



Howard County Health Department

APPLICATION

FOR PERCOLATION TESTING AND SITE EVALUATION

TEST DATE(S) Benedict Farm TEST TIME _____ A/P _____

AGENCY REVIEW: Sand Mound soil descriptions DATE 7/17/03

DO NOT WRITE ABOVE THIS LINE

I HEREBY APPLY FOR THE NECESSARY TESTING/EVALUATION PRIOR TO ISSUANCE OF SEWAGE DISPOSAL SYSTEM PERMIT(S) TO:

CHECK AS NEEDED:

- CONSTRUCT NEW SEPTIC SYSTEM(S)
- REPAIR/ADD TO AN EXISTING SEPTIC SYSTEM
- REPLACE AN EXISTING SEPTIC SYSTEM

CHECK AS NEEDED:

- NEW STRUCTURE(S)
- ADDITION TO AN EXISTING STRUCTURE
- REPLACE AN EXISTING STRUCTURE

CHECK ONE:

- CREATE NEW LOT(S)
- BUILD ON AN EXISTING LOT IN A SUBDIVISION
- BUILD ON AN EXISTING PARCEL OF RECORD

IS THE PROPERTY WITHIN 2500' OF ANY RESERVOIR?

- YES
- NO

THE TYPE OF STRUCTURE IS:

- RESIDENTIAL WITH _____ PROPOSED BEDROOMS IN THE COMPLETED STRUCTURE (NOTE **UNKNOWN** IF APPROPRIATE)
- COMMERCIAL (PROVIDE DETAIL OF NUMBERS AND TYPES OF EMPLOYEES/ CUSTOMERS ON ACCOMPANYING PLAN)
- INSTITUTIONAL/GOVERNMENT (PROVIDE DETAIL OF NUMBERS AND TYPES OF EMPLOYEES/USERS ON ACCOMPANYING PLAN)

PROPERTY OWNER(S) _____

DAYTIME PHONE _____ CELL _____ FAX _____

MAILING ADDRESS _____
STREET CITY/TOWN STATE ZIP

APPLICANT _____

DAYTIME PHONE _____ CELL _____ FAX _____

MAILING ADDRESS _____
STREET CITY/TOWN STATE ZIP

APPLICANT'S ROLE: DEVELOPER BUILDER BUYER RELATIVE/FRIEND REALTOR CONSULTANT

PROPERTY LOCATION
SUBDIVISION/PROPERTY NAME Benedict Farm LOT NO. 81

PROPERTY ADDRESS off Rt 108 ; location west of Homewood intersection/
STREET TOWN/POST OFFICE RT 108

TAX MAP PAGE(S) _____ GRID _____ PARCEL(S) _____ PROPOSED LOT SIZE _____

AS APPLICANT, I UNDERSTAND THE FOLLOWING: THE SYSTEM INSTALLED SUBSEQUENT TO THIS APPLICATION IS ACCEPTABLE ONLY UNTIL PUBLIC SEWERAGE IS AVAILABLE. THIS APPLICATION IS COMPLETE WHEN ALL APPLICABLE FEES AND A SUITABLE SITE PLAN HAVE BEEN RECEIVED. I ACCEPT THE RESPONSIBILITY FOR COMPLIANCE WITH ALL M.O.S.H.A. AND 'MISS UTILITY' REQUIREMENTS. APPROVAL IS BASED UPON SATISFACTORY REVIEW OF A PERC CERTIFICATION PLAN.

TEST RESULTS WILL BE MAILED TO APPLICANT. _____
SIGNATURE OF APPLICANT

HOWARD COUNTY HEALTH DEPARTMENT, BUREAU OF ENVIRONMENTAL HEALTH, WELL AND SEPTIC PROGRAM
3525-H ELLICOTT MILLS DRIVE, ELLICOTT CITY, MARYLAND 21043-4544 (410) 313-1771 FAX (410) 313-2648
TDD (410) 313-2323 TOLL FREE 1-877-4MD-DHMH

TEST DATA

UP TO John to finalize

NAME <u>Benedict Farm</u>	FILE NO _____
LOCATION <u>LOT 81</u>	COUNTY _____
	DATE <u>7/28/03</u>
	GRID _____ E
RECORDED BY <u>Kacie Noonan</u>	N

HOLE NO.	TEST NO. <i>Below Ground</i>	DEPTH <i>water</i>	CLOCK TIME <i>H₂O</i>	ELAPSED TIME	MEASUREMENT	REMARKS (Method, Moisture, Biopores)
#988	35"	9 1/16	—	1:48	Start	60
		9 12/16	Δ 4/16	2:03	> 15 min	SEE SOIL
		9 8/16	Δ 4/16	2:13	> 10 min	40 profile
		9 2/16	Δ 6/16	2:30	> 17 min	45
		8 16/16	Δ 3 2/16	2:43	> 13 min	10% 17/16" in/hr
		8 10/16	Δ 4 1/16	2:58	> 15 min	40

pass

TEST DATA

NAME Benedict Farm FILE NO. _____

LOCATION LOT 81 COUNTY _____

DATE 7/17/03

GRID _____ E

RECORDED BY Kacie Noonan _____ N

HOLE NO.	TEST NO. <small>Depth below grade</small>	DEPTH <small>H₂O drop</small>	CLOCK TIME	ELAPSED TIME	MEASUREMENT <small>A. H₂O</small>	REMARKS <small>(Method, Moisture, Biopores)</small>
#984	29"-30"	34 ¹⁶ / ₁₆	12:34 ⁵²	—	START	
		34 ¹³ / ₁₆	12:50	15 min	Δ ³ / ₁₆ "	= 80
		34 ¹¹ / ₁₆	1:05	↓	Δ ² / ₁₆ "	= 120
		34 ⁹ / ₁₆	1:20		Δ ² / ₁₆ "	= 120
		34 ⁸ / ₁₆	1:35		Δ ¹ / ₁₆ "	=
		34 ⁷ / ₁₆	1:50		Δ ¹ / ₁₆ "	=
		34 ⁴ / ₁₆	2:05		Δ ³ / ₁₆ "	= 80
		34 ¹ / ₁₆	2:20		Δ ³ / ₁₆ "	= 80
		33 ¹⁵ / ₁₆	2:35		Δ ² / ₁₆ "	= 120
		33 ¹³ / ₁₆	2:50		Δ ² / ₁₆ "	= 120

Δ is 1/2" in 1hr

120/20 min/inch

Fails

TEST DATA

NAME Benedict Farm FILE NO _____
 LOCATION LOT 81 COUNTY _____
 DATE 7/17/03
 GRID _____ E
 RECORDED BY Kacie _____ N

HOLE NO.	TEST NO.	DEPTH	CLOCK TIME	ELAPSED TIME	MEASUREMENT	REMARKS (Method, Moisture, Biopores)
	<u>Below grade</u>	<u>H₂O</u>			<u>A: H₂O</u>	
<u>#980A</u>	<u>1.8"</u>	<u>8 10/16</u>	<u>1:59</u>	<u>-</u>	<u>- START</u>	
		<u>7 12/16</u>	<u>2:14</u>	<u>15min</u>	<u>A 29 4/16</u>	<u>= 60 mpi</u>
		<u>6 15/16</u>	<u>2:31</u>	<u>↓</u>	<u>A 13/16</u>	<u>= 19 mpi</u>
		<u>8 14/16</u>	<u>2:39</u>	<u>repair</u>	<u>-</u>	
		<u>7 12/16</u>	<u>2:54</u>	<u>15</u>	<u>A 14 18/16</u>	<u>.058 13mp 17.14 min</u>
		<u>6 14/16</u>	<u>3:09</u>	<u>↓</u>	<u>A 14/16</u>	<u>= 17 mpi</u>
		<u>5 15/16</u>	<u>3:24</u>	<u>↓</u>	<u>A 15/16</u>	<u>= 16 mpi</u>
			<u>Pulled due to time</u>			<u>≈ 3/4" fall in 15min</u>

TEST DATA

NAME Benedict Farm FILE NO. _____

LOCATION LOT 81 COUNTY _____

DATE 7/17/03

GRID _____ E

RECORDED BY Kacie Noonan _____ N

HOLE NO.	TEST NO.	DEPTH	CLOCK TIME	ELAPSED TIME	MEASUREMENT	REMARKS (Method, Moisture, Biopores)	
		H ₂ O			Δ H ₂ O		
# 985	Depth below grade 20"	9 10/16	1:13	—	—		
		9 14/16	1:15	15 min	2/16 in 2 min		
		9 21/16	1:30	↓	A 12/16	= 20 mpi	
		8 10/16	1:45		A 12 7/16	= 30 mpi	
		7 13/16	2:00		A 13/16	= 19 mpi	
		7 2/16	2:15		A 11/16	= 22 mpi	
		6 9/16	2:30		A 7 1/16 9/16	= 27 mpi	
		9 5/16	2:42		repair	3/4" in 15 min	
		8 9/16	2:57		15	A 12/16	= 20 mpi
		7 16/16	3:12		1	A 10 1/16 9/16	= 27 mpi
		7 4/16	3:29		17	A 12/16	= 20 mpi
		6 7/16	3:44		15	A 12 1/16 13/16	= 20 min / inch 19 mpi

COUNTY #

SOIL PROFILE

0'

Empty rectangular box for soil profile notes on the left side.

Empty rectangular box for soil profile notes in the middle left side.

Empty rectangular box for soil profile notes at the bottom left side.

SOIL PROFILE

0'

Empty rectangular box for soil profile notes on the right side.

INDICATE NORTH - NAME ADJOINING ROADWAY AS BASE LINE.

DATE	TEST NO.	DEPTH	PRE-WET		TEST - 1" DROP		TIME
			START	STOP	START	STOP	
4/16/03	989	17-18"	4:07	4:17	MOVED	3/8"	
			PRELIM	S.M.	TEST	OK	

REMARKS _____

TYPE OF SOIL _____

TESTED BY M. Rifkin ALSO PRESENT Mike J. crew

TRENCH DESIGN DATA: AVERAGE PERCOLATION TIME _____ TRENCH WIDTH _____

INLET DEPTH _____ MAXIMUM BOTTOM DEPTH _____ SQ. FT/BEDROOM _____

A/P

(989) Top soil 2"
 DK Brn hvy Lm Ribbons 1/2" WSP 15"
 DK brn hvy Lm to CL Lm sm. Qtz frags Approx 100% WSP 18"
 Strong brn CL Lm Ribbons 2" WSP Bottom 24"

(988) DK brn Loam Crumbly DK brn SCL Lm Dense, massive 22"
 y brown Dense CL Lm WVP Ribbons 1/2" Bottom 30"

(986A) DK brn hvy Lm 18"
 DK brn Strong SCL Lm 22"
 tan ybrn md. grain SL micac. sm Qtz frags 210%

SEE SHEET
 DATED 7/28/03
 For Relative positions of test holes

DATE	TEST #	DEPTH	START	BREAK 1" DROP	STOP 2" DROP	TIME OF 2nd INCH	P/F/H
7/17/03		SEE SAND MOUND PERC					
		SHEETS FOR TESTING RATES					
		#987 No soil profile done					
		#987A Not tested due to time.					
		BASED ON VISUAL - plasticity, texture, soil structure - it should pass					
		#988 Perc times NOT ESTABLISHED					

Brn SLm Crumbly
 Brn, dense SL-SCLL WSP 1/4" ribbon 21"-24"
 wk org Qtz frags 10% brn SiCLL micaceous Ribbons 1" to 1 1/4" WVP

(985) Top soil 2"
 DK Brn ALL-SCLL Crumbly 20"
 DK brn SiCLL micaceous WVP 30"
 org Dense SCLL sm Qtz Rock 210% WVP SAND on it makes it crumbly

(984) DK brn SCLL w/ roots Lg SBK peds micaceous 19-30"
 Strong org SCLL micaceous

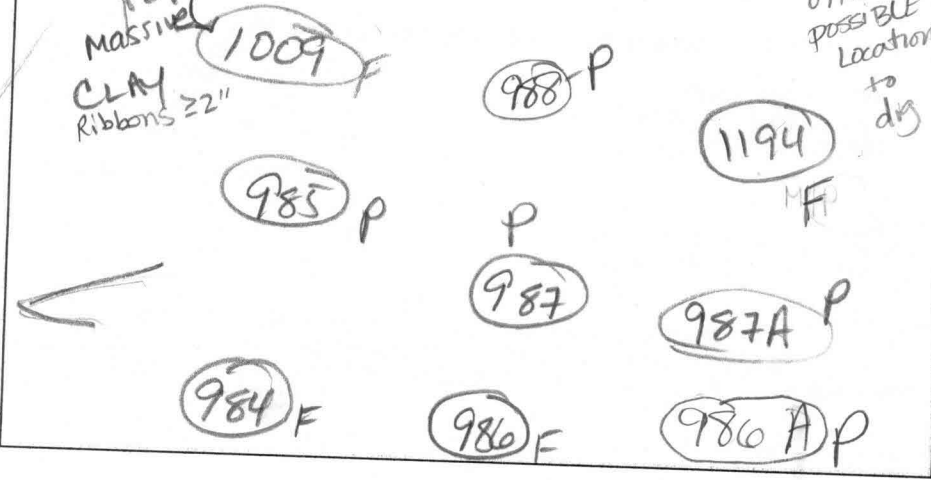
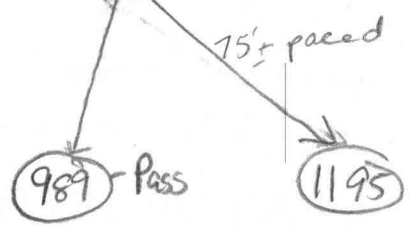
REMARKS SAND MOUND TESTING #987A, #986A NOT PER PLAN
 SANITARIAN Kacie Noonan BACKHOE Johnsons OTHERS
 TEST HOLES USED IN SDA _____ AVG. PERC TIME _____ SQ. FT/BR _____
 TRENCH WIDTH _____ INLET DEPTH _____ MAX. BOT DEPTH _____ EFFECTIVE SW _____

M = marginal
 p = pass
 F = Fail

7 NE
 pass
 1007A - NOT ON PLAN

unlikely to pass
 massive
 CLAY
 Ribbons 22"

NOT TESTED
 DUE TO
 OTHER
 POSSIBLE
 Locations
 to dig



DATE	TEST #	DEPTH	START	BREAK 1" DROP	STOP 2" DROP	TIME OF 2nd INCH	P/F/H
7/20/03	Hole Locations						
	SHEET 2						
	SEE SAND MOUND						
	SHEETS FOR SOIL						
	Profiles						

REMARKS Holes 987A & 1009 A NOT PER PLAN
 SANITARIAN Kacie Norman BACKHOE _____ OTHERS _____
 TEST HOLES USED IN SDA _____ AVG. PERC TIME _____ SQ. FT/BR _____
 TRENCH WIDTH _____ INLET DEPTH _____ MAX. BOT DEPTH _____ EFFECTIVE SW _____

TEST DATA

NAME <u>Benedict Farm</u>	FILE NO _____
LOCATION <u>LOT 81</u>	COUNTY _____
_____	DATE <u>7/17/03</u>
RECORDED BY <u>Kacie</u>	GRID _____ E
_____	N

HOLE NO.	TEST NO. <small>Depth below grade</small>	DEPTH <small>water drop</small>	CLOCK TIME	ELAPSED TIME	MEASUREMENT <small>Δ-H₂O</small>	REMARKS <small>(Method, Moisture, Biopores)</small>
#986	18"	9 ¹⁶ / ₁₆	12:12	—	START	480 min/inch
		9 ¹⁶ / ₁₆	12:15	15 Min	NO Δ in 3min	
		9 ¹⁵ / ₁₆	12:30	↓	Δ 1/16	
		9 ¹⁴ / ₁₆	12:45 1:00	↓	Δ 1/16 Pulled	
			<u>FAILS</u>	NEED 1/4" in 15 mining 1/8" in 1/2 hour		

TEST DATA

NAME Benedict Farm FILE NO _____
 LOCATION LOT 81 COUNTY _____
 DATE 7/28/03 GRID _____
 RECORDED BY Kacie Noonan E _____
 H _____

HOLE NO.	TEST NO.	DEPTH	CLOCK TIME	ELAPSED TIME	MEASUREMENT	REMARKS (Method, Moisture, Biopores)
1009A	25"	9 8/16	Start	1:32		<u>Soil profile</u> 24mp: DK brn hvyl sbk 12" ybrn. hvyl-CLL massive and crumbly Structure 24" org massive s:CLL 34" <u>Bottom</u>
		8 14/16	Δ 10/16	1:47	15min	
		8 4/16	Δ 10/16	2:02	15min	
		7 14/16	Δ 6/16	2:11	9min	
		7 4/16	Δ 10/16	2:27	16min	
		6 12/16	Δ 8/16	2:42	15	
		6 6/16	Δ 6/16	2:56	14min	
		EST. 40-50min inch				

possible rain water →
drops accumulation

40mp

17mp

27mp

60mp

17mp

18mp

120mp

43mp

.75 gpd/ft²?

$$750 = 1500 \text{ ft}^2 \times 3$$

.5 gpd/ft²

65

5 Bedroom house

1) Soil Loading rate? on soil?

2) Conv Sm Sand = 1.2 gpd/ft² bed

Alt Sm sand = 1.0 gpd/ft² bed

3) Fencing / Stake all

$$4160 \text{ ft}^2 \times \frac{3 \text{ gpd}}{1 \text{ ft}}$$

TEST DATA

NAME Benedict Farm FILE NO _____
 LOCATION Lot 81 COUNTY _____
 DATE 7/28/03 GRID _____
 RECORDED BY Kacie Moran E _____
 N _____

HOLE NO.	TEST NO.	DEPTH	CLOCK TIME	ELAPSED TIME	MEASUREMENT ELAPSED TIME	REMARKS (Method, Moisture, Biopores)	
#1194	28-29"	34 ¹⁶ / ₁₆	Δ H ₂ O	—	poired	<p style="text-align: center;">(FAIL)</p> <p style="text-align: center;">80 min/inch</p>	
		34 ¹⁵ / ₁₆			1pm		
		34 ¹⁰ / ₁₆	Δ 5/16	1:15	15 min		
		34 ⁶ / ₁₆	Δ 4/16	1:30	15 min		
		34 ² / ₁₆	Δ 4/16	1:45	15 min		
		33 ¹⁵ / ₁₆	Δ 3/16	2:00	15 min		
		33 ¹² / ₁₆	Δ 3/16	2:10	10 min		
		33 ⁹ / ₁₆	Δ 3/16	2:25	15 min		
		33 ⁷ / ₁₆	Δ 2/16	2:40	15 min		
		33 ⁴ / ₁₆	Δ 3/16	2:55	15 min		

Pouring rain @ 2:50 pm

TEST DATA

NAME Benedict Farm FILE NO _____

LOCATION 81 COUNTY _____

DATE 7/17/03

RECORDED BY Race Norman GRID _____ E _____ N _____

HOLE NO.	TEST NO. <i>Soil depth</i>	DEPTH <i>H₂O</i>	CLOCK TIME	ELAPSED TIME	MEASUREMENT <i>A H₂O</i>	REMARKS <i>(Method, Moisture, Biopores)</i> <i>Inches per min</i>
#989	18"	30 ¹⁶ / ₁₆	3:02	—	START	inch per min
		29 ¹⁴ / ₁₆	3:17	15	¹⁴ / ₁₆ 13.3	.075 ; 13.33 min per inch
		29 ⁵ / ₁₆	3:32	15	⁹ / ₁₆ 26.7	.037 ; 26.66
		28 ⁴ / ₁₆	3:54	2:2	¹⁷ / ₁₆ 20.7	.048 ; 20.7
988	22" to 23"	8 ¹⁶ / ₁₆	3:35	—	START	
		8 ² / ₁₆	2:53	18 min	¹⁴ / ₁₆	
		7 ¹⁵ / ₁₆	4:00	7 min	³ / ₁₆	
<p align="center">RAN OUT OF TIME Test Again See sheet dated 7/28/03</p>						

TEST DATA

NAME <u>Benedict Farm</u>	FILE NO _____
LOCATION <u>LOT 81</u>	COUNTY _____
DATE <u>7/28/03</u>	GRID _____
RECORDED BY <u>Kacie Noonan</u>	E N

HOLE NO.	TEST NO. Depth	DEPTH H ₂ O	CLOCK TIME A H ₂ O	ELAPSED TIME	MEASUREMENT	REMARKS (Method, Moisture, Biopores)
#1195	NOT TESTED DUE TO CLOSE LOCATION OF #1194 which was tested & failed					<p align="center"><u>#1195</u></p> <p>Soil profile</p> <p>wk rd brn Lm with CLAY SKINS blk struct. 16"</p> <p>Strong brn hvy L 25-26"</p> <p>Sticky brn CLAY Ribbons 1 3/4" Bottom 31"</p>
1009	NOT TESTED TEST 1009A (NOT PER PLAN)					<p align="center"><u>#1009 Soil profile</u></p> <p>Choc brn hvy L with Clay Bridges 13"</p> <p>org brn Sticky sicc Ribbons 2" long 36"</p> <p>NOT TESTED DUE TO LONG Ribbon - test higher up "hill"</p>

Use this version
w/ Corrections

**SAND MOUND
COMPUTATIONS**

for

Lot 88 Homewood Crossing

**Third Election District
Anne Arundel County, Maryland**

prepared for

**Toll Brothers III Limited Partnership
7164 Columbia Gateway Drive, Suite 230
Columbia, Maryland 21046**

prepared by

**ESE Consultants, Inc.
7164 Columbia Gateway Drive, Suite 230
Columbia, MD 21046**

March 2012

SAND MOUND DESIGN

Based on *Design and Construction Manual for Sand Mound Systems*, MDE June 2003, referred to herein as "the Manual".

1. Sand Mound Dimensions

Site Data

Slope @ cross section sand mound = 5.9% use 6%
 Depth to high water table or rock (Z) > 48 "
 Number of bedrooms = 5
 Design flow based on 5 bedrooms = 750 gpd

Absorption Bed Area

Absorption bed area is determined by dividing the design flow by the design infiltration rate of the approved sand fill.

The sand fill being used in this design is USDA Soil Texture Sand, Sandy Loam which has an infiltration rate of 1.2 gpd/ft²

$$\text{Bed Area (BA)} = \frac{750 \text{ gpd}}{1.2 \text{ gpd/sq ft}} = 625 \text{ sq ft}$$

Absorption Bed Length

Compute side slope setback
 Sideslope setback (K) = $\left[\frac{(D + E)}{2} + 28 \text{ in.} \right] \times 3 = 127.56 \text{ in} = 11 \text{ ft}$

where:

- Z (depth to high water table or bedrock) > 48"
- D (Upslope sand fill depth) = 48 in. - Z in. = 0 in (Min. sand fill depth of 12 inches must be maintained regardless of water table or bedrock depth.) = 12.0 in
- E (Downslope sand fill depth) = [A (bed width) x %slope] + D in = (7 ft x 12 in/ft x 0.06) + 12 in = 17.0 in

Compute Bed Length = 130.4 ft - 11 ft - 11 ft = 108 ft **use 105 ft**

Absorption Bed Width

Bed width should not be greater than 12 feet. A width of 9 feet or less is preferred. Bed width is determined by the formula:

$$\text{Bed width (A)} = \frac{\text{absorption bed (sq ft)}}{\text{bed length (ft)}} = \frac{625 \text{ sq ft}}{105 \text{ ft}} = 5.95 \text{ ft} \quad \text{use 6 ft}$$

Absorption Bed Depth

The absorption bed consists of six inches of ¾ to 2 inch-diameter clean aggregate below the distribution pipes, the distribution pipes and two inches of aggregate over the distribution pipes. A slight variation of the depth of aggregate above and around distribution pipes allows a standard bed depth of 10 inches to be used.

Cap and Topsoil

Topsoil cover is to be 6 in over entire mound

Cap is to be 12 in at center of mound and 6 in over bed edges

$$H \text{ (cap + topsoil at center of mound)} = 12 \text{ in} + 6 \text{ in} = 18 \text{ in}$$

$$G \text{ (cap + topsoil at edges of mound)} = 6 \text{ in} + 6 \text{ in} = 12 \text{ in}$$

Upslope and Downslope Setbacks

Upslope Setback

J (Upslope setback) = [D (Upslope sand fill depth) + 22 in] x 3 x Upslope correction factor from Table 3.2 "Design and Construction Manual for Sand Mound Systems"

$$J = (12 \text{ in} + 22 \text{ in}) \times 3 \times 0.86 = 87.72 \text{ in} \quad \text{or } 7.3 \text{ ft}$$

Downslope Setback

I (Downslope setback) = [D (Downslope sand fill depth) + 22 in] x 3 x Downslope correction factor from Table 3.2 "Design and Construction Manual for Sand Mound Systems"

$$I = (17 \text{ in} + 22 \text{ in}) \times 3 \times 1.22 = 142.74 \text{ in} \quad \text{or } 11.9 \text{ ft}$$

Total Mound Width

$$L \text{ (Mound width)} = 6 \text{ ft} + 7.3 \text{ ft} + 11.9 \text{ ft} = 25.2 \text{ ft}$$

Lot is existing lot of record sand mound made as wide as possible due to soil conditions see plan.

2. Laterals Manifold and Force Main

Length of Lateral

A center feed network has been chosen based on the length of the absorption bed being greater than 41 ft as recommended in "the Manual". A 1/4 inch perforation size is being used along with an effluent filter and a 3.0-foot discharge head. With the 1/4 inch diameter perforation and 1.5" diameter lateral, a 3.75-foot perforation spacing is being used for first trial based on Figure 4.4 - "Perforation Spacing as a Function of Perforation Diameter, Lateral Diameter and Lateral Length".

$$\text{Center Feed Lateral Length} = \frac{1}{2} \text{ Bed Length} - \frac{1}{2} \text{ Perforation Spacing} = 105/2 \text{ ft} - 3.75/2 \text{ ft} = 50.63 \text{ ft}$$

Number of Perforations per Lateral

$$\begin{aligned} \text{Center Feed} &= \frac{1}{2} \text{ Bed Length divided by spacing between perforations.} \\ &= (0.5 \times 105 \text{ ft}) / 3.75 \text{ ft} = 14.00 \end{aligned}$$

Spacing Between Perforations

Since the number of perforations came out even the 3.75 foot spacing will be held.

Spacing and Number of Laterals

According to "the Manual", Laterals should be spaced two to four feet apart so that effluent is applied uniformly to the absorption area.

The design calls for two lateral rows. The distance between the lateral rows equals the width of the absorption bed divided by the number of laterals:

$$\frac{6 \text{ feet}}{2 \text{ laterals}} = 3.0 \text{ ft} = \text{distance between laterals}$$

Diameter of Manifold and Force Main

A three-inch dia. force main and manifold is being used based on the velocity, and as recommended by "the Manual"

SAND MOUND DESIGN FOR:
LOT 88 HOMEWOOD CROSSING

DATE: 02/27/12
ESE PN: 1214

3. Pumping System

Site Data

Total length of laterals = ^{202.52} 203.8 ft
Number of perforations = ^{72 56}
Design flow = 750 gpd
Length of force main and manifold = 116.5 ft
Elevation of pump off float = 357.70
Elevation of manifold = 365.27

Dose

The minimum dose is the greater of:

$1/6$ the design flow = $1/6 \times 750$ gallons = 125 gallons

The volume of the force main and manifold+ (5 × volume of the laterals) = 44.74 gallons +(5 × 21.6 gallons)
= 152.74 gallons

Volume of force main = $116.5 \text{ ft} \times 38.4 \text{ gallons}/100 \text{ ft} = 44.74$ gallons

Where:

Length of the force main and manifold = 116.5 ft

Volume of storage in the force main = 38.4 gallons/100 ft

Volume of laterals = $203.8 \text{ ft} \times 10.6 \text{ gallons}/100 \text{ ft} = 21.6$ gallons

Where:

The length of the laterals = 203.8 ft

Volume of storage in the force main = 10.6 gallons/100 ft

152.74 gallons is greater than 125 gallons, so use 153 gallons as the minimum dose.

Pumping Chamber

The pump chamber must have the capacity to accommodate a pump positioned on a six-inch riser, one dose volume, and one day's design flow storage capacity above the high water alarm.

One Day Storage Capacity = 750 gallons

One Dose = 153 gallons

Total storage above high water alarm = 903 gallons

Pump sizing

Flow Rate

The discharge rate per perforation x the number of perforations = flow rate

Where:

The discharge rate per perforation = 1.28 gpm for 1/4 perforations with 3 feet of head, and

The number of perforations = 4 laterals x 14 perforations per lateral = 56 perforations

Flow = 56 x 1.28 gpm = 72 gpm

Design Head

The design head = static head (feet) + friction head (feet) + 3 ft. of head at distal end of laterals

1 Static head = The elevation of the manifold - the elevation of the pump off float switch.
= 365.27 - 357.70 = 7.6 ft

2 Friction head = The head loss due to friction in the pipe between the pumping chamber and the laterals including fittings.

Length of force main and manifold = 116.5 ft

Additional length for fittings = 79 ft ⁸⁴

3 4-90 degree elbows @ 10' = 32', 1-union @ 3' = 3', 1-45 degree elbow @ 6',
3 2-90 degree side tees @ 15' = 79.00 ft

Calculate friction loss for 195.5 feet (116.5 + 79) of three-inch dia. pipe at 72 gpm.

Look up friction loss per 100 feet of 3 in dia pipe and 72 gpm in Table 4.4 of "the Manual" = 1.14 feet per 100-foot length = 1.14 ft x (195.5 ft / 100 ft) = 2.2 ft

3 System head = 1.3 x distal head (ft) per "Pressure Distribution Network Design" Converse (2000)
= 1.3 x 3.0 = 3.9 ft

Design Head = 7.6 feet (static) + 2.2 feet (friction) + 3.9 feet (system) = 13.7 ft

A pump is needed that can deliver 72 gpm against 13.7 feet of head.

13.8

SAND MOUND DESIGN FOR:
LOT 88 HOMEWOOD CROSSING

DATE: 02/27/12
ESE PN: 1214

System Curve

Choose 5-flow rates, two above and two below the design discharge rate.

Flow Rate gpm	Orifice Flow gpm	Static Head feet	Friction Head feet	Network Head feet	Total Head feet
50	0.89	7.6	1.1	1.9	10.6
60	1.07	7.6	1.6	2.7	11.9
72	1.29	7.6	2.2	4.0	13.8
80	1.43	7.6	2.7	4.9	15.2
90	1.61	7.6	3.4	6.2	17.2

Orifice Flow: Calculate orifice flow by dividing flow rate by the number of perforations

Network Head: Network head is calculated by the equation: $H = 1.3 (Q/(11.79d^2))^2$

where Q = orifice flow rate in gpm

and d= the orifice diameter in inches

for orifice diameter = 1/4" the equation is: $H = 1.3 (Q/0.7369)^2$

TEST DATA

NAME <u>Benedict Farm</u>	FILE NO _____
LOCATION <u>LOT 81</u>	COUNTY _____
_____	DATE <u>7/17/03</u>
_____	GRID _____ E
RECORDED BY <u>Kacie Noonan</u>	N

HOLE NO.	TEST NO. <small>Depth below grade</small>	DEPTH <small>water drop</small>	CLOCK TIME	ELAPSED TIME	MEASUREMENT <small>Δ of water drop</small>	REMARKS <small>(Method, Moisture, Biopores)</small>	
#987	19"	9 ¹⁶ / ₁₆	11:50	—	Start		
		9 ¹ / ₁₆	12:05	15 min	10/16	= 16 mpi	
		8 ⁴ / ₁₆	12:20		12/16	= 18 mpi	
		7 ⁶ / ₁₆	12:35		14/16	= 17 mpi	
		repour H ₂ O to ...	9 ¹⁶ / ₁₆	12:40	repour	START	
		8 ¹⁵ / ₁₆	12:55	↓	17/16	= 14 mpi	
		7 ¹⁵ / ₁₆	1:10		16/16	= 15 mpi	
		6 ¹⁶ / ₁₆	1:25		15/16	= 16 mpi Approx 1" in 15 min	
		5 ¹⁵ / ₁₆	1:40		17/16	= 14 mpi	