWTS) meeting at least NSF-40 standards, approved TS-I or TS-II advanced wastewater pretreatment system, or approved equal.
3. Filtration — Automatic, self-cleaning filter(s) (appropriately sized Arkal disc filters, or approved equal) capable of screening particles larger than or equal to 115 microns.
4. Manifold — Common line (Schedule 40 PVC) to connect all the dripline in a single field or zone at the start of the field or zone (supply end) and the distal ends of the dripline (flush end).
5. Air vent — Air vacuum breaker(s) installed at the high point(s) of each drip field to allow air to be rapidly evacuated from the tubing during pressurization and to keep soil from being aspirated into the drip emitters due to back siphoning or back pressure after the pumps shut off.
6. Dripline — NETAFIM PC dripline with pressure-compensating emitters spaced uniformly in the tubing (12, 18, or 24 inch centers). The dripline contains interior emitters and the outside layer is purple colored for easy identification. The emitters are

impregnated with a biocide to inhibit slime accumulations.

7. Drip lateral — Entire length of dripline, from the connection to the supply manifold to the connection to the return manifold.
8. Drip run — Single section, on contour, of a drip lateral between manifolds, a manifold and a loop, or between two loops. Multiple parallel drip runs may be used within a single drip lateral.
9. Field flushing valve — An automatic valve used to enable accumulated debris and sediment to be flushed from the dripline back to the pretreatment unit.
10. System Controls — Control/software package controlling all functions, including filter flushing, system dosing and flushing, and audible/visible alarms. Telemetry must be included for systems with a design daily flow larger than 600 gallons per day (gpd). Flow monitoring and self diagnostics capabilities must be included for systems with a design daily flow larger than 3,000 gpd.
11. Documentation — Current schematics, drawings and manuals must be filed with NCDENR for all major components utilized under this approval, for posting on the On-Site Water Protection Section Webpage.

B. Scope
   1. This Innovative Approval is for subsurface drip systems receiving effluent from an approved advanced wastewater pretreatment system designed to meet NSF-40, TS-I or TS-II standards, pursuant to Rule 15A NCAC 18A .1970, or more stringent standards.
   2. For systems with a daily design flow of up to 1,500 gallons per day (gpd), pretreatment may be by an RWTS designed to meet NSF-40 Standards, approved pursuant to Rule .1957(c), or by an E&I system designed to meet NSF-40, TS-I, TS-II or more stringent standards, approved pursuant to Rule .1969.
   3. For systems with a daily design flow greater than 1,500 gpd and up to 3,000 gpd, pretreatment may be by an I&E system designed to meet NSF-40, TS-I, TS-II or more stringent standards, approved pursuant to Rule .1969.
   4. Advanced pretreatment systems which have not received prior approval by the State may be proposed for use when designed by a Professional Engineer to meet applicable standards and submitted to the State for review and approval on a case by case basis. This would include the use of multiple RWTS for a system with a daily design flow greater than 1,000 gpd or as otherwise specified in the RWTS approval.
   5. State review of engineering plans for the system, including the advanced pretreatment components, are required for all systems with a daily design flow greater than 3,000 gpd, and for all systems receiving industrial process wastewater, in accordance with State Review/Approval Processes (Rule 15A NCAC 18A .1938).

C. System siting, sizing and horizontal setbacks shall be in accordance with this Approval. Where there are conflicts between the requirements of this approval and the June 1, 2006 version of Rule .1970, the requirements of this approval shall be applicable.

D. Consideration may be given to modifying the siting, sizing, horizontal setback or installation requirements delineated herein for conjunctive use reclaimed water systems, where all of the following conditions are met:
   1. The pretreatment system shall meet a reclaimed water effluent standard pursuant to Rule 15A NCAC 02T .0900.
   2. The conjunctive system drip dispersal area is separate from the required drainfield area and required repair area for the system, and shall be designed and operated to utilize the reclaimed water in a beneficial manner.
   3. Siting, sizing, setbacks, installation, and management requirements shall be proposed by the system designer and approved by the State on a case by case basis.

II. Siting Criteria

The Aerobic American Perc-Rite® subsurface drip system may be utilized when one or more of the conditions set

forth in Sections II.A through I of this approval are met, as applicable. Summary tables of siting criteria, including when a special site evaluation (Section IV) is required, are included in Appendix A.

A. An aerobic subsurface drip system may be utilized on sites that meet one of the following criteria:
   1. Sites classified suitable or provisionally suitable in accordance with Rules .1939-.1948;
   2. Sites reclassified to be provisionally suitable in accordance with Rules .1956(1), (2), (4), (5) or (6a); or
   3. Sites meeting the criteria for low pressure pipe (LPP) systems in accordance with Rule .1957(a)(2).
   4. A special site evaluation pursuant to Section IV shall only be required if needed to justify the proposed long term acceptance rate (LTAR), as set forth in Section III.

B. Required vertical separation requirements shall be measured from the trench bottom or point of application, whichever is deeper.

C. The minimum vertical separation distance to rock or tidal water for subsurface drip systems shall be 12 inches, regardless of treatment.

D. A minimum of 6 inches of soil cover shall be maintained over driplines receiving effluent treated to TS-II or a less stringent standard.

E. Minimum required soil cover shall be uniform over the entire drip dispersal field or zone.

F. If reuse quality water is being dispersed to a conjunctive system area, less than 6 inches of soil cover may be maintained over the drip tubing.

G. This requirement for at least 6 inches of cover may be met by the addition of up to 6 inches, after settling, of suitable Group II or III soil material over the drip field. If cover material is required and the slope is over 30 percent, a slope stabilization plan must be provided by an appropriately licensed individual.

H. Driplines shall be installed at least 1 inch into naturally occurring soil. The drip installation shall otherwise be considered a fill system.

I. A drip system receiving effluent treated to the NSF-40 standard, or a more stringent standard, may be utilized on sites where there is at least 18 inches of useable naturally occurring soil above an UNSUITABLE soil horizon, rock, or soil wetness condition. The minimum vertical separation distance between the trench bottom or point of application, whichever is deeper, and any UNSUITABLE horizon, rock, or soil wetness condition shall be 12 inches.

J. A special site evaluation, pursuant to Section IV of this Approval, shall be required whenever Group IV soils are encountered within 18 inches of the naturally occurring soil surface or within 12 inches of the trench bottom or point of application, whichever is deeper, and the LTAR pursuant to Section III.B is proposed to exceed 0.10 gpd/ft^2 for NSF-40 effluent, 0.12 gpd/ft^2 for TS-I effluent, and 0.15 gpd/ft^2 for effluent treated to TS-II or a more stringent standard.

K. A drip system receiving aerobic effluent treated to TS-I, or a more stringent standard, may be utilized on sites where there is at least 15 inches of useable naturally occurring soil above an UNSUITABLE soil horizon, rock, or soil wetness condition.
   1. The minimum vertical separation distance between the trench bottom or point of application, whichever is deeper, and an UNSUITABLE soil horizon, or soil wetness condition shall be 9 inches for TS-I effluent.
   2. A special site evaluation, pursuant to Section IV of this Approval, shall be required whenever there is less than 18 inches of useable naturally occurring soil above an UNSUITABLE soil horizon, rock, or soil wetness condition.

L. A drip system receiving aerobic septic tank effluent treated to TS-II, or a more stringent standard, may be utilized on sites when there is at least 13 inches of useable naturally occurring soil above an

UNSUITABLE soil horizon, rock, or soil wetness condition.

1. The minimum vertical separation distance between the trench bottom or point of application, whichever is deeper, and an UNSUITABLE soil horizon, or soil wetness condition shall be 6 inches for TS-II effluent.
2. A special site evaluation, pursuant to Section IV of this Approval, shall be required whenever there is less than 18 inches of useable naturally occurring soil above an UNSUITABLE soil horizon, rock, or soil wetness condition,

M. A drip system receiving aerobic effluent treated to at least the NSF-40 standard, may be utilized when a groundwater lowering system (existing or proposed) is used to meet the vertical separation requirements to a soil wetness condition. In order to use a groundwater lowering system:
   1. When only Group I or Group II soils with suitable structure and clay mineralogy are present within 36 inches of the naturally occurring soil surface the system may receive effluent treated to the NSF-40 standard. A special site evaluation is required when the local health department or regional soil scientist require such an evaluation to determine the effectiveness of the groundwater lowering system.
   2. When there are Group III soils present at any depth above the invert elevation of the highest point of the drainage system or within 36 inches of the naturally occurring soil surface, whichever is deeper, effluent shall be treated to TS-I or a more stringent standard. A special site evaluation, pursuant to Section IV of this Approval shall be required.
   3. No groundwater lowering drainage of Group IV soils is allowed, regardless of treatment level.
   4. On new fill sites [Rule .1957(b)(1)], when all or part of the dripline is to be installed in approved fill, effluent shall be treated to TS-I or a more stringent standard when used in conjunction with a groundwater lowering system. A special site evaluation, pursuant to Section IV of this Approval shall be required.
   5. When a groundwater lowering system is used, the minimum vertical separation from the trench bottom or point of application, whichever is deeper, to the projected (drained) soil wetness condition shall be 12 inches.

N. An aerobic subsurface drip system receiving effluent treated to at least the NSF-40 standard may be utilized on new fill sites [Rule .1957(b)(1)], when all or part of the dripline is to be installed in approved fill material, when there is at least 18 inches of useable naturally occurring soil above an UNSUITABLE soil horizon or rock and at least 12 inches above a naturally occurring soil wetness condition,
   1. The minimum vertical separation distance between the trench bottom or point of application, whichever is deeper, and any UNSUITABLE soil horizon or rock shall be 18 inches and any soil wetness condition shall be 12 inches.
   2. Except as provided for herein, all requirements for new fill sites and systems of Rule 1957(b)(1) are applicable to drip systems in fill.

O. An aerobic subsurface drip system receiving effluent treated to TS-I, or a more stringent standard, may be utilized on new fill sites [Rule .1957(b)(1)], when all or part of the drip tubing is to be installed in approved fill material, when there is at least 12 inches of useable naturally occurring soil above an UNSUITABLE soil horizon or rock and at least 12 inches above a naturally occurring soil wetness condition.
   1. The minimum vertical separation distance between the trench bottom or point of application, whichever is deeper, and any UNSUITABLE soil horizon or rock shall be 12 inches and any soil wetness condition shall be 9 inches.
   2. A special site evaluation, pursuant to Section IV of this Approval, shall be required.
   3. Except as provided for herein, all requirements for new fill sites and systems of Rule 1957(b)(1) are applicable to drip systems in fill.

P. An aerobic subsurface drip system may be utilized on sites meeting the criteria for existing fill, in accordance with Rule .1957(b)(2), when all or part of the dripline is to be installed in approved fill material.
   1. For an aerobic drip system receiving effluent treated to the NSF-40 standard, the minimum vertical separation distance between the trench bottom or point of application, whichever is deeper, and any UNSUITABLE soil horizon, rock, or soil wetness condition shall be 18 inches
   2. For an aerobic drip system meeting TS-I or TS-II standards, the minimum vertical separation distance

between the trench bottom or point of application, whichever is deeper, and any UNSUITABLE soil horizon, rock, or soil wetness condition shall be 12 inches

3. Except as provided for herein, all requirements for existing fill sites and systems of Rule 1957(b)(2) are applicable to all drip systems in existing fill.

Q. The minimum horizontal setback requirements of Rule .1970 shall be met for systems receiving effluent meeting the NSF-40, TS-I, or TS-II standard, as applicable.

R. For drip systems used on sites where there is at least 18 inches of naturally occurring soil to an UNSUITABLE soil horizon, rock, or soil wetness condition, the horizontal setback reductions of Rule .1970 for NSF-40, TS-I or TS-II, as applicable, may be concurrently taken with LTARs as allowed in Section III.H of this Approval.

S. For drip systems used on sites where there is less than 18 inches of naturally occurring soil to an UNSUITABLE soil horizon, rock, or soil wetness condition, effluent treated to TS-II or a more stringent standard, shall be required in order for reductions in horizontal setbacks allowed for TS-II in Rule .1970 to be taken. The LTAR shall be as allowed in Section III.I. A special site evaluation, pursuant to Section IV of the Approval, shall be required.

T. A special site evaluation, including a hydraulic assessment, shall be provided to the local health department on behalf of the owner, when required pursuant to Section IV of this Approval.

III. System Sizing

A. The LTAR shall be based on the most hydraulically limiting, naturally occurring soil horizon within 18 inches of the naturally occurring soil surface or to a depth of 12 inches below the trench bottom or point of application, whichever is deeper.

B. The following table shall be used in determining the LTAR for the American Perc-Rite® aerobic subsurface drip system.

Soil Group	LTAR (area basis) (gpd/ft^2)		
	NSF-40	TS-I	TS-II
I.	1.0-0.6	1.2-0.8	1.5-0.8
II.	0.6-0.4	0.8-0.5	0.8-0.6
III.	0.4-0.15	0.6-0.2	0.6-0.2
IV.	0.15-0.05	0.2-0.05	0.2-0.05

C. Special site and soil limitations in Rule .1970(f)(2)(E) and (F) apply where the LTAR exceeds 1.2 gpd/ ft^2 for TS-II systems on Group I Soils.

D. For aerobic drip systems in new fill [Rule .1957(b)(1)] receiving effluent treated to the NSF-40 standard, the LTAR shall not exceed 0.6 gpd/ft^2 for Group I, 0.4 gpd/ft^2 for Group II, 0.15 gpd/ft^2 for Group III, or 0.05 gpd/ft^2 for Group IV soils, respectively. Soil group is based on the most hydraulically limiting, naturally occurring soil horizon within 18 inches of the naturally occurring soil surface or 12 inches below the trench bottom or point of application, whichever is deeper.

E. For aerobic drip systems in new fill [Rule .1957(b)(1)] receiving effluent treated to the TS-I standard, the LTAR shall not exceed 1.0 gpd/ft^2 for Group I, 0.5 gpd/ft^2 for Group II, 0.2 gpd/ft^2 for Group III, or 0.07 gpd/ft^2 for Group IV, respectively. Soil group is based on the most hydraulically limiting, naturally occurring soil horizon within 18 inches of the naturally occurring soil surface or 12 inches below the trench bottom or point of application, whichever is deeper. An LTAR above 0.05 gpd/ft^2 in Group IV soil must be supported by a special site evaluation and hydraulic assessment, pursuant to Section IV of this Approval.

F. For aerobic drip systems in new fill [Rule .1957(b)(1)] receiving effluent treated to the TS-II standard, the LTAR shall not exceed 1.0 gpd/ft^2 for Group I, 0.6 gpd/ft^2 for Group II, 0.2 gpd/ft^2 for Group III, or 0.07 gpd/ft^2 for Group IV, respectively. Soil Group is based on the most hydraulically limiting naturally occurring soil horizon within 18 inches of the naturally occurring soil surface or 12 inches below the trench bottom or point of application, whichever is deeper. An LTAR above 0.05 gpd/ft^2 in Group IV soil must be supported by a special site evaluation and hydraulic assessment, pursuant to Section IV of this Approval.

G. For aerobic drip systems in existing fill [Rule .1957(b)(2)] receiving effluent treated to NSF-40, TS-I, or TS-II, the LTAR shall not exceed 0.8 gpd/ft^2 (NSF-40) and 1.0 gpd/ft^2 (TS-I or II)

H. When any reductions are taken in horizontal setbacks pursuant to the use of an NSF-40, TS-I, or TS-II system pursuant to Rule .1970 of this Approval, on sites where there is at least 18 inches of naturally occurring soil to an UNSUITABLE soil horizon, rock, or soil wetness condition, any one of the following LTAR allowances may apply:
   1. The LTAR may be determined pursuant to Section III.B when the only horizontal reductions taken are reduced setbacks to drainage devices.
   2. When effluent is treated to NSF-40, or a more stringent standard, the LTAR in gallons per day per square foot shall not exceed the lowest LTAR for the applicable soil group for Soil Groups I, II and III, pursuant to Section III.B, and 0.10 gpd/ft^2 for Soil Group IV.
   3. When effluent is treated to TS-II or a more stringent standard, the LTAR in gallons per day per square foot shall not exceed the mid-range LTAR for the applicable soil group for Soil Groups I, II and III, pursuant to Section III.B, and 0.10 gpd/ft^2 for Soil Group IV.

I. For drip systems receiving effluent treated to TS-I, or a more stringent standard, on sites with less than 18 inches of naturally occurring soil to any UNSUITABLE soil horizon, rock, or soil wetness condition, the LTAR shall not shall not exceed the lowest LTAR for the applicable soil group for Groups I, II and III, pursuant to Section III.B, and 0.10 gpd/ft^2 for Group IV, and a special evaluation must be provided pursuant to Section IV of this Approval.

J. The following table shall be used in determining the LTAR for American Perc-Rite® aerobic subsurface drip systems installed in saprolite pursuant to Rule .1956(6). The LTAR shall be based on the most hydraulically limiting, naturally occurring saprolite to a depth of 24 inches below the trench bottom or point of application, whichever is deeper.

Saprolite Group	Texture	LTAR (area basis) (gpd/ft^2)	
		NSF-40	TS-I & II
I.	Sand	0.5-0.4	0.6-0.4
	Loamy sand	0.4-0.3	0.5-0.3
II	Sandy loam	0.35-0.25	0.4-0.25
	Loam	0.25-0.2	0.3-0.2
	Silt loam	0.1-0.05	0.15-0.05
III.	Sandy clay loam	0.1-0.05	0.15-0.05

K. In calculating the minimum number of square feet for the drainfield, the daily design flow shall be divided by the LTAR determined from the appropriate table above.

L. In calculating the minimum length of dripline to be used, the total square footage of drainfield as derived in Section III.K shall be divided by two feet, unless additional linear footage is determined to be needed pursuant in Subparagraph III.M of this approval or at the recommendation of the designer as soil and site conditions allow.

M. The required total linear footage of dripline shall not be less than 0.5 x Q for Group I, 0.83 x Q for Group II, 1.25 x Q for Group III, or 3.33 x Q for Group IV Soils (Q = daily design flow). This shall not affect the total area required for the system based on Section III.K above.

N. Sections of tubing without emitters (blank tubing) required to meet site specific conditions shall not count towards the minimum length of dripline needed when laying out the system or when calculating the linear footage of dripline needed (see Section V.G).

IV. Special Site Evaluation

A special site evaluation for an aerobic drip system shall be provided to the local health department on behalf of the owner, containing information required by Rule .1970(p)(2), as applicable, including a hydraulic assessment, to justify use at the proposed LTAR and system layout when any of the following conditions are applicable:

A. Group IV soils are encountered within 18 inches of the naturally occurring soil surface or within 12 inches of the trench bottom or point of application, whichever is deeper, and the LTAR, pursuant to Section III.B, is proposed to exceed 0.10 gpd/ft^2 for NSF-40, 0.12 gpd/ft^2 for TS-I effluent, and 0.15 gpd/ft^2 for effluent treated to TS-II or a more stringent standard.

B. The dripline is to be installed within the naturally occurring soil, and there is less than 18 inches of naturally occurring soil to an UNSUITABLE soil horizon, soil wetness condition, or rock.

C. An existing or proposed groundwater lowering system is used to meet soil depth and vertical separation requirements to a soil wetness condition and
   1. There are Group III or IV soils present within 36 inches of the naturally occurring soil surface,
   2. There are Group III soils present at any depth above the invert elevation of the highest point of the drainage system, or
   3. When the local health department or regional soil scientist requires such an evaluation to determine the projected effectiveness of the groundwater lowering system.

   The evaluation shall include site-specific determination of saturated hydraulic conductivities and other critical site factors, and the proper application of appropriate drainage models and assessment tools.

D. To verify a proposed LTAR that exceeds the LTAR assigned by the EHS/LHD, pursuant to Section III.B or Section III.J of this Approval.

E. Aerobic drip meeting NSF-40 standards is proposed, and the LTAR is proposed to exceed 0.8 gpd/ft^2 for Group I, 0.5 gpd/ft^2 for Group II, 0.25 gpd/ft^2 for Group III or 0.1 gpd/ft^2 for Group IV soils.

F. Aerobic drip meeting TS-I standards is proposed, and the LTAR is proposed to exceed 1.0 gpd/ft^2 for Group I, 0.6 gpd/ft^2 for Group II, 0.3 gpd/ft^2 for Group III or 0.12 gpd/ft^2 for Group IV soils.

G. Aerobic drip meeting TS-II or a more stringent standard is proposed, and the LTAR is proposed to exceed 1.2 gpd/ft^2 for Group I, 0.7 gpd/ft^2 for Group II, 0.4 gpd/ft^2 for Group III or 0.15 gpd/ft^2 for Group IV soils.

H. Aerobic drip meeting TS-I or a more stringent standard is proposed in new fill, and
   1. A groundwater lowering drainage system (existing or proposed) is also used to meet soil depth and vertical separation requirements to a soil wetness condition; or
   2. Group IV soils are encountered within 18 inches of the naturally occurring soil surface and the LTAR is proposed to exceed 0.05 gpd/ft^2; or
   3. There is less than 18 inches of naturally occurring soil to an UNSUITABLE soil horizon or rock.

I. When required in Rule .1970 unless otherwise specified in this Approval.

J. The daily design flow for the design unit exceeds 1,500 gpd.

K. When any of the conditions listed below are met, the hydraulic assessment of the special site evaluation

shall include one or more of the following: a lateral flow, linear loading, groundwater mounding, or water balance analysis.

1. The local health department or regional soil scientist determines that the combination of soil conditions, site topography and landscape position, daily design flow, system layout and proposed stormwater appurtenances creates the potential for hydraulic overloading of a site.
2. The daily design flow is greater than 720 gpd and there is less than 18 inches of naturally occurring soil to an UNSUITABLE soil horizon, soil wetness condition, or rock.
3. The dripline is to be installed within the naturally occurring soil and there is 15 inches or less of naturally occurring soil to an UNSUITABLE soil horizon, soil wetness condition, or rock.
4. There is less than 18 inches of naturally occurring soil to an UNSUITABLE soil horizon, soil wetness condition, or rock, and reductions in horizontal setbacks allowed in Rule .1970 are taken with a drip system receiving effluent meeting TS-II or a more stringent standard.

In conjunction with the information required to be included by Rule .1970(p)(2), the report is to communicate to the designer site specific details of the delineated area and include a preliminary system layout and design that complies with the requirements of this approval. The report shall identify, comment on, and offer recommendations to address, as necessary, site specific conditions such as soil quality, slope, landscape position, stoniness, vegetation, surface drainage, site preparation, depth of installation, etc. that may, in the judgment of the evaluator, effect the design and /or field installation.

V. Design Criteria

A. Pretreatment

The drip system drainfield shall be preceded by a pretreatment process designed to meet at least NSF-40 or a more stringent standard, pursuant to Rule .1970. This level of pretreatment may be achieved by an approved RWTS, approved Advanced Wastewater Pretreatment Systems, or project-specific approved equal.

B. Dosing tank

1. The dosing system shall meet the design and construction criteria of Rules .1952-.1954.
2. The dosing tank shall be a separate approved pump tank with a minimum liquid capacity not less than the total liquid capacity of the septic tank that would be required for this system in accordance with Rule .1952, unless approved pursuant to Section V.B.3.
3. If the dosing tank is not separate it must be designed by an engineer or be an integral part of an approved advanced pretreatment system. The system designer must verify the following.
    a. The pretreatment system approval specifically includes the proposed integral dosing tank, where applicable.
    b. The drip dosing pump can be feasibly installed, repaired and maintained in the pretreatment system effluent dosing compartment.
    c. The level control float and alarm requirements of this Subparagraph V.B and the pump requirements of Subparagraph V.C of this approval are met.
    d. All applicable pump submergence, dosing volume, flow equalization and emergency storage capacity requirements of the system are met, without interfering with the performance of the advanced pretreatment system.
    e. Normal operating levels will not result in effluent backing up into a part of any pretreatment component designed for free gravity flow drainage, including any media filter.
    f. Additional flow equalization capacity in the dosing tank is not required if flow equalization is provided as part of the treatment system prior to the dosing tank.
    g. Emergency storage capacity requirements may be reduced to 8 hours when a telemetry system is provided, whereby the Operator in Responsible Charge (ORC) shall be notified immediately of alarm conditions (high water or power outage). The telemetry system and alarm shall include automatically rechargeable battery backup power supply.
4. Level control floats in the dosing tank shall be adjustable and replaceable from the ground surface without requiring entrance into the tank.

5. The Rule requirement for a separate high water alarm that is audible and visible by system users shall be met, in conjunction with any required self monitoring features of the American Perc-Rite® system.

C. Pumps

Pumps to be used shall include effluent rated turbine pumps with cooling flow collars, effluent rated suction lift self-priming centrifugal pump(s), or high head submersible effluent pump(s) in accordance with Rule .1952(c)(2), and as specified by American. For a suction lift pump, the intake pipe shall contain a screen and foot valve as specified by American. Pump, controls, intake pipe and screen, as applicable, shall be easily accessible, adjustable and replaceable from the ground surface without requiring entrance into the tank by the system ORC for routine operation, maintenance, monitoring and servicing.

D. Filters
1. Self-cleaning disc filter(s) capable of screening particles larger than or equal to 115 microns shall be used. Self-cleaning process shall be automatic. American Perc-Rite® Filters, or American approved equal, shall be used.
2. Filter flushing residuals shall be pumped into the upstream end of the pretreatment system, with provisions made to minimize disturbance of any solids in the septic tank or settling chamber (where applicable).
3. The number and size of filter(s) shall be at least adequate to operate at a flow rate, during both irrigation and flushing conditions, within the filter manufacturer's specified acceptable operating range.

E. Headworks

The headworks assembly typically includes the filters and associated filter backwash valves, field flush valve, and flow meter, and may also include zone dosing and isolation valves. Headworks components shall be in a separate enclosure that is freeze protected, UV and corrosion resistant and easily accessible for routine operation, maintenance, monitoring and servicing. Design shall facilitate reasonable access to all internal components.

F. American Perc-Rite® processing and control unit
1. Controls shall:
   a. Provide for delivery of designer specified preprogrammed volumes of effluent to each field zone (adjustable and variable between zones) at designer specified time intervals (24 hour flow equalization);
   b. Provide for automatic flushing of integral unit filters (filter flushing), initiated by a timer (adjustable duration);
   c. Provide for automatic flushing (at least weekly) of the drip laterals (field flushing) with filtered effluent for designer specified duration; and
   d. Monitor pump cycles and run times (for each pump and field zone) and flow (with totalizing flow meter, or equal).
2. A telemetry system shall be provided for systems with a daily design flow greater than 600 gpd. The ORC shall be immediately notified of alarm conditions (high water and power outage). A telemetry system will also be necessary when the dosing system serves as the discharge from an advanced pretreatment system and telemetry is required in the pretreatment system approval.
3. For systems with a daily design flow greater than 3,000 gpd, controls shall also monitor flow volume to each zone and provide a flow variance indication when flow is + or - 20% of design. Telemetry system and alarm shall include an automatically rechargeable battery backup power supply.
4. Any special equipment to monitor system performance shall either be provided with the system, or determined to be in the possession of the manufacturer authorized ORC prior to system approval.
5. Controls and float levels shall be synchronized to assure the minimum dose is available prior to initiating a dosing cycle to a zone or subfield.
6. Minimum dose volume per zone shall be set as needed so that at least 80 percent of each dose is delivered when the minimum pressure in the field network pressure is at least 10 pounds per square

inch (psi). This shall be approximated by using five times the liquid capacity of the drip laterals plus the liquid capacity of the supply and return manifold lines (only the portion which drain between doses), unless a smaller volume is field determined to meet this performance criteria. For example, the minimum dose time can be field determined as follows:

a. When zone is "dry", measure the time from pump start until the top of return pressure is greater than 10 psi. This time shall be designated "Ti". Also measure the total gallons it takes to reach 10 psi. This "fill" volume is designated "Gi".
b. Determine minimum additional dose time as (4xGI)/(irrigation flow rate) = "Tf".
c. Total adjusted minimum dose time can be reduced to "Ti" plus "Tf", and adjusted dose volume is 5x "Gi".

7. Minimum automatic field flushing volume per zone shall be two times the liquid capacity of the drip laterals plus the liquid capacity of supply and return and manifold lines that drain between doses.
8. Either the drip system control panel or the pretreatment system control panel shall enable the daily, 7-day and 30-day monitoring requirements of Rule .1970 to be met. The system designer must specify whether the pretreatment system manufacturer or the American Perc-Rite® control panel shall record the flow monitoring requirements of Rule .1970.
9. A duplex pump dosing system shall be provided whenever the daily design flow exceeds 3,000 gpd or when the total length of driplines exceeds 5,000 feet.
10. Floats and controls shall be set up as follows:
    a. The off ("redundant off") float is set to provide at least the minimum level of effluent required to keep the pump submerged based on recommendations by the pump manufacturer and American. The purpose of the off float is to help ensure that the pump shuts off prior to the system being pumped dry.
    b. The timer enable ("on") float is set to initiate the pump cycle which will last until the preset "on" cycle times out (set to deliver desired dose volume). The float shall be set sufficiently above the redundant "off" level so that one dose volume to the largest drip dispersal zone is available, and the effluent level in the tank remains above the deactivation ("off") float level at the end of each pump cycle. The cycle "off" time begins to time out at the start of each dose event. The purpose of the timer enable float is to deliver up to 60 percent of the daily design flow to the drainfield.
    c. The peak enable float is set to initiate an accelerated (more frequent) pump cycle by reducing the "off" time period. This float shall be set one-half the distance between the high water alarm float and the timer enable float. The purpose of the peak enable float is to deliver up to 100 percent of the daily design flow to the drainfield.
    d. The high water alarm float is set to provide the minimum required emergency storage capacity for the system, which shall be at least 24 hours or as otherwise approved pursuant to Rule .1952(c)(1)(D). The purpose of the high water alarm float is to maximize storage capacity to help ensure that effluent does not exceed the pump tank/collection system capacity and discharge to the surface or back up into the facility.

    Alternative setups for floats and controls may be proposed by the system designer on a project specific basis. Such alternative proposals must receive the concurrence of American and the local health department or the State.
11. Floats, pump and control circuits, and the control panel shall meet the requirements of Rule .1952(c). Panel and control equipment shall include lightning protection, be protected from unauthorized access, and remain accessible at all times to the ORC. The bottom of the panel shall be at least 36 inches above the ground surface.
12. The drip system control panel shall be manufactured by American Manufacturing, unless the conditions of Subparagraph V.F.13 of this Approval are met. The same panel may include the capability to operate a portion of an advanced pretreatment system, if this is proposed by the pretreatment system manufacturer and meets all of their requirements. Documentation shall be provided to the State for inclusion on the On-Site Water Protection Section's Homepage.
13. The drip system control panel may alternately be a combination panel supplied or manufactured by an approved advanced pretreatment system manufacturer, and concurrently approved to serve some or all of the control system requirements of the advanced pretreatment system. This option must first be jointly proposed by American Manufacturing and the applicable pretreatment system manufacturer and shall meet all of the control requirements of this Approval for this drip system and applicable control

requirements for the pretreatment system. Documentation of this shall be provided to the State for inclusion on the On-Site Water Protection Section's Homepage.

G. American Perc-Rite® Subsurface Drip System Field Design (See Section VII for designer responsibilities)
1. The field network shall utilize 1/2-inch (0.67 inch O.D., 0.57 inch I.D.) nominal size NETAFIM PC polyethylene dripline.
2. Pressure compensating emitters, containing a biocide, are spaced uniformly along the dripline on a maximum of two foot centers and designed to deliver 0.61 to 0.65 gallons per hour per emitter (+ or - 5%) at internal pressures of 7 to 60 psi.
3. The field shall consist of multiple separately and automatically dosed and valved zones whenever needed to meet irrigation and/or flushing requirements, and in adherence with manufacturer's recommendations.
4. The minimum zone size and linear feet of dripline in each zone shall adhere to the manufacturer's recommendations. The linear feet of dripline may be increased utilizing reduced dripline spacing as the site and this Innovative Approval allow, without requiring an increase in the total area requirement as calculated in Section III.K. Also refer to subparagraphs pertaining to "Blanking," below for further guidance on options and constraints associated with system size and layout in the field.
5. Driplines and drip runs shall be designed and installed level, following the naturally occurring ground contour. A maximum variance of + or - 2 inches off dead level may be allowed within any drip run or any contiguous section of dripline containing drip emitters between fittings.
6. Individual driplines and drip runs are designed and installed on contour and on at least 2 foot centers, unless approved to be spaced uniformly on less than 2 foot centers as described in section V.G.4 above to address site-specific situations or for short sections as needed to avoid field obstructions, without reducing total area requirements.
    a. In no case shall dripline spacing be less than 12 inches on center.
    b. In order to keep on contour, driplines or portions of driplines may be installed on greater than 2 foot centers, requiring additional total application area.
    c. Short sections installed on less than 2 foot centers as needed to avoid field obstructions shall account for less than 5 percent of the total linear feet of dripline within any zone.
7. Solvent welded heavy duty non-perforated flexible PVC pipe shall be used to connect the supply and return manifolds with the driplines, or to connect common driplines installed at varying depths or locations (e.g.: in stepdowns or to connect looped drip runs). The connection lines shall be made to the driplines by solvent welded American Perc-Rite® compression or insert adapters or fittings, or approved equal.
8. Connection lines shall be conveyed over compacted earthen dams constructed at least 2 inches higher than the maximum elevation of each dripline served. These dams are to retain effluent in the driplines at the end of each dose cycle. If the "TopFeed™" system is used, the manifold feed lines shall be on a continuous positive grade from the supply/return manifolds to each drip lateral, through an earthen dam, without passing over a 2 inch rise. The loops between runs must be elevated so that they drain freely into the run lines. Connection lines and loops shall be schedule 40 pvc or solvent-welded, non-perforated flexible pvc.
9. "Blanking" describes interior watertight sections of tubing without any drip emitters, which may be installed where unfavorable site conditions are encountered along a drip lateral, such as rock, shell fragments (> 35%), trees, large roots, large tree stumps as identified by the system designer, soil scientist, installer or local health department.
10. Short sections of blanking tubing may also be used where minimum horizontal separation requirements between adjacent driplines as specified in Section V.G.6 of this Approval cannot be met.
11. Sections of blank tubing shall not be included in meeting the minimum linear footage of dripline requirement calculated for the zone containing the blanking section.
12. No more than 20 percent of the total drip lateral length in a zone shall be compromised of blanking sections.
13. Blanking tubing shall be either
    a. Black or otherwise differently colored HDPE tubing of the same material, specifications and inside diameter as the connecting dripline; or
    b. Non-perforated Flexible PVC.

14. Non-perforated Flexible PVC shall be used whenever the blanking section passes through an area having excessive abrasion hazards due to number or condition of rocks or an area where uniform bedding cannot be effectively insured.
15. Blanking sections shall also meet the following conditions:
    a. Connection lines shall be made to the driplines (with emitters) by solvent welded American Perc-Rite® compression or insert adapters or fittings, or American approved equal.
    b. Blanking sections and connections shall be provided by the drip system manufacturer.
    c. Blanking sections shall be installed in hand shaped trenches with a minimum of 2 inches of clean acceptable soil, free of organic material, on all sides. The entire length of the blanking section shall be protected from abrasion or damage from contact with rocks, roots, voids or other obstructions.
    d. All direction changes shall be gentle, sweeping bends which eliminate any danger of kinking, pinching or collapse of the tubing.
    e. Where possible, blanking sections shall be installed level and at the same elevation as the dripline. Where the blanking tubing trench floor elevation must vary from the dripline elevation due to specific obstructions, the blanking section shall go above in elevation around the obstruction, rather than below, with a single, sweeping high point in a manner which will not retain water in the blanking section.
    f. The dripline at both ends of any given section of blanking shall be maintained at the same elevation or the blanked section be constructed as a raised contour dam, preventing flow at pump cut off from the upper portion to the lower portion.
    g. A minimum of 6 inches of soil cover shall be maintained over blanking sections with care taken to provide proper surface drainage without creating areas of concentrated runoff or ponding. Less cover (a minimum of three inches is required) may be considered when utilizing flexible PVC if necessary to allow the dripline to be installed at the specified depth.
    h. When driplines must be installed closer than 12 inches apart, both shall be blanking sections and those sections shall be backfilled with hand compacted clayey material.
    i. At least a single blanking section is to be used whenever a drip lateral must be installed where the horizontal separation between adjacent sections of dripline is less than the minimum spacing as set forth in Section V.G.6, above. This portion of the blank section shall be backfilled with well compacted, low permeability, clay.
    j. Locations and lengths of blanking sections shall be noted on the as-built drawings for the project.
16. The hydraulic design shall be based on achieving the following conditions:
    a. No more than a 10 percent variation in flow between any individual emitters anywhere within a separately dosed zone, including any effluent redistribution due to drain back.
    b. On sites with a discernable slope (typically greater than 4 percent), “Top Feed™” manifolds will be utilized to minimize disproportionate amount of drainage into the lowest area of the zone.
    c. Maintenance of velocities of at least 1.2 feet per second in the supply line from the dosing tank to the beginning of the drip field during normal dosing cycles.
    d. Maintenance of velocities of at least 1.2 feet per second in each supply manifold segment during field flushing.
    e. Minimum pressure of 10 psi during flushing flows and a maximum of 60 psi during normal dosing flows.
    f. Maintenance of field network velocities of at least 2 feet per second at the distal end of each drip lateral line during automatic field flushing.
17. The hydraulic design shall include documentation that minimum scour velocities and maximum pressure restrictions will be maintained, including project-specific calculations, computer simulations as necessary, or verification of adherence to pre-approved design criteria. Hydraulic calculations are to take into account sections of top feed lateral feed/return lines and blanking, where applicable.
18. Field appurtenances include an air/vacuum release valve at the high point(s)/outlet of each zone; an isolation valve and check valve at the high point/outlet of each zone (when there are more than one zone); pressure sustaining valves where needed; solenoid valve with separate isolation valves on each side at the inlet to each zone or in the headworks assembly (or by an appropriate alternate method which enables all valves to be isolated and serviced without effluent discharge from supply/return lines); cleanout at each end of the supply and return manifolds; a separate cleanout at the distal end of

the supply line to each zone; and pressure monitoring fittings at the field inlet and outlet points, and at the headworks for measuring deadhead and operating pressures.

19. The ORC must be able to access all solenoid valves, air vents, pressures monitoring points and isolation valves at all times for inspection, testing and maintenance. Valves, pressure monitoring fittings, vents and cleanouts shall be provided with protective vaults or boxes that are decay resistant, ultraviolet rated, and that extend at least to finished grade. Routine maintenance and monitoring shall be possible without effluent discharging from the network in preparation for or during these procedures.

H. Return Line
This shall be directed into the upstream end of the pretreatment system, with provisions made to minimize disturbance of any solids in the tank. For fields remotely located in relation to the pretreatment system, an intermediate pump tank may be used to receive the field flush effluent prior to its direct conveyance back to the pretreatment system, or a separate settling tank provided to receive the field flush effluent prior to its conveyance back to the drip dosing tank.

VI. Installation and Testing Procedures

A. A preconstruction conference shall be required prior to beginning any site modifications or construction of the American subsurface drip system. The conference shall be attended by the American authorized system designer, American authorized installer, and the local health department. The licensed soil scientist and registered professional engineer shall also be present, as applicable.

B. It shall be the responsibility of the system designer to specify equipment to be used, and site-specific procedures to be followed, including blanking provisions.

C. The septic tank(s), dosing tank(s), and any other pretreatment system tank(s) shall be demonstrated to be watertight by vacuum test or 24 hour leakage test conducted at the installation site. Test shall be run after tank installation with risers/and inlet/outlet pipes in place, but before the tanks are covered (backfilled). A water level change of ½ inch or more, within a 24-inch riser, over 24 hours, or visual observation of leakage shall be cause for failure of a leakage test. Initial water level shall be to 2 inches above the riser/adapter seam in the tanks.

D. The preservation of the original structure of the soil in the drainfield and repair areas is essential to maintaining the absorptive capacity of the soil. No activity other than the construction of the system is permitted within these areas before, during and after installation of the system.

E. Drainfield area shall be prepared in a manner that minimizes site disturbance.
1. No equipment shall cross the field areas during rainfall events, or when the soil moisture content of the fields is above field capacity (“too wet to plow”).
2. Only equipment light enough to not compact the soil shall be used to remove trees, roots, and rocks, with hand incorporation of select fill material used to eliminate weak spots where roots or boulders must be removed.
3. Fill material and final cover shall be in accordance with Rule .1957(b)(1)(F). In some instances, final cover material may be approved to be added after dripline installation.
4. Field shall be prepared as needed to enable the final cover to be established and maintained prior to dripline installation.
5. The selection, transportation, and incorporation procedures of fill or cover must be carefully reviewed and concurred with by the system designer, soil evaluator, and local health department prior to and during installation.

F. Drip laterals shall be staked out by use of an engineer’s or laser level and taped prior to permitting. At least every fourth drip run or parallel adjacent dripline shall be field staked. However, staking shall be more frequent if needed, as determined by the system designer or local health department, to assure conformation with natural contours and design requirements for sizing, location and separations. Maximum dripline

depth shall be in accordance with permit conditions.

G. Dripline shall be installed in accordance with the designer's and manufacturer's recommendations for each site. A vibratory plow, static plow, trencher, or rock saw is most typically used, or the system is installed by hand. Soil moisture must be dry enough so that soil compaction or smearing will not occur. The system shall not be constructed during periods of wet weather when the soil is sufficiently wet at the depth of installation to exceed its plastic limit. The plastic limit is exceeded when the soil can be rolled between the palms of the hands to produce a roll (wire) 1/8 inch in diameter (>1.5 inches in length) without breaking and crumbling. Questions about site workability shall be reviewed with the system designer, soil evaluator, and local health department prior to proceeding.

H. Leaf litter and debris shall be removed prior to the installation of dripline, where applicable. When a trencher is used or trenches are hand dug, the trench bottoms shall be hand cleaned of roots, debris and litter, and the dripline shall be secured to the center of the trench bottom prior to backfilling.

I. Minimum soil cover over dripline shall be 6 inches to finished grade. Cover material shall be free of rocks, debris, construction and demolition (C+D) waste, hazardous or contaminated waste, or material with concentrations or layers containing more than 35 percent by volume of shell fragments or more than 10 percent by volume of fibrous organics.

J. Minimum depth of valves in protective vaults or boxes shall be at least 12-18 inches below finished grade (as needed to be below normal frost depth).

K. Air vents shall be installed in a valve box so that the entire vent is below finished grade. The outlet of the vent must be above the installation depth of the dripline.

L. Extreme care must be taken during and after system installation to assure no extraneous debris enters the tankage, supply lines, and dripline network. Supply lines and manifolds shall be flushed out prior to system startup.

M. Designer's and manufacturer's recommendations shall be followed for system startup. All leaks in pipe network or from emitters exhibiting excessive emission rates, as evidenced by wet spots during dosing cycles comparable to normal operating conditions, shall be repaired.

N. Dosing and flushing flow rates must be measured. Dosing pressure must be measured at the lowest point in the supply manifold to verify need for a pressure sustaining valve and its effectiveness, if valve is present. Flushing pressures at the ends of each zone supply and return manifold shall be measured and determined to be in accordance with design criteria.

O. Fields shall be finished graded to shed surface water and in a manner which facilitates system inspection, operation, maintenance, and repair as well as turf management with standard mowing equipment (if applicable). Provisions shall be made to establish and maintain a vegetative cover (e.g., grass) to prevent erosion and allow mowing with standard equipment and to allow for effective system inspection.

P. Other methods of site stabilization may be proposed, such as in woodland sites. Equivalent provisions for finished grading to shed surface water and as needed to facilitate inspection, operation, maintenance, and repair apply. Establishment of a permanent vegetative cover on a wooded site is not necessary if the site is otherwise effectively stabilized from erosion after construction until a protective litter cover is naturally reestablished. Site-specific procedures should be reviewed by the system designer, soil evaluator and local health department. To facilitate inspection and maintenance, new woody vegetation must be prevented from becoming established over driplines and appurtenances.

Q. All mechanical components, pumps, pump cycling, filters, valves, vents, flushing, high water alarm and telemetry systems, as applicable, must be demonstrated to be fully operable in accordance with their design.

VII. Operation, Maintenance and Monitoring Requirements

A. System management entity, inspection/maintenance and reporting frequency requirements shall be comparable to at least Type V(a) systems in Rule .1961(b), Table V(b), except that the maximum inspection interval for systems up to 1,500 gpd shall be quarterly for the first year of operation. Inspections shall be more frequently as required for advanced pretreatment units, where applicable.

B. During the first operational inspection after system start-up, an American Manufacturing representative will meet with the ORC and the property owner to explain the system and answer any questions.

C. In the event any system is found to be out of compliance, American Manufacturing will assist in the development of an action plan to bring the system back into compliance.

D. The maximum inspection/maintenance/inspection frequency shall revert to quarterly for a period of one year after a system found to be out of compliance is repaired.

E. The ORC shall provide monitoring reports to the health department which include a log of all malfunction incidences/notifications, maintenance activities and wastewater volume delivered to each zone between each required monitoring period.

F. Minimum activities during each required inspection shall include visual observation of the dripfield(s), checking/cleaning filter(s), measured dosing flow rate to each zone, and recording of flow meter reading, pump run times and cycle counts.

G. Flushing flow rates and pressure head measurements during flushing at the inlet and outlet of each field zone shall be taken at least once per year.

H. The ORC shall report inspection findings and measurements on the report form and spread sheet provided by American and appended to this Innovative Approval.

I. For systems with a daily design flow of greater than 600 gpd, the ORC shall be telemetrically notified of high water and power outage. For systems with a daily design flow of greater than 3,000 gpd, the ORC shall also be telemetrically notified of flow variance (+ or – 20%) and catastrophic failure (+ or – 50%) conditions.

J. The ORC shall also conduct other additional observations, measurements, monitoring, and maintenance activities as specified in the Operation Permit and as recommended by American and as required for any applicable advanced pretreatment system that may also be present.

VIII. Responsibilities and Permitting Procedures

A. Prior to the installation of an American Subsurface Drip System at a site, or modification to a site for an American subsurface drip system, the owner or owner's legal representative shall notify the local health department of their proposed use of such a system. The local health department shall issue an Improvement Permit or Authorization to Construct or amend a previously issued Improvement Permit or Authorization to Construct allowing for the use of the proposed Innovative System upon a finding that all provisions of this approval and all other applicable rules shall be met.

B. Use of the proposed Innovative System and any conditions shall be described in the Improvement Permit and Authorization to Construct or amended Improvement Permit and Authorization to Construct, as well as described on the Operation Permit to be issued upon the acceptable completion of the system installation.

C. All systems shall be designed by a professional engineer or by individuals authorized in writing by the manufacturer. The system shall be designed by a professional engineer when:

1. Pretreatment components have not received prior State approval, or the pretreatment system approval requires the system to be designed by a professional engineer,
2. The system daily design flow exceeds 600 gpd,
3. Drip lateral lengths in a single field zone vary by more than 25 percent,
4. Duplex pumps are required in accordance with Section V.F.9, above, or
5. The complexity of the site or system dictates non-standard design as determined by the local health department or the manufacturer.

D. When required, plans and specifications shall be prepared, reviewed and approved in accordance with Rules .1938(e) and (f). Systems designed by an authorized designer shall include a review letter from the manufacturer along with a submittal checklist signed by the manufacturer for each system.

E. The system shall be installed by a NCOWCICB certified Level IV Installer that is authorized in writing by the manufacturer to install the system. The installer shall coordinate the installation with the system designer and manufacturer's field representative.

F. Prior to issuance of an operation permit a contract for operation and maintenance shall be executed between the system owner and an ORC as required in accordance with Rule .1961(b). The ORC shall have been trained and certified in writing by American to operate and maintain American Perc-Rite® subsurface drip dispersal systems. American shall provide as needed classroom and field training for licensed operators.

G. A condition of the operation permit shall be that a contract for operation and maintenance with an American certified ORC shall remain in effect for as long as the system is to remain in use.

H. A professional engineer or American authorized designer, as applicable, must certify in writing that the system was installed in accordance with the approved plans and specifications prior to Operation Permit issuance. The manufacturer or the manufacturer's authorized field representative and authorized designer shall provide written confirmation of their acceptance of the system installation prior to operation permit issuance.

I. For sites required to be evaluated by a Licensed Soil Scientist or Professional Geologist, the local health department shall specify as a condition on the Improvement Permit and Authorization to Construct that a Licensed Soil Scientist or Professional Geologist oversee critical phases of the ground absorption system installation and certify in writing that the installation was in accordance with their specified site/installation requirements prior to the Operation Permit issuance.

J. American Manufacturing Company, Inc. shall provide lists of manufacturer’s authorized designers, installers and operators to the State and applicable local health departments. The Manufacturer shall also provide notice of all scheduled manufacturer authorized training programs for individuals seeking authorization, or on-going training.

IX. Repair of System

The provisions of 15A NCAC 18A .1961(c) shall govern the use of the American Perc-Rite® Subsurface Drip System for repairs to existing malfunctioning wastewater systems.

Approved by:_____ Date:_____

Appendix A

In the Tables "SWC" means "Soil Wetness Condition" and "USC" means an "UNSUITABLE Soil Condition," other than a SWC and "NOSS" means "naturally occurring soil surface"

Table A-1 – Siting criteria for aerobic drip systems where dripline is installed below the elevation of the naturally occurring soil surface (NOSS).

Criteria or requirement	Treated to NSF-40 or more stringent	Treated to TS-I or more stringent	Treated to TS-II or more stringent
Minimum useable soil depth below NOSS to USC or SWC	18 inches	15 inches	13 inches
Minimum vertical separation between the trench bottom or point of application, whichever is deeper, and USC or SWC	12 inches	9 inches (12 inches to rock or tidal water)	6 inches (12 inches to rock or tidal water)
Allowance to meet 6 inches cover requirement	Addition of up to 6 inches suitable Group II or III soil material, after settling		
Special site evaluation not required, unless specifically required below	18 inches or more of useable soil		
Special site evaluation required (Section IV)	Group IV within 18 inches of NOSS and LTAR >.10	Group IV within 18 inches of NOSS and LTAR >0.12	Group IV within 18 inches of NOSS and LTAR > 0.15
	Proposed LTAR exceeds LTAR assigned by EHS/LHD per Section III.B		
		Groundwater lowering system used and any Group III soil above invert elevation of drain or any Group III or IV soil within 36 inches of NOSS	
	Groundwater lowering system used and LHD or RSS determines evaluation needed		
	Daily design flow exceeds 1,500 gpd		
		Less than 18 inches from NOSS to USC or SWC	
	LTAR: >0.8 (Group I) >0.5 (Group II) >0.25 (Group III); >0.10 (Group IV)	LTAR: >1.0 (Group I) >0.6 (Group II) >0.3 (Group III) >0.12 (Group IV)	LTAR: > 1.2 (Group I) >0.7 (Group II) >0.4 (Group III) >0.15 (Group IV)

Table A-2 – Siting criteria for aerobic drip systems on new fill sites, when all or part of the dripline is to be installed in approved fill material.

Criteria or requirement	Treated to NSF-40 or more stringent	Treated to TS-I or more stringent	Treated to TS-II or more stringent
Minimum useable soil depth below NOSS to USC or SWC	18 inches to USC 12 inches to SWC	12 inches to USC 12 inches to SWC	
Minimum vertical separation between the trench bottom or point of application, whichever is deeper, and USC or SWC	18 inches to USC 12 inches to SWC	12 inches to USC 9 inches to SWC	
Special site evaluation not required, unless specifically required below	18 inches or more of useable soil		
Special site evaluation required (Section IV)		<18 inches to USC	
		Group IV soil within 18 inches of NOSS and LTAR >0.05	
		Groundwater lowering system is used with fill	
	Daily design flow exceeds 1,500 gpd		

Table A-3 – Siting criteria for aerobic drip systems on existing fill sites, when all or part of the dripline is to be installed in approved fill material

Criteria or requirement	Treated to NSF-40 or higher	Treated to TS-I or higher	Treated to TS-II or higher
Minimum depth Group I fill/soil below existing fill surface to USC or SWC	24 inches		
Minimum vertical separation between the trench bottom or point of application, whichever is deeper, and USC or SWC	18 inches	12 inches	

MINT HILL ATHLETIC PARK **DRIP DISPERSAL SYSTEM PARAMETERS** 03/16/2017
MINT HILL, NORTH CAROLINA

TOTAL MAX FLOW	2,141	GPD	**AMERICAN PERC-RITE MODEL ASD 25**
DRAINFIELD AREA PROVIDED	14,400	SQ FT	
LOADING RATE PROVIDED	0.15	GPD/SQ. FT.	
TOTAL DRIPPER LINE	7,200	L.F.	
DOSE TANK SIZE	MIN 1/2 TO 1 DAY EMERGENCY & FLOW EQUAL. STORAGE		

ZONE SIZING & FLOW RATES

	Zone #1	Zone #2	Zone #3	Zone #4	Zone #5	Zone #6	Zone #7	Zone #8	Zone #9	Zone #10	Total
Linear Feet of Drip Tubing	1200	1200	1200	1200	1200	1200	0	0	0	0	7200
Dosing Flow Rate (gpm)	6.1	6.1	6.1	6.1	6.1	6.1	0.0	0.0	0.0	0.0	
No. of Field Flush Connections	4	4	4	4	4	4	0	0	0	0	0.0
Field Flushing Flow (gpm)	6.4	6.4	6.4	6.4	6.4	6.4	0.0	0.0	0.0	0.0	
Total Flow Required (gpm)	12.5	12.5	12.5	12.5	12.5	12.5	0.0	0.0	0.0	0.0	75.0

Dosing Flow Rate = (L.F./2' O.C. emitter spacing) x (0.61 gph/emitter) / (60 min/hr)
Field Flushing Flow = No. of Field Flush Connections x 1.6 gpm
Total Flow Required = Dosing Flow Rate + Field Flushing Flow Rate
Note: 1.6 gpm is flow required per lateral to achieve min. scouring velocity (2 ft/sec) at distal end of each lateral.

ZONE DETAIL PARAMETERS

	Zone #1	Zone #2	Zone #3	Zone #4	Zone #5	Zone #6	Zone #7	Zone #8	Zone #9	Zone #10	Total
Total No. of Runs	8	8	8	8	8	8	0	0	0	0	48
Total Laterals	4	4	4	4	4	4	0	0	0	0	24
Runs/Lateral	2	2	2	2	2	2	0	0	0	0	
Longest Lateral Length (ft)	300	300	300	300	300	300	0	0	0	0	
Total L.F. in Zone	1200	1200	1200	1200	1200	1200	0	0	0	0	7200

DOSING REGIME - TIME DOSING
Zones will dose ONE at a time. Avg conditions = 24 dosing events/day (one dose every 60 minutes).
Avg. 60% = 1,285 gpd, Peak 100% = 2,141 gpd. Peak conditions = 50 dose events/day (one every 29 min).
Zones are Field Flushed individually.

	Zone #1	Zone #2	Zone #3	Zone #4	Zone #5	Zone #6	Zone #7	Zone #8	Zone #9	Zone #10	
Avg. gallons/day/zone	214	214	214	214	214	214	0	0	0	0	1285
Avg. cycles/day/zone	3.0	3.0	3.0	3.0	3.0	3.0	0.0	0.0	3.0	3.0	24
Peak gallons/day/zone	357	357	357	357	357	357	0	0	0	0	2141
Peak cycles/day/zone	5.0	5.0	5.0	5.0	5.0	5.0	0.0	0.0	5.0	5.0	40
Gallons/cycle/zone	71.4	71.4	71.4	71.4	71.4	71.4	0.0	0.0	0.0	0.0	428
Dosing Flow Rate (gpm)	6.1	6.1	6.1	6.1	6.1	6.1	0.0	0.0	0.0	0.0	
Minutes/cycle	11.7	11.7	11.7	11.7	11.7	11.7	0.0	0.0	0.0	0.0	

MINT HILL ATHLETIC PARK **FLUSHING HEAD LOSS CALCULATIONS** 03/16/2017

MINT HILL, NORTH CAROLINA

SUPPLY PIPE DIA.

150 Roughness coefficient

1.00							1.0	1.0	dia.	
DIA. SUPPLY PIPE	Flow used is total flow (dosing flow + flushing flow)									
	Zone #1	Zone #2	Zone #3	Zone #4	Zone #5	Zone #6	Zone #7	Zone #8	Zone #9	Zone #10
Total Flow Req.(gpm)	12.5	12.5	12.5	12.5	12.5	12.5	0.0	0.0	0.0	0.0
Length of pipe (feet)	330	300	270	235	200	165	0	0	0	0
Equiv. length (feet)	380	350	320	285	250	215	0	0	0	0
ft hL/100 ft of pipe	8.34	8.34	8.34	8.34	8.34	8.34	0.00	0.00	0.00	0.00
Velocity (ft/sec)	4.6	4.6	4.6	4.6	4.6	4.6	0.0	0.0	0.0	0.0
Loss in supply pipe (ft)	31.7	29.2	26.7	23.8	20.8	17.9	0.0	0.0	0.0	0.0

RETURN PIPE DIA.

1.00							1.0	1.0		
DIA. RETURN PIPE	Flow used is flushing flow (1.6 gpm X number of laterals in zone)									
	Zone #1	Zone #2	Zone #3	Zone #4	Zone #5	Zone #6	Zone #7	Zone #8	Zone #9	Zone #10
Field Flushing Flow (gpm)	6.4	6.4	6.4	6.4	6.4	6.4	0.0	0.0	0.0	0.0
Length of pipe (feet)	380	350	320	285	250	215	0	0	0	0
Equiv. length (feet)	430	400	370	335	300	265	0	0	0	0
ft hL/100 ft of pipe	2.42	2.42	2.42	2.42	2.42	2.42	0.00	0.00	0.00	0.00
Velocity (ft/sec) Minimum	2.4	2.4	2.4	2.4	2.4	2.4	0.0	0.0	0.0	0.0
Loss in return pipe (ft)	10.4	9.7	8.9	8.1	7.3	6.4	0.0	0.0	0.0	0.0

TDH	Zone #1	Zone #2	Zone #3	Zone #4	Zone #5	Zone #6	Zone #7	Zone #8	Zone #9	Zone #10
TDH from TANK to H.U.(ft) 1.5" d	13.0	13.0	13.0	13.0	13.0	13.0	0.0	0.0	0.0	0.0
Loss thru H.U. (ft)	7.5	7.5	7.5	7.5	7.5	7.5	0.0	0.0	0.0	0.0
Loss in zone supply pipe (ft)	31.7	29.2	26.7	23.8	20.8	17.9	0.0	0.0	0.0	0.0
Static Lift (H.U. to field) (ft)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Loss 1.0" 24v Solenoid Valve (ft)	2.3	2.3	2.3	2.3	2.3	2.3	0.0	0.0	0.0	0.0
Loss in sub-manifolds (ft) 1.0"	2.0	2.0	2.0	2.0	2.0	2.0	0.0	0.0	0.0	0.0
Loss in sub zone connector (ft.) 1	n/a	n/a	n/a	n/a	n/a	n/a	0.0	0.0	0.0	0.0
Loss flushing through tubing (ft)	58.0	58.0	58.0	58.0	58.0	58.0	0.0	0.0	0.0	0.0
Loss in zone return pipe (ft)	10.4	9.7	8.9	8.1	7.3	6.4	0.0	0.0	0.0	0.0
TDH	124.9	121.7	118.4	114.7	110.9	107.1	0.0	0.0	0.0	0.0

System Curve Points During Field Flushing (zones flush individually)

gpm	12.5	12.5	12.5	12.5	12.5	12.5	0.0	0.0	0.0	0.0
@ (ft)	124.9	121.7	118.4	114.7	110.9	107.1	0.0	0.0	0.0	0.0
psi	54.1	52.7	51.3	49.6	48.0	46.4	0.0	0.0	0.0	0.0

MINT HILL ATHLETIC PARK **DOSING HEAD LOSS CALCULATIONS** 03/16/2017

MINT HILL, NORTH CAROLINA

SUPPLY PIPE DIA.

150 Roughness coefficient

1.00 1.00 **1.049** dia.

DIA. SUPPLY PIPE Flow used is dosing flow for SINGLE zones.

	Zone #1	Zone #2	Zone #3	Zone #4	Zone #5	Zone #6	Zone #7	Zone #8	Zone #9	Zone #10
ONE-Zone Dose Flow (gpm)	6.1	6.1	6.1	6.1	6.1	6.1	0.0	0.0	0.0	0.0
Length of pipe (feet)	330	300	270	235	200	165	0	0	0	0
Equiv. length (feet)	380	350	320	285	250	215	0	0	0	0
ft hL/100 ft of pipe	2.21	2.21	2.21	2.21	2.21	2.21	0.00	0.00	0.00	0.00
Velocity (ft/sec)	2.3	2.3	2.3	2.3	2.3	2.3	0.0	0.0	0.0	0.0
Loss in supply pipe (ft)	8.4	7.7	7.1	6.3	5.5	4.8	0.0	0.0	0.0	0.0
TDH										
TDH from TANK to H.U.(ft)	13.0	13.0	13.0	13.0	13.0	13.0	0.0	0.0	0.0	0.0
Loss thru H.U. (ft)	2.1	2.1	2.1	2.1	2.1	2.1	0.0	0.0	0.0	0.0
Loss in zone supply pipe (ft)	8.4	7.7	7.1	6.3	5.5	4.8	0.0	0.0	0.0	0.0
Static Lift (H.U. to field) (ft)	-13.0	-10.0	-3.0	0.0	3.0	5.0	0.0	0.0	0.0	0.0
Loss 1.0" 24v Solenoid Valve (ft)	2.3	2.3	2.3	2.3	2.3	2.3	0.0	0.0	0.0	0.0
Loss in sub-manifold (ft) 1.0"	1.0	1.0	1.0	1.0	1.0	1.0	0.0	0.0	0.0	0.0
Loss in sub-zone connector (ft) 1.	n/a	n/a	n/a	n/a	n/a	n/a	0.0	0.0	0.0	0.0
Loss in tubing (ft)	6.2	6.2	6.2	6.2	6.2	6.2	0.0	0.0	0.0	0.0
Min. pressure at emitters (ft)	16.2	16.2	16.2	16.2	16.2	16.2	0.0	0.0	0.0	0.0
TDH	36.2	38.5	44.9	47.1	49.3	50.6	0.0	0.0	0.0	0.0
System Curve Points During Dosing (Single zone dose)										
gpm	6.1	6.1	6.1	6.1	6.1	6.1	0.0	0.0	0.0	0.0
@ (ft)	36.2	38.5	44.9	47.1	49.3	50.6	0.0	0.0	0.0	0.0
psi	15.7	16.7	19.4	20.4	21.4	21.9	0.0	0.0	0.0	0.0

MINT HILL ATHLETIC PARK **DISC FILTER BACKFLUSH HEADLOSS REQUIREMENTS**

Filter Backwash Requirements

15 gpm at 50 psi = 115.5 ft. Pressure Required at Filters

13.0 TDH (ft.) from pump to Hydraulic Unit

15 gpm at 128.5 ft.

PUMP REQUIREMENTS	**gpm**	**@ ft**
Disc Filter Backflush	**15.0**	**128.5**
Field Flush	**12.5**	**124.9**
SINGLE Zone Dose	**6.1**	**50.6**

PUMP SPECIFICATION: Make: Goulds Model: 20EB05, 4.0" Submersible AMC Model: PUTURB1512112W
1/2 HP, 115 VOLTS, 1 PHASE

RECOMMENDED EMITTER PRESSURE OPERATING RANGE: 7-70 PSI

FIELD FLUSHING VELOCITY CALCULATIONS

MINIMUM SCOURING (2 FT/SEC) VELOCITY IS REQUIRED OUT OF THE DISTAL END OF EACH LATERAL IN ORDER TO PROPERLY FLUSH THE INSIDE OF THE TUBING. 1.6 GPM IS THE FLOW REQUIRED PER LATERAL CONNECTION TO ACHIEVE MINIMUM SCOURING VELOCITY OF 2 FT/SEC AT THE DISTAL END OF EACH LATERAL.

Diameter of Netafin drip tubing:

inches	feet	
0.50	0.0417	Nominal Inside Diameter
0.57	0.0475	Actual Inside Diameter

Flow = Velocity x Area Q = V*A

Area = 3.14159*(d^2)/4
= 0.0018 sq.ft.

Min. Velocity (ft/sec) = 2.0

Flow (gpm) = Velocity x Area Q = V*A
= 0.0018 sq. ft. X 2.0 ft/sec X (60sec/min) X (7.481 gal/cu. ft.)

Q = V*A **1.6 gpm**

Includes 10 psi adder for NC.

Lash Engineering, Inc.
Civil/Consulting/Wastewater/Planning
1104 Cindy Carr Drive
Matthews, NC 28105
Phone: 704-847-3031
mikel@LashEngineering.com

Lash Engineering, Inc.

The Mint Hill Athletic Park Wastewater Facility

ANTI-FLOATATION CALCULATIONS for:

For the Septic Tank, the Bio-Microbics Tank and the Pump Tank.

4,000g Septic Tank

Weight Downward:

Weight of Unit = 47,000 lbs. (from Spec Sheet)

Weight of dirt on tank @ 1.5'

78" x 167" x 18" x 105 lbs/cf. = 6.5' x 13.9' x 1.5' x 105 lbs/cf. = 14,250 lbs.

Total Weight Downward = 47,000 + 14,250 = 61,247 lbs ↓

Buoyancy of Tank:

Volume of Tank = 4,000 gals (from spec sheet) or

4,000 gals. / 7.48 g/cf. = 535 cf.

Unit Weight of Water = 62.4 lbs/cf.

Buoyancy = 62.4 lbs/cf. x 535 cf. = 33,370 lbs. ↑

Summary: Downward Force of 61,247 lbs > 33,370 lbs therefore "OK".

4,000g Bio-Microbics Tank

Weight Downward:

Weight of Unit = 21,000 lbs. (approximate)

Weight of permanent effluent in bottom @ 16"=

72" x 144" x 16" = 6' x 12' x 1.33' = 96 cf.

96 cf. x 62.4 lbs/cf. = 5,990 lbs.

Weight of dirt on tank @ 1.5'

78" x 150" x 18" x 105 lbs/cf. = 6.5' x 12.5' x 1.5' x 105 lbs/cf. = 12,796 lbs.

Total Weight Downward = 21,000 + 5,990 + 12,796 = 39,786 lbs ↓

Buoyancy of Tank:

Volume of Tank = 4,219 gals (from spec sheet) or

4,219 gals. / 7.48 g/cf. = 564 cf.

Subtract out the permanent water = 564 – 96 (see above) = 468 cf.

Unit Weight of Water = 62.4 lbs/cf.

Buoyancy = 62.4 lbs/cf. x 468 cf. = 29,203 lbs. ↑

Summary: Downward Force of 39,586 lbs > 29,203 lbs therefore "OK".

4,000g Pump Tank

Weight Downward:

Weight of Unit = 20,800 lbs. (from Spec Sheet)

Weight of permanent effluent in bottom @ 16"=

72" x 144" x 16" = 6' x 12' x 1.33' = 96 cf.

96 cf. x 62.4 lbs/cf. = 5,990 lbs.

Weight of dirt on tank @ 1.5'

78" x 150" x 18" x 105 lbs/cf. = 6.5' x 12.5' x 1.5' x 105 lbs/cf. = 12,796 lbs.

Total Weight Downward = 20,800 + 5,990 + 12,796 = 39,586 lbs ↓

Buoyancy of Tank:

Volume of Tank = 4,219 gals (from spec sheet) or

4,219 gals. / 7.48 g/cf. = 564 cf.

Subtract out the permanent water = 564 – 96 = 468 cf.

Unit Weight of Water = 62.4 lbs/cf.

Buoyancy = 62.4 lbs/cf. x 468 cf. = 29,203 lbs. ↑

Summary: Downward Force of 39,586 lbs > 29,203 lbs therefore "OK".

Lash Engineering, Inc.
Civil/Consulting/Wastewater/Planning
1104 Cindy Carr Drive
Matthews, NC 28105
Phone: 704-847-3031
mikel@LashEngineering.com

Lash Engineering, Inc.

TOTAL AND EFFECTIVE STORAGE CALCULATIONS

Peak Flow = 2,880 gpd (Ballpark has varied inflow during week – Facility is utilizing Flow Equalization)

Pump Tank ≈ 43.95 g/in.

Storage provided from Inlet in Elev (676.10) – Pump Off Elev. (670.93) = 5.17' or 62"

@ 43.95 g/in. x 62" = 2,727 gallons

Storage Provided = 2,727 gallons

Duplex Pump provided to offset storage (See Auxiliary Power Report for additional information).

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Lash Engineering, Inc.

AUXILIARY POWER REPORT

1. Wastewater Facility is for a Dollar General Store.
2. Facility has 22 days of Storage which would suffice for all but the most extreme and rare power shortages.
3. Facility water supply is through a water well which will not work without Power and has an automatic shut-off during power failure.
4. Restrooms do not have over 22 days of available water stored for emergencies.
5. Facility does not have an elevated water storage tank.
6. The storage of wastewater is inside a closed precast concrete pump tank with a sealed lid. The tank is located away from the building on the other side of the playground area. The wastewater that will be stored in the pump tank has been treated and is essentially odorless. The amount of untreated wastewater in the PreTreat unit would be minimal. Therefore, prolonged detention of the wastewater can be tolerated.

Therefore, Wastewater Facility and Disposal is OK from an outage of power.

SHOAF PRECAST SEPTIC INC.
4130 WEST US HWY 64
LEXINGTON, NC 27295
PHONE (336) 787-5826
FAX (336) 787-2826

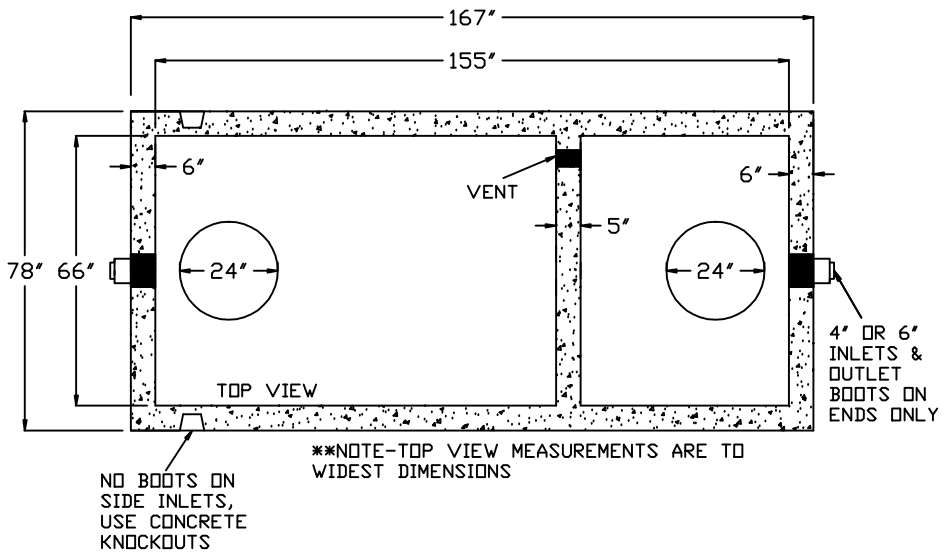
MODEL: MS 4000 H20 STB

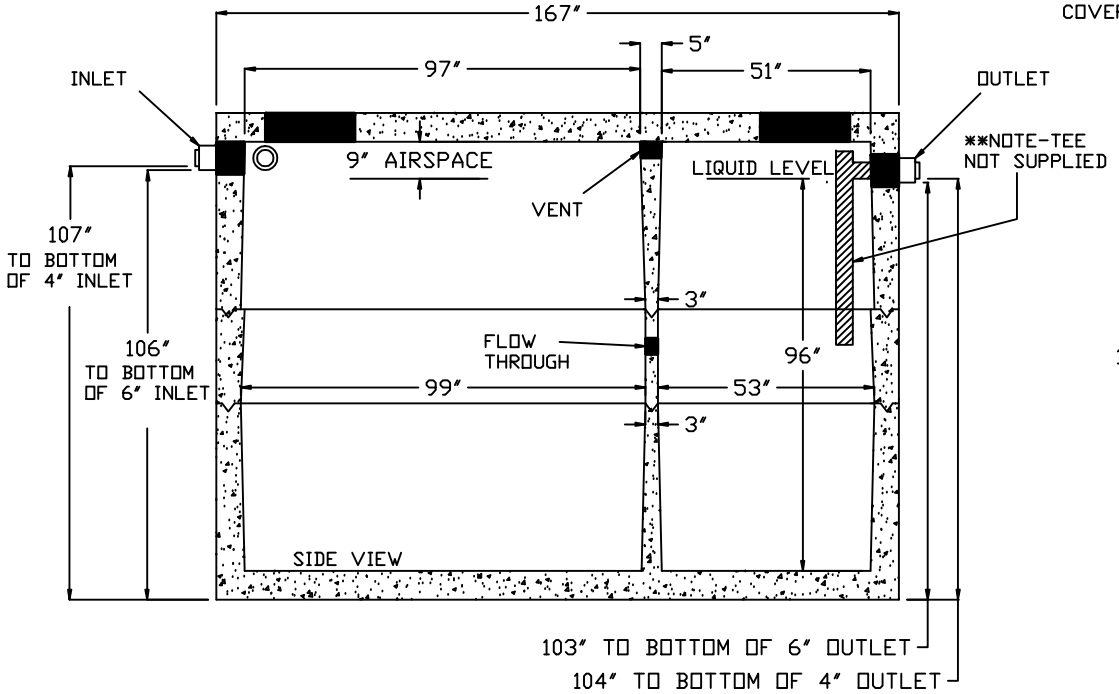
H20 TRAFFIC RATED

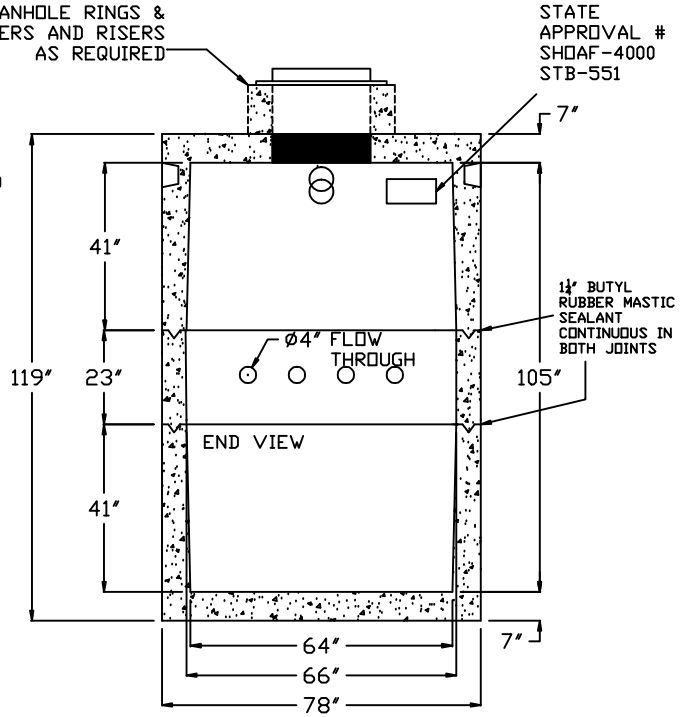
4000 Gallon Septic Tank

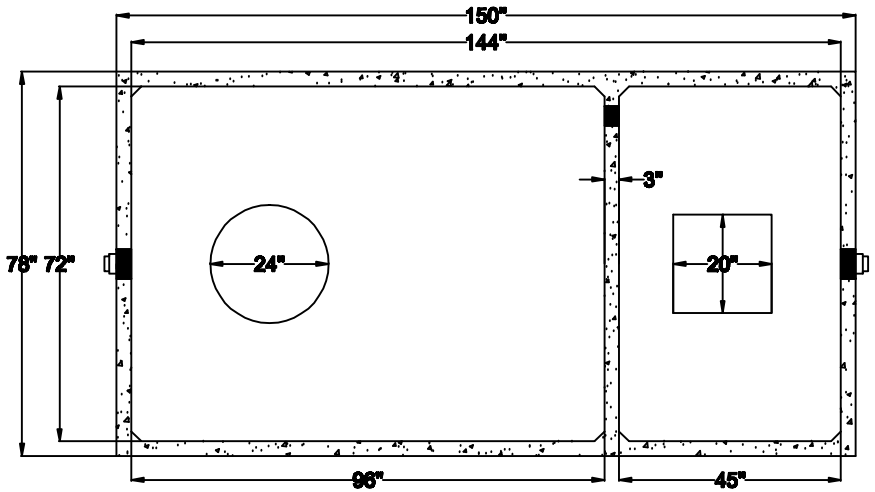
WWW.SHOAFPRECAST.COM
SHOAF-4000 H20 TRAFFIC RATED
STB-551 H20 TRAFFIC RATED
LIQUID CAPACITY-4000 US GALLONS/AIRSPACE-9"
TANK HEIGHT-119"
BOTTOM OF TANK TO CENTER OF INLET-109"
BOTTOM OF TANK TO CENTER OF OUTLET-106"
LENGTH TO WIDTH RATIO-2 TO 1
SIZE OF INLET & OUTLET-4" OR 6" PIPE
TYPE ON INLET & OUTLET-POLYLOCK OR EQUAL (MEETS ASTM C-923)
CONCRETE PSI-5000; TANK WEIGHT-47,000 LBS.
ACCESS TOP WITH RISERS PLUS RINGS AND COVERS (NOT INCLUDED)
REINFORCEMENT PER ENGINEER DRAWING

SCALE-N.T.S.





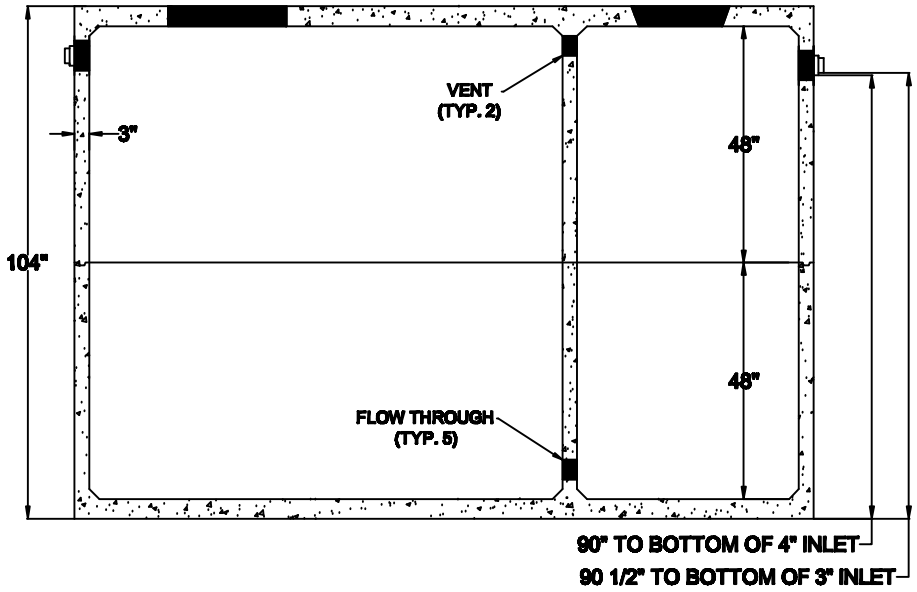


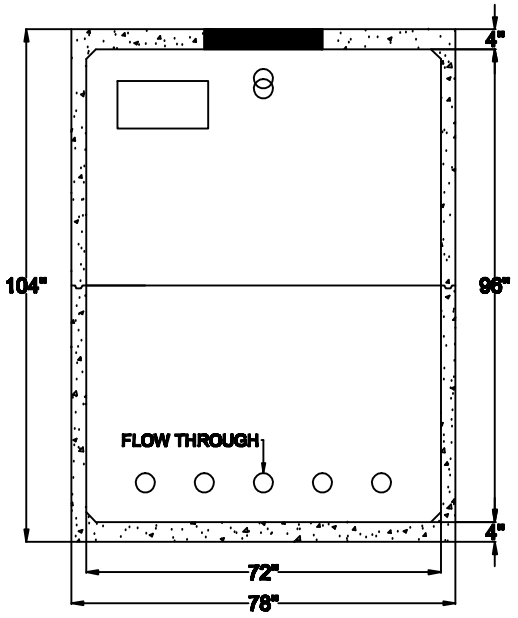


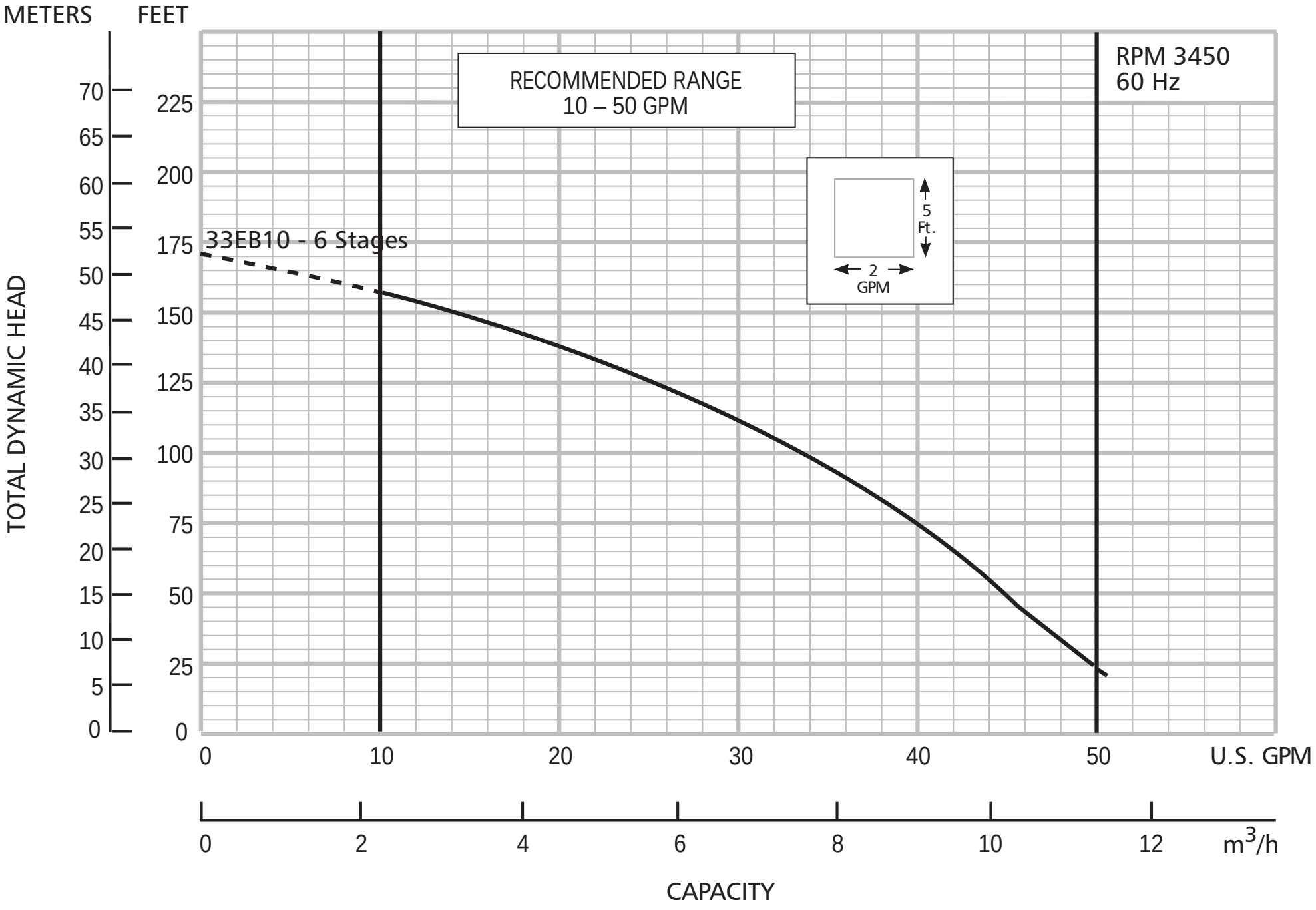
MODEL: MS 4000 PT
NON TRAFFIC MID SEAM PUMP TANK

SHOAF PRECAST SEPTIC INC.
4130 WEST US HWY 64
LEXINGTON, NC 27295
PHONE (336) 787-5826
FAX (336) 787-2826
info@shoafprecast.com
www.shoafprecast.com

- NC APPROVAL # : PT-2106
- LIQUID CAPACITY- 4,219 GALLONS
- GALLONS PER INCH - 43.95
- PIPE PENETRATIONS - (MEETS ASTM C-923)
- CONCRETE - 5000 PSI MIN
- TANK WEIGHT - 20,800
- TOP - 10,400 #
- BOTTOM - 10,400 #
- REINFORCEMENT PER ENGINEER SPECS
- 7/8" BUYTL SEALANT CONTINUOUS






METERS
FEET
TOTAL DYNAMIC HEAD
70
65
60
55
50
45
40
35
30
25
20
15
10
5
0
225
200
175
150
125
100
75
50
25
0
RECOMMENDED RANGE
10 – 50 GPM
RPM 3450
60 Hz
33EB10 - 6 Stages
5
Ft.
2
GPM
0
10
20
30
40
50
U.S. GPM
0
2
4
6
8
10
12
m3/h
CAPACITY

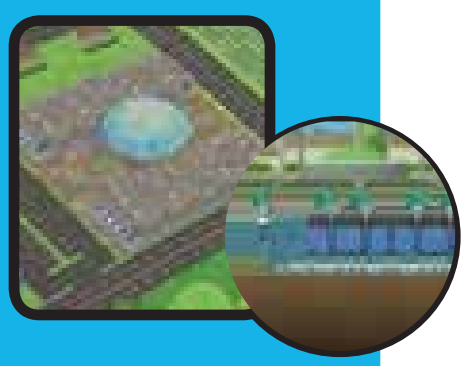


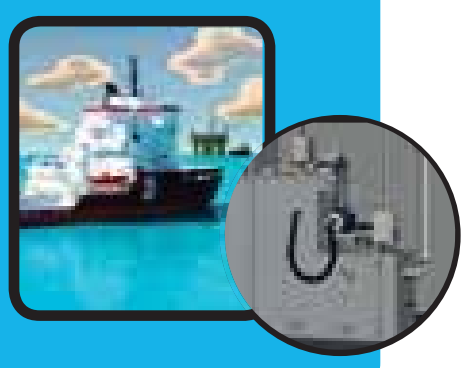
Residential • Community • Commercial

BETTER WATER. BETTER WORLD.®









Innovative Ideas, Proven Products

With an immediate adoption of clean waste processing technologies and development of better infrastructure to protect water resources around the world, Bio-Microbics FAST® technologies provide solutions for septic system rejuvenation to small municipal astewater treatment systems. We strive for excellence in environmental protection and ensure that all our water solutions – are made with the environment in mind.

- **Microbial growth even in low/average/peak usage**
- **Increases settleabilty and eliminates sludge bulking**
- **Easy to maintain and extraordinarily reliable**
- **Exceeds minimum Nitrogen Reduction Standards**
- **Lessen the impact of harmful bacteria and viruses**
- **Takes all aspects of the treatment into consideration**

Unobtrusive and dependable, the FAST® system handles smaller, variable flows generated from onsite applications. The clean effluent prevents biomat formation and leachfield clogging. This septic technology is very compatible with shallow drip, direct discharge, pressure distribution, spray irrigation, and conventional leachfield.

The Bio-Microbics FAST® systems provide significantly improved nitrification/denitrification performance over traditional systems and exceeding typical effluent requirements for wastewater recycling opportunities or reducing the size of the leach field with less aesthetic disturbance of property value or system components. Offering versatility and consistent high performance, the FAST® are also a favorite on marine vessels and offshore platforms of all types to produce high-quality effluent, specifically designed for extreme environments.





FAST® wastewater treatment systems with SFR®

Bio-Microbics FAST® wastewater treatment systems provide alternative options for properties residing outside the reach of municipal (public) treatment plants. Engineered to fit most typical residential and commercial applications, FAST® systems can be used for new construction or retrofit in existing tanks; including those in nitrogen sensitive areas or limitations with distance to groundwater and/or smaller dispersal field size requirements.

Scientifically-proven, advanced, self-contained wastewater treatment systems, the process contains no internal in-sewage moving parts. The Bio-Microbics FAST® systems use only active naturally occurring microorganisms to transform sewage wastewater to be cleaner than natural surface fresh water sources and protects family health, dwellings, property values and fresh water sources.

RESIDENTIAL

- Single-family homes
- Multi-Family Properties
- Clustered Subdivisions
- Housing Developments
- Recreational Facilities
- Apartment Complexes
- Military Facilities
- Communities/Villages
- Small Municipalities

COMMERCIAL

- Restaurants
- Schools/Universities
- RV & Mobile Home Parks
- Office Parks
- Resort Areas/Hotels
- Highway Rest Areas
- Country Club/Golf Courses
- Shopping Centers
- Grocery stores
- Food/Beverage Facilities
- Wineries & Breweries

MARINE/OFFSHORE

- Tug & Work Boats
- Luxury Yachts
- Commercial Vessels
- School/Research Boats
- Offshore Vessels
- Tankers
- Container Ships
- Aircraft Carriers
- Cruise Ships
- Offshore Oil Platforms

...and more!

MicroFAST® wastewater treatment systems

Versatile and robust, these systems are designed for individual homes, clustered subdivisions, and other domestic-strength flow applications.

RetroFAST® wastewater treatment systems

Ideal for existing tanks or upgrading the septic system to enhance/renovate a drain field; see our **S.O.S.-Save Our Septic®** Warranty Program.

HighStrengthFAST® wastewater treatment systems

Meeting the unique challenges of high-strength commercial applications or properties with a higher loading with robust, low-maintenance treatment systems.



MgFAST® wastewater treatment systems

Ideal for small communities or commercial properties, the MyFAST® maintains consistent high performance, low maintenance, and sludge management all in one tank.

NitriFAST®

For use with a MicroFAST® system to provide second stage nitrification to achieve even higher levels of nitrogen reduction.

MarineFAST®

Certified Type II Marine Sanitation Devices (MSDs) for virtually every type of vessel or offshore structure.

GENERAL FAST® PRODUCT INFORMATION

RetroFAST	Maximum Treatment Capacity*		Module Dimensions*** (L x W x H) [-18" (45.7cm) dia. opening required]	Weight***	
	Volume/Module**	People per Module**		Pounds	Metric
RetroFAST® 0.150	150 GPD (567 LPD)	1 to 3	22" (55 cm) x 24" (61 cm) x 32" (81 cm)	74 lbs	34 kg
RetroFAST® 0.250	250 GPD (947 LPD)	1 to 4	27" (67 cm) x 30" (76 cm) x 34" (85 cm)	125 lbs	57 kg
RetroFAST® 0.375	375 GPD (1420 LPD)	1 to 5	39" (98 cm) x 30" (76 cm) x 34" (85 cm)	156 lbs	71 kg

MicroFAST	Maximum Treatment Capacity*		Module Dimensions*** (L x W x H)	Weight***	
	Volume/Module**	People per Module**		Pounds	Metric
MicroFAST® 0.5	500 GPD (1893 LPD)	1 to 8	59" (150 cm) x 30" (76 cm) x 56" (130 cm)	165 lbs	75 kg
MicroFAST® 0.625	625 GPD (2366 LPD)	1 to 10	60" (152 cm) x 43" (109 cm) x 55" (130 cm)	185 lbs	84 kg
MicroFAST® 0.75	750 GPD (2839 LPD)	1 to 11	60" (152 cm) x 43" (109 cm) x 55" (130 cm)	200 lbs	91 kg
MicroFAST® 0.9	900 GPD (3407 LPD)	1 to 14	59" (150 cm) x 48" (122 cm) x 57" (145 cm)	215 lbs	98 kg
MicroFAST® 1.5	1500 GPD (5678 LPD)	6 to 21	82" (208 cm) x 55" (140 cm) x 58" (147 cm)	456 lbs	207 kg
MicroFAST® 3.0	3000 GPD (11356 LPD)	10 to 42	71" (180 cm) x 59" (150 cm) x 81" (206 cm)	725 lbs	329 kg
MicroFAST® 4.5	4500 GPD (17034 LPD)	18 to 63	145" (368 cm) x 73" (185 cm) x 51" (130 cm)	1600 lbs	726 kg
MicroFAST® 9.0	9000 GPD (34068 LPD)	30 to 126	145" (368 cm) x 73" (185 cm) x 76" (193 cm)	2300 lbs	1044 kg
Larger Applications>9000 GPD	*Multiple FAST® treatment modules can be used in parallel and/or series for additional flow or desired treatment levels.*				

HighStrengthFAST	Maximum Treatment Capacity*		Module Dimensions*** (L x W x H)	Weight***	
	Volume/Module**	People per Module**		Pounds	Metric
HighStrengthFAST® 1.0	~900 GPD (3407 LPD)	Consult Factory	59" (150 cm) x 48" (135 cm) x 57" (130 cm)	227 lbs	103 kg
HighStrengthFAST® 1.5	~1500 GPD (5678 LPD)		82" (208 cm) x 55" (140 cm) x 58" (147 cm)	456 lbs	207 kg
HighStrengthFAST® 3.0	~3000 GPD (11356 LPD)		71" (180 cm) x 59" (150 cm) x 81" (206 cm)	725 lbs	329 kg
HighStrengthFAST® 4.5	~4500 GPD (17034 LPD)		145" (368 cm) x 73" (185 cm) x 51" (130 cm)	1600 lbs	726 kg
HighStrengthFAST® 9.0	~9000 GPD (34068 LPD)		145" (368 cm) x 73" (185 cm) x 76" (193 cm)	2300 lbs	1044 kg
Larger Applications>9000 GPD	*Multiple FAST® treatment modules can be used in parallel and/or series for additional flow or desired treatment levels.*				

MyFAST	Maximum Treatment Capacity*		AMS ZONE *Optional Lixor® system*	BMS ZONE *Optional Package*	OPTIONAL **MyTEE®** SCREENING DEVICE	
	Volume	People Served			Minimum Tank Volume	Units
MyFAST® 1.0	10000 GPD (38 m^3/d)	up to 200+	---------	----------	5000 gallon [19 m^3]	2
MyFAST® 2.0	20000 GPD (76 m^3/d)	up to 400+	3.0XD	Lixor® 2.0	5000 gallon [19 m^3]	2
MyFAST® 3.0	30000 GPD (114 m^3/d)	up to 500+	3.0XD	Lixor® 2.0	5000 gallon [19 m^3]	2
MyFAST® 4.0	40000 GPD (150 m^3/d)	up to 600+	4.0XD	Lixor® 2.0	5000 gallon [19 m^3]	2
MyFAST® 6.0	60000 GPD (225 m^3/d)	up to 900+	6.0XD	Lixor® 3.0	7500 gallon [28 m^3]	3
MyFAST® 8.0	80000 GPD (300 m^3/d)	up to 1200+	(2) 4.0XD	Lixor® 4.0	10000 gallon [38 m^3]	4
MyFAST® 12.0*	120000 GPD (450 m^3/d)	up to 1900+	(2) 6.0XD	Lixor® 6.0	(2) 7500 gallon [28 m^3]	6
MyFAST® 16.0*	160000 GPD (600 m^3/d)	up to 2500+	(4) 4.0XD	Lixor® 8.0	(2) 10000 gallon [38 m^3]	8
Larger Applications >160000 GPD, consult factory. *Multiple FAST® treatment modules can be used in parallel and/or series for additional flow or desired treatment levels.*						

*Treatment capacity: Individual FAST® module capacities are rated based on biological (BOD), hydraulic and other project-specific considerations. All rated capacities are given as guidelines for suggested use. Actual capacity may vary with local conditions and performance goals.

**Volume/People per module: Please note that only residential applications or those applications requiring treatment for only sanitary wastewater may be designed from the volume and number of people per module. Actual capacity may vary with local conditions and performance goals.

***Module dimensions/weight provided only for shipping specifications. Please see design specifications for recommended exterior tankage sizing. Treatment modules shall be installed inside tanks that are locally approved and manufactured using watertight materials.

Electrical Options: Electrical components are available to meet all worldwide electrical specifications (volt/phase/frequency).



How Does the FAST® System Work?

1. Wastewater enters the treatment system
2. Natural separation and settling processes occur in the primary settling zone.
3. In the primary settling zone for most large residential and commercial applications, a SaniTEE® device is used to prevent large solids from entering the treatment zone.
4. A remote, above-ground blower introduces air (oxygen) into the treatment module to facilitate a robust circulation of wastewater through the media's channeled flow path.
5. Bacteria in the aeration zone become "fixed" or attached to the stationary media. This is where the abundant, diverse, self-regulating population of microbes consistently metabolize the incoming waste.
6. Clear, odorless, treated water is ready for standard or innovative dispersal.



OTHER SYSTEMS & PRODUCTS AVAILABLE TO SUIT YOUR PARTICULAR NEEDS:

Membrane BioReactor Systems
- BioBarrier® MBR
- BioBarrier® HSMBR®

Extended Aeration Technology
- RollsAIR® & RollsAIR® HS-STP®

Horizontal Trickling Filter Technology
- SeptiTech® STAAR™ Residential
- SeptiTech® STAAR™ Commercial

Greywater Treatment Technology
- Recover® Residential
- BioBarrier® Residential & Commercial Greywater

Stormwater Treatment Solutions
- BioSTORM® Stormwater System
- StormTEE® Litter Control Screen
- d-Rain Joint™ Rainwater Filtration

Marine Sanitation Technology
- MarineFAST® LX-Series
- MarineFAST® M-&MX-Series
- MarineFAST® DV-Series

Influent/Effluent Screening Solutions
- BioSTEP® Screened Pumping Systems
- MyTEE® Grit Control Screen
- SaniTEE® Wastewater Screen

Other Management Solutions
- Lixor® Submerged Aeration Systems
- FOGHog® Traps & Tablets
- ABC®-N Clarifiers & Devices

Water Treatment Solutions
- SciCHLOR® Hypochlorite Generators
- SciBRINE® BrineMakers
- Mighty Mike® CPT Tablets

Environmentally-Friendly Cleaning Solutions
- Mighty Mike® All Purpose Cleaner
- Mighty Mike® Laundry Detergent
- Mighty Mike® Industrial Descaler
- Mighty Mike® Bond-SORB® Odor Eliminator

With over 60,000 installations in more than 70 countries, our Fixed Integrated Treatment Technologies (FITT®) are the result of decades of experience, research & development, and real world operating history.

Awards, Technology Approvals, and Certifications

- **2017 Top 10 Green Building Products**, BuildingGreen, Inc.– d-Rain Joint™ Device
- **2016 LIFT's "Passport to Innovation"**, WE&RF Leaders Innovation Forum for Technology (LIFT) Scan Program - a growing collection of vetted, innovative technologies that will drastically improve wastewater treatment operations. – BioBarrier® HSMBR®
- **2016 President's "E Star" Award** & **2012 President's "E" Award** for Excellence in Exports, granted by President of the United States, presented by US Dept of Commerce
- **2015 Ingenuity Award Winner,** Ingenuity Central @ K-State Olathe, Ingenuity Central (IC) showcases innovative companies that exemplify the newest thinking driving our community & growing our economy.
- **2015 Innovation in Marine Environmental Technology Offshore Excellence Award**, based on environmental impact of marine sanitation devices and technology.
- **2014 "BEST of GreenBuild" Editor's Choice Award**, U.S. Builders Review, "Creating Better Water Treatment Solutions for a Better World…" article.
- **2011 Technology Innovation Award** (Decentralized Commercial Outlets) – Frost & Sullivan – FAST® Technology
- **2011 New Product of the Year Award** – Recycling Category. Environmental Protection Magazine (EPonline.com) "The financial, environmental and social benefits of 'recycling' are indisputable." – BioBarrier® MBR Technology
- **2011 Kansas Governor's Exporter of the Year** – presented by the Governor of KS, KS Dept. of Commerce
- **2010 North American Technology Innovation Award** (Water/Wastewater) – Frost & Sullivan – FAST® Technology
- 2**009 Technology Merit Business Achievement Award**, Water/Wastewater – Environmental Business Journal (EBJ) – BioBarrier® MBR Technology
- **2002 U.S. Export Achievement Certificate**, US Dept. of Commerce, US & Foreign Commercial Service
- **2000 U.S. EPA Environmental Technology Innovator Award** – U.S. EPA, Region 1 – SeptiTech® Technology
- Australian Dept of Transportation & Royal Australian Navy - Technology Approval
- Canadian Great Lakes (CGL) Maritime Certification – Canadian Coast Guard
- CAN/BNQ 3680-600 (B-IV) Onsite Wastewater Technologies - BioBarrier® MBR
- Canadian Standards Association (CSA) International Electrical Certification
- CE – European Electrical Systems (including a "Tropical Certification Rating")
- China Classification Society (CCS) 中国船级社 – FAST® Technology Approval
- EN 12566-3, Packaged and/or site assembled domestic wastewater treatment plants for up to 50 People, PIA GmbH tested - BioBarrier® MBR 0.5, 1.0, & 1.5 & FITT®-ee
- IAPMO (International Association of Plumbing and Mechanical Officials) Research & Testing Inc. – Reclaimed Water Conservation System for Flushing Toilets (Standards CSA B128.1-2006 & CSA B128.2-2006) – Recover® Technology
- IMO (International Maritime Organization) MARPOL Annex IV (2010) – provides guidance for the Navigation and Vessel Inspection Circular (NVIC) No. 1-09, US EPA and other effluent standards as may be required – FAST® Technology
- Massachusetts Title 5 Innovative/Alternative System - Technologies Listed under "General Use Permit for Nitrogen Reduction", "Provisional Use," & "Remedial Use"
- NSF/ANSI Std 40, class 1 Certified – MicroFAST®, BioBarrier® MBR and SeptiTech® Systems up to 1500 GPD – Recognized in domestic and international trade by regulatory agencies at the local, state/province, and federal levels.
- NSF/ANSI Std 245 (Nitrogen Reduction) Certified – MicroFAST®, BioBarrier®-N MBR, BioBarrier® MBR and SeptiTech® Systems up to 1500 GPD
- NSF/ANSI Std 350 class R (Water Reuse) Certified – BioBarrier® MBR 0.5, 1.0, & 1.5
- Poland – Aprobata Techniczna (Technology Approval) ze Instytut Ochrony Srodowiska (Institute of Environmental Protection)
- România – Avizează Favorabil – Consiliul Tehnic Permanent Pentru Constructii – Ministerul Dezvoltarii Regionale Si Turismului
- Russia – Technology Approval – Федеральная Служба По Надзору В Сфере Защиты Прав Потребителей И Благополучия Человка (Federal Service of Environmental Protection)
- Russia – СРТ Свидетельство о Российских Стандартах (Certification of Russian Standards) – BioSTORM® – All sizes
- Russia – РМРС (Russian Maritime Register of Shipping) МЕЖДУНАРОДНОЕ СВИДЕТЕЛЬСТВО О ПРЕДОТВРАЩЕНИИ ЗАГРЯЗНЕНИЯ СТОЧНЫМИ ВОДАМИ - International Sewage Pollution Prevention Certificate
- SASO (Saudi Arabian Standards Organization) Certified
- ETL (UL) – Listed to US electrical certification requirements
- U.S. Coast Guard – 33CFR159, MEPC.159(55) – FAST® Technology Approval for Type II MSD (Marine Sanitation Devices)
- U.S. EPA–ETV (Environmental Technology Verification) – validates the performance of technology that may improve the protection of the environment. – RetroFAST®, Report No. 03/08/WQPC-SWP – SeptiTech®, Report No. 02/04/WQPC-SWP

...and MORE!

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BETTER WATER BETTER WORLD
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(800) 753-3278 • T: (913) 422-0707 • F: (913) 422-0808
www.biomicrobics.com • sales@biomicrobics.com

SeptiTech
a subsidiary of Bio-Microbics, Inc.
69 Holland Street • Lewiston, ME 04240 USA
(800) 318-7967 • T: (207) 333-6940 • F: (207) 333-6944
www.septitech.com • info@septitech.com

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a division of Bio-Microbics, Inc.
12977 Maurer Industrial Dr • Sunset Hills, MO 63127 USA
(800) 652-4539 • T: (314) 756-9300 • F: (314) 756-9306
www.sciencoFAST.com • solutions@sciencofast.com

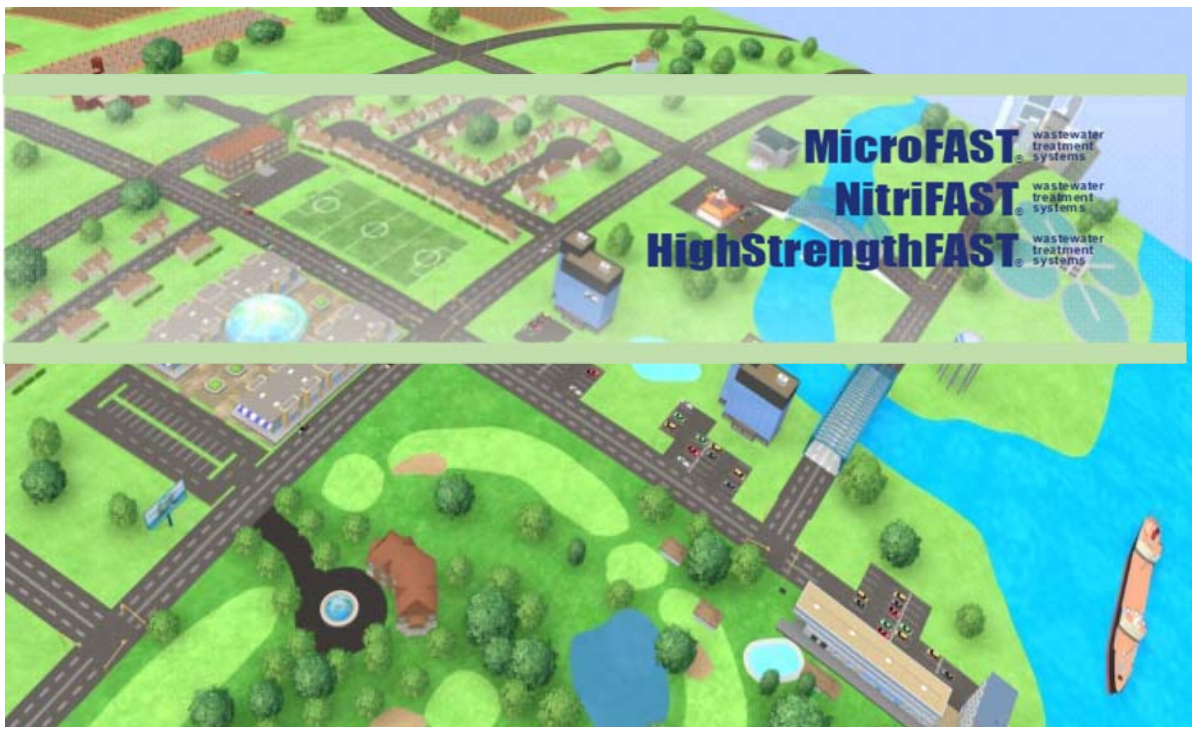
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FAST® Installation Manual

FOR USE WITH

(NSF Std 40 & 245) **MicroFAST® 0.5, 0.625, 0.75, 0.9, 1.5**
(non-NSF certified) **MicroFAST® 3.0, 4.5, 9.0**
NitriFAST® 0.5, 0.625, 0.75, 0.9, 1.5, 3.0, 4.5, 9.0
HighStrengthFAST® 1.0, 1.5, 3.0, 4.5, 9.0



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INSTALLATION MANUAL

FOR USE WITH FAST® SYSTEMS:

(**NSF®** Std 40/245 cert.) **MicroFAST® 0.5, 0.625, 0.75, 0.9, 1.5**
(Non-NSF cert.) **MicroFAST® 3.0, 4.5, 9.0**
NitriFAST® 0.5, 0.625, 0.75, 0.9, 1.5, 3.0, 4.5, 9.0
HighStrengthFAST® 1.0, 1.5, 3.0, 4.5, 9.0

GENERAL INFORMATION

All FAST® products are ETL certified for safety (electrical, environmental, etc.). One or more of the following patents protects this process: 3,966,599; 3,966,608; 3,972,965; 5,156,742. Certified by NSF International, the MicroFAST® 0.5, 0.625, 0.75, 0.9 and 1.5 systems meets NSF Standard 40, Class 1 and Standard 245 certifications for wastewater treatment devices. If you have questions regarding any Bio-Microbics products, please contact us:

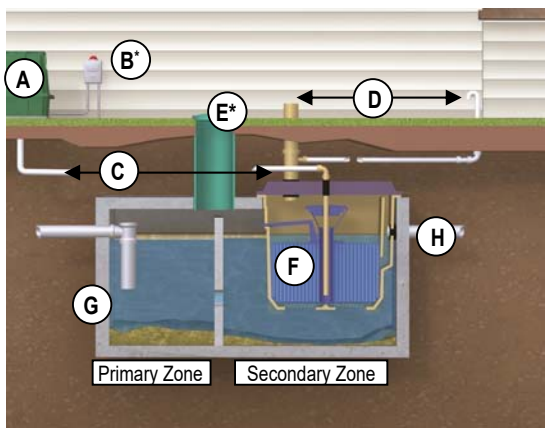
800-753-FAST (3278) or (913) 422-0707
e-mail: onsite@biomicrobics.com

About FAST®: The FAST® (Fixed Activated Sludge Treatment) system uses naturally occurring bacteria (biomass) to treat sewage for dispersal into the environment. This continuous process provides the biomass with waste (food) and air in a suitable environment. Dead bacteria and non-biodegradable waste settle and accumulate in the bottom of the tank for periodic removal.

The FAST® process consists of the treatment module and blower. The blower provides air to the system via the air supply pipe. The air supply pipe and draft tube create an air lift. The air lift mixes oxygen and waste throughout the media inside the tank. Bacteria grows on the media and digests the waste. A vent pipe expels harmless vapors created by the process.

- **A. Blower and Housing**
- **B. Control Panel**
- **C. Air Line Piping**
- **D. Vent(s) and Observation Port**
- **E. Access**
- **F. FAST® Unit**
- **G. Tank**
- **H. Outlet to Drain field**

GENERAL LAYOUT



***PLEASE NOTE**: Adequate pump out must be provided for primary and secondary zones. There may be ancillary equipment associated with your system: pump(s) (before and/or after the FAST® unit), a distribution box, a disinfection system, an irrigation system, a remote alarm, or auto dialer, etc.*

⚠ WARNING *Only qualified service personnel should open access ports and/or covers to a septic tank. Infectious organisms exist in a septic tank. If any contact with wastewater occurs, immediately wash and disinfect all exposed areas and contact personal physician. Failure to do so could result in severe sickness or death. DO NOT use an open flame or cause a spark near a septic tank's access points. Gases emanating from septic tanks can explode if ignited or deadly if inhaled.*

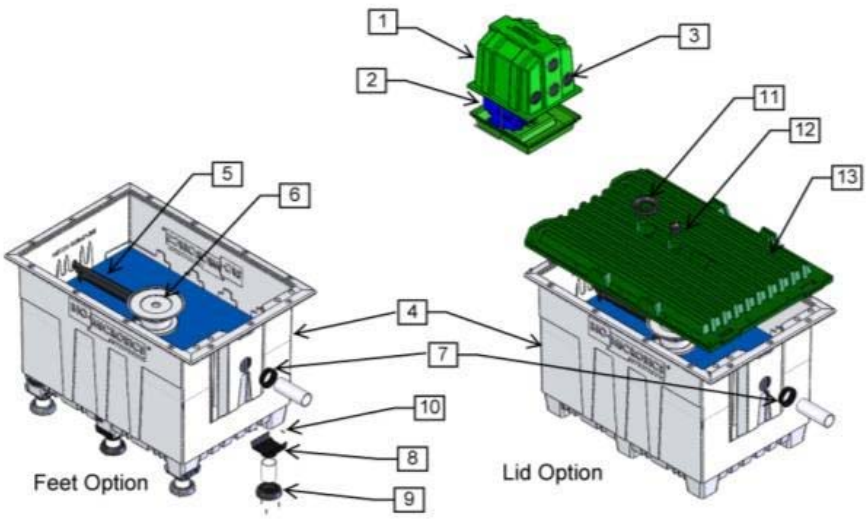
LOCATION

⚠CAUTION *Always have all utility lines and equipment marked by a locating service prior to performing any work. Failure to do so could result in severe bodily injury or death.*

FAST® systems may be located in the same position relative to the house and water supply as any conventional septic system. However, some basic guidelines should be followed:

1. The FAST® system lid is designed to withstand a burial depth of up to 3 feet (0.9 meters). Do not place the tank in a location where it could be subjected to traffic or additional weight. A professional engineer should be consulted if additional loading conditions are expected. FAST® with feet option should be considered.
2. The FAST® system must be located so that sufficient slope (≥2%, ¼ inch/foot) is provided for the influent and effluent lines.
3. Excessive back pressure must not be placed on the blower. Follow all installation guidelines.
4. The method and arrangement for effluent discharge must not interfere with the treatment plant's operation.

SYSTEM COMPONENTS



OPTIONAL EQUIPMENT		
8	Foot Top	010-FT
9	Foot Bottom	010-FB
10	Foot Screws	085-SSD141

SUPPLIED EQUIPMENT		
COMMON NAME		**PART NUMBER**
1	Blower housing	dependant on model
2	Blower	dependant on model
	Blower I/O Piping, Inlet Filter Assembly, Screws	dependant on model
	Inlet Filter Element	dependant on model
3	Louver	045-LVR4
4	Liner	dependant on model
5	Recirculation Trough	dependant on model
6	Air Lift	dependant on model
7	4" Outlet Gasket	050-GSKT4
11	6" Obs. Port Gasket	050-GSKT6
12	2" Air Line Gasket	050-GSKT2
13	Lid (Not available with MCF 4.5 & 9.0)	dependant on model

WARNING *Persons coming in contact with wastewater, must immediately wash all exposed areas with disinfecting cleaner and contact your personal physician. Failure to do so could result in severe sickness or death.*

WARNING *Hazards exist in confined spaces such as a septic tank. All confined space precautions must be followed if entering a tank. Always keep tank openings covered during storage and installation*

Before installation may begin, check the tank to ensure it is level within ±1/2" [12 mm].

MATERIALS REQUIRED FOR INSTALLATION

Note: other tools may be needed to complete installation.

1. Septic tank that meets all applicable requirements & standards
2. Safe lifting mechanism
3. Anchor bolts for securing FAST® unit to the tank and blower housing to the concrete base.
4. Piping for observation/vent port, air lines, and vent lines (check installation procedures, specs, and plans to determine the size and type of pipes needed).
5. PVC saw
6. Pipe lubricant/soap
7. PVC primer and glue (weather appropriate)
8. Concrete base for blower assembly
9. Mounting screws for control panel
10. Electrical conduit, fittings and specified wires
11. Hammer drill and masonry bits

MODULE INSTALLATION

There are two options available for mounting the FAST® module into a tank.

Option A uses FAST's plastic lid and hangs the module from the concrete tank.
Option B uses leg extensions to stand the unit up on the bottom of tank.

MODULE WEIGHTS						
MODULE SIZE	MCF 0.5	MCF 0.75, 0.9, 1.0	MCF 1.5	MCF 3.0	MCF 4.5	MCF 9.0
WEIGHT (lbs)	165	220	505	690	1500	2200

CAUTION *Use safe lifting techniques to set module in tank. Be sure all lifting equipment is clear of obstructions such as power lines and trees.*

OPTION A: LID INSTALLATION (not available on any 4.5 or 9.0 unit)



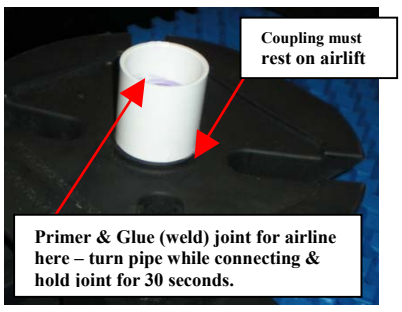
1. Hang module liner from the opening in top of tank. Place FAST® lid on top of liner. Carefully line up the air line hole in the lid with coupling at top of air lift inside insert. Make sure the air line pipe is not leaning and stands perpendicular to the lid.

2. Use hammer drill to drill holes for anchoring module to the tank using pre-formed holes in the module lid as guides.

3. Apply sealant to surface between liner and tank, and module lid.

4. Place module lid on top of liner and secure using holes drilled in step 2 and non-corrosive 3/8" anchor bolts.

5. **AIR LINE** Insert cut length of air supply pipe (see AIR LINE SIZING table) through factory provided air line gasket in module lid. Use 6” hole in the lid for access to connect and glue air supply to air lift coupling. Run the air line to the desired blower location using required piping. Be sure airline is properly bedded when installed. Air line piping to FAST® may not exceed 100 ft [30.5 m] total length with ≤ 4 elbows.



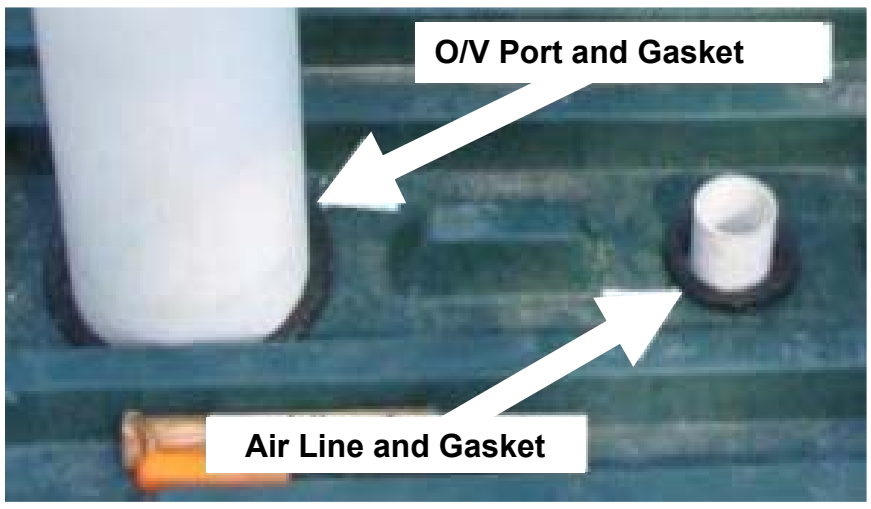
ALL CONNECTIONS MUST BE AIR/WATER-TIGHT AND PERMANENT.

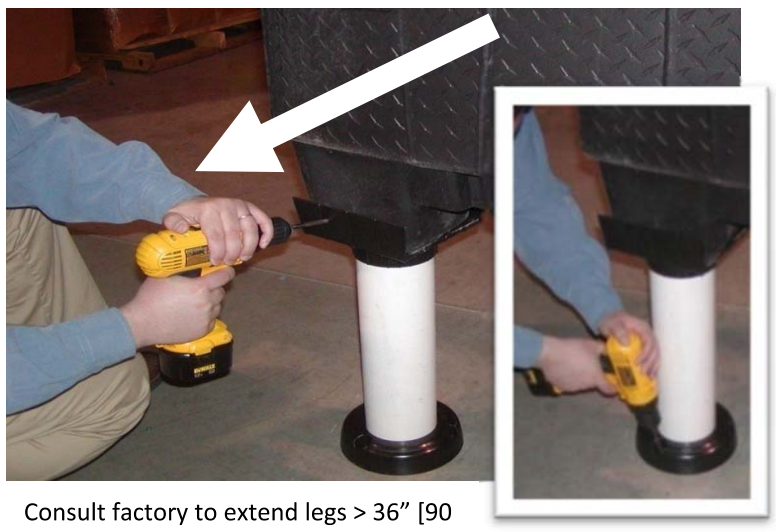
AIR LINE SIZING			
MODEL	PIPE SIZE (O.D.)		MATERIAL
0.5, 0.625, 0.75, 0.9. 1.0, 1.5. 3.0	2” (2.375”)	51mm (60.3 mm)	PVC
4.5, 9.0	3” (3.516”)	78.5mm (90mm)	Steel (stainless inside FAST® Tank

6. **OBSERVATION / VENT PORT** (o/v port) Insert desired length of 6” pipe into factory provided gasket then into access hole in lid. Insert pipe until it stops.

⚠CAUTION

DO NOT PUSH PIPE TO MEDIA SURFACE!





Consult factory to extend legs > 36” [90

OPTION B: LEG INSTALLATION

1. **BUILD LEGS** using 4” [101 mm] Sch 40 pipe cut to your desired length. Glue the pipe to the bottom and top leg pieces. Attach the leg extensions to the module using supplied self-tapping screws. Creating lateral stability for the FAST system is also recommended by use of non-corrosive materials.

NOTE: If legs are > 18” [45.7 cm] tall then Sch 80 PVC or stronger pipe must be used. cm].

2. **ATTACH LINER TO TANK** Attach leg extensions to the base of the tank with stainless steel anchor bolts (not provided). Two anchor bolts are required per leg extension. Place the anchor bolts in the corners opposite each other.

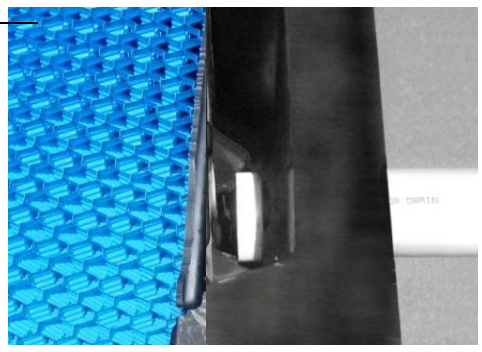
3. **AIR LINE** Join the air supply line to the air lift connection using required piping (see AIR LINE SIZING table). Blower piping to FAST® may not exceed 100 ft [30.5 m] total length with ≤ 4 elbows.

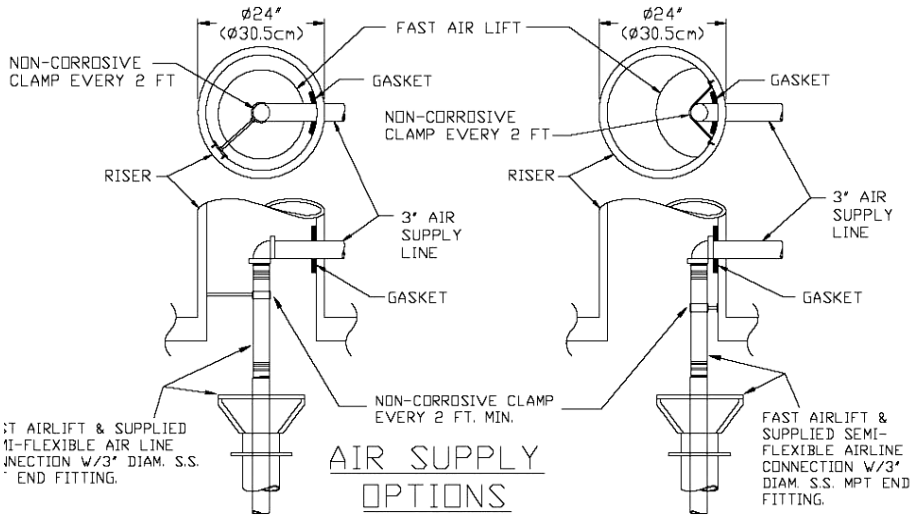
AIR LINE SIZING			
MODEL	PIPE SIZE (O.D.)		MATERIAL
0.5, 0.625, 0.75, 0.9. 1.0, 1.5. 3.0	2" (2.375")	51mm (60.3 mm)	PVC
4.5, 9.0	3" (3.516")	78.5mm (90mm)	Steel (stainless inside FAST® Tank

The air supply line inside the tank must be secured with non-corrosive clamps every 2 ft [0.6 m] to prevent breaking.

OUTLET INSTALLATION

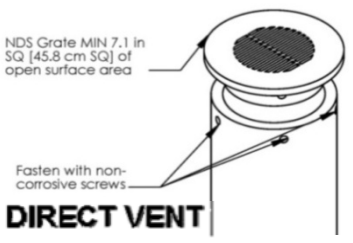
Insert 4" Sch 40 PVC pipe for use as an effluent line. Insert through tank wall and into 4" outlet gasket in the liner. Push pipe to baffle stops.



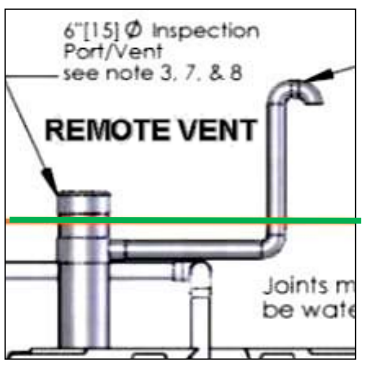


VENTING

Numerous options exist for proper venting. Three of the most common are mentioned here. The vent system must be sized properly to avoid excessive back pressure in the system (see table below). It also must not allow surface water to enter the system and must allow internal condensation to drain.



DIRECT VENT: The 6" o/v port can have holes drilled in it or a slotted cap put on it. Any cap must be fastened with screws to prevent unauthorized access. The opening(s) should prevent foreign material from entering the system.



REMOTE VENT: Branch off of the 6" o/v port or manhole below grade. Run the vent pipe to the desired location and terminate above grade. Cover opening with #4 mesh screen or similar. Water accumulating in the vent piping MUST be drained to prevent back pressure. **NOTE: The vent should not exceed 100 ft. [30.5m] in total length.**

BIOFILTER: Please contact Bio-Microbics for guidance on how to build this buried vent.
NOTE: A biofilter vent must not allow moisture back into the treatment system.

REQUIRED VENT SIZES		
MODEL	MIN VENT DIAM in/mm	Vent Opening in in^2/cm^2
All 0.5, 0.625, 0.75, 0.9.	3 / 76	7.0 / 45
All 1.5, HSF 1.0	4 / 102	9.1 / 59
All 3.0	6 / 152	19.5 / 126
All 4.5, 9.0	10 / 254	39 / 251

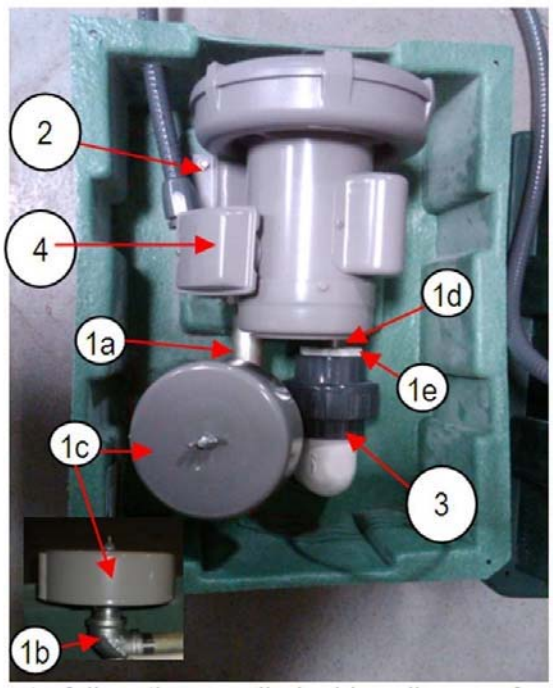
BLOWER INSTALLATION

CAUTION *Always have all utility lines and equipment marked by a locating service prior to performing any work.*

WARNING *All electrical work shall be properly performed by a qualified electrician per all applicable codes. Failure to do so may result in severe bodily injury or death.*

The blower and blower housing must be mounted on a solid base such as concrete to avoid settling. All conduit/piping should pass through the concrete slab from below.

1. CONNECT SUPPLIED INITIAL PIECES (See picture to the right)
   a. Longest pipe
   b. Elbow (See Inset)
   c. Air filter assembly
   d. Shortest pipe
   e. Reducer bushing



NOTE: ALL PIPE CONNECTIONS MUST BE AIR/WATER TIGHT.

2. SECURE BLOWER assembly to housing base using four supplied #14 x 1½" self-tapping screws. Drill screws directly into blower base.

3. CONNECT AIR LINE from FAST® unit to blower outlet using required piping (see chart). A "quick disconnect" is highly recommended to be installed at this location. Blower piping to FAST® may not exceed 100 ft [30.5 m] total length and have ≤ 4 elbows. Keep all debris out of air line.

ALL CONNECTIONS MUST BE AIR/WATER-TIGHT.

4. CONNECT INCOMING POWER to the blower at the blower junction box. Be sure to follow the supplied wiring diagram for the voltage at your specific location. All blowers are dual voltage and must be connected according to the proper diagram. Blower diagrams can be found on the blower's shipping box and/or at the end of this manual.

CONTROL PANEL INSTALLATION

CAUTION *Always have all utility lines and equipment marked by a locating service prior to performing any work.*

WARNING *All electrical work shall be properly performed by a qualified electrician per all applicable codes. Failure to do so may result in severe bodily injury or death.*

All FAST® system electrical parts are ETL (UL equivalent) certified for safety. The control panel meets NEMA4X standards for all weather use (not explosive or submerged environments).

1. Examine wiring directions inside the supplied FAST® control panel
2. A dedicated breaker is required in the building's master electrical panel. Make connections between the master panel and FAST® control panel.
3. Make connections between blower and FAST® control panel per the electrical diagram.

Bio-Microbics manufactures control panels that control UV systems and sewage pumps. The TRACK system (or other auto-dialer) can also be connected to the panel.

FINAL INSPECTION & START UP

It is the responsibility of the installer to ensure that the tank will not float due to hydraulic conditions at the site. Your local FAST® Systems distributor may provide installation inspection services. If you have questions, call Bio-Microbics at 800-753-FAST (3278) or (913) 422-0707.

WARNING *Always secure all access covers to prevent unauthorized people from entering the tank. Only qualified service personnel should open access ports and/or covers. Infectious organisms exist in a septic tank. If any contact with wastewater occurs, immediately wash and disinfect all exposed areas and contact personal physician. Failure to do so could result in severe sickness or death. DO NOT use an open flame or cause a spark near a septic tank's access points. Gases emanating from septic tanks can explode if ignited or deadly if inhaled.*

BEFORE THE UNIT IS BACKFILLED:

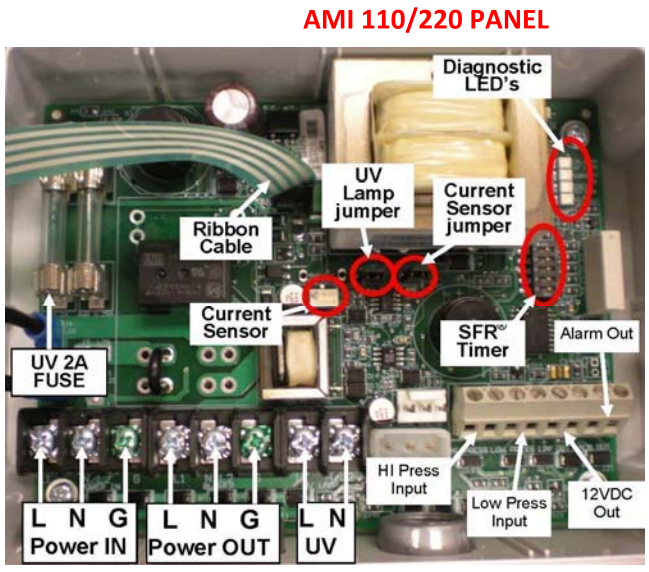
A. Fill the tank to the normal operating level.
B. Check for leaks in all water-tight seals.
C. Turn the blower ON and observe the operation of the airlift. A robust splash should be present.
D. Check for excessive back pressure: Seal all access covers, place hand about 8 inches [20 cm] from FAST® vent, if air flow is felt then excessive back pressure exists and the system's vent must be upgraded.
E. Check for proper water level over the media. The normal water line should be ~2" [5 cm] over the media.
F. Check for proper alarm function. Turn OFF the blower circuit breaker and wait for the alarm to sound. If the alarm does not sound after 30 seconds, then review the electrical installation procedures.
G. Turn the blower back ON.
H. Backfill the excavation.
I. Lastly, record the FAST® unit's serial number in the Service Manual.

ELECTRICAL WIRING DIAGRAMS

Only the MicroFAST® 0.5, 0.625, 0.75, and 0.9 system diagrams are displayed here. Information for larger FAST® systems accompanies those units and can be obtained from Bio-Microbics.

TIMING MODES DIP SWP OS. (S1)					BLOWER MINUTES	
5	4	3	2	1	ON	OFF
Off	Off	Off	Off	Off	30	15
Off	Off	Off	Off	On	15	15
Off	Off	Off	On	On	30	30
Off	Off	On	Off	Off	60	15
Off	Off	On	Off	On	60	30
Off	Off	On	On	Off	120	30
On	On	On	On	Off	TEST	
On	On	On	On	On	∞	
TEST = 15 SEC ON, 20 SEC OFF						
∞ = ALWAYS ON						

AMI 110/220 PANEL



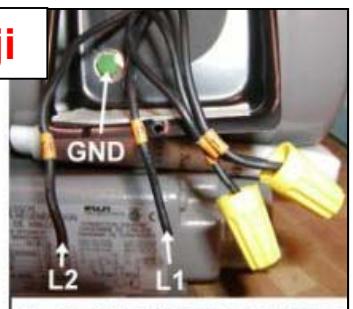
BLOWER DIAGRAMS

ATTENTION: Please refer to side of shipping box for correct Blower.

Fuji

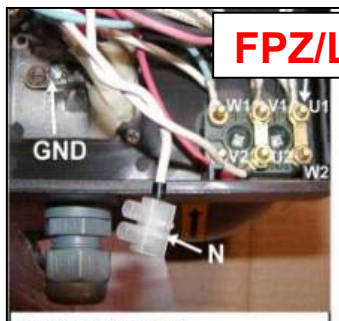


Model: FUJI VFC 209, 100P, 300P
Power: 110VAC
- L1 to P1
- N to T2, T4
- T1 & T3, cap together

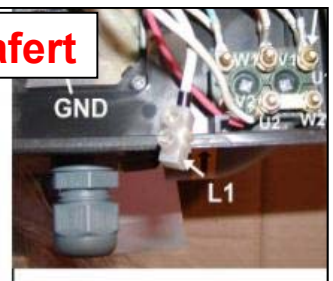


Model: FUJI VFC 209, 100P, 300P
Power: 220V 1ø
- L1 to P1
- L2 to T4
- T2 & T3, cap together
- T1, cap off

FPZ/Lafert

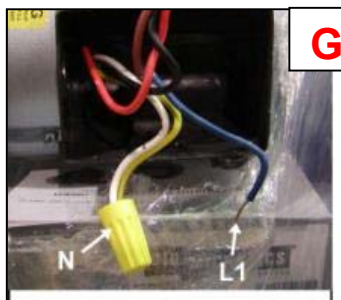


Model: FPZ SCL06
Power: 110VAC
- Jumper U2 to V1
- Jumper W2 to U1
- L1 to “terminal block”
- N to white connector

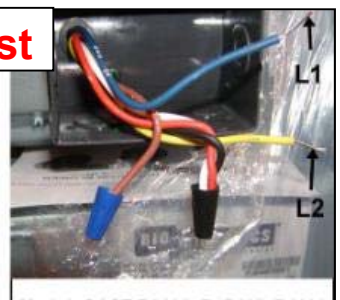


Model: FPZ SCL06
Power: 220VAC, 1ø
- L1 to "terminal block"
- L2 to V1
- Jumper W2 to U2

Gast



Model: GAST R2103, R4P115, R1102
Power: 110VAC
- L1 to P1
- N to 2,4
- P2,5,3 cap together



Model: GAST R2103, R4P115, R1102
Power: 220VAC 1ø
- L1 to P1
- L2 to 4
- 5, 3 and 2, cap together
- P2 cap off

LIMITED WARRANTY

Bio-Microbics, Inc. warrants every new residential FAST® system against defects in materials and workmanship for a period of two years after installation or three years from date of shipment, subject to the following terms and conditions, (Commercial FAST system for a period of one year after installation or eighteen months from date of shipment, whichever occurs first, subject to the following terms and conditions):

During the warranty period, if any part is defective or fails to perform as specified when operating at design conditions, and if the equipment has been installed and is being operated and maintained in accordance with the written instructions provided by Bio-Microbics, Inc., Bio-Microbics, Inc. will repair or replace at its discretion such defective parts free of charge. Defective parts must be returned by owner to Bio-Microbics, Inc.’s factory postage paid, if so requested. The cost of labor and all other expenses resulting from replacement of the defective parts and from installation of parts furnished under this warranty and regular maintenance items such as filters or bulbs shall be borne by the owner. This warranty does not cover general system misuse, aerator components which have been damaged by flooding or any components that have been disassembled by unauthorized persons, improperly installed or damaged due to altered or improper wiring or overload protection. This warranty applies only to the treatment plant and does not include any of the structure wiring, plumbing, drainage, septic tank or disposal system. Bio-Microbics, Inc. reserves the right to revise, change or modify the construction and/or design of the FAST system, or any component part or parts thereof, without incurring any obligation to make such changes or modifications in present equipment. Bio-Microbics, Inc. is not responsible for consequential or incidental damages of any nature resulting from such things as, but not limited to, defect in design, material, or workmanship, or delays in delivery, replacements or repairs.

THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES EXPRESS OR IMPLIED. BIO-MICROBICS SPECIFICALLY DISCLAIMS ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. NO REPRESENTATIVE OR PERSON IS AUTHORIZED TO GIVE ANY OTHER WARRANTY OR TO ASSUME FOR BIO-MICROBICS, INC., ANY OTHER LIABILITY IN CONNECTION WITH THE SALE OF ITS PRODUCTS.

Contact your local distributor for parts and service.

Keep for Your Records



FAST® System Serial Number: _____

System Designer Name: _____

Designer Phone: _____

Health Official Name: _____

Health Official Phone: _____

Manufacturer Name: Bio-Microbics, Inc. _____

Manufacturer Phone: 1-800-753-FAST (3278) _____

Installed By: _____

Installer Phone: _____

Maintenance Provider Name: _____

Maintenance Provider Phone: _____

BIO MICROBICS
BETTER WATER. BETTER WORLD.®

8450 Cole Parkway • Shawnee, KS 66227 • USA
Ph: 913-422-0707 • Fax: 913-422-0808
800-753-FAST (3278) • www.biomicrobics.com

FAST® Service Manual

FOR USE WITH

(NSF Std 40 & 245) MicroFAST® 0.5, 0.625, 0.75, 0.9, 1.5

(non-NSF certified) MicroFAST® 3.0, 4.5, 9.0

(ETV/EPA tested) RetroFAST® 0.150, 0.250, 0.375

NitriFAST® 0.5, 0.625, 0.75, 0.9, 1.5, 3.0, 4.5, 9.0

HighStrengthFAST® 1.0, 1.5, 3.0, 4.5, 9.0



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FAST, MicroFAST, NitriFAST, HighStrengthFAST, and RetroFAST are registered trademarks used under license.

SERVICE MANUAL

FOR USE WITH FAST® SYSTEMS:

(NSF® Std. 40/245 cert.) MicroFAST® 0.5, 0.625, 0.75, 0.9, 1.5
(Non-NSF cert.) MicroFAST® 3.0, 4.5, 9.0
(ETV/EPA tested) RetroFAST® 0.150, 0.250, 0.375
NitriFAST® 0.5, 0.625, 0.75, 0.9, 1.5, 3.0, 4.5, 9.0
HighStrengthFAST® 1.0, 1.5, 3.0, 4.5, 9.0

GENERAL INFORMATION

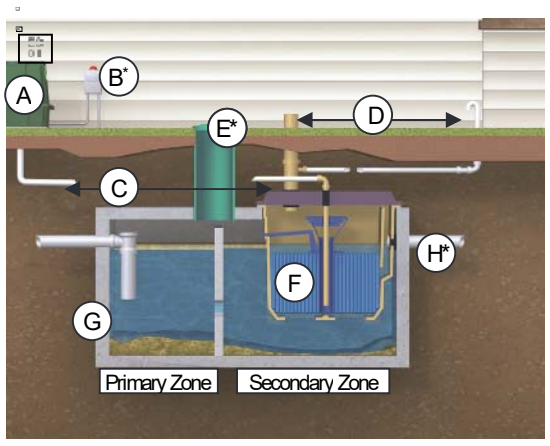
All FAST® products are ETL certified for safety (electrical, environmental, etc.). One or more of the following patents protects this process: 3,966,599; 3,966,608; 3,972,965; 5,156,742. Certified by NSF International, the MicroFAST® 0.5, 0.625, 0.75, 0.9 and 1.5 systems meets NSF Standard 40, Class 1 and Standard 245 certifications for wastewater treatment devices. If you have questions regarding any Bio-Microbics products, please contact us:

800-753-FAST (3278) or (913) 422-0707
e-mail: onsite@biomicrobics.com

About FAST®: The FAST® (Fixed Activated Sludge Treatment) system uses naturally occurring bacteria (biomass) to treat sewage for dispersal into the environment. This continuous process provides the biomass with waste (food) and air in a suitable environment. Dead bacteria and non-biodegradable waste settle and accumulate in the bottom of the tank for periodic removal.

The FAST® process consists of the treatment module and blower. The blower provides air to the system via the air supply pipe. The air supply pipe and draft tube create an air lift. The air lift mixes oxygen and waste throughout the media inside the tank. Bacteria grows on the media and digests the waste. A vent pipe expels harmless vapors created by the process.

A. Blower and Housing
B. Control Panel
C. Air Line Piping
D. Vent(s) and Observation Port
E. Access
F. FAST® Unit
G. Tank
H. Outlet to Drainfield

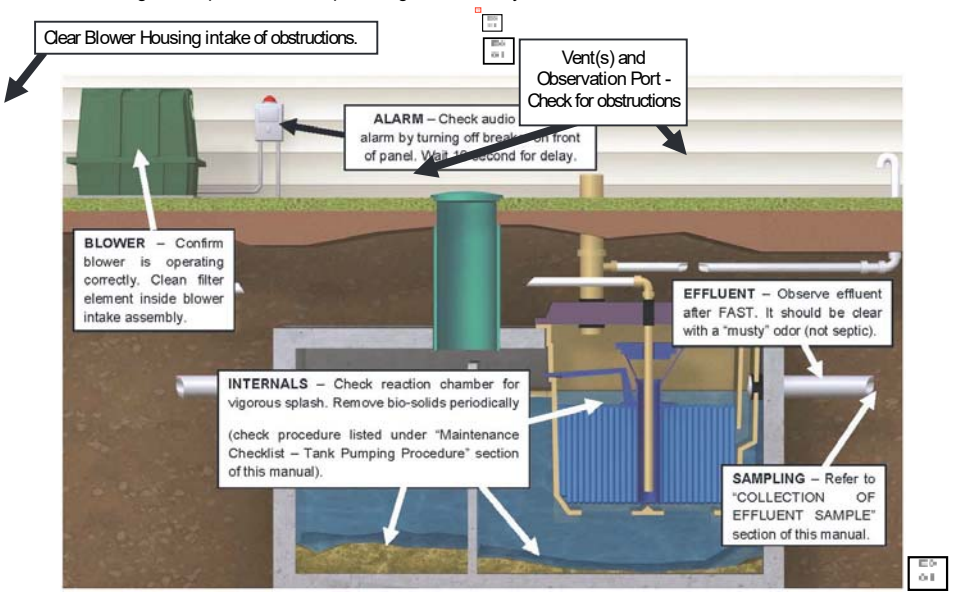


GENERAL LAYOUT

*PLEASE NOTE: Adequate pump out must be provided for primary and secondary zones. There may be ancillary equipment associated with your system: pump(s) (before and/or after the FAST® unit), a distribution box, a disinfection system, an irrigation system, a remote alarm, or auto dialer, etc.

REGULAR SERVICE MAINTENANCE

WARNING Always secure all access covers to prevent unauthorized people from entering the tank. Only qualified service personnel should open access ports and/or covers. Infectious organisms exist in a septic tank. If any contact with wastewater occurs, immediately wash and disinfect all exposed areas and contact personal physician. Failure to do so could result in severe sickness or death. DO NOT use an open flame or cause a spark near a septic tank's access points. Gases emanating from septic tanks can explode if ignited or deadly if inhaled.

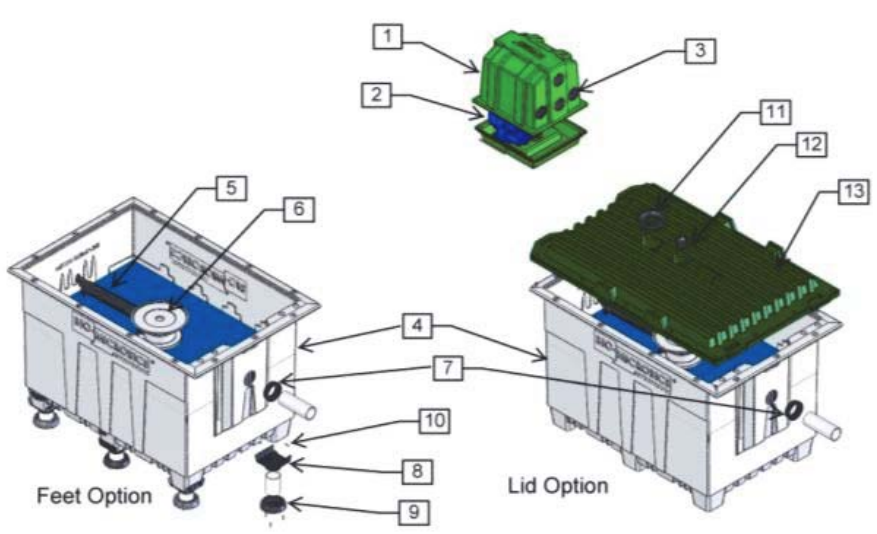


SYSTEM COMPONENTS

SUPPLIED EQUIPMENT

Please refer to the Installation Manual for a list of your system's original supplied parts. Picture shown is the MicroFAST® standard parts diagram.

If replacement parts are needed please have the serial number ready and call the local distributor listed on the control panel or Bio-Microbics.



COMMON NAME

1. Blower Housing
2. Blower (with blower I/O piping, Inlet Filter Assembly, blower and housing screws not shown)
3. Louver
4. Liner
5. Recirculation Trough
6. Air Lift
7. 4" Outlet Gasket
8. Foot Top (foot option)
9. Foot Bottom (foot option)
10. Foot Screws (foot option)
11. 6" Observation Port Gasket (lid option)
12. 2" Air Line Gasket (lid option)
13. Lid (Optional) (Not with MCF 4.5 or 9.0)

DO'S & DON'TS.....What can I put down the drain?

Please refer to the list below for important info on how to keep your treatment system performing as it should.

⚠ CAUTION Introducing harmful or damaging substances into the FAST system may void the warranty.

DO NOT PUT THESE ITEMS DOWN THE DRAIN:

FOOD WASTES	ANIMAL BONES / COFFEE GROUNDS / CORN COBS / EGG SHELLS / SKIN / FRUIT PEELS / MELON RINDS / HOME BREWERY WASTE
PERSONAL PRODUCTS	BANDAGES / CONDOMS / SANITARY NAPKINS / WET WIPES / DISPOSABLE DIAPERS
CHEMICALS/ TOXINS	AUTOMOTIVE FLUIDS / CAUSTIC CLEANERS / DRUGS / FLOOR STRIPPER / HARSH DETERGENTS / HERBICIDES / MEDICATIONS / PAINTS (OIL-BASE / PESTICIDES / AMMONIUM CHLORIDE CLEANERS / SOLVENTS / THINNER
OTHER PRODUCTS	CAT LITTER / CIGARETTE BUTTS / CLOTH TOWELS / FILM DEVELOPING WASTE / METAL OBJECTS / MODELING CLAY / PAPER TOWELS / SCRAPS / PLASTIC BAGS / PLASTIC OBJECTS / RAGS / RV WASTE

RECORD KEEPING

Keep copies of all system drawings/plans of the site/installed equipment/service records with all other home appliance documents. Record all applicable information.

LAUNDRY

Spread wash loads throughout the week. Instead of liquid fabric softener, dryer sheets should be used. Use low-suds, biodegradable and low phosphate detergents, like Mighty Mike® from Scienco/FAST (www.sciencofast.com).

LEAKY FIXTURES

Large quantities of water are added to your wastewater system when you have leaking fixtures. Timely detection and repair can help to maximize the life of your system, especially the drain field.

WATER SOFTENERS

The FAST® process may tolerate discharge from properly operating softeners that backwash as needed based on water usage (DIR) vs. timer operated systems, if allowed by your local regulatory authority. However, these discharges can possibly damage other parts of the septic system.

FOOD WASTES

Garbage disposal waste is acceptable - if allowed by your local regulatory authority. However, it may lead to more frequent removal of solids from your septic tank. Please dispose of large quantities of food in the garbage.

FATS, OILS & GREASE

Too much grease (i.e. animal fats, vegetable oils, lard, etc) put down the drain may overload the system and prevent the bacteria from fully breaking down the waste.

DISINFECTANTS/CLEANERS

Use citric acid, chlorine, or biodegradable cleaners according to the manufacturer's recommendations. Products containing ammonium chloride compounds or pine oil-based cleaners should not be used. Use drain cleaners as a last resort to unclog pipes.

GARAGE & WORKROOM

Drains from work areas should be diverted away from your system; petroleum-based products and saw dust should not enter the septic system.

MEDICATIONS

DO NOT FLUSH UNUSED MEDICATIONS DOWN THE DRAIN. Please dispose properly by returning unused medication to the pharmacy/doctor.

NOTE: The human body absorbs ≤20% of typical medications, please notify service provider of medications taken frequently or used intermittently in the house; this could ease disruption of service for your system.

SEPTIC ADDITIVES/ENZYMES

The wastewater in the system typically contains all the required bacteria for proper operation. Commercial additives are most often unnecessary; and may do more harm than good.

PAPER PRODUCTS

Use single- or double-ply, non-quilted, white toilet paper products. Some color dyes in the paper cannot be eaten by natural bacteria. Non-bleached paper (brown in color) takes longer to break down and can therefore increase the pump out frequency of your tank. Avoid flushing paper towels, napkins, wipes, or other thick paper material.

MAINTENANCE CHECKLIST

WARNING Always secure all access covers to prevent unauthorized people from entering the tank. Only qualified service personnel should open access ports and/or covers. Infectious organisms exist in a septic tank. If any contact with wastewater occurs, immediately wash and disinfect all exposed areas and contact personal physician. Failure to do so could result in severe sickness or death.

WARNING DO NOT use an open flame or cause a spark near a septic tank access points. Gases emanating from septic tanks can explode if ignited or deadly if inhaled.

NORMAL OPERATING CONDITIONS

SOUND	The FAST® system's blower makes a constant humming noise, much like a household refrigerator. Under normal conditions, the blower should last 5+ years without need for replacement. If an unusual noise is heard, refer to the Trouble-Shooting Guide.
ODOR	A musty, earthy-type of odor is normal. However, if a sewage odor (rotten egg smell) is detected, refer to the Trouble-Shooting Guide.
SIGHT	A properly loaded and operated FAST® system will produce effluent that looks like tap water. If the effluent is turbid, opaque, or suddenly changes, refer to the Trouble-Shooting Guide.

TRAFFIC Ensure that the FAST® system has not been damaged due to excessive weight loading (>1,750 lb. point load.) Only normal yard traffic (lawn mowers, etc.) is acceptable. Traffic bearing (H-20) tanks can be made for use with FAST® (w/ feet). Consult local distributor or the factory for guidance.

BLOWER OPERATION DO NOT turn off the blower (unless testing alarm). Treatment quality and drain field life could be reduced. Check the blower for proper function. Clean the blower's inlet air filter element. The blower can be operated by a timer in certain situations. Contact your local Bio-Microbics distributor for more information. If the blower is malfunctioning please refer to the "Troubleshooting Guide" or Blower Replacement section located in this manual.

ALARM PANEL AND ALARM SOUNDS The alarm has a ~10 second built-in delay. Test the audible alarm by turning the blower OFF. To silence the alarm, use the "Silence" button on the panel's front. If the alarm is activated for an unknown reason, please refer to the "Troubleshooting Guide" located in this manual.

VENTS, ODORS, AND INTAKES Clear the vent(s) and blower housing intakes of any obstructions. Please refer to the "Troubleshooting Guide" located in this manual if you detect septic odors coming from the FAST® vent as this may indicate a problem with the system.

WATER QUALITY effluent should be clear and odorless. All FAST® systems are capable of exceeding the USEPA standard for secondary wastewater treatment (40CFR, part 133.102) depending on how they are applied, sized, installed and operated. If samples are required please refer to the "Collection of Effluent Sample" section below.

BIO-SOLIDS (SLUDGE) LEVELS Scheduling sludge removal depends on the size and design of the septic tank. Check the sludge levels in both tanks/compartments by inserting a sludge-measuring instrument and taking measurements in multiple locations in each compartment of the tank(s). Pump both compartments/tanks if the sludge is:

1. 18" deep in the primary settling tank or is within 6" of the connection point between the settling tank and the secondary/treatment zone; and/or
2. Within 3"-4" of the bottom of the FAST® unit in the treatment tank.

To determine the proper measurement for #2 above, measure the total liquid depth of the treatment tank (containing the FAST® unit) using a sludge-measuring instrument. Take that value and subtract the height of the FAST® product (in the table below). The result is the total sludge storage height available in the tank.

FAST® Models	Module Height
ALL RetroFAST®	27" [68.5 cm]
FAST® Models 0.5, 0.625, 0.75, 0.9, 1.5, & 4.5	31" [79 cm]
FAST® models 3.0 & 9.0	55" [140cm]

All stricter, applicable regulations supersede these operational directions.
Always pump out both zones, even if only one zone may require it.

TROUBLESHOOTING GUIDE

Contact factory or local distributor for all other issues: (913) 422-0707

PROBLEM	SITUATION	POSSIBLE CAUSE & SOLUTION
Alarm is activated (sounding)	Blower is NOT running. Please check the following. If problem persists, call service provider.	Breaker has tripped – turn blower switch ON. If the switch will not stay ON, see next steps.
		Breaker trips after 2-3 seconds – blower is over amping – electrician needs to check blower wiring.
		Breaker trips immediately – electrical system has a short – electrician must investigate.
		Blower is seized – cooling fan will not spin freely with power OFF – replace blower – call service provider.
	Blower is running. Please check the following. If problem persists, call service provider.	Water Level is high – check the water level in the unit. Water level should be 2-3 inches above the media. Water level high? YES: consult distributor. NO: Go to next step.
		Liquid Level Switch Present – NO: Go to next step. YES: Check if wired in the same conduit as 90 VAC or higher wires (a violation of electric code NEC/IEC). If YES: Wires will need to be separated.) – If NO: Switch may need adjusting. Turn switch's Allen screw clockwise, wait ~10 seconds for alarm to "catch up".
		Current Sensor Present – YES: Open panel and find "Diagnostic LED's" in the upper right hand corner. Note which light is lit and consult the distributor. NO: Consult distributor.
		Vent is undersized or Vent(s) or air line is blocked or broken – Check specifications for vent sizing requirements. Remove blockage or repair vent(s) or air line.
Waste is backing up from tank	Blockage in pipe network.	Check all piping for blockage, including all interior tank piping and effluent piping.
	Mechanical failure of ancillary equipment	Pump is not running – have qualified person check pumping system for mechanical and/or electrical failures.
		Pump's Level Controls are improperly set, have failed, or pump too much volume per dose. Have service provider check/adjust pumping system.
System emits odor (rotten eggs/shell)	Mechanical failure/ Air line break	Blower operating – NO: check "blower is not running" above, YES: see next step
		Proper splash in reaction chamber – NO: air line is broken, YES: see next steps
	Multiple issues can contribute; the cause is usually due to undersized settling tank. Multiple solutions possible.	Decrease settling tank volume – easiest done with a pumping system which can then pump the tank.
		Move vent – re-locate the vent to a location where the prevailing winds will catch odor.
		Place a carbon filter on the end of the vent pipe – only use a filter that will create less than 0.1 psi of back pressure.
		Create bio-filter vent – create a remote vent by placing a well perforated vent line in a trench with shredded bark mulch – contact local installer
Blower runs backwards	3-Phase installed incorrectly/ power out of phase at	Switch any two "hot legs" at the panel or blower AFTER turning OFF the power. Only a QUALIFIED electrician can do this work. After rewiring, it may be necessary to dry the blower's internal parts.
	Single-Phase (which can run counter-clockwise) installed incorrectly	Some blowers have wires numbered "5" and "8". After turning OFF the power, switch these two wires. Only a QUALIFIED electrician can do this work. After re-wiring, it may be necessary to dry the blower's internal parts.
Blower is noisy	Blower noise is an annoyance at site	Blower housing can be supplemented with additional sound reducing measures, contact your service provider.
		Blower may be re-located from its current location and can be placed up to 100 ft away from unit.
	Blower is shaking or makes a loud, whiny noise	Vibration between the blower & housing – tighten or place rubber washers in mounting screws between blower & housing
		Blower bearings are going bad – replace blower now or wait for it to seize up
Effluent is dirty	Many solids detected in effluent	Toxic substance in system, check for even growth in reaction chamber
		Pump out required – refer to "Bio-Solids Levels" under "Maintenance Checklist" section
		Other – call service provider
Water in blower/ housing	Water entry from outside	Move blower above flood level
	Blower is siphoning	Check blower rotation – see "Blower runs backwards" section above
		Move blower to location higher than the FAST® system

TANK PUMPING PROCEDURE:

WARNING Only qualified service personnel should open access ports/covers. If any contact is made with wastewater, immediately wash and disinfect all exposed areas and contact personal physician. Failure to do so could result in severe sickness or death.

CAUTION Avoid pumping down after periods of heavy rain or when the ground water is likely to be above the bottom of the concrete tank. Emptying the tank under these conditions could cause the tank to float up and become dislodged.

1. Open the access ports/cover(s) and insert the hose. Always pump out both settling and treatment chambers of the system, even if only one side requires it.
2. Once the unit has been pumped out, immediately refill the tank with clean water to reduce the risk of the tank floating and to minimize the impact on treatment. Close the access ports/cover(s) making sure it is watertight.
3. Properly dispose of the solids removed in compliance with local and state regulations.

COLLECTION OF EFFLUENT SAMPLE

Please contact your local distributor or Bio-Microbics for a copy of the "Testing Protocol" document. Important: All samples must be collected, stored, transported and tested according to the "Testing Protocol" document by Bio-Microbics and the most current version of Standard Methods.

OTHER SYSTEM COMPONENTS (if applicable)

- Check UV OR PRE-AERATION DEVICE blower, inlet filter, blower housing, and air delivery system for proper function.
- Check INFLUENT BIOSTEP® PUMP(S) for proper function. Clean the screening device by using built in swab or other method.
- Check SANITEE® EFFLUENT SCREEN (FILTER) or other screening device. Clean by using the built in swab or other method.
- DISPERSAL SYSTEM (not by Bio-Microbics) Follow manufacturer's recommendation.

SEASONAL/INTERMITTENT USE PROPERTIES

The FAST® System will function normally even if there is no wastewater flowing during short periods of vacancy. Examples of seasonal/intermittent use and suggested operational procedures:

- Summer use property (shut down all winter) – blower should be turned off at end of summer and restarted at least a week before returning. Please contact your local service provider to restart the system and check with local regulations.
- Weekend property (used at least once every three weekends) – maintain normal operation or utilize FAST's SFR® blower timer feature on control panel.

Important: Consult your service provider and local regulations prior to any system changes.

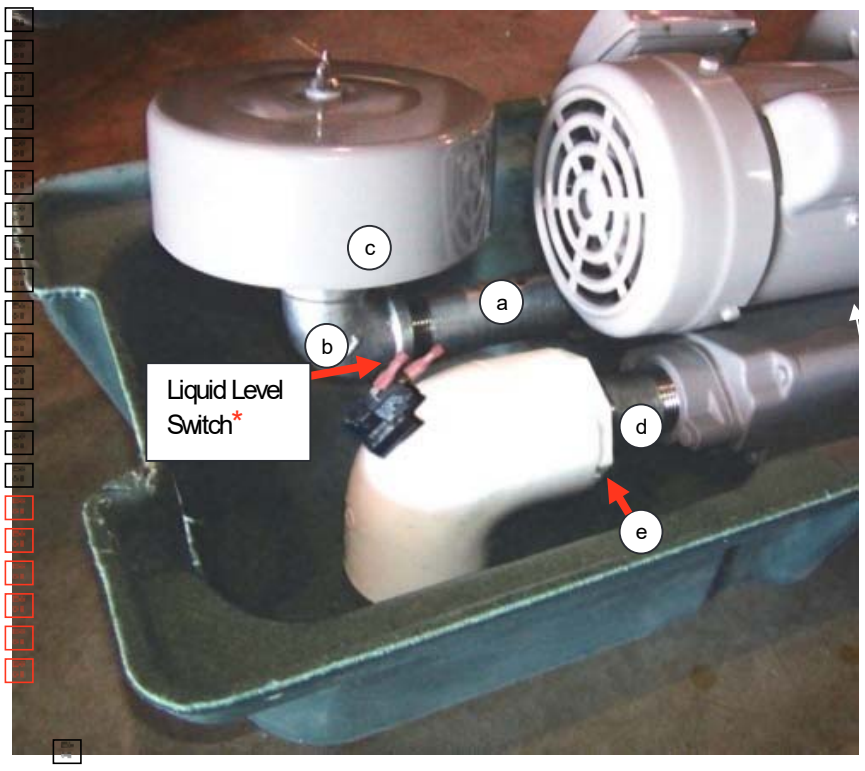
BLOWER REPLACEMENT

WARNING All electrical work shall be properly performed by a qualified electrician per all applicable codes. Failure to do so may result in severe bodily injury or death.

WARNING Hazards exist in confined spaces such as a septic tank. All confined space precautions must be followed if entering a tank. Always keep tank openings covered during storage and installation.

When replacing a blower follow the steps below. If relocating the blower run the electrical supply conduit from the control panel to the desired blower location. Air line piping from the blower to the FAST® unit may NOT exceed 100 ft [30.5m] in total length and must have ≤ 4 elbows. The total electrical supply should NOT exceed 150 ft [45 m]. The blower and blower housing must be mounted on a solid base such as concrete to avoid settling.

CONNECT SUPPLIED PIECES (refer to picture below)



a. Longest steel pipe
b. Steel elbow
c. Air filter assembly
d. Shortest steel pipe
e. PVC reducer bushing

SECURE BLOWER ASSEMBLY to housing base using four supplied #14 x 1½" self-tapping screws. Drill screws directly into blower base.

RECONNECT AIR LINE from FAST® unit to blower outlet using required piping. A "quick disconnect" is highly recommended to be installed in this location if it is not currently in place.

NOTE: ALL CONNECTIONS MUST BE AIR AND WATER TIGHT

CONNECT INCOMING POWER to the blower at junction box. Follow the FAST® Installation Manual for further instruction. Common wiring diagrams are located at the end of this manual.

*(OPTIONAL) LIQUID LEVEL SWITCH – NOT required for most new systems. AMI control panel with current sensor replaces this switch. To replace this switch:

a) Drill a ⅞" hole in the blower outlet pipe.
b) IMPORTANT: Connect low voltage wires to switch before mounting in pipe.
c) Insert the switch into the ⅞" hole (nipple first), then glue into place with PVC glue.
d) Install low voltage pressure switch wiring back to the control panel according to applicable codes (must not be inside high voltage blower wiring).

CONTROL PANEL REPLACEMENT

CAUTION Always have all utility lines and equipment marked by a locating service prior to performing any work.

WARNING All electrical work shall be properly performed by a qualified electrician per all applicable codes. Failure to do so may result in severe bodily injury or death.

The FAST® systems, including all electrical parts, are ETL (UL equivalent) certified for electrical safety. The control panel meets NEMA4X standards for all weather use (not explosive or submerged environments). The total electrical supply should NOT exceed 150 ft. [45m].

Bio-Microbics also manufactures control panels that can control other systems, such as UV and sewage pumps. Call your distributor or Bio-Microbics for more information.

When replacing a panel follow the steps below. If relocating the panel run the electrical supply conduit from the control panel to the blower location. Keep in mind the electrical supply line should NOT exceed 150 ft. [45 m] total.

1. Turn all Power OFF.
2. Examine wiring directions inside the supplied FAST® control panel (also found at the end of this Manual).
3. A dedicated breaker is required in the building's master electrical panel. Make connections between the master panel and FAST® control panel.
4. Make connections between the blower and FAST® control panel per the electrical diagram.
5. For systems requiring the Liquid Level Switch - connect the switch to the control panel terminals labeled "FLOAT" or "Hi Press Input". The newest AMI control panel with current sensor can be used to replace this switch.

CERTIFICATIONS

WARNING Only authorized service personnel should service a septic system and its components. Deadly hazards such as lethal gases and high voltage electricity are associated with the system.

MicroFAST® 0.5, 0.625, 0.75, 0.9, and 1.5 systems are tested and certified for NSF® / ANSI® Standards 40 (Class I) and 245

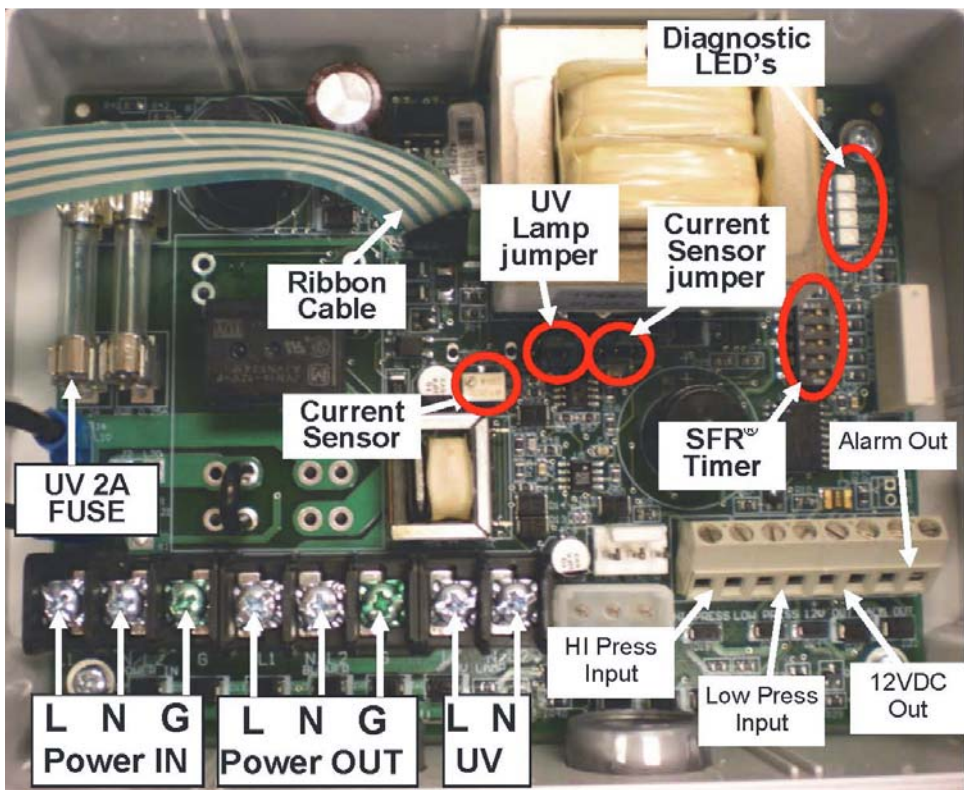
Certified to NSF/ANSI Standard 40

PARAMETER		LIMIT
CBOD5	30 day avg.	25 mg/L
	7 day avg.	40 mg/L
TSS	30 day avg.	30 mg/L
	7 day avg.	45 mg/L
pH		6-9 s.u.
Total Nitrogen		50% reduction of influent

ELECTRICAL WIRING DIAGRAMS

Only the MicroFAST® 0.5, 0.625, 0.75, and 0.9 system diagrams are displayed here. Information for larger FAST® systems and companies those units and can be obtained from Bio-Microbics.

AMI 110/220 PANEL



TIMING MODES DIP SWPOS. (S1)					BLOWER MINUTES	
5	4	3	2	1	ON	OFF
Off	Off	Off	Off	Off	30	15
Off	Off	Off	Off	On	15	15
Off	Off	Off	On	On	30	30
Off	Off	On	Off	Off	60	15
Off	Off	On	Off	On	60	30
Off	Off	On	On	Off	120	30
On	On	On	On	Off	TEST	
On	On	On	On	On	∞	
TEST = 15 SEC ON, 20 SEC OFF						
∞ = ALWAYS ON						

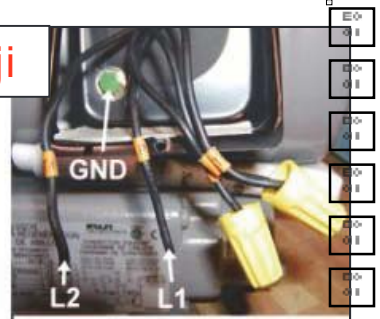
BLOWER DIAGRAMS

ATTENTION: Please refer to side of shipping box for correct Blower.

Fuji

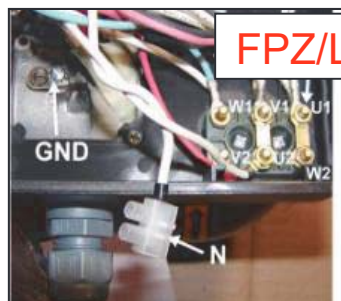


Model: FUJI VFC 209, 100P, 300P
Power: 110VAC
- L1 to P1
- N to T2, T4
- T1 & T3, cap together

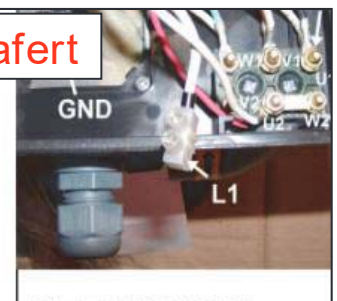


Model: FUJI VFC 209, 100P, 300P
Power: 220V 1ø
- L1 to P1
- L2 to T4
- T2 & T3, cap together
- T1, cap off

FPZ/Lafert

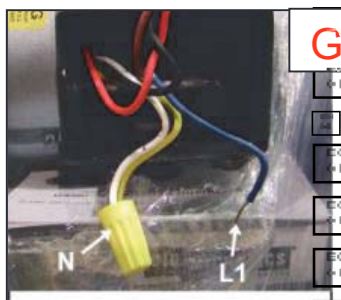


Model: FPZ SCL06
Power: 110VAC
- Jumper U2 to V1
- Jumper W2 to U1
- L1 to "terminal block"
- N to white connector

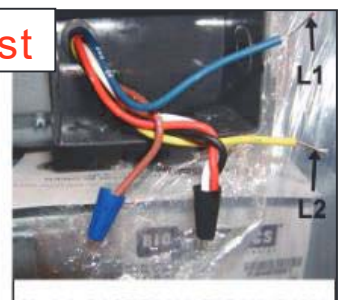


Model: FPZ SCL06
Power: 220VAC, 1ø
- L1 to "terminal block"
- L2 to V1
- Jumper W2 to U2

Gast



Model: GAST R2103, R4P115, R1102
Power: 110VAC
- L1 to P1
- N to 2,4
- P2,5,3 cap together



Model: GAST R2103, R4P115, R1102
Power: 220VAC 1ø
- L1 to P1
- L2 to 4
- 5, 3 and 2, cap together
- P2 cap off

LIMITED WARRANTY

Bio-Microbics, Inc. warrants every new residential FAST® system against defects in materials and workmanship for a period of two years after installation or three years from date of shipment, subject to the following terms and conditions, (Commercial FAST system for a period of one year after installation or eighteen months from date of shipment, whichever occurs first, subject to the following terms and conditions):

During the warranty period, if any part is defective or fails to perform as specified when operating at design conditions, and if the equipment has been installed and is being operated and maintained in accordance with the written instructions provided by Bio-Microbics, Inc., Bio-Microbics, Inc. will repair or replace at its discretion such defective parts free of charge. Defective parts must be returned by owner to Bio-Microbics, Inc.'s factory postage paid, if so requested. The cost of labor and all other expenses resulting from replacement of the defective parts and from installation of parts furnished under this warranty and regular maintenance items such as filters or bulbs shall be borne by the owner. This warranty does not cover general system misuse, aerator components which have been damaged by flooding or any components that have been disassembled by unauthorized persons, improperly installed or damaged due to altered or improper wiring or overload protection. This warranty applies only to the treatment plant and does not include any of the structure wiring, plumbing, drainage, septic tank or disposal system. Bio-Microbics, Inc. reserves the right to revise, change or modify the construction and/or design of the FAST system, or any component part or parts thereof, without incurring any obligation to make such changes or modifications in present equipment. Bio-Microbics, Inc. is not responsible for consequential or incidental damages of any nature resulting from such things as, but not limited to, defect in design, material, or workmanship, or delays in delivery, replacements or repairs.

THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES EXPRESS OR IMPLIED. BIO-MICROBICS SPECIFICALLY DISCLAIMS ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. NO REPRESENTATIVE OR PERSON IS AUTHORIZED TO GIVE ANY OTHER WARRANTY OR TO ASSUME FOR BIO-MICROBICS, INC., ANY OTHER LIABILITY IN CONNECTION WITH THE SALE OF ITS PRODUCTS.

Contact your local distributor for parts and service.

Keep for Your Records



FAST® System Serial Number: _____

System Designer Name: _____

Designer Phone: _____

Health Official Name: _____

Health Official Phone: _____

Manufacturer Name: Bio-Microbics, Inc.

Manufacturer Phone: 1-800-753-FAST (3278)

Installed By: _____

Installer Phone: _____

Maintenance Provider Name: _____

Maintenance Provider Phone: _____

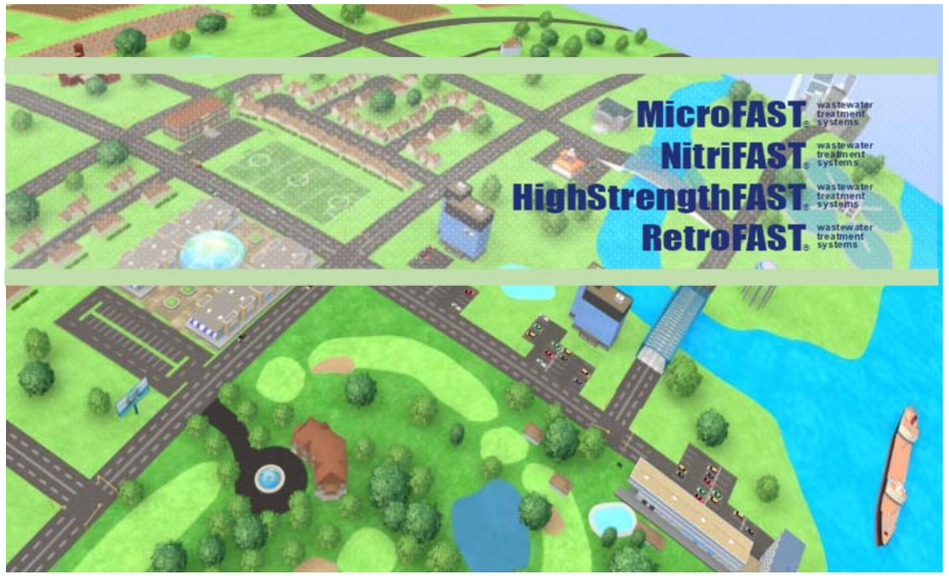
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Ph: 913-422-0707 • Fax: 913-422-0808
800-753-FAST (3278) • www.biomicrobics.com

FAST® Owner's Manual

FOR USE WITH

(NSF Std 40 & 245)	**MicroFAST® 0.5, 0.625, 0.75, 0.9, 1.5**
(non-NSF certified)	**MicroFAST® 3.0, 4.5, 9.0**
(ETV/EPA tested)	**RetroFAST® 0.150, 0.250, 0.375**
	NitriFAST® 0.5, 0.625, 0.75, 0.9, 1.5, 3.0, 4.5, 9.0
	HighStrengthFAST® 1.0, 1.5, 3.0, 4.5, 9.0



FAST Owner's Manual © 2014 Bio-Microbics, Inc. Revised January 2014.
FAST, MicroFAST, NitriFAST, HighStrengthFAST, and RetroFAST are registered trademarks used under license.

Dear FAST® System Owner

Congratulations! You have a FAST® wastewater treatment system installed on your property.

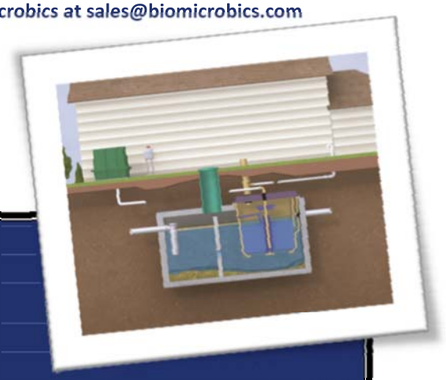
At the forefront of green technology, the FAST® System by Bio-Microbics meets the highest industry treatment standards. Based on environmentally sound and simple scientific principles, the FAST® process is our continued commitment to improve small onsite treatment capabilities. You can take pride in knowing that, with the FAST® system, you will help ensure a clean environment for future generations.

Please take time to read this FAST® Owner's Manual, you will learn important safety precautions, review detailed information on proper use and care of your system. Designed for minimal operator attention, the FAST® System contains only one moving part – the blower. By consistently following a maintenance schedule and being mindful of what can go down your drains, you can enjoy the lasting benefits FAST® Wastewater Treatment System for decades to come.

Top things you can do to prolong the life of your system:

1. Have the FAST® system inspected and tank pumped as necessary.
2. Keep track of the substances entering your system, please review the list of Do's & Don'ts (see other side for poster).
3. Keep the FAST® System operating - do not turn off the blower.
4. Care for your drain field or irrigation system (if incorporated into your FAST® System).

If you should desire any further assistance, please contact Bio-Microbics at sales@biomicrobics.com or call us at 800-753-FAST (3278).



Thank you again for using FAST®!

Sincerely, *Bio-Microbics Team*

Certified to NSF/ANSI Standard 40

NSF INTERNATIONAL

CERTIFIED SYSTEMS SERVICE POLICY

All NSF (National Sanitation Foundation) Standard 40 Class I and 245 certified wastewater treatment systems (MicroFAST® 0.5, 0.75, 0.9, 1.5) have an initial two-year service agreement included with the system's initial purchase price (two service calls per year). The NSF service calls **ONLY** cover NSF Standard 40 certified systems; other components of the septic system are NOT covered.

If there are any deficiencies in the FAST® system's operation or components, the service person will notify the owner in writing and detail when these deficiencies can be fixed.

The company listed on the blower housing or control panel label performs this service. During an NSF service call, the service company shall inspect the blower for proper operation, visually inspect the system's effluent for clarity, clean the blower air filter and assure proper function of the control panel. If these service calls are not performed on your NSF certified system, or not all of the items are checked, please call Bio-Microbics at:

800-753-FAST (3278) or (913)422-0707

For continual service of NSF certified systems beyond the first two years, an extended service agreement is available through your local Distributor or current service provider. This policy should provide the same services and may include any additional service that are required by local regulation.

OWNER'S MANUAL

FOR USE WITH FAST® SYSTEMS:

(**NSF®** Std 40/245 cert.)	**MicroFAST® 0.5, 0.625, 0.75, 0.9, 1.5**
(Non-NSF cert.)	**MicroFAST® 3.0, 4.5, 9.0**
(ETV/EPA tested)	**RetroFAST® 0.150, 0.250, 0.375**
	NitriFAST® 0.5, 0.625, 0.75, 0.9, 1.5, 3.0, 4.5, 9.0
	HighStrengthFAST® 1.0, 1.5, 3.0, 4.5, 9.0

GENERAL INFORMATION

All FAST® products are ETL certified for safety (electrical, environmental, etc.). One or more of the following patents protects this process: 3,966,599; 3,966,608; 3,972,965; 5,156,742. Certified by NSF International, the MicroFAST® 0.5, 0.625, 0.75, 0.9 and 1.5 systems meets NSF Standard 40, Class 1 and Standard 245 certifications for wastewater treatment devices. If you have questions regarding any Bio-Microbics products, please contact us:

800-753-FAST (3278) or (913) 422-0707
e-mail: onsite@biomicrobics.com

About FAST®: The FAST® (Fixed Activated Sludge Treatment) system uses naturally occurring bacteria (biomass) to treat sewage for dispersal into the environment. This continuous process provides the biomass with waste (food) and air in a suitable environment. Dead bacteria and non-biodegradable waste settle and accumulate in the bottom of the tank for periodic removal.

The FAST® process consists of the treatment module and blower. The blower provides air to the system via the air supply pipe. The air supply pipe and draft tube create an air lift. The air lift mixes oxygen and waste throughout the media inside the tank. Bacteria grows on the media and digests the waste. A vent pipe expels harmless vapors created by the process.

INTRODUCING SUBSTANCES INTO THE SYSTEM: While the FAST® wastewater treatment system will process most waste produced by the average household, introducing large amounts of subatances into the system may reduce the efficiency of the system or stop the treatment process by destroying the biomass. These substances can be grouped as: prohibited substances and limited-use substances. Please refer to the "DO'S AND DON'TS" list to get familiar with ***What You Can Put Down the Drain*** to maximize the system's efficiency and reduce the time period between septic tank pump-outs.

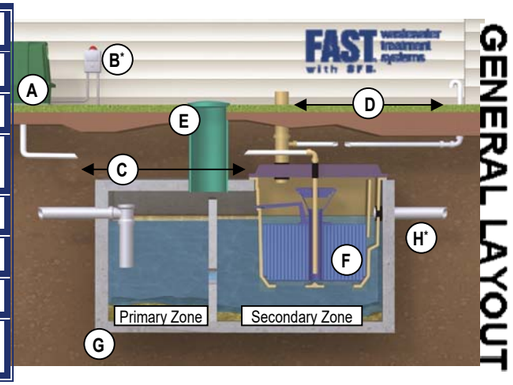
In general: IF A SUBSTANCE IS HARMFUL TO HUMANS OR IS ANTI-BIOTIC IN NATURE, IT SHOULD NOT BE PUT INTO ANY SEPTIC SYSTEM INCLUDING FAST®.

IF YOU HAVE A QUESTION REGARDING THE EFFECT OF A PARTICULAR SUBSTANCE ON THE FAST® SYSTEM, CALL YOUR BIO-MICROBICS SERVICE TECHNICIAN.

SYSTEM COMPONENTS

The FAST® wastewater treatment system typically includes the following components:

- A. Blower & Housing
- B. Control Panel
- C. Air Piping
- D. Vent(s) and Observation Port
- E. Access
- F. FAST® Unit
- G. Tank
- H. Outlet to Drain field



***PLEASE NOTE**: Adequate pump out must be provided for primary and secondary zones. There may be ancillary equipment associated with your system: pump(s) (before and/or after the FAST® unit), a distribution box, a disinfection system, an irrigation system, a remote alarm, or an auto dialer, etc.

WARNING ***DO NOT ENTER THE SEPTIC TANK.*** Hazards exist in a septic system. All precautions must be followed when inspecting the system. Keep tank openings covered at all times. Failure to do so could result in severe sickness or death. Lethal gases, high voltage electricity, and other deadly hazards can be associated with the system. DO NOT use an open flame or cause a spark near a septic tank's access points. Gases emanating from septic tanks can explode if ignited or be deadly if inhaled.

WARNING Only authorized, qualified service personnel should service a septic system; open access ports, and/or open covers to a septic tank. Infectious organisms exist in a septic tank. If any contact with wastewater occurs, immediately wash and disinfect all exposed areas and contact personal physician.

MAINTENANCE & SERVICE

WARNING Only qualified service staff should open access ports and/or covers. Infectious organisms exist in a septic tank. If any contact with wastewater, immediately wash and disinfect all exposed areas and contact personal physician. Failure to do so could result in severe sickness or death.

CAUTION Avoid pumping down a tank after periods of heavy rain or when the ground water is likely to be above the bottom of the concrete tank. Emptying the tank under these conditions could cause the tank to float up and become dislodged.

As the FAST® system processes the raw domestic waste (producing sludge and sloughed-off bacteria), the dead bacteria and non-biodegradable waste settle and accumulate in the bottom of the septic tank for periodic removal. The periodic removal time interval will change depending on the size of the system and varying load conditions.

Tank Pumping Procedure: As Required by Measurement of Sludge Depth

To determine the sludge depth accurately, open up the access ports/cover(s) to the primary zone (settling compartment), insert a sludge-measuring instrument, and take samples. If sludge is 18” (inches) deep or takes up 75% of the area below the port connecting settling compartment to secondary zone (which contains the FAST system), have the tank pumped out. All stricter, applicable regulations supersede these operational directions.

Also, check the sludge depth of the secondary zone. Open the access ports/cover(s) to the secondary zone and measure sludge depth. If sludge depth in the secondary zone is greater than 14” (inches), it is necessary to pump the bio-solids out.

CAUTION Always pump out both zones of the system even if only one zone may require it.

Continued - Tank Pumping Procedure: As Required by Measurement of Sludge Depth

1. Open the access ports/cover(s) and insert the hose. Be sure to **pump out both settling and treatment chambers** of the system.
2. Once the unit has been pumped out, **immediately refill the tank with clean water** to reduce the risk of the tank floating and to minimize the impact on treatment. Close the access ports/cover(s) making sure it is watertight.
3. **Properly dispose of the solids** in compliance with local and state regulations.

SEASONAL/INTERMITTENT USE PROPERTIES FAST® wastewater treatment system will function normally during short periods of inactivity, even if there is no wastewater flowing to the system. The power to the system should be left on during this time. Typical examples of extended periods of intermittent use and suggested operational procedures:

- **Summer use property** (shut down all winter) - blower should be turned off at end of summer and restarted upon return.
- **Weekend property** (used at least once every three weekends) - maintain normal operation or utilize FAST's SFR® blower timer feature on control panel. Consult your service provider and local regulations prior to any system changes.

Check with local regulations before attempting: If property is seldom used and blower is shut down completely for an extended period of time (i.e. summer use only), we suggest to arrange through your local service provider restarting the blower a week or two prior to returning to the property.

WARNING ***Only authorized service personnel should service a septic system and its components. Deadly hazards such as lethal gases and high voltage electricity are associated with the system.***

CAUTION ***Introducing harmful or damaging substances into the FAST system may void the warranty.***

LIMITED WARRANTY

Bio-Microbics, Inc. warrants every new residential FAST® system against defects in materials and workmanship for a period of two years after installation or three years from date of shipment, subject to the following terms and conditions, (Commercial FAST system for a period of one year after installation or eighteen months from date of shipment, whichever occurs first, subject to the following terms and conditions):

During the warranty period, if any part is defective or fails to perform as specified when operating at design conditions, and if the equipment has been installed and is being operated and maintained in accordance with the written instructions provided by Bio-Microbics, Inc., Bio-Microbics, Inc. will repair or replace at its discretion such defective parts free of charge. Defective parts must be returned by owner to Bio-Microbics, Inc.'s factory postage paid, if so requested. The cost of labor and all other expenses resulting from replacement of the defective parts and from installation of parts furnished under this warranty and regular maintenance items such as filters or bulbs shall be borne by the owner. This warranty does not cover general system misuse, aerator components which have been damaged by flooding or any components that have been disassembled by unauthorized persons, improperly installed or damaged due to altered or improper wiring or overload protection. This warranty applies only to the treatment plant and does not include any of the structure wiring, plumbing, drainage, septic tank or disposal system. Bio-Microbics, Inc. reserves the right to revise, change or modify the construction and/or design of the FAST system, or any component part or parts thereof, without incurring any obligation to make such changes or modifications in present equipment. Bio-Microbics, Inc. is not responsible for consequential or incidental damages of any nature resulting from such things as, but not limited to, defect in design, material, or workmanship, or delays in delivery, replacements or repairs.

THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES EXPRESS OR IMPLIED. BIO-MICROBICS SPECIFICALLY DISCLAIMS ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. NO REPRESENTATIVE OR PERSON IS AUTHORIZED TO GIVE ANY OTHER WARRANTY OR TO ASSUME FOR BIO-MICROBICS, INC., ANY OTHER LIABILITY IN CONNECTION WITH THE SALE OF ITS PRODUCTS.

Contact your local distributor for parts and service.

EXTENDED SERVICE AFTER THE FIRST TWO YEARS
An Extended Service Policy is available and may be purchased through your local Bio-Microbics distributor. The extended service policy should provide the same service checks as the initial NSF service policy, sludge accumulation levels in the septic and FAST tanks, and perform any additional service required by local regulation. Extended service on NSF certified systems should be performed twice per year.

Keep for Your Records



FAST® System Serial Number: _____

System Designer Name: _____

Designer Phone: _____

Health Official Name: _____

Health Official Phone: _____

Manufacturer Name: Bio-Microbics, Inc.

Manufacturer Phone: 1-800-753-FAST (3278)

Installed By: _____

Installer Phone: _____

Maintenance Provider Name: _____

Maintenance Provider Phone: _____

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Ph: 913-422-0707 • Fax: 913-422-0808
800-753-FAST (3278) • www.biomicrobics.com

Take care of your septic system for your health, finances, and the environment.

Do's & Don'ts

OUTSIDE

DO'S & DON'TS

YARD SAFETY

Regular Maintenance should be performed by a qualified service company for ensuring the long life of your system.

BLOWER OPERATION

DO NOT turn off blower. DO notify your Maintenance or Service Provider if you detect problems with system or leaving the property for an extended period (>3 weeks).

ALARM

If alarm sounds, DO press the "RESET" button on the front of the panel. Contact your service provider (info should be on the control panel and/or the blower) or contact Bio-Microbics (913-422-0707) as soon as possible

DOWN SPOUTS

DO divert away anywhere water is collected, i.e. roof downspouts, pavement runoff, or sump pump/house footing drains. The water should be allowed to discharge over buried tank(s) or drain field.

TRAFFIC / LANDSCAPING

DO NOT drive over any portion of your system (tank, piping, drain field) except for normal yard traffic, i.e. lawn mowers. Buried tanks (H-20) can be made for under roadways, driveways. If possible, deter traffic by using a fence or create a landscaped area with shallow root plants (ornamentals, shrubbery, bushes, decorative grasses, and/or flowers). DO NOT plant trees near any portion of your system (within 30').

STRUCTURES

DO NOT build patios, carports, or other structures over any part of your septic system; as this may cause damage.

VENTS / ODORS / INTAKES

DO keep vent and blower housing clear of debris, such as leaves or snow. Contact your service provider if you detect septic odors, as this may indicate a problem with the system.

BIOSOLIDS (SLUDGE) REMOVAL

DO determine when a pump out of your tank is required; a maintenance provider should measure the biosolids level(s) in the tank(s) on a regular basis. **Please see the service manual for specific procedures.**



DON'T PUT THESE ITEMS DOWN THE DRAIN

FOOD WASTES
ANIMAL BONES / EGG SHELLS
COFFEE GROUNDS / CORN COBS
MELON RINDS / FRUIT PEELS
SKIN / HOME BREWERY WASTE

PERSONAL CARE PRODUCTS
BANDAGES / CONDOMS
DISPOSABLE DIAPERS
SANITARY NAPKINS
WET WIPES

CHEMICALS/TOXINS
AUTOMOTIVE FLUIDS
CAUSTIC CLEANERS
HARSH DETERGENTS
FLOOR STRIPPER
HERBICIDES / PESTICIDES
MEDICATIONS / DRUGS
PAINTS - OIL-BASED
QUATERNARY AMMONIA
SOLVENTS / THINNERS

OTHER PRODUCTS
CAT LITTER
CIGARETTE BUTTS
CLOTH TOWELS / RAGS
FILM DEVELOPING WASTE
METAL / PLASTIC OBJECTS
MODELING CLAY
PAPER TOWELS / SCRAPS
PLASTIC BAGS
RV WASTE
STRING / YARN / NYLON
STICKS / YARD WASTE

Refer to this list to help keep system performing properly

RECORD KEEPING
Keep copies of all system manuals, drawings, and site plans, as well as, other information about the installed equipment and service/maintenance records with all other home appliance documents. Do keep records on all System and Site evaluations.

LAUNDRY/WATER USAGE
Spread wash loads throughout the week. Instead of liquid fabric softener, dryer sheets should be used. Use a low-sud, biodegradable detergent, like the ***Mighty Mike® Laundry Detergent*** from **Scienco/FAST** (www.sciencofast.com).

LEAKY FIXTURES
Large quantities of water are added to your wastewater system when you have leaking fixtures. Timely detection and repair can help to maximize the life of your system, especially the drain field.

WATER SOFTENERS
If allowed by your local regulatory authority, the FAST® process may tolerate discharge from properly operating softeners that backwash (as needed) based on water usage (DIR) vs. timer operated systems. However, please be aware that these discharges can possibly damage other parts of the septic system.

FOOD WASTES
Garbage disposal waste is acceptable - if allowed by your local regulatory authority. However, it may lead to more frequent removal of solids from your septic tank. For large quantities of food, please dispose of in the garbage.

FATS, OILS, & GREASE
Be aware too much grease (i.e. animal fats, vegetable oils, lard, etc) down the drain may overload or prevent the bacteria from fully breaking down the waste.

DISINFECTANTS / CLEANERS
Use citric acid, chlorine, and/or other biodegradable cleaners according to the manufacturer's recommendations. Products containing quaternary ammonia or pine oil-based cleaners should not be used. Use drain cleaners as a last resort to unclog pipes.

MEDICINES
DO NOT FLUSH THEM DOWN ANY DRAIN. All antibiotic medicines are harmful to treatment quality. Unused medications should be returned to the pharmacy, doctor, or thrown away in the trash.

NOTE: *As the human body absorbs ≤20% of these medications, please notify your service provider of medicines in the house. This could reduce troubleshooting efforts and possibly your maintenance bill.*

FLOOR DRAINS FROM GARAGE AND WORKROOMS
Should be diverted away from your septic system. Items like petroleum-based oils, gas, and saw dust should never enter the system.

SEPTIC TANK ADDITIVES / ENZYMES
The wastewater in the system contains all the required bacteria for proper operation. Additives are unnecessary; and may do more harm than good.

PAPER PRODUCTS
Use single- or double-ply, non-quilted, white toilet paper products. Some color dyes in the paper cannot be eaten by natural bacteria. Non-bleached paper (brown in color) takes longer to break down and can therefore increase your biosolids pump out frequency. Avoid flushing paper towels, napkins, wipes, or other thicker paper material.

PLEASE BE AWARE OF THE FOLLOWING:

- Only qualified service persons should open any access port on a septic system. Always secure all access covers of the tank, control panel and blower to ensure no one can enter without the use of proper tools.
- DO NOT use flame or spark near a septic tank access point(s). Gases emanating from septic tanks can explode if ignited; or deadly if inhaled.
- Infectious organisms exist in a septic tank. If in direct contact with wastewater, immediately wash and disinfect all exposed areas. Please contact personal physician(s).



Service Provider:

_____

_____

_____

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